

ACTION PLAN

Pleven Province, part of the North
Bulgaria region

“Protection and support of energy
vulnerable consumers in Pleven Province”

English version

prepared by:
WWF Bulgaria

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority Area: Implementation of EE and RES measures in households

Action plan: Protection and support of energy vulnerable consumers in Pleven Province

1 Objective

This Action Plan, aims at identifying the energy poor households in Pleven Province, as well as indicating the reasonable steps for decreasing their number by **at least 25% by 2030**, chiefly through energy efficiency measures and the replacement of the fuels used for applicable RES technologies, using local resources and opportunities also specified in the regional energy profile within the "Panel 2050" project.

The total area of the Pleven Province is 4653,3 km² and its population is 269 752 people. The Province consists of 11 municipalities with a total of 123 populated areas – 14 cities/towns and 109 villages. In the last 2 decades Pleven Province has been among the most quickly depopulating provinces in Bulgaria, with an increasing negative growth of minus 7 to minus 10 per-mils per 1000 people. Pleven is among the three poorest provinces in North Bulgaria, measured by GDP levels, among the 14 north Bulgarian provinces, as well as one of the five poorest provinces on a nationwide level, of all the 28 provinces. As a comparison, the GDP level in Pleven per capita on an annual basis, is 3,5 times lower than that in Sofia and almost 2 times lower than the richest province in North Bulgaria – Varna Province. At present almost 20% of the population is of Roma and Turkish ethnic origin, which further complicates coping with energy poverty. The Province used to be a major industrial centre with the second largest oil refinery in Bulgaria, and also the location of the almost forty years of unaccomplished plans for the construction of a second nuclear power plant in Bulgaria. At present the services sector¹ is dominant and almost two times higher than both runners-up – industry and agriculture.

Bulgaria ranks first in the EU in terms of share of the energy poor households at approximately 37% of all households, according to Eurostat's latest data. The World Bank, in a report in 2014 indicated that approximately 80% of the households in Bulgaria may be classified, as energy vulnerable, meaning that in case of any shock to the household, such as one of the family members losing their job, such households would automatically become energy poor and will not be able to cover their monthly energy costs.

Due to the absence of a clear definition of energy poor households, as well as a centralized system for the identification of the precise number of the energy poor households, Pleven Province makes strong efforts to deal with this issue. The national methodology² for the classification of the energy poor, is only based on their annual income and status, allowing them to apply for energy allowances, but this methodology only provides an estimate and identifies the households, applying for energy allowances for a particular heating season, without any clear, precise and most of all – predictable indication of where, many energy poor households there are and in what populated areas they reside. There is no information by years and by municipalities and what is most

¹

<http://www.nsi.bg/bg/content/2215/%D0%B1%D0%B2%D0%BF-%D1%80%D0%B5%D0%B3%D0%B8%D0%BE%D0%BD%D0%B0%D0%BB%D0%BD%D0%BE-%D0%BD%D0%B8%D0%B2%D0%BE>

² <https://pravatami.bg/10714>

important – there are no indications of the reasons, why the respective households are unable to cover their monthly energy costs.

Despite the declared intention of the relevant institutions to cover, through energy allowances, as many as possible of the energy poor households, the currently achieved scope continues to be limited. Although Pleven Province is among the poorest in Bulgaria, there is no data, showing that a higher share of the population is covered by energy allowances, proving that most of the population in this province falls within the classification criteria for energy poor households. According to the latest data from 2017 the poor increased by 8% reaching 14,8% compared to the previous year, but still remained close the country-average, which is 13,6% of the total number of the households.

The model of direct financial support for purchasing energy fuels, which at present is the only commonly applied option, achieves mostly increased use of cheap, low-thermal-value and high-emission fuel to cover the heating needs of the households. Most often the energy poor buy firewood and coal to get them through the cold months. This fails to improve in any way their comfort of dwelling during the critical winter period, while increasing the use of wood and coal, which results in air pollution and increased greenhouse gas emissions. The persons, receiving such allowances, do not enjoy significant and meaningful improvements in the living conditions in their households. No efforts are made, and the households themselves get no incentives, to improve the energy efficiency and to gradually switch to RES for heating, so that their energy costs are palpably reduced, first through energy efficiency measures and then – through the gradual replacement of the fuels used and implementation of RES. This is generally the case on a nationwide level, and therefore the allowances increase every year and at currently exceed BGN 120 million per annum. These are enormous resources, which are spent unreasonably, failing to produce an overall improvement of the situation and dealing with the energy poor households in Bulgaria and in Pleven Province in particular.

In Pleven Province, as in the whole of Bulgaria, it is now necessary – in the context of the forthcoming electricity market liberalization – to develop a new approach to support and compensate the most vulnerable households for the additional burden they are expected to bear as a result of the market liberalization, as well as for reducing energy poverty below its current levels. The vulnerability of the households may increase, both due to the introduction of new pricing schemes, and due to the changes in the accessibility to electricity, as the main energy source, including for heating.

The implementation of pilot measures, both on a national level and in Pleven Province in particular, is required in order to show the impact of the diversification of the methods of supporting the households in meeting their energy needs. It is necessary to carry out detailed analyses on a local level, as the relevant results and data accumulated should be used in the course of the pilot projects implementation. These results should be used to change the local policies, with a potential to have impact also on the nationwide policies for supporting energy poor households.

1.1 Objective scope and targets values

The objective of this plan is to precisely identify the energy poor households, as well as to develop a package of measures in the area of energy efficiency and the implementation of RES, to replace the existing inefficient direct financial support to the energy poor households, and thus reducing their number in Pleven Province by at least 25% in the next decade.

According to the National Statistical Institute³, a household in Bulgaria is inhabited by an average of 2,6 people. According to the most recent official data⁴ in recent years the total population of the Pleven Province amounts to 269 752 people (of which 100 000 in the centre of the province – the City of Pleven, and the remaining 169 752 people – in the other 13 towns and 109 villages in the province). This number is equal to 103 750 households. Based on the average share of the energy poor households in Bulgaria (~40%), this means that in the municipality there are approximately 41 500 households, facing problems in covering their monthly energy bills and falling within the classification criteria for energy poor in Bulgaria. On a nationwide level, according to the World Bank⁵ merely 14-15% of the households receive energy allowances, which – if extrapolated for Pleven Province would mean that 15 and not 14% of the households receive energy allowances, or approximately 6225 households. In financial terms this means that 6225 households will receive BGN 374 each as financial allowance for heating season 2018–2019 or a total in the Pleven Province of BGN 2 160 075 (or EUR 1 103 204).

Unlike the municipal level, where the information on the energy allowances received is difficult to access publicly, since allowances are planned on a nationwide level, and the applications are submitted on a regional level, for the Pleven Province, the data⁶ for the heating season 2018/2019 are easily accessible and show that a total of 11 855 applications have been filed for the granting of targeted heating allowances, and 9801 of these were allowed. Multiplied by BGN 374 per household, this means that in the latest heating season, the Pleven Province will receive a total of BGN 3 665 574 (or EUR 1 872 101). During heating season 2017/2018 such allowances were granted to 9535 persons and families, i.e. there is a more than 3% increase of the granted energy allowances within one year, although the impoverishment indicator for this province is 8%.

Taking into consideration the official national data⁷, the energy consumption of the households, has remained at the approximately same levels in the last two decades and varies between 2050 and 2350 ktoe per annum. The average monthly costs for the electricity consumed amount to 759,07 kWh per month or 9108 kWh per annum – electricity consumed or an average of BGN 1800 per annum in electricity bills per household.

Based on the aforesaid data, the pilot measures in the Pleven Province should be focused on 41 500 households in 123 populated areas (including 14 cities/towns and 109 villages) within the Pleven Province, where a positive impact must be observed in at least 25% (or 10 375) of such households by 2030 and these are to be taken out of the group of energy poor households. The ambitiousness of this plan is the reason of its lower objective, since it is hardly possible for a positive impact to be ensured for the entire group of the energy poor within such a limited period of time.

The implementation of this plan requires first the development of a financial plan for the more efficient medium-term spending of the financial resources for energy support to the households. In this way, and subject to the implementation of the EE and RES measures, the following quantities of electricity and emissions will be saved:

³ <http://www.nsi.bg/census2011/spagebg.php?SHP=7>

⁴ <http://www.grao.bg/tna/tab02.txt>

⁵ https://www.me.government.bg/files/useruploads/files/wb_ras_i_summary_report_bg.pdf

⁶ <https://plevenzapleven.bg/blog/2018/11/12/11-855-%D1%81%D0%B0-%D0%BF%D0%BE%D1%81%D1%82%D1%8A%D0%BF%D0%B8%D0%BB%D0%B8%D1%82%D0%B5-%D0%B7%D0%B0%D1%8F%D0%B2%D0%BB%D0%B5%D0%BD%D0%B8%D1%8F-%D0%B7%D0%B0-%D0%BF%D0%BE%D0%BC%D0%BE%D1%89-%D0%B7%D0%B0-201445/>

⁷ <http://eea.government.bg/bg/soer/2014/soer-bg-2014.pdf>

- 10 375 households x 9108 kWh per annum = 94 495 500 kWh per annum or 944 955 000 kWh in 10 years.
- Assuming that consumption will be reduced by 25% - the share of the positively affected households in the period of implementation of the action plan, this means that a total of 23 623 875 kWh will be saved on an annual basis or 236 238 750 kWh in 10 years.
- The saved CO₂ emissions⁸ through the lower energy consumption would amount to 3040 tons per annum, or 30 400 tons of CO₂ in 10 years.

A characteristic feature of the Pleven Province is that a large share of the population is aging. In the cities and towns, the average age is 44.5 years, while in villages - 48.4 years. The active population in the province accounts for 56,1% of the total number of residents. Another issue, further complicating the situation is that almost 20% of the population is of Roma and Turkish ethnicity, which is twice the country average. Both issues, especially the one, concerning the aging population, are factors, necessitating the setting of a more modest objective, since working with the Roma population requires additional processes of education and convincing, which is a time-consuming and costly, but necessary process, and the elderly most often do not want to take part in processes and projects for the improvement of their social status. In the particular case of this plan, the changes mean replacement of the used fuel - firewood and coal, by other fuel types or EE measures, i.e. reducing the thermal losses of the households, which is chiefly based on a reduction of their energy costs, applicable to each and every building and/or household.

1.2 Target indicators

Key indicators:

- Number of (energy poor) households covered in the Pleven Province;
- Energy savings through EE and RES measures;
- Carbon savings, based on the implemented improvements;
- Capacity trainings for energy advisors by municipalities and in the major populated areas;
- Financial resources utilized for energy efficiency measures for households;
- Initiation of individual financial resources, to be utilized for energy efficiency measures for the households;
- Initiation of individual financial resources, to be utilized for the implementation of RES.

Objective	Target indicator	Method of measurement and validation
Covered households	At least 10 375 households (out of 41 500) to be relieved of energy poverty in the next 10 years	A list of covered households, containing data on the number of persons, income, energy survey and characteristics of the dwellings, identified needs, applied measures, etc.
Energy savings	236 238 750 kWh. decrease	Standard calculation

⁸ <https://www.eecabusiness.govt.nz/tools/wood-energy-calculators/co2-emission-calculator/>

	in the electricity consumption in 10 years, an average of 23 623 875 kWh. per annum for a total of 10 375 households	methodology
CO2 Savings	Approximately 3040 tons of saved emissions per annum, A total of 30 400 tons in 10 years	Standard calculation methodology ⁹
Provision of targeted financial resources for the neediest energy poor households within the Pleven Province for energy efficiency measures and replacing the currently used fuels by RES	500 households receiving targeted support per annum in 10 years, or a total of 5000 households	Number of implemented individual projects for households
Capacity-building trainings for energy advisors	500 advisors – 50 per annum for the largest populated areas in the province	Number of trained energy advisors

2 Implementation strategy

Development of a provincial programme for supporting energy poor households, planned as a pilot showcase programme intended for testing and improvement of appropriate EE and RES measures.

2.1 Step by step description

A. Preparation of a preliminary analysis and databases containing the key demographic indicators and a specific energy profile of the households in Pleven Province. The actual energy costs on a monthly and annual basis will be summed with the specific costs for the different types of energy sources, which will make it possible to identify the precise number of the energy poor households in all the populated areas in the province.
Implementation period 2019-2021;

B. A detailed energy analysis of the household and corporate consumers in Pleven Province. Defining the typical groups and their territorial allocation by age, populated area and social identity. The analysis will contain a description of the households with the available income, number of people forming the households, including children below the age of 18, people in disadvantaged position and with special needs; characteristics of the dwellings (inhabited premises); the type of the heating devices/appliances and the type of fuel used, the type of the food storage and cooking devices/appliances, etc.
Implementation period 2020-2022;

C. Defining types of measures for individual support of the households and capacity building training of 500 energy advisors in a 10-year period.

⁹ <https://www.eecabusiness.govt.nz/tools/wood-energy-calculators/co2-emission-calculator/>

The types of measures may include, but are not limited to:

- Thermal insulation of one or more premises per household (indoor insulation, windows replacement, ceiling and building foundations insulation etc.);
- Replacement of heating appliances/devices by more efficient ones, including preservation of the type of fuel/heating method, while using more efficient heaters;
- Preparation of flexible financial schemes, which will enable the households to commit to long-term repayment of low-interest/interest-free loans or 100% support, with starting capital, granted by the municipality, for the neediest households;
- The implementation of RES and replacement of the used fuels at the households, according to the local specificities.

It is necessary to develop criteria for investments in the programme, which would ensure the achievement of low emissions and maximization of the benefits to the local economy, through the use of local resources and local manufacturers. **Implementation period 2020-2030.**

D. Implementation of the measures in the selected households

This activity shall include:

- Determining and negotiation of the necessary types of insulation materials and service providers;
- Determining the RES, which may be installed in the households and negotiation of their installation;
- Determining the necessary types and quantities of heating devices/appliances and fuels with higher efficiency and lower emissions, and thus – lower costs;
- Drafting agreements for the provision of support, conditions for the provision of devices/appliances etc.;
- Information measures, implemented through the energy advisors;
- Monitoring of the results achieved.

The programme must include mandatory verification, evidencing that the energy efficiency measures proposed and/or implemented and/or RES and/or more efficient heating devices/appliances installed, have actually been delivered and are used as intended. In the best-case scenario, each household, approved to receive support, shall be checked before and after the installation, to ensure compliance with the requirements, specified in the documents, developed for the programme. It is necessary to plan follow-up inspections every 3-5 years after the implementation of the EE measures, the installation of the RES or the new heating system, to make sure that the system is not destroyed due to negligence, resold or given to someone else. For this purpose, the Pleven Province may retain ownership to the improvements made and the new heating devices/appliances. This will enable the Municipality to subsequently provide the heating devices/appliances to other needy households in case of poor care, deceased user etc.

Implementation period 2020-2030.

2.2 Time schedule

The specific time schedule depends on the preparation and commencement of the programme. In the best-case scenario, its implementation can commence by the end of 2020.

2019 – 2020 – preparation – provision of resources, administrative preparation and procedures, drafting the necessary documentation and preparation of the human

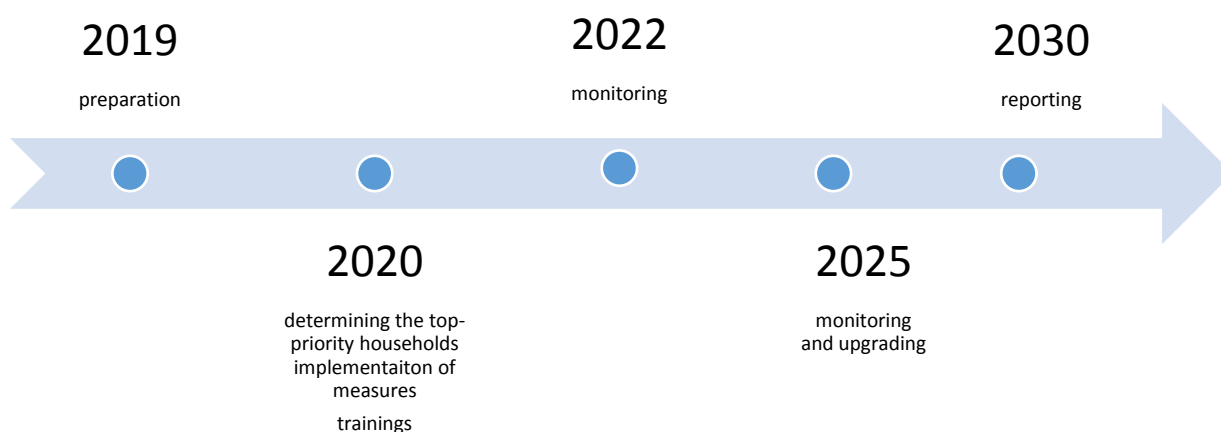
resources; preliminary analysis of the energy poor households and detailed analysis of the energy consumers and producers;

2020 – 2022 – establishing the top-priority households to receive support and the implementation of measures for heating season 2021-2022;

2022 – 2025 results monitoring, adjustments to the programme and expansion of its scope;

2020 – 2030 training energy advisors;

2020 – 2030 implementation of the EE measures and installation of RES to deal with energy poverty, based on national/provincial and municipal financial resources.



2.3 Budget and resources needed

The financing options, potentially useable for the project, are diverse and include, but are not limited to:

- Loans from commercial banks;
- Grants, provided by environmental funds, in particular – the Enterprise for the management of environmental protection activities and National Trust EcoFund, including interest-free loans;
- Loans with beneficial conditions and/or guarantees, provided by a future specialized fund for the encouragement of the renewable energy production; financial lease of equipment, usually provided by a provider, implementing the project on a turnkey basis;
- Encouraging financial schemes with a wider scope, such as the flexible mechanisms of the Kyoto Protocol and in particular the “joint performance” mechanism;
- The Bulgarian Energy Efficiency and RES Fund;
- Governmental and municipal budgets;
- Energy Savings Performance Contracts;
- A combination of white/green certificate trading schemes, low-interest loans from intergovernmental specialized funds, bridge crediting;
- Modernization Fund;
- European funds;
- Saved resources from the national budget for energy support and their reinvestment in EE and RES.

3 Collaboration with stakeholders

- The Province Governor's office in Pleven;
- Municipal centres in Pleven Province;
- Mayor's offices of the populated areas in the municipalities of the Pleven Province;
- Regional Council for the Development of the North-western Planning Region;
- Municipal council and mayors of municipalities, when applying for loans in case of approval of public resources and projects;
- Energy and environmental experts of the municipalities;
- The respective directorates (environmental, social and energy) at the municipalities, engaged in the project implementation;
- Environmental, social and energy-concerned NGOs – national, regional and local;
- Roma organizations;
- Educational and cultural institutions;
- Service and consulting providers;
- RES companies;
- EcoEnergy;
- Political Party "The Greens";
- WWF

Roles and responsibilities of different actors for Action Plan implementation

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Provincial governor's office	Process administration and management	Contribution to the action plan and implementation of the EE and RES measures and objectives
Implementing parties	Municipality and mayors' offices	Process administration and management	Contribution to the action plan and implementation of the EE objectives
	Energy vulnerable households	Direct participants and stakeholders	Their involvement will be defined when developing specific schemes for supporting them and according to their specific needs.
Political decision-makers	Research organizations, NGOs and independent experts + representatives of the business	Participation in the surveying and modelling	Their involvement will be defined when establishing specific partnerships

	Municipal experts and management of the Municipality	Process administration	Information measures
Target groups	Users of municipal buildings and personnel	Support and understanding of project's objectives	Information measures
	Civil associations, Roma associations, social citizen associations	Support and understanding of project's and plan's objectives	Information measures

4 Monitoring

Data, regarding the households in need of energy support will be collected in the initial analysis. These shall be complemented and upgraded through the reporting of the performance of the energy advisors before, during and after the implementation of the energy measures for each household-beneficiary under the programme. The monitoring will be performed at year 3-5 of the implementation of the measures in each household, reviewing and reporting the achieved effects, implementing adjustments and upgrades, through the help of the households, redirecting resources in case of occurrence of certain conditions, to other people in need.

It is necessary to measure the achieved results, after the end of the very first heating season, based on the applied measures in the households. This will enable the evaluation of the potential for expanding the programme and attracting further resources.

5 Risk management

Risk	Probability of realising	Mitigation measure
Insufficient resources	Medium	Attracting more stakeholders, including other provinces and municipalities for lobbying for resources through EU's OP, support funds, national budget and prioritization of the issue of dealing with energy poverty
Insufficient human resources, consisting of suitable personnel for energy advisors	Medium	Use of the capabilities of the local business through social engagement, attracting consulting services
Poor interest in the support programme by the target households	High	Implementing information measures and direct work through the information from the initial analysis

		and the Social Assistance Directorate
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ACTION PLAN

Gorna Malina Municipality, part of
the Danube Basin

“Protection and support of energy
vulnerable consumers in Gorna Malina
Municipality“

English version

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Implementation of EE measures in households

Action Plan: Protection and support of energy vulnerable consumers in Gorna Malina Municipality

1 Objective

This Action Plan, aims at identifying the energy poor households Gorna Malina Municipality, as well as indicating the reasonable steps for decreasing their number **by 50% by 2030**, chiefly through energy efficiency measures.

Bulgaria ranks first in the EU in terms of share of the energy poor households at approximately 37% of all households, according to Eurostat's latest data¹. The World Bank, in a report in 2014 indicated that approximately 80% of the households in Bulgaria may be classified, as energy vulnerable, meaning that in case of any shock to the household, such as one of the family members losing their job, such households would automatically become energy poor and will not be able to cover their monthly energy costs.

Both on a national level and in Gorna Malina there is no clear and public classification and definition of energy poor households. There is no centralized system for the identification of the precise number of the energy poor households, either. This issue applies to all the regions and municipalities. There is national methodology² for the classification of the energy poor, based on their annual income and status, allowing them to apply for energy allowances, but this methodology only provides an estimate and identifies the households, applying for energy allowances for a particular heating season, without any clear and precise indication of where and how many energy poor households there are by years and by municipalities.

Despite the declared intention of the relevant institutions to cover, through energy allowances, as many as possible of the energy poor households, the currently achieved scope continues to be limited. The model of direct financial support for purchasing fuels, which at present is the only commonly applied option, achieves mostly increased use of cheap, low-thermal-value and high-emission fuel to cover the heating needs of the households. Most often the energy poor buy firewood and coal to get them through the cold months. This fails to improve in any way their comfort of dwelling during the critical winter period, while increasing the use of wood and coal, which results in air pollution and increased greenhouse gas emissions. The persons, receiving such allowances, do not enjoy significant and meaningful improvements in the living conditions in their households. No efforts are made, and the households themselves get no incentives, to improve the energy efficiency and to gradually switch to RES for heating, so that their energy costs are palpably reduced, first through energy efficiency measures and then – through the gradual replacement of the fuels used. This is generally the case on a

¹<https://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20190131-1?inheritRedirect=true&redirect=%2Feurostat%2F>

² <https://pravatami.bg/10714>

nationwide level, and therefore the allowances increase every year and at currently exceed BGN 120 million per annum. These are enormous resources, which are spent unreasonably, failing to produce an overall improvement of the situation and dealing with the energy poor households in Bulgaria.

In Gorna Malina, as in the whole of Bulgaria, it is now necessary – in the context of the forthcoming electricity market liberalization – to develop a new approach to support and compensate the most vulnerable households for the additional burden they are expected to bear as a result of the market liberalization, as well as for reducing energy poverty below its current levels. The vulnerability of the households may increase, both due to the introduction of new pricing schemes, and due to the changes in the accessibility to electricity, as the main energy source.

The implementation of pilot measures, both on a national level and in Gorna Malina in particular, is required in order to show the impact of the diversification of the methods of supporting the households in meeting their energy needs. It is necessary to carry out detailed analyses on a local level, as the relevant results and data accumulated should be used in the course of the pilot projects implementation. These results should be used to change the local policies, with a potential to have impact also on the nationwide policies for supporting energy poor households.

1.1 Objective scope and targets values

The objective of this plan is to precisely identify the energy poor households, as well as to develop a package of measures in the area of energy efficiency, to replace the existing inefficient direct financial support to the energy poor households, and thus reducing their number through pilot implementation of the energy efficiency measures in Gorna Malina Municipality.

According to the National Statistical Institute³, a household in Bulgaria is inhabited by an average of 2,6 people. According to the official data⁴ the total number of residents of the Gorna Malina Municipality is 6788 people, which equals 2610 households. Based on the average share of the energy poor households in Bulgaria (~40%), this means that in the municipality there are approximately 1044 households, facing problems in covering their monthly energy bills and falling within the classification criteria for energy poor in Bulgaria. On a nationwide level, according to the World Bank⁵ merely 14-15% of the households receive energy allowances, which – if extrapolated for Gorna Malina would mean that approximately 150 households apply or and receive energy allowances. In financial terms this means that 150 households will receive BGN 374 each as financial allowance for heating season 2018–2019, or a total in the Gorna Malina Municipality of BGN 56 100 (EUR 28 651).

Taking into consideration the official national data⁶, the energy consumption of the households, has remained at the approximately same levels in the last two decades and varies between 2050 and 2350 ktoe per annum. The average monthly costs for the electricity consumed amount to 759,07 kWh per month or 9108 kWh per annum – electricity consumed or an average of BGN 1800 per annum in electricity bills per household.

³ <http://www.nsi.bg/census2011/spagebg.php?SHP=7>

⁴ <http://gornamalina.eu/demografski-danni.html>

⁵ https://www.me.government.bg/files/useruploads/files/wb_ras_i_summary_report_bg.pdf

⁶ <http://eea.government.bg/bg/soer/2014/soer-bg-2014.pdf>

Based on the aforesaid data, the pilot measures should be focused on 1044 households in 14 villages and towns within the Gorna Malina Municipality, where a positive impact must be observed in at least half of these households by 2030.

It is necessary to develop a financial plan for the more efficient medium-term spending of the financial resources for energy support to the households. This will result in the saving of 4 554 000 kWh in 10 years and approximately 600 tons of CO₂ emissions in the same period, i.e. 60 tons of CO₂ emissions per annum.

1.2 Target indicators

Key indicators:

- Number of (energy poor) households covered;
- Energy savings;
- Carbon savings;
- Capacity trainings for energy advisors;
- Financial resources utilized for energy efficiency measures for households, including using RES and/or more efficient devices/appliances;

Objective	Target indicator	Method of measurement and validation
Covered households	522 households (out of 1044) to be relieved of energy poverty in the next 10 years	A list of covered households, containing data on the number of persons, income, energy survey and characteristics of the dwellings, identified needs, applied measures, etc.
Energy savings	4 554 000 kWh/ decrease in the electricity consumption in 10 years, an average of 455 000 kWh per annum for approximately 500 households	Standard calculation methodology
CO ₂ Savings	Approximately 60 tons of saved emissions per annum, A total of 600 tons in 10 years	Standard calculation methodology ⁷
Provision of targeted municipal financial resources for the neediest energy poor households within the municipality	10 households receiving targeted support per annum in 10 years, or a total of 100 households	Number of implemented individual projects for households
Capacity-building trainings	100 advisors - 10 per annum	Number of trained

⁷ <https://www.eecabusiness.govt.nz/tools/wood-energy-calculators/co2-emission-calculator/>

for energy advisors		energy advisors
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2 Implementation strategy

Development of a pilot municipal programme for supporting energy poor households, planned as a pilot showcase programme intended for testing and improvement of appropriate measures.

2.1 Step by step description

A. Preparation of a preliminary analysis and databases containing the key demographic indicators and a specific energy profile of the households in Gorna Malina. The actual energy costs on a monthly and annual basis will be summed with the specific costs for the different types of energy sources, which will make it possible to identify the precise number of the energy poor households in the 14 towns/villages in the municipality. **Implementation period 2019;**

B. A detailed energy analysis of the household and corporate consumers in Gorna Malina. Defining the typical groups and their territorial allocation by age, village/town and social identity. The analysis will contain a description of the households with the available income, number of people forming the households, including children below the age of 18, people in disadvantaged position and with special needs; characteristics of the dwellings (inhabited premises); the type of the heating devices/appliances and the type of fuel used, the type of the food storage and cooking devices/appliances, etc. **Implementation period 2020;**

C. Defining types of measures for individual support of the households and capacity building training of 100 energy advisors in a 10-year period.

The types of measures may include, but are not limited to:

- Thermal insulation of one or more premises per household (indoor insulation, windows replacement, ceiling and building foundations insulation etc.);
- Replacement of heating appliances/devices by more efficient ones, including preservation of the type of fuel/heating method, while using more efficient heaters;
- Preparation of flexible financial schemes, which will enable the households to commit to long-term repayment of low-interest/interest-free loans or 100% support, with starting capital, granted by the municipality, for the neediest households;

It is necessary to develop criteria for investments in the programme, which would ensure the achievement of low emissions and maximization of the benefits to the local economy, through the use of local resources and local manufacturers. **Implementation period 2020-2030.**

D. Implementation of the measures in the selected households

This activity shall include:

- Determining and negotiation of the necessary types of insulation materials and service providers;
- Drafting agreements for the provision of support, conditions for the provision of devices/appliances etc.;
- Information measures, implemented through the energy advisors;

- Monitoring of the results achieved.

The programme must include mandatory verification, evidencing that the energy efficiency measures proposed and/or implemented and/or more efficient heating devices/appliances installed, have actually been delivered and are used as intended. In the best-case scenario, each household, approved to receive support, shall be checked before and after the installation, to ensure compliance with the requirements, specified in the documents, developed for the programme. It is necessary to plan follow-up inspections every 2-3-5 years after the implementation of the EE measures or the installation of the new heating system, to make sure that the system is not destroyed due to negligence, resold or given to someone else. For this purpose, the Gorna Malina Municipality may retain ownership to the improvements made and the new heating devices/appliances. This will enable the Municipality to subsequently provide the heating devices/appliances to other needy households in case of poor care, deceased user etc.

Implementation period 2020-2030.

2.2 Time schedule

The specific time schedule depends on the preparation and commencement of the programme. In the best-case scenario, its implementation can commence in 2020.

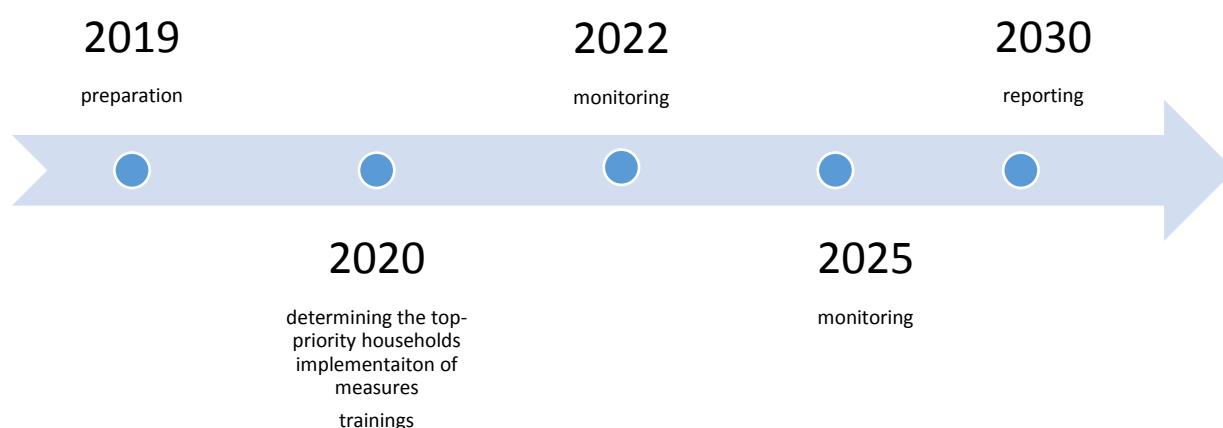
2019 – preparation – provision of resources, administrative preparation and procedures, drafting the necessary documentation and preparation of the human resources; analysis of the energy poor households;

2020 – establishing the top-priority households to receive support and the implementation of measures for heating season 2020-2021;

2021 – 2022 – results monitoring, adjustments to the programme and expansion of its scope;

2020 – 2030 – training energy advisors;

2020 – 2030 – implementation of the EE measures to deal with energy poverty, based on municipality's own financial resources.



2.3 Budget and resources needed

The financing options, potentially useable for the project, are diverse and include, but are not limited to:

- Loans from commercial banks;

- Grants, provided by environmental funds, in particular – the Enterprise for the management of environmental protection activities and National Trust EcoFund, including interest-free loans;
- Loans with beneficial conditions and/or guarantees, provided by a future specialized fund for the encouragement of the renewable energy production; financial lease of equipment, usually provided by a provider, implementing the project on a turnkey basis;
- Encouraging financial schemes with a wider scope, such as the flexible mechanisms of the Kyoto Protocol and in particular the “joint performance” mechanism;
- The Bulgarian Energy Efficiency and RES Fund;
- Governmental and municipal budgets;
- Energy Savings Performance Contract;
- A combination of white/green certificate trading schemes, low-interest loans from intergovernmental specialized funds, bridge crediting;
- European funds.

3 Collaboration with stakeholders

- Mayors' offices of the villages and towns in the Gorna Malina Municipality;
- The Municipal Council, especially in case of applying for loans
- The energy and environmental experts in the Municipality;
- The respective directorates (environmental, social and energy) at the municipality, concerned with the subject matter of the plan;
 - Environmental, social and energy-concerned NGOs;
 - Educational and cultural institutions;
 - Service and consulting providers;
 - EcoEnergy;
 - Political Party “The Greens”;

Roles and responsibilities of different actors for Action Plan implementation

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipality and mayors' offices	Process administration and management	Contribution to the action plan and implementation of the EE objectives
	Energy vulnerable households	Direct participants and stakeholders	Their involvement will be defined when developing specific schemes for supporting them.
Political decision-makers	Research organizations, NGOs and independent experts + representatives of the business	Participation in the surveying and modelling	Their involvement will be defined when establishing specific partnerships

	Municipal experts and management of the Municipality	Process administration	Information measures
Target groups	Users of municipal buildings and personnel	Support and understanding of project's objectives	Information measures

4 Monitoring

Data, regarding the households in need of energy support will be collected in the initial analysis. These shall be complemented and upgraded through the reporting of the performance of the energy advisors before, during and after the implementation of the energy measures for each household-beneficiary under the programme. The monitoring will be performed at year 2-3-5 of the implementation of the measures in each household, reviewing and reporting the achieved effects, implementing adjustments and upgrades, through the help of the households, redirecting resources in case of occurrence of certain conditions, to other people in need.

It is necessary to measure the achieved results, after the end of the very first heating season, based on the applied measures in the households. This will enable the evaluation of the potential for expanding the programme and attracting further resources.

5 Risk management

Risk	Probability of realising	Mitigation measure
Insufficient resources	Medium	Attracting more stakeholders, including other municipalities for lobbying for resources through EU's OP, support funds, national budget
Insufficient human resources, consisting of suitable personnel for energy advisors	Medium	Use of the capabilities of the local business through social engagement, attracting consulting services
Poor interest in the support programme by the target households	High	Implementing information measures and direct work through the information from the initial analysis and the Social Assistance Directorate

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

**Berkovitsa Municipality, part of the
region of North Bulgaria**

**„Protection and support of energy
vulnerable consumers in Berkovitsa
Municipality“**

English version

**prepared by:
WWF Bulgaria**

**PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7**

Date: December 2018



**CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK**

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Priority Area: Implementation of EE and RES measures in households

Action Plan: Protection and support of energy vulnerable consumers in Berkovitsa Municipality

1 Objective

This Action Plan, aims at identifying the energy poor households Berkovitsa Municipality, as well as indicating the reasonable steps for **decreasing their number by 40% by 2030**, chiefly through energy efficiency measures and the replacement of the fuels used for applicable RES technologies.

Bulgaria ranks first in the EU in terms of share of the energy poor households at approximately 37% of all households, according to Eurostat's latest data¹. The World Bank, in a report in 2014 indicated that approximately 80% of the households in Bulgaria may be classified, as energy vulnerable, meaning that in case of any shock to the household, such as one of the family members losing their job, such households would automatically become energy poor and will not be able to cover their monthly energy costs.

In Berkovitsa this issue is rather clearly seen, also due to the fact that a large share of the population in the municipality is of Roma origin, and members of this ethnos are largely classified as energy poor. Both on a national level and in Berkovitsa there is no clear and public classification and definition of energy poor households. There is no centralized system for the identification of the precise number of the energy poor households, either. This issue applies to all the regions and municipalities. There is national methodology² for the classification of the energy poor, based on their annual income and status, allowing them to apply for energy allowances, but this methodology only provides an estimate and identifies the households, applying for energy allowances for a particular heating season, without any clear and precise indication of where and how many energy poor households there are by years and by municipalities and why are they unable to cover their monthly energy costs.

Despite the declared intention of the relevant institutions to cover, through energy allowances, as many as possible of the energy poor households, the currently achieved scope continues to be limited. The model of direct financial support for purchasing fuels, which at present is the only commonly applied option, achieves mostly increased use of cheap, low-thermal-value and high-emission fuel to cover the heating needs of the households. Most often the energy poor buy firewood and coal to get them through the cold months. This fails to improve in any way their comfort of dwelling during the critical winter period, while increasing the use of wood and coal, which results in air pollution and increased greenhouse gas emissions. The persons, receiving such allowances, do not enjoy significant and meaningful improvements in the living conditions in their

¹<https://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20190131-1?inheritRedirect=true&redirect=%2Feurostat%2F>

² <https://pravatami.bg/10714>

households. No efforts are made, and the households themselves get no incentives, to improve the energy efficiency and to gradually switch to RES for heating, so that their energy costs are palpably reduced, first through energy efficiency measures and then – through the gradual replacement of the fuels used. This is generally the case on a nationwide level, and therefore the allowances increase every year and at currently exceed BGN 120 million per annum. These are enormous resources, which are spent unreasonably, failing to produce an overall improvement of the situation and dealing with the energy poor households in Bulgaria.

In Berkovitsa, as in the whole of Bulgaria, it is now necessary – in the context of the forthcoming electricity market liberalization – to develop a new approach to support and compensate the most vulnerable households for the additional burden they are expected to bear as a result of the market liberalization, as well as for reducing energy poverty below its current levels. The vulnerability of the households may increase, both due to the introduction of new pricing schemes, and due to the changes in the accessibility to electricity, as the main energy source, including for heating.

The implementation of pilot measures, both on a national level and in Berkovitsa in particular, is required in order to show the impact of the diversification of the methods of supporting the households in meeting their energy needs. It is necessary to carry out detailed analyses on a local level, as the relevant results and data accumulated should be used in the course of the pilot projects implementation. These results should be used to change the local policies, with a potential to have impact also on the nationwide policies for supporting energy poor households.

1.1 Objective scope and targets values

The objective of this plan is to precisely identify the energy poor households, as well as to develop a package of measures in the area of energy efficiency and the implementation of RES, to replace the existing inefficient direct financial support to the energy poor households, and thus **reducing their number in Berkovitsa by at least 40% in the next decade.**

According to the National Statistical Institute³, a household in Bulgaria is inhabited by an average of 2,6 people. According to the official data⁴ the total number of residents of the Berkovitsa Municipality is 18 387 people (of whom 13 376 in the municipal centre – the Town of Berkovitsa, and the other 5011 people in 19 villages in the municipality). This number is equal to 7071 households. Based on the average share of the energy poor households in Bulgaria (~40%), this means that in the municipality there are approximately 2828 households, facing problems in covering their monthly energy bills and falling within the classification criteria for energy poor in Bulgaria. On a nationwide level, according to the World Bank⁵ merely 14-15% of the households receive energy allowances, which – if extrapolated for Berkovitsa would mean that approximately 424 households apply or and receive energy allowances. In financial terms this means that 424 households will receive BGN 374 each as financial allowance for heating season 2018–2019, or a total in the Berkovitsa Municipality of BGN 158 576 (EUR 80 988).

Taking into consideration the official national data⁶, the energy consumption of the households, has remained at the approximately same levels in the last two decades and

³ <http://www.nsi.bg/census2011/spagebg.php?SHP=7>

⁴ <http://www.grao.bg/tna/tab02.txt>

⁵ https://www.me.government.bg/files/useruploads/files/wb_ras_i_summary_report_bg.pdf

⁶ <http://eea.government.bg/bg/soer/2014/soer-bg-2014.pdf>

varies between 2050 and 2350 ktoe per annum. The average monthly costs for the electricity consumed⁷ amount to 759,07 kWh per month or 9108 kWh per annum – electricity consumed or an average of BGN 1800 per annum in electricity bills per household.

Based on the aforesaid data, the pilot measures in the Berkovitsa Municipality should be focused on 2828 households in 20 villages and towns within the Berkovitsa Municipality, where a positive impact must be observed in at least 40% of such households by 2030.

It is necessary to develop a financial plan for the more efficient medium-term spending of the financial resources for energy support to the households. In this way, and subject to the implementation of the EE and RES measures, the following quantities of electricity and emissions will be saved:

- 2828 households x 9108 kWh per annum = 25 757 424 kWh per annum or 257 574 240 kWh in 10 years.
- Assuming that consumption will be reduced by 40% this means that a total of 10 302 970 kWh will be saved on an annual basis or 100 302 970 kWh in 10 years.
- The saved CO₂ emissions⁸ through the lower energy consumption would amount to 1326 tons per annum, or 13 260 tons in 10 years.

A characteristic feature of the Berkovitsa municipality is that approximately 20% of its population are of Roma origin, or twice the country-average share, which is a reason for the more modest objective, since working with the Roma population requires additional processes of education and convincing, which is a time-consuming and costly, but necessary process.

1.2 Target indicators

Key indicators:

- Number of (energy poor) households covered;
- Energy savings;
- Carbon savings;
- Capacity trainings for energy advisors;
- Financial resources utilized for energy efficiency measures for households;
- Financial resources, utilized for the implementation of RES.

Objective	Target indicator	Method of measurement and validation
Covered households	1131 households (of 2828) to be relieved of energy poverty in the next 10 years	A list of covered households, containing data on the number of persons, income, energy survey and characteristics of the dwellings, identified needs, applied measures, etc.
Energy savings	100 302 970 kWh. Decrease in the electricity	Standard calculation

⁷ <https://narodovlastie.bg/2018/12/11/bezplatna-energija/>

⁸ <https://www.eecabusiness.govt.nz/tools/wood-energy-calculators/co2-emission-calculator/>

	consumption in 10 years, an average of 10 302 970 kWh. per annum for 1131 households	methodology
CO ₂ Savings	Approximately 1326 tons of saved emissions per annum, A total of 13 260 tons in 10 years	Standard calculation methodology ⁹
Provision of targeted municipal financial resources for the neediest energy poor households within the municipality for energy efficiency measures and replacing the currently used fuels by RES	30 households receiving targeted support per annum in 10 years, or a total of 300 households	Number of implemented individual projects for households
Capacity-building trainings for energy advisors	100 advisors - 10 per annum	Number of trained energy advisors

2 Implementation strategy

Development of a municipal programme for supporting energy poor households, planned as a pilot showcase programme intended for testing and improvement of appropriate EE and RES measures.

2.1 Step by step description

A. Preparation of a preliminary analysis and databases containing the key demographic indicators and a specific energy profile of the households in Berkovitsa. The actual energy costs on a monthly and annual basis will be summed with the specific costs for the different types of energy sources, which will make it possible to identify the precise number of the energy poor households in the 20 towns/villages in the municipality.
Implementation period 2019-2020;

B. A detailed energy analysis of the household and corporate consumers in Berkovitsa. Defining the typical groups and their territorial allocation by age, village/town and social identity. The analysis will contain a description of the households with the available income, number of people forming the households, including children below the age of 18, people in disadvantaged position and with special needs; characteristics of the dwellings (inhabited premises); the type of the heating devices/appliances and the type of fuel used, the type of the food storage and cooking devices/appliances, etc.
Implementation period 2020-2021;

C. Defining types of measures for individual support of the households and capacity building training of 100 energy advisors in a 10-year period.

The types of measures may include, but are not limited to:

⁹ <https://www.eecabusiness.govt.nz/tools/wood-energy-calculators/co2-emission-calculator/>

- Thermal insulation of one or more premises per household (indoor insulation, windows replacement, ceiling and building foundations insulation etc.);
- Replacement of heating appliances/devices by more efficient ones, including preservation of the type of fuel/heating method, while using more efficient heaters;
- Preparation of flexible financial schemes, which will enable the households to commit to long-term repayment of low-interest/interest-free loans or 100% support, with starting capital, granted by the municipality, for the neediest households;
- The implementation of RES and replacement of the used fuels at the households, according to the local specificities.

It is necessary to develop criteria for investments in the programme, which would ensure the achievement of low emissions and maximization of the benefits to the local economy, through the use of local resources and local manufacturers. **Implementation period 2020-2030.**

D. Implementation of the measures in the selected households

This activity shall include:

- Determining and negotiation of the necessary types of insulation materials and service providers;
- Determining the RES, which may be installed in the households and negotiation of their installation;
- Determining the necessary types and quantities of heating devices/appliances and fuels with higher efficiency and lower emissions, and thus – lower costs;
- Drafting agreements for the provision of support, conditions for the provision of devices/appliances etc.;
- Information measures, implemented through the energy advisors;
- Monitoring of the results achieved.

The programme must include mandatory verification, evidencing that the energy efficiency measures proposed and/or implemented and/or RES and/or more efficient heating devices/appliances installed, have actually been delivered and are used as intended. In the best-case scenario, each household, approved to receive support, shall be checked before and after the installation, to ensure compliance with the requirements, specified in the documents, developed for the programme. It is necessary to plan follow-up inspections every 2-3-5 years after the implementation of the EE measures, the installation of the RES or the new heating system, to make sure that the system is not destroyed due to negligence, resold or given to someone else. For this purpose, the Berkovitsa Municipality may retain ownership to the improvements made and the new heating devices/appliances. This will enable the Municipality to subsequently provide the heating devices/appliances to other needy households in case of poor care, deceased user etc. **Implementation period 2020-2030.**

2.2 Time schedule

The specific time schedule depends on the preparation and commencement of the programme. In the best-case scenario, its implementation can commence in 2020.

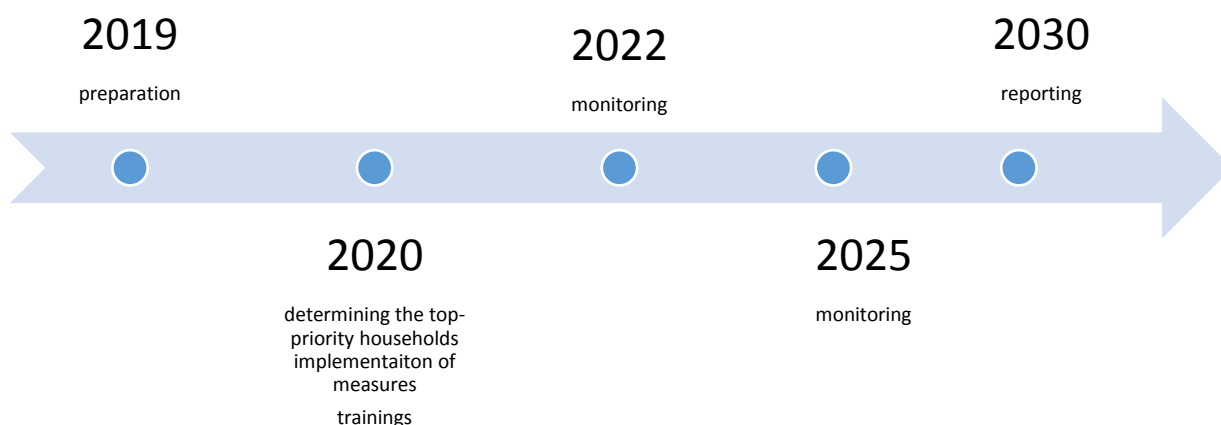
2019 – 2020 – preparation - provision of resources, administrative preparation and procedures, drafting the necessary documentation and preparation of the human resources; analysis of the energy poor households;

2020 – 2022 – establishing the top-priority households to receive support and the implementation of measures for heating season 2020-2021;

2022 – 2025 – results monitoring, adjustments to the programme and expansion of its scope;

2020 – 2030 – training energy advisors;

2020 – 2030 – implementation of the EE measures and installation of RES to deal with energy poverty, based on municipality's own financial resources.



2.3 Budget and resources needed

The financing options, potentially useable for the project, are diverse and include, but are not limited to:

- Loans from commercial banks;
- Grants, provided by environmental funds, in particular – the Enterprise for the management of environmental protection activities and National Trust EcoFund, including interest-free loans;
- Loans with beneficial conditions and/or guarantees, provided by a future specialized fund for the encouragement of the renewable energy production; financial lease of equipment, usually provided by a provider, implementing the project on a turnkey basis;
- Encouraging financial schemes with a wider scope, such as the flexible mechanisms of the Kyoto Protocol and in particular the "joint performance" mechanism;
- The Bulgarian Energy Efficiency and RES Fund;
- Governmental and municipal budgets;
- Energy Savings Performance Contract;
- A combination of white/green certificate trading schemes, low-interest loans from intergovernmental specialized funds, bridge crediting;
- Modernization Fund;
- European funds.

3 Collaboration with stakeholders

- Mayors' offices of the villages and towns in the Berkovitsa Municipality;
- The Municipal Council, especially in case of applying for loans;
- The energy and environmental experts in the Municipality;
- The respective directorates (environmental, social and energy) at the municipality, concerned with the subject matter of the plan;

- Environmental, social and energy-concerned NGOs;
- Roma organizations;
- Environmental and cultural institutions;
- Service and consulting providers;
- RES companies;
- EcoEnergy;
- Political Party “The Greens”;
- WWF

Roles and responsibilities of different actors for Action Plan implementation

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipality and mayors' offices	Process administration and management	Contribution to the action plan and implementation of the EE objectives
	Energy vulnerable households	Direct participants and stakeholders	Their involvement will be defined when developing specific schemes for supporting them.
Political decision-makers	Research organizations, NGOs and independent experts + representatives of the business	Participation in the surveying and modelling	Their involvement will be defined when establishing specific partnerships
	Municipal experts and management of the Municipality	Process administration	Information measures
Target groups	Users of municipal buildings and personnel	Support and understanding of project's objectives	Information measures

4 Monitoring

Data, regarding the households in need of energy support will be collected in the initial analysis. These shall be complemented and upgraded through the reporting of the performance of the energy advisors before, during and after the implementation of the energy measures for each household-beneficiary under the programme. The monitoring will be performed at year 2-3-5 of the implementation of the measures in each household, reviewing and reporting the achieved effects, implementing adjustments and upgrades, through the help of the households, redirecting resources in case of occurrence of certain conditions, to other people in need.

It is necessary to measure the achieved results, after the end of the very first heating season, based on the applied measures in the households. This will enable the evaluation of the potential for expanding the programme and attracting further resources.

5 Risk management

Risk	Probability of realising	Mitigation measure
Insufficient resources	Medium	Attracting more stakeholders, including other municipalities for lobbying for resources through EU's OP, support funds, national budget
Insufficient human resources, consisting of suitable personnel for energy advisors	Medium	Use of the capabilities of the local business through social engagement, attracting consulting services
Poor interest in the support programme by the target households	High	Implementing information measures and direct work through the information from the initial analysis and the Social Assistance Directorate

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

**Nikopol Municipality, part of the
North Bulgaria region**

**“Implementing Energy Efficiency
measures combined with RES installations
for municipal buildings to reduce energy
use in Nikopol Municipality“**

English version

**prepared by:
WWF Bulgaria**

**PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7**

Date: December 2018



**CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK**

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Priority Area: **Implementing EE and RES measures in public buildings**

Action plan: Implementing Energy Efficiency measures combined with RES installations for municipal buildings to reduce energy use in Nikopol Municipality

1 Objective

The objective of this action plan is to develop an approach and improve the energy efficiency of six of the key municipal buildings in the Nikopol Municipality. These include:

- Chitalishte (Community Centre) "Napredak 1871" (Total Floor Area (TFA) - 3444 sq.m. – consumption 1,47 MWh/year);
- Municipal Children's Complex (TFA – 831 sq.m. – consumption 19,20 MWh/year);
- The building of the General Active Treatment Hospital Nikopol EOOD (TFA - 1843 sq.m. consumption 97,20 MWh/year);
- Medical Centre (TFA - 630 sq.m. consumption 17,20 MWh/year);
- „Radost 3“ Kindergarten (TFA- 1149 sq.m. – consumption 28,39 MWh/year);
- The building of the municipal administration (TFA- 1884 sq.m. – 0,30 MWh/year).

The total heat and electricity consumption of the said buildings amounts to 163,76 MWh = 163 760 kWh per annum. Total floor area: 9781 sq.m.

The implementation of energy efficiency measures will result in a 30-40 % reduction of the carbon emissions and financial energy expenditures of the municipality by 2030. This will be achieved not only through the EE measures, but also through the subsequent replacement of the combustion systems in the buildings.

Currently, the prevailing heating method in the municipality is based on solid fuels (firewood and coal), as this also applies to households and public municipal properties.

The Nikopol Municipality also plans to install solar collectors on some of the roofs of the buildings, which will enable the significant reduction of the electricity expenditures, currently spent for heating-up water.

The action plan further aims at promoting renewable energy sources among the population of the municipality, which would subsequently encourage them to contribute to the introduction of RES in the private sector and in the households in the Nikopol

region, as well. This is one of the first important steps towards low-carbon development, in line with the strategic plans of the municipality and the Pleven Province for the promotion of RES and energy efficiency.

1.1 Objective scope and targets values

The action plan will be implemented on the territory of the Nikopol Municipality including the following populated areas - Town of Nikopol and the villages: Asenovo, Batsova Mahala, Vabel, Debovo, Dragash Voyvoda, Evlogievo, Zhernov, Lozitsa, Lyubenovo, Muselievo, Novachene, Sanandievo and Cherkovitsa. The total population of the municipality is approximately 8 000 people.

The 6 buildings, included in the plan, are all located in the municipal centre - Nikopol and serve the needs of the town itself and the entire municipality.

The planned thermal insulation and EE measures are expected to result in the reclassification of the specified municipal buildings from class F and D to class C and B.

The renovation and EE measures will be accompanied by a plan for the replacement of the fuels used and implementation of equipment for electric and thermal energy, using RES in the said buildings. An individual technical and investment plan will be developed specifically for each and every building, so that during the performance of the renovation and EE activities, it will be clear in advance what will be constructed in the future and what will not.

The plan of the municipality also has a demonstrational, showcase objective, as it is intended to promote renewable energy sources and high-efficiency buildings, including zero-energy consumption (class A and A++), which will be achieved through the implementation of information measures in combination with a Plan for an information system for RES implementation and public attitudes change. In addition to the said measures, further investigations will be carried out for the opportunities to implement other suitable technologies, based on the interest and needs of the population and the public buildings – solar collectors, solar district heating, thermal pumps, etc.

The estimated reduction of the energy consumption is 30 to 40% per annum, which will result in an equivalent reduction in the greenhouse gas emissions, through the measures, implemented in the said buildings. The annual levels of the emissions of the above buildings amount to approximately 21 tons of CO₂, which, after the introduction of the measures, will mean that at least 7 tons of emissions less will be emitted every year. The total emission savings of the specified buildings in a 10-year period, amount to 70 tons.

The time period for the implementation of this action plan is 2019-2030.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Renovated buildings to match class B and C energy efficiency	6 municipal public buildings	Building passportization including the energy efficiency class
Estimated CO ₂ emissions reduction	7 t CO ₂ /year, or a total of - 70 t CO ₂ in 10 years	Annual energy efficiency reports for each system/building
Energy savings	491 280 kWh/ reduced electricity consumption in 10 years by an average of 49 128kWh per annum in 6 municipal buildings	Standard calculation methodology

2 Implementation strategy

2.1 Step by step description

The steps, which will be undertaken, as listed below, aim at ensuring the transparency of the implementation of the action plan, as well as the understanding and favourable attitudes among the population of the Nikopol Municipality and all the stakeholders.

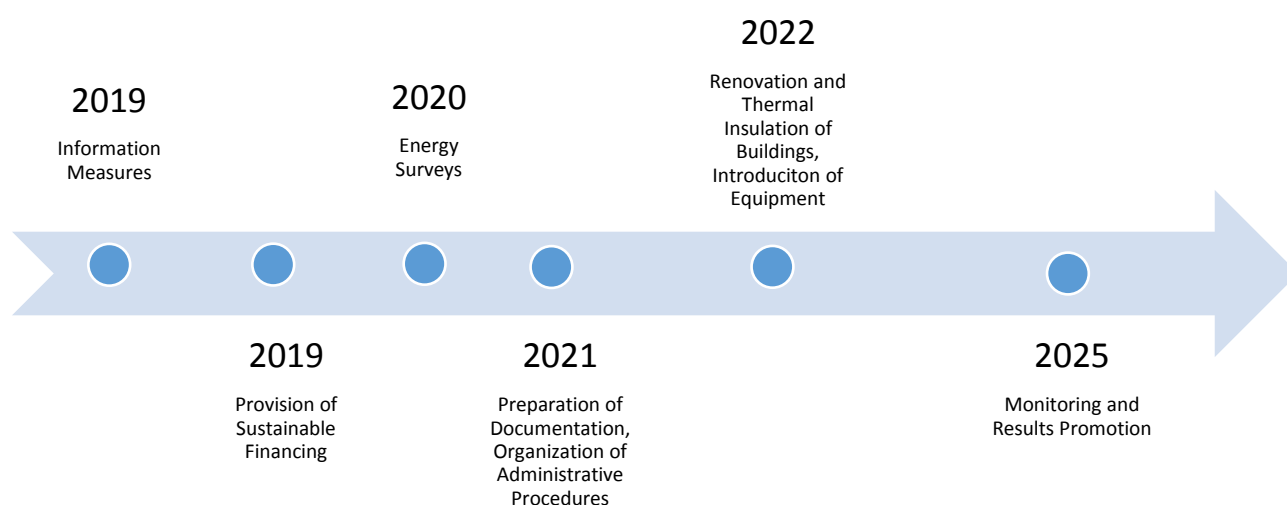
1. Carrying out information activities for presenting the action plan and municipality's intentions for the stimulation and support of the introduction of energy efficiency measures, as well as the measures for use of renewable energy sources in the production of electricity and thermal energy in the specified municipal buildings.
2. Choosing the financing model. This step involves a comparative evaluation of several models of financing the action plan, in order to decide which would be the most appropriate option, from the perspective of the moment of implementation.

3. Performance of energy audit of the listed municipal buildings. The energy audit are key when establishing the necessary energy efficiency measures and deciding the capacity of the electricity and thermal energy production systems. The audit will also be used for the follow-up and verification of the results achieved under this action plan, as well as in addition to the project. The most appropriate EE measures will be assessed for each individual building, in terms of:
 - Exterior walls thermal insulation;
 - Floor insulation;
 - Roof insulation;
 - Replacement of windows and doors;
 - Energy-saving measures applicable to the boiler systems for heating;
 - Energy-saving measures, related to the metering, control and management devices;
 - Energy-saving measures, related to the utility systems of the building.
4. Preparation of tender documentation in accordance with the Public Procurement Act and organization of a tender procedure to appoint the contractor. The preparation includes review and verification of the documentation, preparation of the terms of reference, preparation of the conditions and evaluation criteria, contract template, etc. The details in this step depend on the chosen method of financing and the results of the information campaign.
5. Preparation and organization of administrative and urban planning procedures, related to the change of the use of terrains, etc. Especially with respect to the potential use of agricultural land or terrains for developing thermal pumping systems, obtaining the consent of the owners of multi-owner residential buildings etc.
6. Preparation of the technical documentation on the number, type and capacity of the systems, which are to be implemented, as well as the details, related to the renovation and thermal insulation of the buildings. The appointment of the contractor shall take place in accordance with the Public Procurement Act.
7. Introduction of the systems, renovation and thermal insulation of the buildings and appointment of investor's supervision. This step can include the preparation of preliminary time schedules, organization of tender procedures, installation of equipment and renovation and thermal insulation of buildings. The introduction of the equipment and the renovation and thermal insulation of the selected buildings can take place either in stages or simultaneously, according to the financing programme selected. The investor's supervision shall be performed by a

person/company, appointed, based on the applicable procedure, who shall monitor the quality and safety assurance, during the construction works.

8. Project promotion. The general public must be made aware of all the implemented measures and equipment, as well as the relevant initial results. This will be accomplished through media reporting, preparation of information materials, organization of open-door days for the systems, implemented in the public buildings, etc.

2.2 Time schedule



2.3 Budget and resources needed

The financing options, potentially useable for the project, are diverse and include, but are not limited to:

- Grants, EU's Operating Programmes;
- Funding, provided by environmental funds, in particular – the Enterprise for the management of environmental protection activities and the National Trust EcoFund, including interest-free loans;
- Loans with beneficial conditions and/or guarantees, provided by a future specialized fund for the encouragement of the renewable energy production; financial lease of equipment, usually provided by a provider, implementing the project on a turnkey basis;
- Encouraging financial schemes with a wider scope, such as the flexible mechanisms of the Kyoto Protocol and in particular the "joint performance" mechanism;

- The Bulgarian Energy Efficiency and RES Fund;
- Governmental and municipal budgets;
- Energy Savings Performance Contracts;
- A combination of white/green certificate trading schemes, low-interest loans from intergovernmental specialized funds, bridge lending;
- Loans from commercial banks;

The precise cost of the EE measures for the 6 selected buildings will be calculated after the detailed energy audit, which will also provide information on the specific options and eligible EE measures, as well as their respective costs. Until then we can only show estimations, based on preliminary expert evaluations, as follows:

Chitalishte (Community Centre) „Napredak 1871“ BGN 2 000 000.

Municipal Children's Complex BGN 500 000.

The building of the „General Active Treatment Hospital - Nikopol“ EOOD BGN 1 100 000.

Medical Centre BGN 400 000.

„Radost 3“ Kindergarten BGN 650 000.

The building of the municipal administration BGN 1 100 000.

The total amount of the investments is BGN 5 750 000 or EUR 2 936 670

3 Collaboration with stakeholders

- Mayor's offices of the populated areas in the Nikopol Municipality – participation in the project implementation;
- Municipal council – making decisions for loan applications and the project implementation;
- Energy and environmental experts of the municipality – participation in the implementation of the plan and the monitoring;
- Local suppliers and manufacturers – supply of the necessary materials for the performance of the project activities;
- NGOs and consultants – energy audits and modelling.

The Action plan was prepared, taking into consideration the views of the municipal administration on the available potentials and opportunities, studies and preliminary evaluations, current deficits and limitations.

Currently, there are ongoing activities, related to the preliminary attitudes for the involvement of NGOs for the use of their expert potential and experience in the implementation of RES, through their members and consultants.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties/ institutions/companies	Municipality and mayors' offices	Process administration and management	Contribution to the action plan and its implementation
Political decision- makers	Research organizations, NGOs and independent experts	Involvement in the surveying and modelling	Their contribution will be defined when signing partnership agreements for the implementation of the plan
	Municipal experts and the management of the municipality	Plan administration	Information measures and ongoing plan implementation
Target groups	Users of municipal buildings and the general population of the municipality	Support for the plan objectives and their implementation	Information measures

4 Monitoring

The monitoring of the results shall take place at each step of the project. Depending on the level of achievement of the respective indicators, relevant corrective steps would be possible.

A key moment in the monitoring is the collection of preliminary data and the benchmarking of the project results with such data. The communication of the results is the final step in the change of attitudes, informing and achievement of the objective for the encouragement of the public for the introduction of RES on the territory of the municipality.

Monitoring should be assigned to a unit of the municipal administration, in order to make use of all the available knowledge of the implementing team. With the support of the experts attracted from NGOs, the team will undertake corrective measures, where necessary. The activities of the monitoring team will be supported in the final phase of the project implementation, by the appointed supervisors.

5 Risk management

Risk	Probability of realising	Mitigation measure
Unfavourable changes or lack of favourable changes in the regulatory framework or public financing	Medium	Increased participation in joint structures of the municipalities and taking a firm and open position on the actual needs in case of legislative changes
Increased cost of the investments in RES	Low	Preparation of tender documentation and organization of the procedures as a top priority and as soon as practicable; careful selection of the suppliers, based on stringent criteria
Insufficient resources	Medium	Attracting more stakeholders, including other municipalities for lobbying for resources through EU's OP, support funds
Insufficient local potential – serve and materials providers, trained administrative staff	Medium	Use of the capabilities of the local business through social commitment; attracting consulting

		services
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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

**Belene Municipality, part of the
North Bulgaria region**

**„Implementing Energy Efficiency
measures combined with RES installations
for municipal buildings to reduce energy
use in Belene Municipality“**

English version

**prepared by:
WWF Bulgaria**

**PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7**

Date: December 2018



**CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK**

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Priority Area: **Implementing EE and RES measures in public buildings**

Action plan: Implementing Energy Efficiency measures combined with RES installations for municipal buildings to reduce energy use in Belene Municipality

1 Objective

For almost forty years Belene Municipality has been functioning, based on the still not implemented plans for the construction of a second nuclear power plant in Bulgaria, planned to take place in this area. This policy has resulted in Municipality's lagging behind in terms of the planning of sufficient strategic documents, measures and projects in the area of energy efficiency and renewable energy sources, for both the municipal public property and the households in this Municipality.

This action plan aims at establishing a specific approach of by the Municipality, in order to plan and subsequently start working for the implementation of energy efficiency measure with respect to the municipal buildings in the Belene Municipality. At a later stage the opportunity for the introduction of RES production of electricity and thermal energy, shall also be established, diversifying the energy sources, by replacing and implementation of new heating systems. This will result in the significant reduction in municipality's costs, will ensure visible energy savings and last, but not least -it will reduce the greenhouse emissions and enable households to become better aware of their benefits and subsequently undertake similar activities for their own properties.

1.1 Objective scope and targets values

The results of this plan will be accomplished first by convincing the local administration and the municipal officials that such actions are not only mandatory, but also very useful in reducing municipality's costs and for the establishment of new jobs. Secondly, by drafting a plan for the identification and renovation/thermal insulation of the buildings most in need of it + subsequent replacement of the fuel used for heating of other municipal buildings, including through the installation of solar collectors for hot water, thermal pumps and biomass utilization.

The action plan aims at encouraging the Belene residents to contribute to the implementation of RES, and this approach would also result in the preparation of the legally required strategic plans of the municipality with respect to RES and EE.

According to the preliminary expert evaluation, the most urgently requiring intervention buildings, currently outlined by the Municipality, are, as follows:

- The building of the municipal administration of Belene, the Dimcho Debelyanov primary school – no energy audits have been carried out and no EE measures have been implemented. These buildings are heated, using gasoil, which results in significant financial expenditures for the municipality;
- Two kindergartens and one schools have implemented certain EE measures (class C – replaced windows and Styrofoam insulation installed), but they also use local gasoil operated heating systems and need planning for the replacement of the fuel used, again in order to ensure financial savings;
- Chitalishte (Community Centre) Hristo Botev and the Municipal Children's Complex – Belene with their sports hall have no local heating systems and use air-conditioners.

The Municipality does not have at its disposal any relevant data, regarding the energy costs of the said buildings, since it fails to collect annual statements of these expenditures, according to the EE Act. What is clear is that the energy expenditures are rather high and Belene incurs significant financial liabilities on an annual basis, resulting in transfers for the payment of electricity and heating expenditures, for both the aforesaid buildings and most of the other buildings, which are the responsibility of the Municipality.

The action plan generally refers to all the populated areas in the Belene Municipality, including: the Town of Belene and the villages – Byala Voda, Dekov, Kulina Voda, Petokladentsi, Tatari, with a total population of approximately 8 500 people. However, in the first stage, the measures will be focused on the municipal centre and the listed buildings in particular, which are considered top priority.

The implementation of this plan will:

- Improve the energy efficiency of at least 3 municipal buildings in Belene of a total of 32 such buildings in the entire municipality.
- At fuel, used by at least 3 buildings will be replaced by a lower-emission and lower-cost fuels.
- New heating systems will be installed in at least 2 buildings.

This will reduce in a 30% decrease by 2030 of the greenhouse gas emissions, of the financial expenditures and will also save the same quantity of energy for the municipality, upon implementation.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Number of buildings with implemented EE measures	At least 3 buildings with implemented EE measures	Building passportization including their energy efficiency class
Number of replaced fuel systems for heating	At least 3 buildings with replaced fuel systems, now using RES	Commissioning Reports/Certificates
Number of buildings with new implemented heating systems	At least 3 buildings with new fuel systems using RES	Commissioning Reports/Certificates
Estimated quantity of CO ₂ emissions reduction, energy saved and financial savings	30% less CO ₂ emissions/year, 30 % energy savings 30% financial savings	Annual reports on the energy saved, produced by each system

2 Implementation strategy

2.1 Step by step description

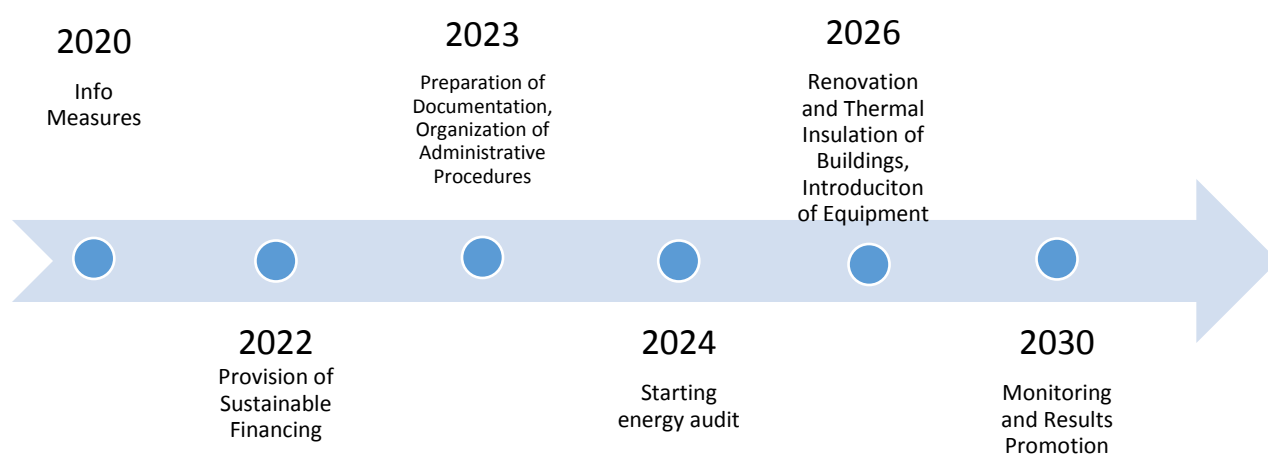
The steps, as listed below, ensure the transparency of the plan and its implementation, as well as the understanding and favourable attitudes among the general public and all the stakeholders.

1. Carrying out information activities for presenting the need of the project and municipality's intentions for the stimulation and support of the introduction of energy efficiency measures, as well as the change of the fuels used and the production of electricity and thermal energy from renewable energy sources.
2. Choosing the financing model. This step involves a comparative evaluation of several models of financing the action plan, in order to decide which would be the most appropriate option, from the perspective of the moment of implementation.
3. Performance of energy audit of the buildings, chosen for renovation and thermal insulation, and those, where the fuels used will be replaced. The energy audits are key when establishing the necessary energy efficiency measures and deciding the capacity of the electricity and thermal energy production systems. The audits will also be used for the follow-up and verification of the results achieved under this action plan, as well as in addition to the project.
4. Preparation of tender documentation in accordance with the Public Procurement Act and organization of a tender procedure to appoint the contractor. The preparation includes review and verification of the documentation, preparation of the terms of reference, preparation of the conditions and evaluation criteria, contract template, etc. At this stage it is necessary to clearly define Municipality's responsibility in the implementation of measures in households, as this shall be specified in the contracts. The details in this step depend on the chosen method of financing and the results of the information campaign.
5. Preparation and organization of administrative and urban planning procedures, related to the change of the use of terrains, etc. Especially with respect to the potential use of agricultural land or terrains for developing thermal pumping systems, obtaining the consent of the owners of multi-owner residential buildings etc.
6. Preparation of the technical documentation on the number, type and capacity of the systems, which are to be implemented, as well as the details, related to the

renovation and thermal insulation of the buildings. The appointment of the contractor shall take place in accordance with the Public Procurement Act.

7. Introduction of the systems, renovation and thermal insulation of the buildings and appointment of investor's supervision. This step can include the preparation of preliminary time schedules, organization of tender procedures, installation of equipment and renovation and thermal insulation of buildings. The introduction of the equipment and the renovation and thermal insulation of the selected buildings can take place either in stages or simultaneously, according to the financing programme selected. The investor's supervision shall be performed by a person/company, appointed, based on the applicable procedure, who shall monitor the quality and safety assurance, during the construction works.
8. Project promotion. The general public must be made aware of all the implemented measures and equipment, as well as the relevant initial results. This will be accomplished through media reporting, preparation of information materials, organization of open-door days for the systems, implemented in the public buildings, etc.

2.2 Time schedule



2.3 Budget and resources needed

The financing options, potentially useable for the project, are diverse and include, but are not limited to:

- Grants, EU's Operating Programmes;

- Funding, provided by environmental funds, in particular – the Enterprise for the management of environmental protection activities and the National Trust EcoFund, including interest-free loans;
- Loans with beneficial conditions and/or guarantees, provided by a future specialized fund for the encouragement of the renewable energy production; financial lease of equipment, usually provided by a provider, implementing the project on a turnkey basis;
- Encouraging financial schemes with a wider scope, such as the flexible mechanisms of the Kyoto Protocol and in particular the “joint performance” mechanism;
- The Bulgarian Energy Efficiency and RES Fund;
- Governmental and municipal budgets;
- Energy Savings Performance Contracts;
- A combination of white/green certificate trading schemes, low-interest loans from intergovernmental specialized funds, bridge lending;
- Loans from commercial banks.

The precise cost of the EE measures and the replacement of the fuels used at the specified buildings will be calculated after the detailed energy audit, which will also provide information on the specific options and eligible EE measures, as well as their respective costs. Until then, the municipality and the plan cannot even provide estimations, although based on the preliminary expert assumptions, the overall costs may be expected to be in the range BGN 5 - 8 million,

3 Collaboration with stakeholders

- Mayor’s offices of the populated areas in the Belene Municipality – participation in the project implementation
- Municipal council – making decisions for loan applications and the project implementation
- Energy and environmental experts of the municipality – participation in the implementation of the plan and the monitoring
- Energy and environmental NGOs – energy audits of buildings and modelling
- Educational and cultural institutions – promotion and raising awareness of the project
- Service and equipment providers, consultants – materials, engineering of RES facilities and renovation and thermal insulation of buildings

The Action plan was prepared, taking into consideration the views of the municipal administration on the available potentials and opportunities, studies and preliminary evaluations, current deficits and limitations.

During the energy audits, the information and promotional activities, as well as with respect to the selection of the financing mechanisms and the organization of tender procedures, the number of stakeholders is expected to grow.

Currently, there are ongoing activities, related to the preliminary attitudes for the involvement of NGOs for the use of their expert potential and experience in the implementation of RES, through their members and consultants.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties/ institutions/companies	Municipality and mayors' offices	Process administration and management	Contribution to the action plan and its implementation
Political decision- makers	Research organizations, NGOs and independent experts	Involvement in the surveying and modelling	Their contribution will be defined when signing partnership agreements for the implementation of the plan
	Municipal experts and the management of the municipality	Plan administration	Information measures and ongoing plan implementation
Target groups	Users of municipal buildings and the general population of the municipality	Support for the plan objectives and their implementation	Information measures

4 Monitoring

The monitoring of the results shall take place at each step of the project. Depending on the level of achievement of the respective indicators, relevant corrective steps would be possible. Key for this project will be the monitoring and evaluation, as soon as the completion of the information campaign. The reason for this is the preliminary impression of contradictory attitudes among the population of the municipality, which should be properly addressed, before undertaking the next steps.

A key moment in the monitoring is the collection of preliminary data and the benchmarking of the project results with such data. The communication of the results is the final step in the change of attitudes, informing and achievement of the objective for the encouragement of the public for the introduction of RES on the territory of the municipality.

Monitoring should be assigned to a unit of the municipal administration, in order to make use of all the available knowledge of the implementing team. With the support of the experts attracted from NGOs, the team will undertake corrective measures, where necessary. The activities of the monitoring team will be supported in the final phase of the project implementation, by the appointed supervisors.

5 Risk management

Risk	Probability of realising	Mitigation measure
Unfavourable changes or lack of favourable changes in the regulatory framework or public financing	Medium	Increased participation in joint structures of the municipalities and taking a firm and open position on the actual needs in case of legislative changes
Increased cost of the investments in RES	Low	Preparation of tender documentation and organization of the procedures as a top priority and as soon as practicable; careful selection of the suppliers, based on stringent criteria
Insufficient resources	Medium	Attracting more stakeholders, including other municipalities for

		lobbying for resources through EU's OP, support funds, the national budget
Insufficient local potential – service and materials providers, trained administrative staff	Medium	Use of the capabilities of the local business through social commitment; attracting consulting services

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

Action plan

Berkovitsa Municipality, part of the
region of North Bulgaria

“Analysing of the possibilities for building
solar heating system for public buildings in
the municipality of Berkovitsa“

English version

prepared by:
WWF Bulgaria

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: December 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Implementation of RES in public buildings

Action plan: Analysing of the possibilities for building solar heating system for public buildings in the municipality of Berkovitsa

1 Objective

The objective of this plan is to provide a detailed analysis of the potential for the development of a solar heating system, often referred to simply as “Solar District Heating“. This analysis should result in the drafting of a clear approach as to how and why to build Solar District Heating, which would ensure reduced heating expenditures, heating of water and cooling, in a complex of public buildings in the Berkovitsa Municipality, where it is technologically and spatially possible and financially beneficial and the even more visible commitment of the municipality in the area of the development of RES.

The provision of central heating and hot water using solar energy is based on a system, where water is heated centrally from arrays of solar thermal collectors (Central Solar Heating Plants - CSHPs) and is distributed through district heating pipework (or «block heating» systems, in the case of the smaller systems).

Solar collectors may be installed on the roof of a building (in the case of the block systems) or on the ground (in the case of the central solar heating plants and where possible).

Central solar heating may include “thermal storage“ (underground heated water storage system), passing from daily storage to seasonal thermal energy storage (STES). Thermal storage increases the solar fraction – the ratio between the solar energy profit and the total energy needs in the system – for solar thermal systems. In the best-case scenario, the objective of the implementation of the seasonal storage of solar energy, collected during the summer, would be storage and used in the winter months.

1.1 Objective scope and targets values

The significant conditions, decisive for the successful technical adaptation of the Solar District Heating concept, are:

- energy audit and high solar energy potential;
- assessment, showing available potential for energy production from biomass, as thermal source, when engineering new plants;
- presence of developed gas-supply grid, as an existing heat source or main thermal source (CHP) when engineering new solar plants;
- duration of the heating season (day-degrees);
- social status of the energy consumers;
- density of the buildings/population, and density of the thermal loads, MW/ha, respectively;

- dynamics of the annual and seasonal population, incl. non-residents;
- ratio of the hot water and heating loads;
- ratio of the loads of the residential buildings and public buildings;
- presence of a high degree of air pollution;
- specific requirements/policies, imposed by the local authorities, for high levels of air purity;
- technical and regulatory support by governmental and local authorities in the overall process of implementation of the Solar District Heating projects.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Public buildings covered	At least 3 municipal buildings covered by the first stage by 2025. At least 3 more buildings after 2030.	A list of covered public buildings; Energy survey reports
Energy savings	25 000 kWh/year of saving (according to the preliminary expert evaluation)	Calculation methodology
Financial savings	According to the preliminary expert evaluation at least 40 to 50% decrease in the financial expenditures on an annual basis for the selected buildings, currently equal to an amount of approximately EUR 25 thousand	Financial savings from monthly bills, on an annual basis
Carbon savings	At least 40% decrease of the quantity of the emissions when using electrical and thermal energy, currently paid by the municipality for the specified buildings	Quantity of carbon emissions saved, which may be extrapolated at financial offset rates
Upgrade and growth potential	Number of new users. At least 500 households and 5 types of consumers on the part of the business will be covered by the subsequent upgrade and connection to	Feasibility studies for the connection of new users

	the solar district heating after 2035.	
Promotion of the technology for involvement of the local stakeholders	At least 30% of the population should support and fully understand the project and its benefits, before its actual launching in the next 5-7 years	Public survey of the attitudes of the residents of Berkovitsa

2 Implementation strategy

2.1 Step by step description

The implementation of the process for the engineering of the Solar District Heating requires the undertaking of a number of administrative steps, studies and specific energy modelling, in order to ensure the application of the best possible combination of technologies for each individual building and for all buildings together, from the perspective of the grid upgrading and expansion potential. For this purpose, it is recommended to follow the sequence of the listed steps, this is not mandatory, but only the provision of the sufficient information and details would ensure the implementation of the Solar District Heating:

1. List of the energy expenditures of a list of pre-identified public buildings. The original list of the buildings includes a school, as sports hall, medical centre/hospital and children's institutions. The main part of all energy data and indicators will be collected, based on the bills and invoices for a period of at least 1 to 3 years back, for each building. The list should also include the type and condition of the heating and cooling systems and their respective condition.

2. Study of municipal terrains near the buildings and their regulation, inclination, sunlight exposure. The presence of appropriate terrains for the development of solar plants and an energy storage facility, their specific position, size, sunlight exposure and shadowing will be the basis for determining the technological positioning of the facilities, with maximum utilization of the available resources.

3. Alternatively – a review of the roof areas for the potential installation of the collectors, instead of using the ground. It is necessary to describe the condition of the roofs, their exposure and inclination, as well as whether or not it would be possible to carry out installation works thereon, considering any already performed or forthcoming repairs.

4. Energy surveys of the buildings – the surveys shall be performed, based on regulatorily approved methodology and it is necessary for determining the condition of the buildings in terms of their energy efficiency.

5. Energy modelling of heating and cooling loads of the annual consumption. The modelling is a necessary study prior to the construction of the solar district heating plants, with view of the placing and installation of all the engineering systems at the proper locations, with minimum interference and maximum benefit. Software modelling optimizes the process of their architectural design, including through visualization and

monitoring of the operation of the systems, as early as the design stage, and provides the most precise information on the energy and financial savings.

6. Assignment of the feasibility study and localization-investment analysis. The objective of the feasibility study is to provide a preliminary evaluation of the energy expenditures, of the use of the best available technology for Berkovitsa, as well as to cover on a preliminary level, the economic, environmental and technical aspects of the project implementation. It should cover the following main items:

- Subject matter of the study
- Data on the energy consumption
- Data on the production by the future system
- Accumulation facilities
- Economic evaluation
- Environmental evaluation
- Technical solution
- Design and implementation

As for the localization and investment analysis, it provides the most exhaustive comparative evaluation of the potential for financial savings of the expenditures of the Berkovitsa Municipality, ensuring an actual evaluation of the overall potential of the same property (land and buildings), while at the same time providing easy comparison to other potential investment solutions. The analysis includes the following:

- Investment repayment period
- Average rate of the income and net present value
- Profitability index
- Internal rate of return
- Potential for other possible investments

7. Financing models for the solar district heating. Several models of financing of such a project should be compared in order to decide what would be the most appropriate model, in terms of the respective moment of implementation. Usually, the following options are possible:

- Public (grant) financing
- ESPC schemes
- Loans from financial institutions
- Public-private partnership
- Combination of these options

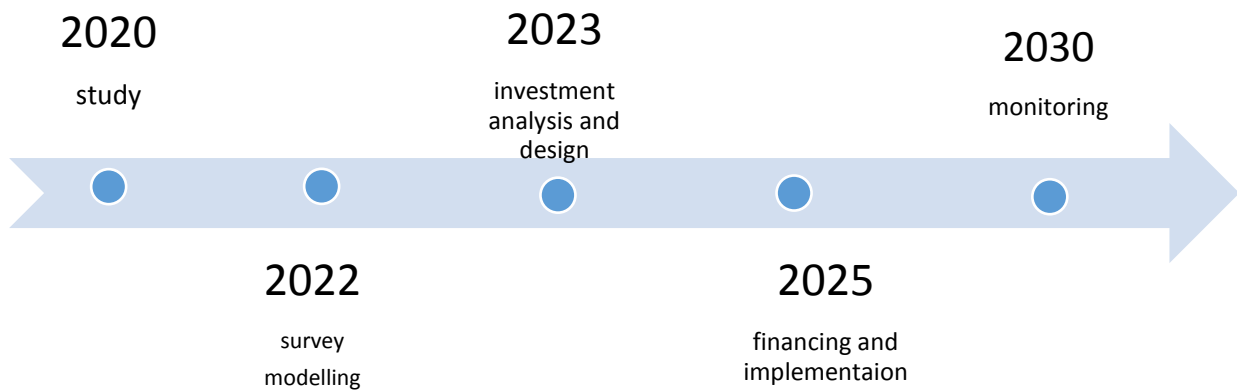
8. Design. The preparation of the technical and architectural design documentation, as the first step of the forthcoming implementation and engineering of the system.

9. Financing and implementation of the system. This activity includes the period of the actual construction of the systems and the testing of their operation. The construction may take place in stages in the covered buildings or simultaneously, according to the relevant needs of the chosen technology.

10. Information and promotional measures. The information measures are both general for the town and clarification of the benefits of the expected impact of the measure, and specific for the inhabitants and/or visitors of the buildings, included in the project.

10. Monitoring of the system. Maintenance of the systems, review of the novelties and planning the upgrading of the system

2.2 Time schedule



2.3 Budget and resources needed

Appropriate sources for the financing of projects, using solar energy/ RES, are:

- Loans from commercial banks;
- Grants, provided by environmental funds, in particular – the Enterprise for the management of environmental protection activities and National Trust EcoFund, including interest-free loans;
- Loans with beneficial conditions and/or guarantees, provided by a future specialized fund for the encouragement of the renewable energy production; financial lease of equipment, usually provided by a provider, implementing the project on a turnkey basis;
- Encouraging financial schemes with a wider scope, such as the flexible mechanisms of the Kyoto Protocol and in particular the “joint performance” mechanism;
- The Bulgarian Energy Efficiency and RES Fund;
- Governmental and municipal budgets;
- Energy Savings Performance Contract;
- A combination of white/green certificate trading schemes, low-interest loans from intergovernmental specialized funds, bridge lending;

Currently we can only rely on the preliminary expert evaluation, indicating that the necessary investment will amount to at least BGN 2 million for the implementation of the first stage of the project, but it will be repaid in less than 10 years, which makes it possible to ensure financing, based on various schemes and financial instruments.

3 Collaboration with stakeholders

On the territory of the Berkovitsa Municipality, the implementation of the plan depends on:

- The central municipal administration and the mayor

- Research institutions and businesses (local and centralized)
- Energy manager/department in the municipality/Environmental expert
- NGOs (local and centralized)
- Organizations with social focus
- Social Assistance Directorate
- Educational and cultural institutions;
- Service and consulting providers;
- Suppliers of equipment, materials and consumables, including fuels, in case a cogeneration option is chosen
- *(it is necessary to list the respective actors with their specific functions and tasks for the plan implementation)*

When preparing the Action Plan, the perspective of the municipal administration was taken into consideration, regarding the available potentials and opportunities, studies and preliminary evaluations.

Role and responsibilities in the implementation of the Action Plan

The stakeholders below are considered key for the implementation of the plan:

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipality and mayors' offices	Process administration and management	Contribution to the action plan and implementation of the RES objectives
Political decision-makers	Research organizations, NGOs and independent experts + representatives of the business	Participation in the surveying and modelling	Their involvement will be defined when establishing specific partnerships
	Municipal experts and management of the Municipality	Process administration	Information measures
Target groups	Users of municipal buildings and personnel	Support and understanding of project's objectives	Information measures

4 Monitoring

In the course of implementation of the Plan, the indicators, determining the efficiency of the investments, shall be the proper indicators for the achievement of sufficient confidence in the project implementation, as well as indicators of the results. These indicators clearly show how the investment will develop – the indicators for the achievement of the Project Objectives and the ultimate results thereof – results indicators.

The monitoring of the activities, related to the project, will continue for 3 to 10 years, after the commencement of the investments. It should be systematically developed and applied, and bind the upgrading of the system. The following monitoring activities are planned:

2020 – 2024 – collection of data and preparation for the initial commissioning;

2025 – 2030 – monitoring of the efficiency of operation and achievement of the indicators;

2030 – updating the monitoring, operation and upgrading plan;

After 2030 – upgrading the capacity of the system and connection of new facilities and users.

5 Risk management

Risk	Probability of realising	Mitigation measure
Insufficient resources	Medium	Attracting more stakeholders, including NGOs, businesses and other municipalities for lobbying for resources through EU's OP, support funds, national budget
Insufficient local potential – service and materials providers, trained personnel	High	Use of the capabilities of the local business through social engagement, attracting consulting services
Insufficient public financial resources for the implementation of the solar system	Medium	Promotion of the technology and its positioning in various financial instruments, so that this risk is replaced by other financial instruments, also suitable for the municipalities and regions

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

Action plan

Gorna Malina Municipality, part of the Danube Basin

„Development of possible financial
schemes for implementation of solar
heating system in municipal buildings -
Gorna Malina Municipality“

English version

prepared by:
WWF Bulgaria

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

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Implementation of RES in public buildings

Action plan: Development of possible financial schemes for implementation of solar heating system in municipal buildings - Gorna Malina Municipality

1 Objective

The objective of this plan is summarize the “Solar District Heating” technology and outline the financing and engineering opportunities and options, resulting in a reduction in the expenditures for heating, hot-water heating and cooling of public building public buildings in the Gorna Malina Municipality. This will also result in decreased carbon emissions by the municipality.

Gorna Malina is the first green municipality in Bulgaria and within the Panel 2050 project it considers the possibilities to implement the Solar District Heating idea on its territory in three phases. All necessary preliminary data has been collected in recent years, and the step-by-step planning of this project has commenced.

Despite the intentions of the administration and the mayor to implement this technology for the first time in Bulgaria, as a public property and project, the most significant challenge yet is the initial high capital investments and the clarification of the possible options for financing the building of the system, which makes it hard for Gorna Malina to choose the best way forward in the implementation of this innovative for Bulgaria idea.

System description: The provision of central heating and hot water using solar energy is based on a system, where water is heated centrally from arrays of solar thermal collectors (Central Solar Heating Plants - CSHPs) and is distributed through district heating pipework (or «block heating» systems, in the case of the smaller systems). Solar collectors may be installed on the roof of a building (in the case of the block systems) or on the ground (in the case of the central solar heating plants and where possible). Central solar heating may include “thermal storage” (underground heated water storage system), passing from daily storage to seasonal thermal energy storage (STES). Thermal storage increases the solar fraction – the ratio between the solar energy profit and the total energy needs in the system – for solar thermal systems. In the best-case scenario, the objective of the implementation of the seasonal storage of solar energy, collected during the summer, would be storage and used in the winter months.

The construction of the Solar District Heating in Gorna Malina is planned to take place in several phases, starting from a pilot phase with 3 public buildings; the second stage will cover the inclusion of 3 buildings of the municipal administration; and in the final stage the expansion of the grid will cover the supplying of thermal energy to 6 multi-family residential private buildings. The implementation of these intentions, will enable the Municipality to achieve significant financial and energy savings (40 to 60% on an annual basis starting from phase one), but this could also be possible with respect to the multi-family residential buildings after their inclusion in phase three.

The different financing options define the period for the return of the investments. In all cases, the shortest period for the return of the investment cannot be less than 2-4 years,

and this always includes a high share of grant financing and direct support through free public funding. In case of standard project financing, this period would be 8-16 years. Despite the different scenarios for the repayment of the investment, in all cases, the expenditures of the Gorna Malina Municipality will decrease, since the useful lifetime of such a facility is 50 to 75 years, and in the long term, the Municipality will be able to release significant financial resources, to be used for other similar projects or for other needs, as required in at the time. Furthermore, saving significant amount of emissions greenhouse gas (approximately 240-250 tons per year) will start from the implementation of phase one.

1.1 Objective scope and targets values

The Central Solar Heating Plants are mainly used for high-efficiency heating of buildings, districts or entire towns and villages. They can also be used to generate cooling through the construction of a central cooling system of buildings. This means that the buildings, for which cooling is also required, will have to build a floor-cooling system as well, which is rather expensive, unless included in the original architectural design, when the building is constructed, or unless complete refurbishment and/or overhaul of the building is planned.

In the case of Gorna Malina, the overall efficiency is high, due to the high ratio of the energy needs of the buildings, selected for phase one and phase two and the suitable solar radiation.

The conditions that have to be met and are decisive for the successful technical implementation of the solar district heating, are:

- Energy audit and high solar energy potential;
- Assessment, showing available potential for energy production from biomass, as thermal source, when engineering new plants;
- Presence of developed gas-supply grid, as an existing heat source or main thermal source (CHP) when engineering new solar plants;
- Duration of the heating season (day-degrees);
- Social status of the energy consumers;
- Density of the buildings/population, and density of the thermal loads, MW/ha, respectively;
- Dynamics of the annual and seasonal population, incl. non-residents;
- Ratio of the hot water and heating loads;
- Ratio of the loads or the residential buildings and public buildings;
- Presence of a high degree of air pollution;
- Specific requirements/policies, imposed by the local authorities, for high levels of air purity;
- Technical and regulatory support by governmental and local authorities in the overall process of implementation of the Solar District Heating projects.

1.2 Target indicators

The road map reviews the potential for the production and use of solar energy for heating needs only in the first phase, i.e. for three public buildings and the options for their financing. These are:

- **Sports Complex, Gorna Malina Hall;**
- **Creche and Kindergarten (C&K) “Vyara, Nadezhda I Lybov” /Faith, Hope and Love/;**
- **Secondary School of General Education (SSGE) “Hristo Botev”.**

A replacement of the obsolete heating systems (industrial gas-oil boiler and electric boiler) is planned, as well as the possible use of the existing newly installed modern heat pump system of the sports complex. The new elements of the Solar District Heating include:

- solar thermal field
- thermal storage
- heat pump system
- technology building (control, automation, pumping systems, storage rooms etc.)
- connections to the existing buildings and their heating systems



Diagram 1. Phase 1 in the construction of solar district heating in Gorna Malina

The total heat and electricity consumption of the three buildings, calculated and averaged, based on the consumption in the past 5 years **amounts to 1190 MWh/year, with peak consumption of 0,5 MW**. The financial cost of the expenditures, incurred by the municipality is in the range of **EUR 40-60 thousand** per year.

According to the type of the possible technical solutions, the production capacity of the future solar district heating shall vary with a deviation of up to 10-15%, and the total price of the Solar District Heating in phase 1 also varies at 10% of the pre-set price, in accordance with the selected technology.

Key indicators:

- Number of buildings covered
- Energy savings
- Financial savings
- Greenhouse gas emissions economized

Objective	Target indicator	Method of measurement and validation
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3 municipal public buildings connected to the central solar heating plant	At least 3 municipal buildings covered by the first stage by 2023. At least 3 more buildings after 2028.	A list of covered public buildings;
Energy savings	3 public buildings with energy consumption decreased by at least 50% compared to the initial indicators, or 590 MWh/year.	Annual energy survey reports
Financial savings	EUR 20-60 thousand saved per year from the energy expenditures of the municipality	Calculation methodology based on the energy bills
Greenhouse gas emission saving	240-250 tons of Carbon dioxide less in the total emissions of the municipality	Expert evaluations and standard calculation methodology

2 Implementation strategy

2.1 Step by step description

1. Legal and administrative support of the project for the central solar heating plant. Certain administrative urban planning procedures may be required for the terrains and buildings which may be used. The implementation of the system requires licensing, in accordance with the Bulgarian regulatory framework. This activity requires the planning and undertaking of all necessary administrative steps for the selection and preparation of the documents for the chosen method (or a combination of approaches) for financing the project.

2. Information measures and communication with stakeholders. The information measures are both general for the town and clarification of the benefits of the expected impact of the measure and specific for the inhabitants and/or visitors of the buildings, included in the project. The construction of the system for residential buildings requires more direct communication with the owners for settling the relations with the investor for the construction, operation and monitoring of the project.

3. Public financing through grants: In case of grant financing within a European programme (e.g. the [Norwegian innovations programme](#)), the municipality may benefit from up to 85% financial grant. In this case, the repayment period of the Solar District Heating Plant drops to merely 2-3 years, and the co-financing from the municipal budget is little over BGN 300 thousand in the project implementation period. In case of insufficient co-financing from the Municipality, this can also be provided through bridge credit co-financing by a bank, if no own capital is available. The financial and energy savings that will be achieved, including if the municipality does not use its own capital for co-financing, will be repaid within not more than 5-7 years.

4. Model of financing through an ESCO scheme: The ESCO models provide a mechanism for the implementation of investment projects for RES and EE. This is achieved through integrated engineering by a one legal entity in the production, control and storage of energy to another legal entity. After the renovation, the building (facility) reports a 50-95% decrease in the heating energy expenditures and 20-70% decrease in the electricity expenditures. ESPC financing offers a hi-tech innovative energy system providing a resource for heating and cooling from renewable energy.

The average investment repayment time is 5-7 years, depending on the specific conditions, and the contract duration is usually 8-12 years, depending, however, on the rates of return. The annual instalments for the repayment of the investment are equal to the difference between the energy expenditures before and after the renovation, evaluated through an energy audit. Such a model is proposed by [GVI](#), a company, representing a development investment fund, using a bank resource through the European Energy Efficiency Funds. GVI is the natural extension of a long experience in the area of energy efficiency and renewable energy sources, as a similar private solar district heating project, has already been implemented at a healthcare institution in Bulgaria.

With the development of the engineering capacity and expertise, they have developed an investment mechanism for quick transformation of the projects from experimental concepts to common practice. The following steps are practices in the implementation of an ESPC scheme:

- a) Signing a memorandum of understanding
- b) Energy and construction audit
- c) Development of a concept design, energy model and technical specification
- d) Signing a contract for energy efficiency services
- e) Design and construction permit
- f) Construction and installation works
- g) Commissioning
- h) Set-up and training
- i) Energy audit of the first annual cycle
- j) Maintenance during the ESPC-period

5. Financing through bank lending: The economic calculations in case of bank lending show that the standard operating expenses, calculated through energy evaluation, assessing the actual energy and financial savings comparing the scenario with the implemented new technology, to the reference (benchmarking) initial data. After that calculation, the capital expenses, incurred within the investment, are deducted. This produces an evaluation of the thermal energy production cost through the newly implemented technology, which is then compared to the initial cost-evidencing financial data, according to the preceding bills and receipts.

The capital expenses, incurred in the case of bank financing, are calculated, based on an average 25-year annuity investment loan, with an actual interest rate of 5%. Even in case of such standard financing models, the system will be repaid in 16-18 years, which will enable the unobstructed repayment of the targeted loan within 25 years.

6. Construction of the systems and equipment. This activity includes the period of the actual construction of the systems and testing their functionalities. The construction may take place in stages in all the covered buildings or simultaneously, according to the requirements of the technology chosen.

2.2 Time schedule

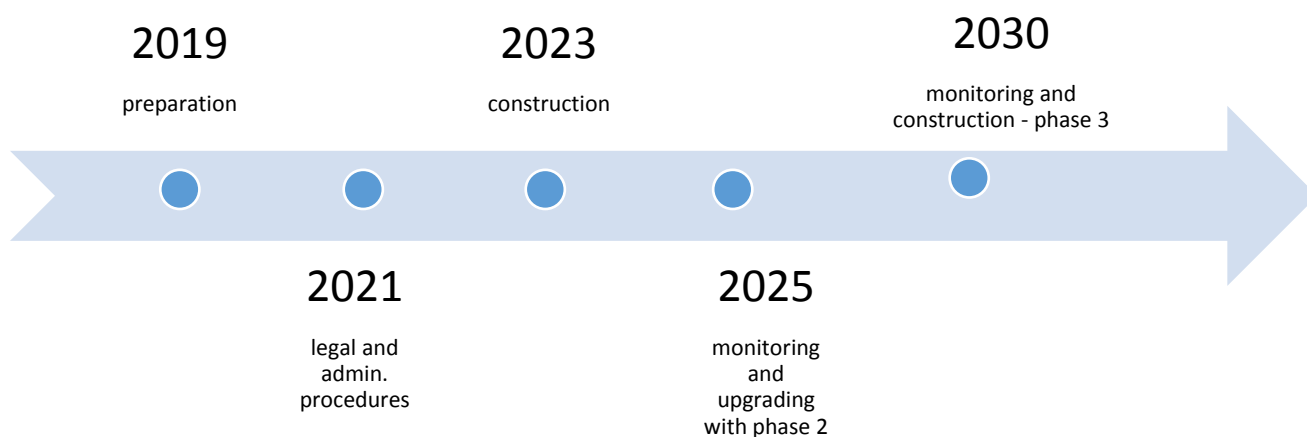
2019 – Legal and administrative support for the construction of the Solar District Heating and technology selection;

2020-2021 – Legal and administrative procedures; provision of financing;

2021-2023 – Construction of the central solar heating plant for a group of buildings;

2023-2025 – Monitoring and upgrading with phase 2;

2028-2030 – Monitoring and construction of the third phase.



2.3 Budget and resources needed

There may be many appropriate sources for the financing of projects, using solar energy/ RES. Not all of them however review and support these technologies. Most of them merely do not know it yet. However, due to its becoming more and more common in practice, we believe that within several years, all of the listed financing options will enable its becoming a regular part of people's lives in Bulgaria as well. These financing options include:

- Standard loans from commercial banks;
- Grants, provided by environmental funds, in particular – the Enterprise for the management of environmental protection activities and National Trust EcoFund, including interest-free loans;
- Grants under innovative projects within various operational programmes;
- Loans with beneficial conditions and/or guarantees, provided by a future specialized fund for the encouragement of the renewable energy production; financial lease of equipment, usually provided by a provider, implementing the project on a turnkey basis;
- Encouraging financial schemes with a wider scope, such as the flexible mechanisms of the Kyoto Protocol and in particular the "joint performance" mechanism, the modernization fund, the financial tools for fair energy transition;
- The Bulgarian Energy Efficiency and RES Fund;
- Governmental and municipal budgets;
- Energy Savings Performance Contract;
- A combination of white/green certificate trading schemes, low-interest loans from intergovernmental specialized funds, bridge lending;

The financing, required for the implementation of phase 1 amount to approximately EUR 1 million, with an investment repayment period of 2 to 25 years, according to the applied financing model.

In addition, at least 500 man-days of three experts from the municipality would be necessary in a period of 5 years, or an average of 30% of the working hours of these municipal employees, so that they can support the project implementation. This is equal to approximately EUR 50 thousand for salaries;

Furthermore, approximately 100 man-days would be required for a period of 1 year for designing all networks and systems of specialists, engineers, architects, which is also equal to approximately EUR 50 thousand for highly qualified (expert) labour.

3 Collaboration with stakeholders

Mayors' offices of the villages and towns in the Gorna Malina Municipality;
 The Municipal Council, especially in case of applying for loans
 The energy and environmental experts in the Municipality;
 The respective directorates of the Municipality, concerned by these matters
 NGOs in the environment and energy sectors
 Educational and cultural institutions;
 Suppliers of equipment, materials and consumables, including fuels, in case a cogeneration option is chosen
 Zero Energy Buildings Institute
 EcoEnergy;
 WWF

Role and responsibilities in the implementation of the Action Plan

The stakeholders below are considered key for the implementation of the plan:

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipality and mayors' offices	Process administration and management	Contribution to the action plan and implementation of the RES objectives
	Legal entity - investor with an ESPC scheme	Administration and management of the overall process, both in its energy and financial aspects	Overall project implementation
Political decision-makers	Research organizations, NGOs and independent experts + representatives of the business	Participation in the surveying and modelling	Their involvement will be defined when establishing specific partnerships

	Municipal experts and management of the Municipality	Process administration	Information measures
	The owner of the legal entity, who has implemented the ESPC scheme	Process administration	Information measures
Target groups	Users of municipal buildings and personnel	Support and understanding of project's objectives	Information measures

4 Monitoring

2022-2025 - Collection of data and preparation for the initial commissioning and planning the second phase;

2025 - Monitoring of the efficiency of operation and achievement of the indicators + implementation of phase two;

2027 - Monitoring the efficiency and achievement of the indicators; updating the monitoring plan, operation and updating the information with the best available technologies + planning the implementation of phase three;

2030 – Monitoring and implementation of phase three.

5 Risk management

Risk	Probability of realising	Mitigation measure
Insufficient resources	Medium	Attracting more stakeholders, including other municipalities for lobbying for resources through EU's OP, support funds
Insufficient local potential – service and materials providers, trained personnel	High	Use of the capabilities of the local business through social engagement, attracting consulting services
Failure to understand and accept the measures on the part of the general population and the potential target groups (owners of residential buildings)	Medium	Application of information measures and direct work through the educational and social institutions and organizations
The technology is not familiar to the local engineers. The selected designer must be very well aware	High	The designer selection criteria should be increased. A possible solution is attracting a foreign

of the respective subject matter.		designer
Due to the presence of various technologies the designer will have to study and evaluate different technological solutions, which will increase the prices of the design work	Medium	A review of the best available technologies and setting other criteria, not only financial for the implementation so that all types of savings are taken into consideration
The cost of investment will be clear after the implementation tender	Low	A cost increase at a certain rate should be included in the specific financial tool

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CENTRAL EASTERN EUROPEAN
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Action plan

Guliantsi Municipality, part of the region of North Bulgaria

Utilization of wetland biomass and
agricultural residues as local heating
source in Guliantsi Municipality

English version

prepared by:
WWF Bulgaria

PANEL 2050 – Partnership for New Energy Leadership 2050
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Energy production from biomass

Action plan: Utilization of wetland biomass and agricultural residues as local heating source in Guliantsi Municipality

1 Objective

The introduction of good practices for utilization of wetland biomass and agricultural residues in the Guliantsi Municipality is the main objective of the project within this Action Plan. The successful implementation of this project requires improvement in the organizational, financial and technical experience in the Guliantsi Municipality, in order to establish the necessary market preconditions, which would enable the energy development of the Municipality in the direction of the implementation of renewable energy sources, based on biomass, as a local energy resource.

Guliantsi aims at sustainable agricultural development and preservation of the biodiversity in the protected areas and agricultural land in the lands of the Municipality, through supporting and encouraging farmers not to apply stubble burning and residues of the grain and oleaginous crops, but to use them for the production of pellets and briquettes, to transform such biomass into a local energy source for heating purposes and to replace the use of expensive firewood and coal by the residents, but also by the business and institutions, as the latter energy sources are imported from other areas, and therefore locals have to pay higher rates.

1.1 Objective scope and targets values

The lands of the populated areas in the Guliantsi Municipality cover a part of the territory of the Natura 2000-protected area "Karaboaz". By 1939 this area used to be flooded on an annual basis by the waters of the Danube, which made it the vastest ever wetland forest in the Danube Basin, with an abundance of diverse animal and plant species. This territory used to be chiefly used for fishing, and the wetland plants were also partially used, in particular reed, which satisfied various household needs - straw-mat production and building roof structures.

The Action Plan is focused on the sustainable development of the agricultural sector and its residues, as the main energy resource within the Guliantsi Municipality. The protection of the biodiversity is the second emphasis of the Plan, as the aim is to support and encourage farmers not to apply stubble burning and to utilize the residues of the grain and oleaginous crops for the production of pellets and briquettes, thus transforming them into a resource for meeting the local energy needs.

Approximately 8% of the agricultural land used within the Guliantsi Municipality is categorized as agricultural land of high natural value, as 5,2% thereof are part of the Karaboaz protected area. The protection of this land is of exceptional significance for the achievement of the biodiversity conservation objectives. This is a valuable resource for the sustenance and means of living of the local population, and it also plays an indispensable role as a source of ecosystem and landscape diversity



Figure 1: The area of the Guliantzi Municipality and the borders of the „Karaboaz“ Protected Area (in red)

In the agricultural land in the protected area, the fields, sown with grain and oleaginous crops, there are large spots and even whole strips of reed. During harvesting this reed is cut, together with the crops and when baling the straw, a mix of grain and oleaginous crops and reed is formed. This residual product, not used by farmers, has high energy indicators and low ash content. Through its use, farmers will be able to generate additional financial revenues from the sale of the end-products (pellets and briquettes). Their utilization will also significantly limit the burning of the stubbles and the rest of this biomass in the fields, which will reduce carbon emissions, as well as the environmental footprint of the farmers. Last, but not least, the negative impact on the environment, including the habitats and the various species, inhabiting the protected area, will be reduced.

The total area of the “Karaboaz” Protected Area is 13659.86 ha, 5300 ha of which are currently farmed. According to the official agricultural data on the annual production, the prevailing crops, grown in the protected area is maize. This is easily explainable, due to the high ground waters, the close proximity with the Danube, Iskar and Vit rivers. A specific feature of this area is the extensive presence and wide distribution of reed (the *Phragmites communis* and *Juncus maritimus* species) in the farmed areas. The distribution of reed in agricultural land is different in the various parts and covers between 20% and 45% of the farmed land. Most often it is dispersed in a mosaic pattern, but in some areas there are whole strips of it. After harvesting the biomass remains in the field and is often burnt by the farmers, so that it does not obstruct subsequent farming activities, such as ploughing and sowing.

Table 1. Areas with agricultural crops and reed in the populated areas of the Guliantsi Municipality within the "Karaboaz" protected area

No.	Village Area	Total Farmed Area ha	Including crops sown Ha				
			wheat and barley – ha	maize ha	sunflower ha	reed %	reed ha
1.	Iskar	240	80	120	40	20	48
2.	Gigen	521	192	300	39	40	208,4
3.	Brest	650	19	600	31	30	195
4.	Guliantsi	1120	300	490	330	40	448
5.	Dabovan	1360	490	660	210	45	612
6.	Zagrazhden	1402	320	705	377	20	280,4
	TOTAL ha:	5293	1401	2875	1027	~ 35%	1791,8

Table 2. Amounts of biomass by agricultural crops, data from a local study

Crop type	Sown area ha	Average yield/ biomass residue from the different crops kg/ha	Total amount of biomass obtained – ton (ha*kg=ton)
Wheat and barley	1401	4000	5604
Maize	2875	7340	21 102,5
Sunflower	1027	2500	2567,5
Reed	1791,8	5400	9675,7
TOTAL:	7094,8	~ 2700	38949,7

In 2010 WWF-Bulgaria implemented the project: "Showcase Implementation of a Biomass- and Solar Energy-Based Heating System in the Building of the Persina Nature Park, for the Reduction of Electricity Consumption and CO₂ Emissions", and worked on the establishment of economic mechanisms for wetlands restoration and sustainable use of reed as a local energy source.

The implemented activities showed the opportunities and potential for the use of biomass from wetlands, as a local energy resource. The new technology resulted in an actual reduction of the electricity expenditures by approximately 60%, and the greenhouse gas emissions of the Directorate of the Persina Park decreased by over 30%. Guliantsi will follow the Persina model, where test activities were performed for the processing of biomass, and the energy and fuel analysis have been successfully completed by a specialized laboratory.

The energy analyses performed on the finished products from the different plant species (bulrush and other reeds) in the wetlands and products, obtained as a combination with various agricultural and tree species, showed that most useful for the production of pellets and briquettes is the mixing of various types of biomass, instead of separating the different materials, which is a very labour-intensive process.

The conclusions are that it is not necessary to separate different types of biomass and process it into different types of pellets – on the contrary: the mixed different types of biomass produce the best-quality pellets with the best energy combustion indicators and low ash content. The separation of the biomass by types is not profitable.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
At least 1000 ha of agricultural land and wetlands in the „Karaboaz“ Protected Area to sustainably utilize the biomass residues, as a local energy resource	Part (ha) of the total area of the “Karaboaz” Protected Area	Documentation of farmers and cooperations
At least 3 populated areas or a minimum of 1500 people to use the biomass produced, as the main local energy source for heating during wintertime and stop using firewood and coal	Number of populated areas Number of consumers	Reporting documentation of the Guliantsi Municipality and mayors' offices
At least 3 new manufacturers of pellets and briquettes to establish their facilities within the Guliantsi Municipality and the production to prove profitable	Number of production facilities Number of new, green jobs	Financial statements Social security contributions paid
At least 20% reduction of the carbon emissions in the Municipality, resulting from the change in the fuel used	Reduced total share of the quantities of firewood and coal used	Financial reports Sales volumes of coal and firewood

2 Implementation strategy

2.1 Step by step description

Preliminary studies, as well as the successful experience of the Directorate of the Persina Nature Park in the neighbouring municipality – Belene, prove the potential of the production of thermal energy from biomass, but it is necessary to encourage a market mechanism on a local level, to include all stakeholders – farmers, pellet manufacturers and distributors, local consumers and the local government, so that it is possible to close the circle and make it self-complementing, both economically and from the energy perspective. The fulfilment of Plan's objectives will be achieved, as follows:

1. Raising the awareness of the local population, local administration and the users of the land. It is necessary to take into consideration all the opportunities and imitations of using biomass within the protected area, including regulatory limitations for unfavourable agricultural practices, such as stubble burning. The collection and processing of the agricultural residues in and outside of the protected area must be reviewed from both the market perspective, and in terms of the preservation of the soil fertility and biodiversity with all direct and indirect benefits. This activity may include the training of farmers in the use of good agricultural practices, showcase activities and model use of the produced pellets.

2. Carrying out market research and establishing a model for encouragement of the production-collection-pellet production-delivery chain. It is necessary to confirm the presence of interest among the local businesses and outline the deficits – e.g. lack of storage areas, lack of suitable machinery for pellet production, other necessary conditions for achieving a standardized and competitive product. The market research should show the opportunities for achieving a favourable price for the consumers, while using the capacities of the local business as fully as possible.

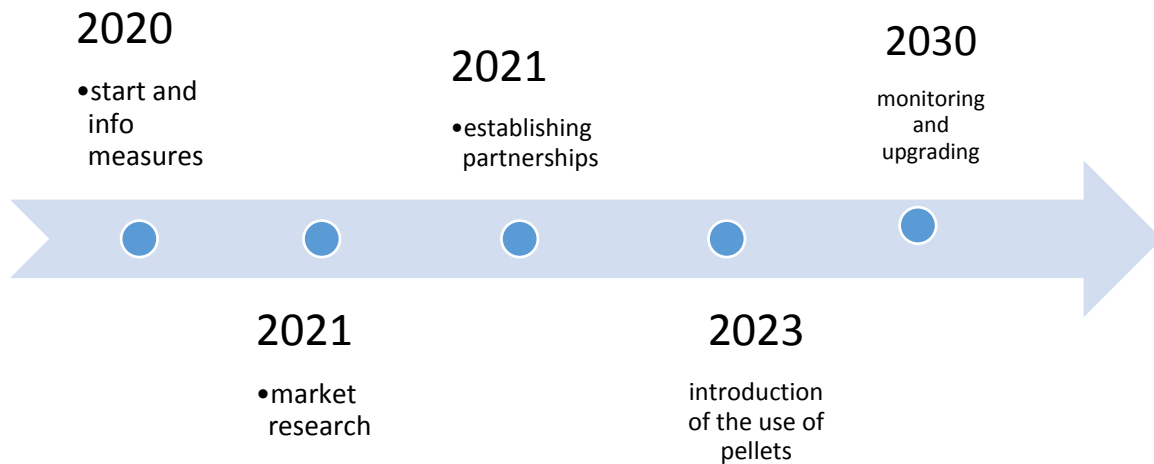
3. Studying the opportunities for the local population to efficiently use briquettes and pellets. This study is to determine to what extent a change is required in the types of the heating equipment, used by the households, as well as the relevant investments required. The results of this study will be used to determine mechanisms for encouraging households to take all necessary measures, in order to be able to benefit as fully as possible from the local energy resource. This measure may be combined with similar activities, carried out within the implementation of the municipal energy efficiency and RES plans.

4. Establishment partnerships with research institutes and businesses for the development of a local model for the efficient utilization of the biomass resources. With the support by specialists, the future opportunities for upgrading the use of biomass in combination with other renewable energy sources will be established, so that public properties and households are also able to accomplish the so-called energy transition and gradually start using local sources, leaving the added value within the local community.

5. Introduction of the use of pellets, made from agricultural biomass. This activity includes the monitoring of the amounts of agricultural mass produced, but remaining unused, as well as the quantities of briquettes and pellets produced and their realization and use in households. The installation of suitable heating equipment and systems also forms part of the activities under this Action Plan and should be coordinated with the measures for supporting energy vulnerable households. It is necessary to monitor the effects of using briquettes and pellets and ensure feedback from the consumers. These data should be collected on an annual basis, supporting the implementation of the municipal energy efficiency and RES plans.

6. Monitoring of the plan for using biomass. The monitoring must take place on an annual basis, in order to ensure the use of all newly occurring opportunities and address any occurring challenges. The changes in consumers' attitudes and the market relations must also be monitored, taking all necessary corrective measures with the help of the stakeholders and this action should be enhanced after the implementation of the first phase, which will enable the accelerated implementation and extensive application of this solution throughout the Municipality.

2.2 Time schedule



2.3 Budget and resources needed

The market research and the studying of the capabilities of the households to use briquettes and pellets, will provide the necessary information on the need of investments and use of encouragement schemes for both the business and the consumers. It is important to define and confirm the interest among manufacturers and providers, and flexible financing schemes may be used, if necessary.

3 Collaboration with stakeholders

On the territory of the Guliantsi Municipality, the implementation of the plan depends on:

- Mayors' offices
- Municipal administration
- The energy manager and the environmental expert of the Municipality
- Local farmers
- Local pellet manufacturers and providers -delivery
- Research institutes and businesses
- NGOs – consumer and manufacturers'

When preparing the Action Plan, the perspective of the municipal administration was taken into consideration, regarding the available potentials and opportunities, studies and preliminary evaluations, promoted through a similar model on the territory of the neighbouring Nikopol Municipality.

Role and responsibilities in the implementation of the Action Plan

The stakeholders below are considered key for the implementation of the plan:

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipality and mayors' offices	Process administration and management	Contribution to the action plan and implementation of the RES objectives
	Local population	Direct participants and stakeholders	Reduction of the heating expenditures with an element of addressing energy poverty
	Business	Direct participants and stakeholders	Opportunity for significant financial savings, which would also ensure the more active involvement of private capital in the implementation of the energy transition solutions
Political decision-makers	Research organizations	Participation in the market research and the studying of the capabilities and capacities of the population	Their involvement will be defined when establishing specific partnerships
	Municipal experts and management of the Municipality	Process administration	Information measures
Target groups	Farmers and households	Their involvement will be determined through studies	Information measures

4 Monitoring

The monitoring should be assigned to a unit within the municipal administration, in order to make use of all the available knowledge and expertise of the implementing team. With the help of experts from NGOs, the team will undertake corrective measures, if and when necessary. A key moment of the monitoring is the collection of preliminary data and their comparison to the results, obtained from the project. A second key element is the adaptive management of the resources (biomass) and the participants, who provide it (agricultural manufacturers).

The communication of the results is the final step in changing the attitudes and raising the awareness and in the fulfilment of the objective – encouragement of the population

to introduce the utilization of biomass from the local agriculture, as an energy resource within the Municipality, with a pilot implementation in 3 populated areas within the Guliantsi Municipality. The monitoring of the results will be carried out on each step of the project implementation. Depending on the achievement of the performance targets, relevant corrective actions can be undertaken. Key to this project will be the monitoring and evaluation as soon as the information/awareness raising campaign is completed. The reason for that is the preliminary impression of conflicting attitudes among the population of the Municipality, which need to be properly addressed prior to undertaking any subsequent steps.

5 Risk management

Risk	Probability of realising	Mitigation measure
Insufficient resources	Medium	Attracting more stakeholders, including stakeholders, incl. other municipalities for lobbying for resources through EU's OP, support funds, national budget
Lack of interest in the local business	Medium	Creating incentives for parallel pellet production in existing different local businesses; seeking options in neighbouring municipalities

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

Pleven Province, part of the North
Bulgaria region

„Introduction of electro-mobility and
development of adequate interurban bus
transport system and connections at
Nikopol, Belene, Levski municipalities“

English version

prepared by:
WWF Bulgaria

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Sustainable mobility

Action plan: Introduction of electro-mobility and development of adequate interurban bus transport system and connections at Nikopol, Belene, Levski municipalities

1 Objective

The main objective of the Action Plan is to initiate the creation and introduction of an interurban transport service for connecting the small populated areas with the municipal centres and the provincial centre, which are the responsibility of the national and municipal budgets, but which are granted by the state.

In recent years, the Nikopol, Belene and Levski municipalities, as well as the rest of the municipalities in the Pleven Province, have been experiencing a significant shortage of additional funding for the transport services. It is often necessary to terminate contracts with transport companies for certain non-profitable lines, resulting in the temporary or permanent lack of transport services for some villages and towns.

The shortage of sufficient funding also results in very sparse schedules of the interurban buses, as the residents of some villages can rely on transportation only on some days of the week, and in very limited time intervals or directions.

The current status of the transport sector means that, despite the willingness of the municipal administration and the competition between transport companies, for many residents in these municipalities, mobility is rather limited. This results in increased use of personal vehicles. The vehicles used are often old, in a compromised technical condition, causing more pollution and increased road safety risks. Bicycles are being used within the populated areas and between the different villages and towns, due to the favourable natural environment and the absence of public transport, but the share of the bicycle trips is not high.

This plan provides the main directions and steps for:

- Ensuring adequate transport service for the population in the populated areas in the three municipalities and their connectivity;
- Sustainable decrease in the use of vehicles with internal combustion engines, and thus – decrease in the harmful emissions and the carbon footprint of the province and the municipalities, as well as increased use of electric vehicles (EV) within the municipalities;
- Switching to more environmentally friendly models of use of vehicles and limiting the harm and pollution, caused by the existing obsolete vehicle fleet.

The concept for achieving these objectives is based on the transport on demand approach, due to the existing preconditions and the need of efficient and flexible

transport solutions. When implementing the plan, the forecasts, regarding the age structure and economic activity of the population should be taken into consideration, so that the transport needs are satisfied as fully as possible, while being justified in terms of time and funding.

The incorporation of electric vehicles in the interurban trips should not be considered an end in itself. In the current stage of technological development, it is clear that the EVs will be used along with hybrid vehicles and internal combustion engine vehicles, with ongoing upgrading and renewal of the fleet. At the same time, the data from the operation of the EV for business purposes confirm the sustainability of such a business solution, due to the low operating expenses. EVs should only be implemented at places and through methods, making use of their benefits as efficiently as possible.

A limiting factor for the fulfilment of the objectives is the relatively low popularity of the EV and the reservations the public and the business may have with respect to these technologies. A study¹ of the Bulgarian Electric Vehicles Association on these matters shows the following dominating views:

- a) This technology is young and dynamic;
- b) The experience with electric vehicles only covers a short period of time;
- c) On some matters, such as residual cost of electric vehicles, there are virtually no reliable market data;
- d) The full acquisition cost of an electric vehicle remains much higher than the equivalent vehicle with an internal combustion engine.

The decisions in favour of the EV, should be made based on a clear justification and expectations for economic efficiency on a case-by-case basis.

The aforesaid study compared EVs and internal combustion vehicles showed that the purchase cost of the electric vehicles was twice as high as that of the internal combustion engines, while the operating expenses of the EVs were four times lower in case of daily use for courier services. In the studied cases, the EVs covered some 15 000 km per annum, based on an average daily mileage of 60-90 km. For the purposes of interurban transport in the target municipalities, studies could show profitability of using standard vehicles on the principle of shared trips, and that is why this case study is a good starting point.

The experience in the shared EVs business in Sofia can be used as a comparison and can be adapted to the existing habits and attitudes of the residents of the Nikopol, Belene and Levski municipalities.

1.1 Objective scope and targets values

The improvement in the access to the transport service must take into consideration the need of reducing the environmental footprint of the transport sector. That is why it is necessary to apply a new approach to selecting vehicles and changing the fuels used. New technologies in this area may offer vehicles with sufficient capacity, efficiency and operating characteristics, so that the transport objectives of both the municipalities and the transport operators are satisfied.

¹ „Clean cars for a clean city” Guide of the Bulgarian Electric Vehicles Association

In the course of implementation of this plan, the municipalities should work together and in good coordination, including in close cooperation with other municipalities in the Pleven Province and the rest of Bulgaria, in order to achieve the best offers for providing the optimum number of electric vehicles.

The objective of this plan is to provide public transport, through electric vehicles connecting 10 neighbouring populated areas/ population - 7 000 people in the three municipalities - Nikopol, Belene and Levski, which are naturally connected in terms of geography and are in need of regional transport, but this is hardly possible at present.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Populated areas covered	10 populated areas in three municipalities	Number of electromobility transport plans
Number of electric vehicles provided	5-8 vehicles in three municipalities	Purchase, leasing documents etc.
Share of the trips, carried out with electric vehicles in the total number of trips	10 % share	Study methodology
Carbon emissions saved in the transport sector	At least 10% reduction in the emissions from the vehicles, owned by the municipalities and Pleven Province	Methodology for valuation and reporting the emissions, based on the respective mileage per annum

2 Implementation strategy

2.1 Step by step description

The long-standing issues, related to the performance of the contracts with transport operators in the three municipalities, and in the Pleven Province in general, are the result of underfinancing in this sector, but also indicate a lack of data, predictability and sustainability of the transport service. Adequate planning requires the performance of research and analytical activities, in order to ensure the acknowledgement and acceptance of the measures by the population and adequate involvement of the business. The following steps have been initiated and are proposed for the implementation of the plan:

- 1. Analysis of the transport needs and current transport habits of the residents of the Nikopol, Belene, Levski municipalities.**

Although the local governments seem well aware of the demographic processes – aging population, decreasing number of the population and limited number of

the employed in the populated areas, it is necessary to obtain a more detailed knowledge of the situation, especially with respect to transportation. The systematization of the data for each and every populated area will make it possible to better define the transport problem – the trip intervals required, the current demand, the visiting points in the municipal and the provincial centre. For some populated areas, the keeping of regular transport connections, with a fixed schedule, will prove non-profitable. At the same time, however, the taking into consideration all the applicable factors and development forecasts, will show the necessary capacity of the vehicles, so that a transport on demand service may be provided. In general, this means that the residents of the more remote populated areas with fewer residents, will have access to the transport service on demand. The analysis must also contain data on the habits of the residents to use alternative means of transport – shared trips, using bicycles, motorcycles.

2. **Development of a new transport plan for each of the municipalities based on the analysis.** The objective of the new transport plan for each municipality is to improve the interurban connections and achieve effective route schedules. These must meet the needs of the working population and provide as convenient as possible access to the services in the municipal and the provincial centre, through the careful planning of the locations of the respective stops. Efficiency of the route schedules will be achieved through the organization of some trips, based on previous request only. This means that the municipalities must provide for the development, maintenance and operation of the respective integration information system – at the locations of the stops, and through the support of the mayors' offices and deputy-mayors – online and offline (telephone connection). The analysis may prove that the most efficient option would be that the municipalities rely on a common information system and integrated trip schedules, including incorporation with the available railway connections. The transport plan must also include charging stations, with locations, selected based on the distances between the different populated areas, the average mileage of the trips required and the current technological capabilities, in terms of capacity and charging times.
3. **Request for offers for electric vehicles.** Based on the analysis and the transport plan prepared, the relevant requirements as to the number, type, passenger capacity, battery capacity and mileage of the electric vehicles will be defined. The joint request for offers by several municipalities will include the optimum number of vehicles, based on the analysis and the transport plan. This will enable the achievement of optimum financial parameters for the procurement.
4. **Drafting a common project proposal for financing from the National Trust Fund,** which is currently managing a programme, allowing the funding and procurement of EVs, at more beneficial prices for each individual municipality and the implementation of larger-scale joint initiatives, between several municipalities or the whole Pleven region.
5. **Drafting a financial plan with the involvement of the municipalities and transport operators.** Currently, the funds, used by the municipalities to ensure the provision of transport services are fully dependent on the national budget. On an annual basis, each of the reviewed municipalities can dispose of approximately BGN 100 000, which are insufficient for additional funding of the activities, performed by the transport operators. Along with municipalities' efforts to ensure increased subsidies from the government, they can apply financial models, together with the operators, to purchase more efficient vehicles with lower operating expenses and increased comfort and security for the passengers. For this purpose the

municipalities may benefit from the current invitations for purchasing EVs, made by the National Trust EcoFund.

6. **Purchasing EVs** - shared responsibility between the municipalities and the transport operators. The procurement will be based on leasing principles or through a subsidized project, relying on the National Trust Fund.
7. **Implementation of the new transport plan and electric vehicles.** The successful start of a new transport plan, involving EVs depends on carefully planned information measures. It is recommended that the launching of the plan is preceded by test-drive days in several populated areas + intensive campaign for increasing the awareness of the benefits of the EVs in the media, especially the local TV and Radio stations.

2.2 Time schedule

The time schedule is fully dependent on the readiness of the local governments and the cooperation between the municipalities. The expected changes in the composition of the local governments, after the elections for mayors at the end of October 2019 may accelerate or decelerate these processes. The proposed time schedule is based on the original ambitious intentions, stated by the representatives of the municipalities and target groups, while preparing the plan.

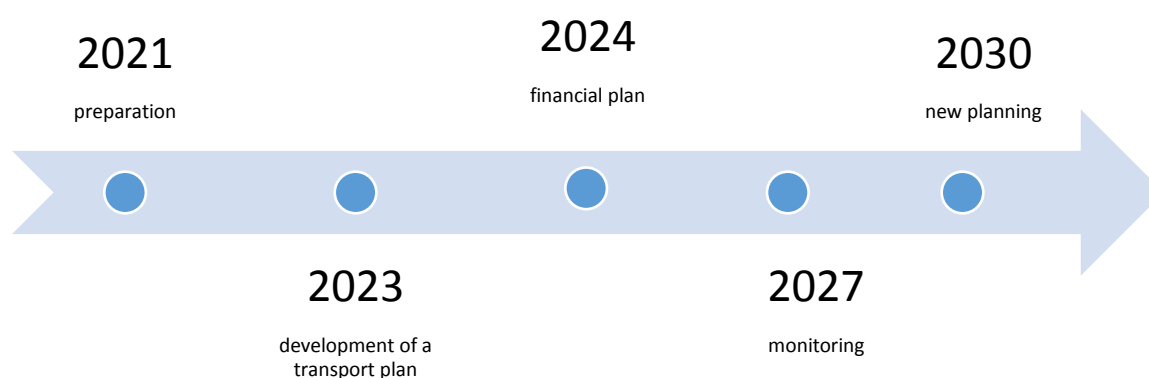
2021 – Preparation – assigning analyses, preparation of procedures and studies, carrying out consultations;

2023 – Development of a new transport plan and submitting project applications;

2024 – Development of a financial plan and purchasing EVs;

2025 – Introduction of the EVs in the new transport plan;

2027 – Monitoring of the results, adjustments and expansion of the scope and services.



2.3 Budget and resources needed

The financing options, potentially useable for the project, are diverse and include, but are not limited to:

- Grants, provided by environmental funds, in particular – the Enterprise for the management of environmental protection activities and National Trust EcoFund, including interest-free loans;
- The Bulgarian Energy Efficiency and RES Fund;
- Governmental and municipal budgets;
- Energy Savings Performance Contracts;
- Public-private partnerships;
- Direct cooperation with the EV manufacturers, based on advertising/promotional opportunities;

3 Collaboration with stakeholders

- The Province Governor's office;
- Municipal centres and village mayors' offices;
- NGOs;
- Bulgarian Electric Vehicles Association
- Energy agencies;
- Bicycle clubs;

Roles and responsibilities of different actors for Action Plan implementation

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties / institutions/companies	Nikopol, Belene, Levski Municipalities	Assigning analyses and studies, coordinating transport plans, responsible for the financial plan	Involvement of the decision-makers in the consultative process
	Local transport operators	Taking part in data collection	Participation in the consultative process
Political decision-makers	The mayors of all the populated areas Mayors of other municipalities in the province	Taking part in the collection of data, contributing to the implementation of an integrated information system	Participation in the consultative process
Target groups	The population of the towns and villages, affected by the changes in the transport	Covered by the data collection, participation in awareness days and discussions	Covered by the data collection, participation in awareness days and discussions

	plans		
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4 Monitoring

The monitoring of the plan implementation shall take place every two years, after the commencement of this implementation. The objective of the monitoring is to ensure awareness of all the stakeholders of the progress of the individual steps and activities.

Upon the implementation of the EVs in the transport plans of the municipalities, the monitoring shall be performed after the first year of operation, and it shall include both the financial results of the transport service and all the conclusions of the operation. The opinions of the population will be checked, with respect to the accessibility and comfort of the EVs used, as well as their overall impressions of the use of the services in the target municipalities.

5 Risk management

Risk	Probability of realising	Mitigation measure
Insufficient resources	Medium	Attracting more stakeholders, including other municipalities for lobbying for resources through the national budget, flexible financing schemes and grant mechanisms
Insufficient information about the suitable EVs	Medium	Attracting consulting services
Poor interest by the business	Medium	Carrying out direct contacts and targeted consulting; showcase events through exchange with partner municipalities abroad

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

Action Plan

Pleven Province, part of the North
Bulgaria region

**“Development of an information system
and awareness raising measures for the
promotion of EE and RES among
households in the municipalities of Pleven
Province”**

English version

**prepared by:
WWF Bulgaria**

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority Area: **Development of energy information system in the Region**

Action Plan: Development of an information system and awareness raising measures for the promotion of EE and RES among households in the municipalities of Pleven Province

1 Objective

The main objective of this plan is to stimulate households and raise their awareness and increase their knowledge. Why it is so important and useful to apply energy efficiency measures, as well as to apply innovative methods of providing energy through renewable energy sources. Raising the awareness of the consumers, regarding the electricity and thermal energy and natural gas energy they use, as well as regarding the benefits of the implementation of EE and RES measures, may be achieved through planning on provincial and implementation on municipal level. The information services, provided to the public through the system, may include:

- Methods and useful advice on energy saving in households;
- Reducing energy consumption by choosing appropriate appliance and minor repairs, without significant investments;
- Information on the accessible EE and RES technologies and the options for their financing;
- Information about local manufacturers and service and equipment providers, as well as fuel distributors;
- Information, regarding pilot and other measures, implemented within the municipality and the effects thereof;
- Calendar of information days and the related events.

An information system providing access to the aforesaid services will be developed and it will be accessible through the regional and municipal websites, as well as at certain locations in the municipalities with electronic access, and access to information materials, events, individual consulting etc.

The development of an information system on EE and RES for the public is in compliance with the plan documents of the municipalities (development plan, plans for EE and encouragement of the use of RES), as well as national plans and strategic documents (National Action Plan on EE and RES, National Strategy for Adaptation to Climate Change, as well as the future National plan 2030 and National Long-Term Decarbonization Strategy etc.).

1.1 Objective scope and targets values

The specific Objective of this Action Plan is to establish the foundation and provide due perspective for the development of an information system, to cover and reach

at least 2000 households per annum in the 123 populated areas in the Pleven Province. This will be accomplished through the provision of information, consulting, specialized training, participation in information days. This will make it possible for the topics of dealing with climate change and sustainable development to reach the people and would generally improve the understanding of why it is so important to implement solutions, for both dealing with climate change and solving the issues, related to the energy poor households. The information system will prepare people for the forthcoming changes in the energy sector – the so-called energy transformation. Last, but not least, this will make it possible for people to consider the reduction of their energy needs, as the main tool for reducing the ever-increasing prices of the energy carriers – fossil fuels. Conditions for entrepreneurship and partnership will also arise, which may improve the opportunities for new and interesting jobs among the young and active people in the Pleven Province.

1.2 Target indicators

Key indicators:

- Number of covered households (energy vulnerable);
- Energy savings;
- Financial resources, utilized for energy efficiency measures of households, incl. with the use of RES and/or more efficient devices.

Objective	Target indicator	Method of measurement and validation
Covered households	At least 2000 households per year/10-year period	Number of unique website visits; number of on-site visits and inquiries at the information centres
Energy savings	100 000 kWh/unplanned annual savings of electricity on the level of the Pleven Province	Calculation methodology
Financial resources, utilized by the households	At least 100 households on an annual basis should benefit from all the possibilities to invest or receive support for the implementation of EE and RES solutions and measures	Number of new individual projects, implemented in households

2 Implementation strategy

Development of a common information system, adapted for the municipal specificities and needs of support of the energy poor households, but also addressing the individual interests of all the other households and stakeholders is planned as a pilot showcase

programme for testing and further developing suitable measures in the area of EE and RES.

This will also be a key tool in the capacity building system and the accompanying on-site consulting through energy advisers, also planned for the Pleven Province.

The direct consulting of the households, regarding the individual characteristics of the buildings/apartments, inhabited by them, will contribute to the defining of the precise measures with the highest possible impact on the improvement of the comfort of dwelling and the gradual achievement of the Objectives for the energy efficiency measures, implementation of the appropriate RES and last, but not least dealing with such issues, as the quality of air and air pollution.

At the same time, people will be informed and encouraged to apply measures of their own choice, corresponding to the financial capabilities of each household. The effect of the information system adapt and helps the existing social programmes for supporting energy poor households, as well as the planned pilot municipal programmes for supporting energy vulnerable households. Will pass information to all the stakeholders, with a new approach for providing support for individually defined measures and solutions, in the implementation of the objectives for EE and RES, both on regional and municipal level.

2.1 Step by step description

1. Preparation of an expert database for the establishment of the information system.

There are plans for collaboration with organizations, NGOs, energy agencies and companies, incl. energy providers for sharing information and data from implemented initiatives etc.

The accumulation of proper data will contribute to the clarification of the services, to be provided through the system, and will provide content for the information website. It is necessary to enhance contacts with the local manufacturers, providers and distributors of energy, appliances, fuels and consulting services. Their involvement in the implementation and functioning of the system will specify the scope of services and the access options for the public, and will ensure positive effects for the local economy. The data, accumulated from the implemented pilot initiatives, related to EE and RES, as well as data from the implementation of the municipal programmes for EE and encouragement of the RES, will serve as a basis for both the development of content for the information system, and for defining a calendar for demonstration events, information meetings – days of open doors, information stalls, public discussions etc.

2. Defining the types of information services, provided through the system.

The accumulation of data on the information system will enable the specification of the services. These may provisionally be divided into:

- Provision of information electronically and by direct access at the service desks;
- Provision of information through direct individual consulting;

In addition to these two types of regularly provided services, the operation of the system will also include a model of organizing information days, including, but not limited to the provincial centre, the municipal centres and some other populated areas in the Pleven Province.

3. Capacity building among the municipal employees and partners for the provision of information services and consulting.

This activity will include:

- Selection and training of energy consultants;
- Improving the capacity for holding public discussions;
- Exchange of experience through collaboration in partner networks and project activity;

The municipalities have undertaken the commitment to improve the capacity of the administration to directly provide or organize the information activity, related to the implementation of energy measures. It is possible that in some municipalities additional full-time jobs are established for energy specialists, in order to ensure proper performance of the activities and the achievement of the objectives, set in this plan and the superior municipal and provincial plans for EE and RES.

4. Establishing the information system

- Implementation of the database and developing tools for searching and visualization of the content in an existing website of the municipality;
- Providing physical access to the information – information centre, desk at the administrative service centre of the municipality

Key for this activity is the ensuring of a single uniform approach in the development of the system. This will positively result in structural changes in the information websites of the municipalities. The development of the system will require additional technical resources and maintenance. In order to improve the opportunities for access to the information, local educational centres/chitalishte-s (community centres) may take part in the development of the system.

2.2 Time schedule

The specific time schedule shall depend on the preparation for the launching of the system, as well as on the possible changes in the political governance, and naturally – on the preliminary provision of the necessary resources for its development. In the best-case scenario, the implementation may commence in 2020-2021 r.

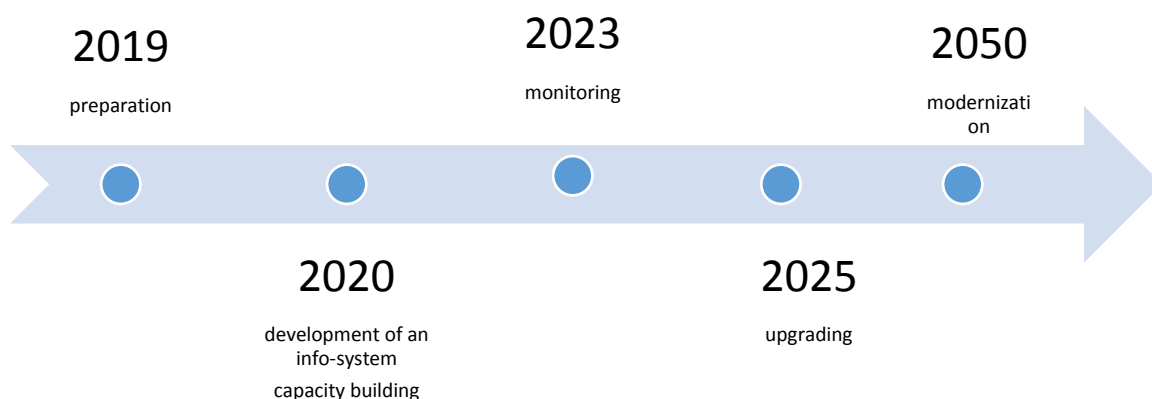
2020 – Preparation - providing resources, administrative preparation and procedures, preparation of documentation and human resources; data collection;

2021 – Establishing the information system and capacity building;

2021 – 2023 – Monitoring of the results, adjustments to the programme and expansion of the scope of services;

2025 – Upgrading and updating the system. Setting new objectives for the next 5-year period;

2030 – Modernization and updating the system.



2.3 Budget and resources needed

The financing options for the information system and the potentially useable options for the financing the project, are diverse and include, but are not limited to:

- Grants, provided by environmental funds, in particular – the Enterprise for the management of environmental protection activities and National Trust EcoFund, including interest-free loans;
- Fund for energy efficiency measures and RES;
- Governmental regional and municipal budgets;
- Public-private partnership schemes;
- European programmes and projects in the area of communication activities, together with the business, NGOs and other parties, for sharing experience;
- ESPC schemes for overall modernization of various public and private heating, lighting and other suitable systems;
- Saved money from the national budget for energy support and their reinvestment in the EE and RES.

3 Collaboration with stakeholders

- The Province Governor's office in Pleven;
- Municipal centres in Pleven Province;
- Mayor's offices of the populated areas in the municipalities of the Pleven Province;
- Regional Council for the Development of the North-western Planning Region;
- Municipal council and mayors of municipalities, when applying for loans in case of approval of public resources and projects;
- Energy and environmental experts of the municipalities;
- The respective directorates (environmental, social and energy) at the municipalities, engaged in the project implementation;
- Environmental, social and energy-concerned NGOs – national, regional and local;
- Roma organizations;
- Educational and cultural institutions;
- Service and consulting providers;
- Energy agencies;
- EcoEnergy;

- Political Party "The Greens";
- WWF

Roles and responsibilities of different actors for Action Plan implementation

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipal centres and mayors' offices	Providing the necessary facilities and equipment for the development of the info system	Involved on a local level, through administrative and consulting support in the planning and implementation of the system
	Educational centres	Providing access to the info system and taking part in the capacity building in this expert area	Involvement in the planning process together with all stakeholders
	NGOs	Involving communication experts and providing access to the system and taking part in the implementation of the direct information measures	Ensuring publicity of the process and opportunities for wide participation
	Regional energy and RES agencies and associations	Providing expertise regarding technological challenges and the proper solutions	Possible direct involvement, through projects and provision of resources and investments
Political decision-makers	Provincial governor's office; Municipal and village mayors; Participants and partners in official projects and other initiatives	Providing administrative support for the necessary procedures; Providing balance for proper assessment for making the proper	Providing publicity of the process and capabilities for extensive participation; Attracting stakeholders, through direct and indirect channels,

		decisions	initiatives and other opportunities
Target groups	Energy vulnerable households Residents of the 123 populated areas	Using information system Participation in information days	Providing publicity of the process and capabilities for extensive participation

4 Monitoring

The monitoring will take place every 2-3 years of the implementation of the information system. A part of the monitoring will include studies of the attitudes of the population and the changes achieved, the level of awareness of the application of energy efficiency measures and the use of RES. The monitoring will include the application of methods for the calculation of energy savings in households.

It is necessary to also take into consideration the ongoing aging and the need of updating and upgrading the system. Experience shows that the development of software and web applications is the most quickly developing sector and failing to perform regular updating and plan such activities, there is a high risk of the system becoming obsolete soon, which will definitely damage its popularity and use.

On the other hand, the system must also be usable by people locally, taking into consideration that such people may be elderly and parts of social groups, having no technological access to the system or sufficient knowledge to use it. In this respect, it will be necessary that a part of the information is presented in a basic, standard manner – in the form of leaflets, guides, brochures etc.

5 Risk management

Risk	Probability of realising	Mitigation measure
Inaccessible resources	Medium	Attracting more stakeholders, including other provinces and municipalities for lobbying for resources through EU's OP, support funds, the national budget
Insufficient human resources, consisting of suitable personnel for energy advisors	Medium	Use of the capabilities of the local business through social engagement, attracting consulting services
Poor interest in the information system	High	Direct contacts and targeted information events in the target populated areas/quarters

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ACTION PLAN

for the South Bohemian Region

Establishment of Regional Technology
Platform for Self-sufficient Buildings

English version

prepared by
AgEnDa z.s.

PANEL 2050 – Partnership for New Energy Leadership 2050
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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Energy efficiency in households

Title: Establishment of regional technology platform for self-sufficient buildings

1 Objective

The main objective is to establish a regional technology platform for self-sufficient buildings as a basic driver as well as becoming a centre of excellence for deployment of related technologies and thus making self-sufficient buildings a household standard by 2050.

The emergence of technology platforms is an important element in removing the main economic, technological or social problems the EU is exposed to. Due to the many different disciplines and their dynamic transformations, the different characteristics of many key players, the issue of platform development has to be continuously monitored and regularly updated.

Strengthening the interconnections at regional, supraregional and international level will lead to the development of a knowledge-based economy and innovation and the implementation of the concept of smart specialization.

Effective communication between decision-makers and the future technology platform will help to remove barriers in the form of regulations, standards and standards, economic measures, security and human resource development. In this way, the emergence of technology platforms can affect a range of economic and social developments both at European and national and regional levels.

Key features of technology platforms:

- Key Document: Strategic Research Areas (SRAs);
- Activities addressing important issues such as market growth, competitiveness and sustainable development, R&D medium / long term view;
- Actual value added for the company;
- High research intensity for future commercial use;
- Wide scope and high share of research and innovative efforts;
- Identification of the medium and long-term potential of the relevant markets;
- European approach to technology, from research and development to the future - market action;
- A common vision of "key players" (industry, public authorities, research companies, regulatory authorities, civil society, operators, customers and users);
- Mobilizing public and private financial resources (EU Framework Programs, Structural Funds programs, National, Regional and Private Research Financing, EIB, EUREKA);
- Teaching, training, communication and dissemination of results.

Other aspects of technology platform's operation:

Industrial policy

Technology platforms will provide impetus for new technologies, but also for traditional sectors in Europe. Private sector participation in technology platforms will ensure an activity in line with market needs in the industry. Small and medium-sized enterprises (SMEs) will be actively supported as they are important partners in the industry and often participate in the development of emerging technologies and significant innovations.

Sustainable Development

Technology platforms can contribute to strengthening the EU's principles of sustainable development, including the development of environmental technologies.

Social Benefits

During the development of the technology platform, the problematic economic and social issues will be identified and removed.

Regional impact

The regional impact of platforms is of particular importance. Platform participants will usually be scattered across many European regions. Socio-economic changes that bring new ones technologies, can act disproportionately in the regions. Technological platforms can positively influence the removal of this impact through the creation of infrastructure networks and to use regional elements to gain specific knowledge to access local markets with new technologies.

Czech Off-Grid House is the name of an architectural project focused on the research and construction of buildings in a different degree of self-sufficiency. Its mission is to accelerate the emergence of more sustainable technologies in homes and buildings. The word „off-grid“ describes the extreme variant of complete independence from utility networks, using modern methods of managing natural resources. This includes the study of so-called hybrid and active buildings. From this basis, the project is based on and identifies the use of sub-elements in the normal building to achieve more gentle operation. The Czech Off-grid House creates fully functional, progressive and sophisticated solutions for self-contained and highly-friendly buildings. The aim is to inspire the public to ensure greater interest and hence the number of applications of such solutions on the market.

The project was set up in February 2016 at the initiative of Pavel Podruh and a small group of experts who decided to form a platform whose mission is to accelerate the take-up of more sustainable technologies (primarily electricity, water, air, materials) into ordinary households and buildings. Within a short time, a wider team of talented students of architecture / engineering and top professionals was formed around the project. All together research the possibilities of a further evolutionary step in building a home that is more sustainable in keeping with the current standard of living. The

Czech Off-Grid House was ranked among the seven most significant projects in the Czech Sustainability and Social Responsibility Award organized by the Czech Government Office, the Ministry of Industry and Trade, the Czech Development Agency and the UN Information Center in Prague.

The project ultimately aims to contribute to the long-term inspiration of the public and to improving the overall approach and understanding of the friendly architecture (the buildings can be both architecturally successful and beautiful and at the same time friendly to natural resources).

Within building up the stakeholder network and roadmapping process in South Bohemia this extraordinary group of forerunners has been approached by Czech partner of the project PANEL 2050. In 2018 this fast-growing platform was awarded the UN Prize for Social Benefits as well as the Energy Globe Award for Energy Innovation. After number of talks, continuous activity monitoring and evaluation AgEnDa offered to support COD within PANEL 2050 activities starting with participation at CEE Energy Transition conference (Prague 2017), followed by the Boot Camp (Budapest 2018) and finally but not least taking over the main role in roadmapping process.

After brief mutual introduction AgEnDa started to research the platform from a different angle in order to explore and deploy its potential by establishment specialized „*technology platform*“ that has a specific structure, mission and which could when properly set receive public funding for its development.

In December 2017 Český soběstačný dům z.s. (Czech Self-sufficient House, hereinafter “CSD”) has been officially registered as legal entity intending to become a technology platform whose focus is broadly expanding and does not deal only with the extreme case of so-called “off-grid” (completely source-independent) constructions but with a whole range of partial possibilities of self-sufficiency in various forms and sizes of buildings. It intends to become a roofing professional institution for the field of study and research of the phenomenon of self-sufficiency of buildings on a scale ranging from small housing units to industrial buildings or sets of buildings to all human settlements and regions. Currently the members of the association are scientists, experts, architects, designers and leading industry companies.

Building on the self-sufficiency of buildings using modern methods of natural resource management and architecture is a clear direction of the future and a rapidly growing segment. The Technology Platform will be studying the linking of fully functional, progressive and sophisticated solutions at different levels of self-sufficiency in eco-friendly buildings, building blocks, and wider areas of settlements. The main mission is to accelerate the take-up of modern technologies ensuring complete or partial self-sufficiency in different building environments.

1.1 Objective scope and targets values

The main objective is to support transformation of a local initiative that has been awarded and acknowledged on regional, national and European level as a promising initiative into functional and sustainable technology platform having the potential to completely re-draw the energy standards in building sector by 2050.

Main milestones:

1. Evaluation of CSD progress so far with verification of basic challenges and current market potential / focus (September – November 2017)
2. Institutionalization – forming an appropriate legal entity (December 2017)
⇒ **DONE**
3. Building up the platform (3 stages) – until 2030
 - Stage 1 – The emergence of a technology platform (by 2020)
 - Stage 2 – Development activities of the Technology Platform (by 2025)
 - Stage 3 – Implementation of SRA via IAP (by 2030)

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Evaluation of CSD progress so far with verification of basic challenges and current market potential / focus	<ul style="list-style-type: none">• Assessment of the status November 2017	Documents and minutes from the meetings, etc.
Institutionalization	<ul style="list-style-type: none">• 1 legal entity called “Český soběstačný dům z.s.” – December 2017	Public registry: https://apl.czso.cz/irsw/detail.jsp?prajed_id=6208848
Development of the technology platform	<ul style="list-style-type: none">• Stage 1 (2020)• Stage 2 (2025)• Stage 3 (2030)	Strategic Research Agenda, Implementation Action plan

2 Implementation strategy

2.1 Step by step description

Stage 1 – The emergence of a technology platform: a cluster of "key players"

The initial platforming stage can be very significant and often decides on its success or extinction. The key role has the facilitator in consultation meetings needed for the involvement of major companies and institutions. Typically, a project team with is set up for each platform. The establishment of a Technology Platform is by no means a guarantee for the integration of the technological area between the priorities of subsidy schemes. This stage is expected to be completed by 2020.

Stage 2 – Development activities of the Technology Platform

Once the platform has been set up and started, these are the activities that are summarized in Strategic Research Agenda (SRA). This documents describes:

- Identification of medium to long-term scientific research priorities including measures to support the emergence of networks and clusters of scientific capacities.
- Finding mechanisms for mobilizing public and private investment such as EU Framework Programs, national R&D support, Structural Funds programs, private investment,
- Identifying issues and actions related to training and education opportunities, and maintaining or increasing the capacity of highly qualified workforce;
- Setting up a communication process with the public to raise awareness on technological developments

Key players and other platform members

Significant industrial companies in the field should be the driving force when forming the member base. To make the platform effective and balanced, other organizations and institutions need to be integrated into the Platform and maintain the openness and transparency of the whole process.

Each platform is typically represented by:

- Industrial businesses - large, medium and small that cover all production and related supply chains.
- Public Authorities – Regional Authorities, Ministries, Development Agencies, Promoters and Technology Users.
- Research institutions and universities - especially those that support collaboration with industry.
- Institutions of Supporting Innovation Infrastructure, Technology Transfer Centers, business incubators.
- Financial institutions - private banks, investors, funds, venture capital, EU institutions

- Civil societies, users, consumers – engaging in mutual communication of research associations with the company and thus co-create the future of products.

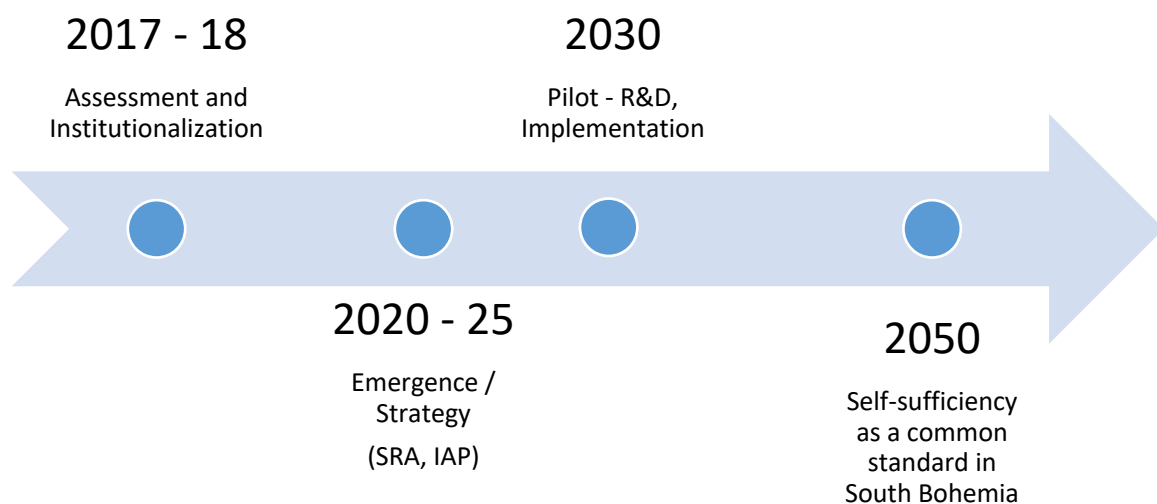
In some cases, business organizations may also participate.

This stage is expected to be finished in 2025.

Stage 3 – Implementation of SRA via Implementation Action Plan (IAP)

It is expected that the most appropriate tool to support the implementation of the SRA is probably so-called innovative tools of collective research (integrated projects and others) or tools supporting research infrastructures. In order to implement SRA it is recommended to elaborate specific document called Implementation Action Plan which defines thoroughly all specific activities set in SRA. This stage is expected to be finished in 2030.

2.2 Time schedule



2.3 Budget and resources needed

Main budget items for the Action plan:

- Assessment and institutionalization - 7.000 € (external experts, legal analysis, etc.)
- Emergence and strategy (SRA, IAP) – 20.000 € (external expertise, events, capacity building, etc.)
- Implementation (operation of the platform, staff costs) – 10.000 € per year

3 Collaboration with stakeholders

Between August and September 2017 AgEnDa was entrusted with the arrangement of CEE Energy Transition conference in Prague (19 – 20.10. 2017) and thanks to intensive communication to potential speakers and guest from the Czech Republic we have established closed contact with this initiative and his author Pavel Podruh who gave very motivating presentation of their success story. From this point close cooperation between CEESEN and Czech Off-Grid House started and led to number of joint meetings and so far resulted in assessment of the potential in terms establishment of technology platform and its actual registration as a legal entity (Český soběstačný dům z.s., CSD).

Along with other forerunners and stakeholders (namely Ekoport, JAIP, ECO trend, etc.) we have put a plan how to help this initiative (having been collecting prestigious awards in the meantime) move forward and support them in establishment of national technology platform for self-sufficient buildings. As an exchange for our contribution to the technology platform origin CSD worked closely on definition of the regional vision within the PANEL 2050 framework.

Roles and responsibilities of different actors for Action Plan implementation

Sector	Who and why?	Who and why – regional level
Public administration	<p>Ministry of Industry and Trade and API – subsidy scheme implementation</p> <p>Ministry of Environment – direct involvement in activities of the platform</p> <p>Czech Technology Centre (TČ AV ČR) – methodological support for framework programs, coordination activities (communication with other TPs, events, etc.)</p> <p>Technology Agency CZ (TAČR) – R&D support, subsidy schemes</p> <p>Government of the Czech Republic – main coordinator of R&D policy in the Czech Republic</p>	<p>South Bohemian Regional Authority - Regional Development, Territorial Energy Concept, Building Bureau</p> <p>South Bohemian Chamber of Commerce - Suppliers and users of local power systems</p> <p>JVTP – support to start-ups, technology drivers</p> <p>South Bohemian Agency for Support to Innovative Enterprise – link to regional innovation strategy / policy</p> <p>Regional Contact Organization – trainings, networking, support towards EU framework programs, contacts</p> <p>City of Český Krumlov – PR, pilot applications</p>

R&D	Research Institutions – Data sources, technologies, know-how Universities – vocational education and training, research, link to local start-ups	South Bohemian University VŠTE, etc. see existing partners here: http://ceskyostrovnidum.cz/partneri.html
Entrepreneurs	Suppliers of technologies - prices, supply conditions, end-user equipment Investors - searching for and evaluating suitable opportunities, project feasibility Battery cell systems Water and waste management Biomass utilization Recuperation 3D, CAD Energy Carriers Media	see existing partners here: http://ceskyostrovnidum.cz/partneri.html
Public	Associations, NGOs - creation of contacts, lobby, transfer of foreign knowledge Experts - professional background, interest in the issue	Association of Corporate Responsibility of the Czech Republic, etc. see existing partners here: http://ceskyostrovnidum.cz/partneri.html

4 Monitoring Strategy

The monitoring strategy for this Action Plan will be set as follows.

- Evaluation of the overall progress and potential re-thinking of the strategy (every 1 year, responsible body: CSD)
- Evaluation of the R&D activities, update of the achievements (every 2 years, responsible body: CSD)
- Overview and update of the financing opportunities (every 2 years, responsible body: JAIP / AgEnDa)

5 Risk management

Risk	Probability of the risk	Mitigation measure
Key players lack of interest	Low	Already strong partnership with the highest profile key players. Integration of activities across more sectors (education, research, awareness, etc.)
Legal obstacles (outdated legislative, attitude of single officers within authorization procedures, etc)	High	Pioneering new approaches, intensive cooperation with relevant experts, lawyers.
Technical and legislative barriers from public administration, energy distributors and fuels.	Medium	Creation of standards and legal prerequisites at national level, regional working groups.
Lack of finance.	Medium	Intensification of the partnership with private sector, initiation of projects funded by public subsidy schemes.
Insufficient potential of South Bohemian R&D bodies for project implementation.	High	Transregional contacts with relevant and suitable R&D partners / universities.

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

for the South Bohemian Region

Elaboration of Strategic Research
Agenda for the technology platform of
Self-sufficient Buildings

English version

prepared by
AgEnDa z.s.

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: October 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Energy efficiency in households

Title: Elaboration of Strategic Research Agenda for the Technology Platform of Self-sufficient Buildings

1 Objective

The goal of this measure is to elaborate main strategy document for the Regional Technology Platform for Self-sufficient Buildings, namely the Strategic Research Agenda (SRA) towards goals by 2050.

This measure is a follow up of previous Action Plan titled „Establishment of regional technology platform for self-sufficient buildings“ and describes the process of SRA elaboration.

As previously stated, the deployment of technology platforms is an important element in removing the main economic, technological or social problems the EU is exposed to. Strengthening the interconnections at regional, supraregional and international level will lead to the development of a knowledge-based economy and innovation and the implementation of the concept of smart specialization. In this way, the emergence of technology platforms can affect a range of economic and social developments both at European and national and regional levels.

The essential part of each technology platform's future success is defining its own strategy. Whereas the technology platform is specifically geared to coordinating research and development in the given sector it is necessary to elaborate strategical documents which define main R&D challenges with regard to market needs, infrastructural premises, scientific capacities and business opportunities.

This basic document – Strategic Research Agenda forms the basis for implementing further platform activities. It is also important to mention that based on elaboration of SRA (along with Implementation Action Plan) any technology platform in the Czech Republic is eligible to submit project for co-financing its operation for the period of three years from Operational Programme managed by API and Ministry of trade. Documents served as a proof that technology platform has already defined its future strategy.

1.1 Objective scope and targets values

The main objective is to further support the origin of technology platform for self-sufficient building by elaboration of key document – Strategic Research Agenda – in order to move on into functional and sustainable technology platform having the potential to completely re-draw the energy standards in building sector by 2050.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Elaboration of Strategic Research Agenda (by 2020)	<ul style="list-style-type: none">1x Strategic Research Agenda by 2020	Documentation of the process of making the SRA (minutes, events, document itself)

2 Implementation strategy

2.1 Step by step description

The Strategic Research Agenda describes the issues that need to be addressed to achieve the technology platform's goals. It defines the areas of future research and includes technology guides to provide theoretical fundament for the further development of the sector. The document should include contributions from working groups to identify key areas of research, constraints and obstacles faced by researchers and propose improvements where needed.

The SRA should range somewhere between 50 – 150 pages of text defining the main directions of research and development in the field for the next period (starting points, current status, target state and the resulting main topics plus possible sources of partners and finances, draft measures).

Recommended structure of SRA is as follows:

Part I - Methodology

1. Introduction
2. Brief description of the potential and challenges of the field
3. Methodology
4. Glossary
5. Working groups and contacts

Part II - Strategic Research Agenda

Basic theses

Research Priority 1

- Introduction, brief description
- Global objective of the Priority 1
- Specific goal 1.1
 - New challenges - what to research and why?
 - Stakeholders - who is influencing the field and topic?
 - Target groups - who could be interested in research and engage?
 - Financial support - sources for R&D, other projects

Research Priority 2

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Research Priority xy

1. Setting up ground rules and appointment of the facilitator

To be effective, everyone needs to be clear about the way they work together. The team needs a common identity to share the same values, goals and objectives. Ground rules provide guidance for specific behaviours and expectations.

In case of SRA team it's important that all possible angles in terms of skills, knowledge and focus are represented that means it should be at least mixture of representatives from R&D, public institutions and authorities, entrepreneurs, investors. The essential role that needs to be appointed before the team is formed is the facilitator. The facilitator is the person whose job is to prevent and face a continuous sequence of obstacles and crises of all sorts.

Facilitator's role:

- identifies and encourages team members and networking opportunities in the region and actively develops them
- looks for opportunities to link businesses where there are similar interests and needs,
- facilitates introductory workshops - introducing and presenting a methodology for a group of stakeholders, representatives of relevant universities and regions
- mediates contacts, builds, develops and maintains relationships
- acts as a neutral mediator, the bearer of change, and a catalyst that facilitates dialogue
- helping technology platform grow, attracting new members, finding opportunities for innovations

2. Roles and Responsibilities

Once the ground rules are agreed the team should begin to define roles and responsibilities. Paying attention to bringing people with the right skills and experience to the team is essential. When the team first meets you get an insight into how well members will work together. This is the time to match people to roles and identify gaps within the team. At this early stage, the team can define the various duties and outcomes and agree responsibility for them. What's more, it is the first chance to identify strengths and weaknesses within the team.

3. Decision Making

Decision making is an important element of team work. The participation or involvement leads to a more effective team. And team members need to understand what authority they have in the decision making process. Clarity about decision making strengthens the team because people are more likely to be committed to carrying out decisions.

4. Service Planning

The team plan achieves two things: it outlines the team vision, mission and service objectives including performance measures, and identifies service-led development activities that will be completed during the life of the action.

5. Team Processes

Team building is largely about directing the team to establish clear objectives. This stage is best achieved with a high level of team involvement since it leads to strong, well supported decisions. With strong foundations the team can begin to move from forming to storming and establishing processes and structure.

Step 2 - Elaboration of Research Priorities

Based on the professional focus of individual team members, the facilitator subdivides assignments for the development of individual research priorities.

First, an introductory section describing the starting point, context, and global goal of the priority will be processed. Then, the first draft of the specific objectives will be developed, which is subsequently discussed within thematic workshops with the participation of representatives of interdisciplinary topics. These actions identify thematic overlays and synergies that are recorded by the facilitator and assembled into comprehensible reports.

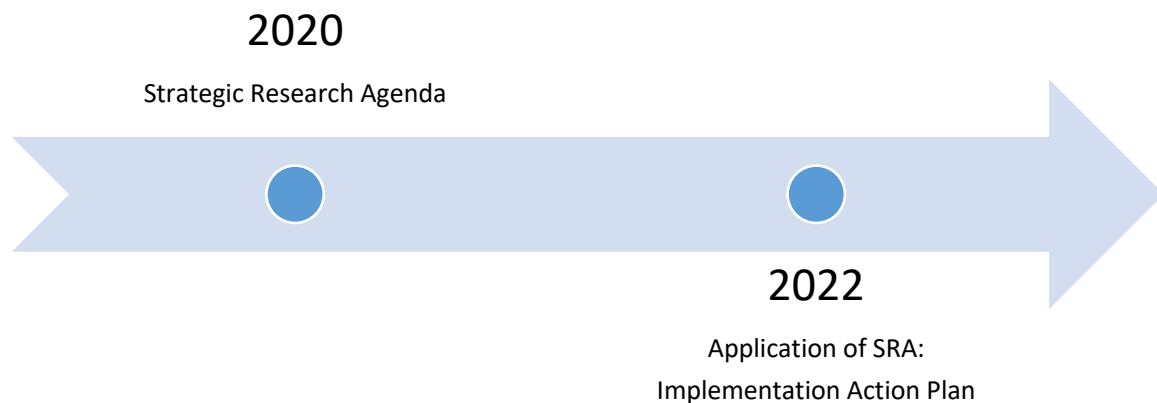
At this stage, it is appropriate to get feedback from the professional public and the private sector through a survey, questionnaire survey or workshop within another thematic close event (eg conference). This will provide another objective view of the correctness of the team's mind set.

Step 3 - Finalization and acknowledgement of the SRA

Once the research priorities have been developed, including details describing stakeholder involvement, target groups, funding, sustainability, the whole document needs to be revised in terms of terminology, methodology, links and possible overlaps.

It is highly recommended to present the document to the relevant authorities, who may use it in the process of creating its own agendas and priorities. These include in particular the Ministry of Industry, the Ministry of the Environment, and other technology and development agencies. Before finalizing the document, it is recommended to introduce it at a related event and accompany it with some of the latest (own) technology achievements (e.g. house management control system, etc.).

2.2 Time schedule



2.3 Budget and resources needed

Main budget items for the Action plan:

- Strategic Research Agenda - 15.000 € (external experts, analysis, events, etc.)

3 Collaboration with stakeholders

Between August and September 2017 AgEnDa was entrusted with the arrangement of CEE Energy Transition conference in Prague (19 – 20.10. 2017) and thanks to intensive communication to potential speakers and guest from the Czech Republic we have established closed contact with this initiative and his author Pavel Podruh who gave very motivating presentation of their success story. From this point close cooperation between CEESEN and Czech Off-Grid House started and led to number of joint meetings and so far resulted in assessment of the potential in terms establishment of technology platform and its actual registration as a legal entity (Český soběstačný dům z.s., CSD).

Along with other forerunners and stakeholders (namely Ekoport, JAIP, ECO trend, etc.) we have put a plan how to help this initiative (having been collecting prestigious awards in the meantime) move forward and support them in establishment of national technology platform for self-sufficient buildings. As an exchange for our contribution to the technology platform origin CSD worked closely on definition of the regional vision within the PANEL 2050 framework.

Roles and responsibilities of different actors for Action Plan implementation

Sector	Who and why?	Who and why – regional level
Public administration	<p>Ministry of Industry and Trade and API – subsidy scheme implementation</p> <p>Ministry of Environment – direct involvement in activities of the platform</p> <p>Czech Technology Centre (TČ AV ČR) – methodological support for framework programs, coordination activities (communication with other TPs, events, etc.)</p> <p>Technology Agency CZ (TAČR) – R&D support, subsidy schemes</p> <p>Government of the Czech Republic – main coordinator of R&D policy in the Czech Republic</p>	<p>South Bohemian Regional Authority - Regional Development, Territorial Energy Concept, Building Bureau</p> <p>South Bohemian Chamber of Commerce - Suppliers and users of local power systems</p> <p>JVTP – support to start-ups, technology drivers</p> <p>South Bohemian Agency for Support to Innovative Enterprise – link to regional innovation strategy / policy</p> <p>Regional Contact Organization – trainings, networking, support towards EU framework programs, contacts</p> <p>City of Český Krumlov – PR, pilot applications</p>
R&D	<p>Research Institutions – Data sources, technologies, know-how</p> <p>Universities – vocational education and training, research, link to local start-ups</p>	<p>South Bohemian University VŠTE, etc. see existing partners here: http://ceskyostrovnikum.cz/partneri.html</p>
Entrepreneurs	<p>Suppliers of technologies - prices, supply conditions, end-user equipment</p> <p>Investors - searching for and evaluating suitable opportunities, project feasibility</p> <p>Battery cell systems</p> <p>Water and waste management</p> <p>Biomass utilization</p> <p>Recuperation</p> <p>3D, CAD</p> <p>Energy</p> <p>Carriers</p> <p>Media</p>	<p>see existing partners here: http://ceskyostrovnikum.cz/partneri.html</p>

Public	Associations, NGOs - creation of contacts, lobby, transfer of foreign knowledge Experts - professional background, interest in the issue	Association of Corporate Responsibility of the Czech Republic, etc. see existing partners here: http://ceskyostrovnikum.cz/partneri.html
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4 Monitoring Strategy

The monitoring strategy for this Action Plan will be set as follows.

- Evaluation of the overall progress and potential re-thinking of the strategy (every 1 year, responsible body: CSD)
- Evaluation of the R&D activities, update of the achievements (every 2 years, responsible body: CSD)
- Overview and update of the financing opportunities (every 2 years, responsible body: JAIP / AgEnDa)

5 Risk management

Risk	Probability of the risk	Mitigation measure
Key players lack of interest	Low	Already strong partnership with the highest profile key players. Integration of activities across more sectors (education, research, awareness, etc.)
Legal obstacles (outdated legislative, attitude of single officers within authorization procedures, etc)	High	Pioneering new approaches, intensive cooperation with relevant experts, lawyers.
Technical and legislative barriers from public administration, energy distributors and fuels.	Medium	Creation of standards and legal prerequisites at national level, regional working groups.
Lack of finance.	Medium	Intensification of the partnership with private sector, initiation of projects funded by public subsidy schemes.
Insufficient potential of South Bohemian R&D bodies for project implementation.	High	Transregional contacts with relevant and suitable R&D partners / universities.

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

for the South Bohemian Region

Elaboration of Implementation Action
Plan and Technology Foresight for 2025
- 2050

English version

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PANEL 2050 – Partnership for New Energy Leadership 2050
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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Energy efficiency in households

Title: Elaboration of Implementation Action Plan and Technology Foresight

1 Objective

The goal of this measure is to elaborate Implementation Action Plan (IAP) and Technology Foresight (TF) for the Technology Platform of Self-sufficient Buildings.

This measure is a follow up of previous Action Plan titled „Elaboration of Strategic Research Agenda (SRA)“ and describes the process of IAP and TF elaboration which are both based on SRA.

As previously stated, the deployment of technology platforms is an important element in removing the main economic, technological or social problems the EU is exposed to. Strengthening the interconnections at regional, supraregional and international level will lead to the development of a knowledge-based economy and innovation and the implementation of the concept of smart specialization. In this way, the emergence of technology platforms can affect a range of economic and social developments both at European and national and regional levels.

The essential part of each technology platform's future success is defining its own strategy. Whereas the technology platform is specifically geared to coordinating research and development in the given sector it is necessary to elaborate strategical documents which define main R&D challenges with regard to market needs, infrastructural premises, scientific capacities and business opportunities.

Implementation Action Plan form the basis for implementing further platform activities. It is also important to mention that based on elaboration of SRA and IAP technology platform in the Czech Republic is eligible to submit project for co-financing its operation for the period of three years from Operational Programme managed by API and Ministry of trade. Documents served as a proof that technology platform has already defined its future strategy.

1.1 Objective scope and targets values

The main objective is to further support the origin of technology platform for self-sufficient building by elaboration of key documents – Implementation Action Plan and Technology Foresight – in order to move on into functional and sustainable technology platform having the potential to completely re-draw the energy standards in building sector by 2050.

Main milestones:

1. Elaboration of Implementation Action Plan (by 2022)
2. Technology Foresight for 2025 - 2050 (by 2024)

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Elaboration of Implementation Action Plan	<ul style="list-style-type: none">1x Implementation Action Plan by 2022	Documentation of the process of making the IAP (minutes, events, document itself)
Technology Foresight 2025 - 2050	<ul style="list-style-type: none">1x Technology foresight by 2024	Documentation of the process of making the TF (minutes, events, document itself)

2 Implementation strategy

2.1 Step by step description

Implementation Action Plan

The Implementation Action Plan is a strategic document that defines and identifies specific topics and activities that carry the so-called technological development potential along with the real implementation potential for its implementation. It includes elaboration of concrete planning of projects, measures and outputs for individual strategic objectives and themes, including an indication of the scope and timing of research, development, innovation and awareness activities. The implementation plan for research, development and innovation in the field should be defined for the period up to 2025 primarily for the environment of the Czech Republic. Account should also be taken of the international context.

The primary objective of IAP is to present and design identified high potential topics that will change the environment and conditions that will effectively support research, development and innovation at national and European level, encouraging their growth and sustainable development as well as enhancing overall competitiveness as such.

Recommended structure of IAP is as follows:

Part I - Methodology

Part II - Implementation Action Plan

Research Priority 1

- *Global objective of the Priority 1*
- *Introduction, brief description*

Topic 1.1

- *Brief description*
- *Topics relevant for R&D and innovations*
- *Key actors and partners*
- *Actual projects overview*
- *Planned projects overview*
- *Concrete measures for support to implementation of the research priority (number, field, description, deadline, responsibility)*
- *Expected outputs*

Topic 1.2

- *Brief description*
- *Topics relevant for R&D and innovations*
- *.....*
- *.....*

These individual topics must be identified by expert groups of the Technology Platform in the Strategic Research Agenda and in line with the objectives of the Technology Platform itself. All the results obtained from the implementation of individual projects and activities will be provided to and disseminated to the broad professional public, through partial publications and articles, by carrying out expert seminars and workshops presenting the results.

The Implementation Action Plan is set up in several stages, giving it a broad framework and allowing for maximum involvement of partners and information sources.

Step 1 - Design

The first draft IAP structure needs to be developed based on SWOT analysis of the SRA. It is then necessary to clarify and agree with the meeting of the relevant guarantors.

Step 2 - Completion phase

The start of the completion phase is the mentioned communication of professional guarantors. Partial professional teams must also communicate on a regular basis or regularly meet within thematic workshops.

Step 3 - Professional public discussion

The first complete version of the IAP must be distributed to professional sites and other partners, after being discussed by the board of the Technology Platform. The public debate will complement the IAP with additional valuable information, in particular on the areas of implemented and planned projects and potential key players or project partners.

Step 4 - Finalization

Based on the collected comments and supplements, with the support of a facilitator and a consultant, the final version of the IAP is completed.

Step 5 - Publication and applications

The final version of IAP is recommended to be presented on the website and some thematic action.

In addition to the brief summaries of the SVA outputs, the following specific objectives are usually added:

- Actual projects – in solutions or results that are used in current projects
- Planned projects and project plans submitted
- Overview of types and numbers of projects implemented or planned by 2025
- Proposals for measures to support the implementation of research topics, proposals and technological development potential
- Outputs expected

It is also described how to change the environment and conditions for supporting R&D and innovation at national and European level in order to encourage their growth as well as increasing competitiveness and sustainable development.

Technology foresight

Technological foresight (TF) provides a qualified estimate of possible future developments. Predictions are often not met, as the world is constantly changing, transforming itself through accelerated knowledge, progress in science and technology innovations, market developments (liberalization vs. protectionist measures), policy measures, economic development, restructuring and changing levels and distribution of resources (raw materials, financial, human) at all levels (global, national, regional, etc.).

Within this changing environment, it is important to have scenarios of the future development of the field and to enable all stakeholders (not only members of the technology platform) to get ahead of time preparing for crisis opportunities,

defending against risks, and leaping ahead of others in terms of choosing the right strategy. The aim is to get a better estimate of where potential problems, challenges or opportunities lie, and find the most crucial driving forces among them.

This document is usually set to follow timeline beyond 15 years in this case it's recommended for 2025 - 2050.

Technology foresight 2025 - 2050 should be based on the current situation in both Europe and the Czech Republic. A brief summary of existing conditions and their development so far is the starting point for further modeling of future developments. It is usually followed by an analysis of the main trends that the industry and individual market participants are now going through. These major trends are ideally formulated on the basis of a survey among all major players (R&D technology, products and services suppliers, households, public administration as a major environmental maker).

The socio-economic scenarios of future developments and related indicators should be based on the determinant drivers, their likely development and possible combinations. At the same time, the reaction scenarios should be defined and, finally, the technologies that are most likely to develop and subsequently apply to the market are evaluated.

The structure of Technology Foresight should be as follows:

Introduction - methodology and definition

European sector analysis

Development premises in the Czech Republic / South Bohemia

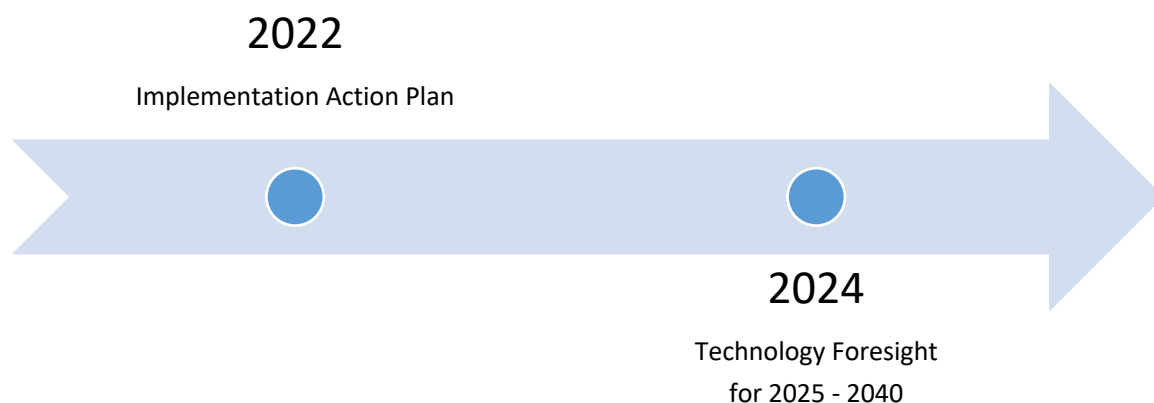
- *Infrastructure*
- *Legislative*
- *Financing (including subsidies)*
- *R&D and innovations*
- *Authorization procedures*

Main trends

Main drivers

Scenarios

Technology development and future utilization



2.3 Budget and resources needed

Main budget items for the Action plan:

- Implementation Action Plan (SRA, IAP) – 20.000 € (external expertise, events, publication, etc.)
- Technology Foresight – 15.000 € (external expertise, events, publication, etc.)

3 Collaboration with stakeholders

Between August and September 2017 AgEnDa was entrusted with the arrangement of CEE Energy Transition conference in Prague (19 – 20.10. 2017) and thanks to intensive communication to potential speakers and guest from the Czech Republic we have established closed contact with this initiative and his author Pavel Podruh who gave very motivating presentation of their success story. From this point close cooperation between CEESEN and Czech Off-Grid House started and led to number of joint meetings and so far resulted in assessment of the potential in terms establishment of technology platform and its actual registration as a legal entity (Český soběstačný dům z.s., CSD).

Along with other forerunners and stakeholders (namely Ekoport, JAIP, ECO trend, etc.) we have put a plan how to help this initiative (having been collecting prestigious awards in the meantime) move forward and support them in establishment of national technology platform for self-sufficient buildings. As an exchange for our contribution to the technology platform origin CSD worked closely on definition of the regional vision within the PANEL 2050 framework.

Roles and responsibilities of different actors for Action Plan implementation

Sector	Who and why?	Who and why – regional level
Public administration	<p>Ministry of Industry and Trade and API – subsidy scheme implementation</p> <p>Ministry of Environment – direct involvement in activities of the platform</p> <p>Czech Technology Centre (TČ AV ČR) – methodological support for framework programs, coordination activities (communication with other TPs, events, etc.)</p> <p>Technology Agency CZ (TAČR) – R&D support, subsidy schemes</p> <p>Government of the Czech Republic – main coordinator of R&D policy in the Czech Republic</p>	<p>South Bohemian Regional Authority - Regional Development, Territorial Energy Concept, Building Bureau</p> <p>South Bohemian Chamber of Commerce - Suppliers and users of local power systems</p> <p>JVTP – support to start-ups, technology drivers</p> <p>South Bohemian Agency for Support to Innovative Enterprise – link to regional innovation strategy / policy</p> <p>Regional Contact Organization – trainings, networking, support towards EU framework programs, contacts</p> <p>City of Český Krumlov – PR, pilot applications</p>
R&D	<p>Research Institutions – Data sources, technologies, know-how</p> <p>Universities – vocational education and training, research, link to local start-ups</p>	<p>South Bohemian University VŠTE, etc. see existing partners here: http://ceskyostrovnikum.cz/partneri.html</p>
Entrepreneurs	<p>Suppliers of technologies - prices, supply conditions, end-user equipment</p> <p>Investors - searching for and evaluating suitable opportunities, project feasibility</p> <p>Battery cell systems</p> <p>Water and waste management</p> <p>Biomass utilization</p> <p>Recuperation</p> <p>3D, CAD</p> <p>Energy</p> <p>Carriers</p> <p>Media</p>	<p>see existing partners here: http://ceskyostrovnikum.cz/partneri.html</p>

Public	Associations, NGOs - creation of contacts, lobby, transfer of foreign knowledge Experts - professional background, interest in the issue	Association of Corporate Responsibility of the Czech Republic, etc. see existing partners here: http://ceskyostrovnidum.cz/partneri.html
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4 Monitoring Strategy

The monitoring strategy for this Action Plan will be set as follows.

- Evaluation of the overall progress and potential re-thinking of the strategy (every 6 months, responsible body: CSD)
- Evaluation of the R&D activities, update of the achievements (every 1 year, responsible body: CSD)
- Overview and update of the financing opportunities (every 1 years, responsible body: JAIP / AgEnDa)
- Update of the Technology Foresight (every 7 years, responsible body: CSD)

5 Risk management

Risk	Probability of the risk	Mitigation measure
Key players lack of interest	Low	Already strong partnership with the highest profile key players. Integration of activities across more sectors (education, research, awareness, etc.)
Legal obstacles (outdated legislative, attitude of single officers within authorization procedures, etc)	High	Pioneering new approaches, intensive cooperation with relevant experts, lawyers.
Technical and legislative barriers from public administration, energy distributors and fuels.	Medium	Creation of standards and legal prerequisites at national level, regional working groups.
Lack of finance.	Medium	Intensification of the partnership with private sector, initiation of projects funded by public subsidy schemes.
Insufficient potential of South Bohemian R&D bodies for project implementation.	High	Transregional contacts with relevant and suitable R&D partners / universities.

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

for the South Bohemian Region

Biogas plants transition to biomethane
production sites system

English version

prepared by
AgEnDa z.s.

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: October 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Renewable energy / bioenergy

Title: Biogas plants transition to biomethane production sites system

1 Objective

The main objective is to support the gradual transition of existing biogas stations in the region to biomethane production and its use in local and global energy and local transport.

Biomethane is, according to the definition, methane, made from biomass (according to ISO DIS 15669, in preparation), which has properties similar to natural gas. It can be prepared by thermochemical conversion, then we talk about bio-SNG, or biochemical conversion (modified biogas). We also consider biomethane to be a gas whose synthesis uses renewable energy or renewable energy (so-called "power-to-gas").

These definitions define the current framework for the production and use of biomethane. At present, we are confronted with several principled directions of biomethane production, which are then followed by the respective ways of using this renewable energy and material source.

The first group of biomethane technologies is an anaerobic digestion technology that produces a roughly equimolar mixture of biomethane (45-60%) and carbon dioxide, supplemented with trace impurities commonly known as biogas. Biomethane is subsequently separated from the biogas in several technological steps. In the most common arrangement, biogas is first removed from minor reactive components such as sulfane and ammonia (cleaning, biogas cleaning), followed by self-separation of biomethane and carbon dioxide, commonly referred to as upgrading from the English biogas upgrading step. There are currently five basic technological processes industrially used for upgrading. These basic procedures then derive a range of proprietary commercial technologies that differ in certain process details, or even in different ranges of integration of the cleaning step into the actual upgrading step. We can encounter both absorption and adsorption processes (using water or amines) as well as membrane filtration or cryogenic separation.

Cryogenic separation is an emerging technology and is interesting for the production of liquefied natural gas. Methane and carbon dioxide are separated by gradual cooling of the raw biogas. All components that have a higher condensing temperature than methane (eg water, sulphate, siloxanes and nitrogen) can be separated in the process. In the event that LNG market share increases, eg in transport, cryogenic separation technology can be gaining importance in view of the possibility of integration of CH₄ separation with the liquefaction unit.

The production of biomethane, synthetic biomass from biomass (so-called bio-SNG), by thermochemical way, can be divided into five process steps: pre-treatment of input biomass, gasification, raw gas purification, methanisation and upgrading. Methanisation results in methane from a synthesis gas, the main components of which are CO and H₂. Methane is a strongly exothermic reaction, so heat removal is one of the main problems for the integration of the methanisation process, eg into bio-chemical refineries or other plants. The methanisation process must be catalyzed.

Power to Gas (P2G) is a way of conserving energy from renewable sources through methane production and eventually adding it to the natural gas distribution system, which allows energy storage that can not be consumed at the moment or that it would not have to be produced because it would not be used. As the name of Power to Gas suggests, it is a transformation of electricity to gas. The first option is to make hydrogen by means of electrolysis, which can be added up to 2% in the natural gas transmission system without any significant influence on the combustion properties of the gas. Another option is the production of "artificial" natural gas (SNG) - methane - through the Sabatier reaction ($4\text{H}_2 + \text{CO}_2 \rightarrow \text{CH}_4 + 2\text{H}_2\text{O}$) - by combining two gases - hydrogen and carbon dioxide under high pressure and temperature.

Overview of related R&D projects

Level	Responsible organization	Objective / timeline	Partners	Financing
EU	DBFZ DEUTSCHES BIOMASSEFORSCHUNGSZENTRUM GEMEINNUTZIGE GMBH, Germany	Research Coordination for a Low-Cost Biomethane Production at Small and Medium Scale Applications (2016 – 2018)	UNIWERSYTET WARMINSKO MAZURSKI W OLSZTYNIE, Poland JTI - Institutet för jordbruks- och miljöteknik AB, Sweden RISE RESEARCH INSTITUTES OF SWEDEN AB, Sweden	H2020-EU.3.3.2.
ČR	MEGA a.s. / MemBrain	New generation electromembrane modules (MODULY) 2016 - 2019	x	MPO
ČR	Czech Biogas Association	Technology platform Biogas 3	x	OP PIK

1.1 Objective scope and targets values

The purpose of this Action Plan is to maximize the regional production of biomethane as a universal energy carrier, storable and usable both for the production of different types of energy and for the storage of excess energy, as well as fuel for sustainable transport or input into chemical production.

The goal is:

- I. to prepare / support in the South Bohemian region by 2025 a project of a small upgrade of biogas surplus for local transport purposes, including the propulsion of agricultural machinery
- II. to prepare / support in the South Bohemian Region the transition of at least one biogas plant to biomethane production in order to push biomethane into the public distribution network or the creation of a new biometan station
- III. to achieve by 2050 a 50% share of biomethane in the production of biogas stations in the South Bohemian Region

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
The emergence of small upgrading unit for the production of biomethane for local purposes in the South Bohemian region	<ul style="list-style-type: none">1 units until 20253 units until 2040	Map of biogas plants: http://www.czba.cz/mapa-bioplynovych-stanic.html Map of CNG stations: http://www.cngstanice.cz/mapa-cng-stanic.html
The construction of biomethane station the South Bohemian region	<ul style="list-style-type: none">full technical and construction documentation until 2030implementation until 2035	Documentation for energy provider (E.ON) and Building Authority Biogas plant traffic reports
The share of biomethane in the production of biogas stations in the South Bohemia	<ul style="list-style-type: none">50% do 2050	Biogas plant traffic reports Map of biogas plants: http://www.czba.cz/mapa-bioplynovych-stanic.html

2 Implementation strategy

2.1 Step by step description

In order to achieve the objective, it is necessary to support research and development and work with stakeholders, in particular with public administration, the energy market regulator and distribution system operators. A key condition is the establishment of a National Biomethane Registry, which will monitor the origin of biomethane and form a platform for public support and trade in biomethane. Technical and legislative are set up, details are fine-tuned. The economic conditions will be modified with the prospect of a new Act on Supported Energy Sources from 2022. For the actual implementation, it will be necessary to consider the situation on site - both the capacity of the gas pipelines and the possibility of utilization in the local transport or agriculture, the transport technology is also important - enough suitable types of vehicles. This is expected to grow gradually between 2020 and 2035.

Support for research – technical and organizational fundamentals

1) Harmonization of the biomethane market

Biomethane is currently the only known substitute for natural gas. By using biomethane, it is therefore possible to increase the security of gas supply while reducing the emissions of this fuel, which together with electricity plays an irreplaceable role in energy supply. The basis for the development of biomethane production is market harmonization along with the harmonization of technical standards for the injection of biomethane into the natural gas distribution network.

2) Scheme for the promotion of energy security of gas supply

The aim of the research is to find a suitable energy security scheme as a possible solution to quantify the energy security level, together with the subsequent financial compensation for this service.

3) Production of biomethane from synthesis gas

Biomass production from wood biomass is complementary to the production of biomethane from biogas. This production line can provide 25 - 50 % of the total production capacity of biomethane in the future. The key step of this production is the synthesis of biomethane from synthesis gas.

The aim of the research is the development of new catalysts of this chemical reaction, together with the process integration of this strongly exothermic process into the production of biomethane, is the key to the mass expansion of this technology. Current nickel-based catalysts are relatively effective but sensitive to the content of catalytic poisons, especially sulfur compounds.

4) Optimization of methane production by Sabatier reaction

The aim of the research is to find new techniques for controlling the Sabatier reaction by reacting gaseous hydrogen with carbon dioxide to form methane. The high

pressure and temperature at which the reaction is currently carried out increases the cost of producing biomethane. Finding suitable catalysts together with the optimization of the reaction parameters will make the gas production technology available from the surplus electricity in the distribution system in a substantial way, thereby increasing the possibilities of integrating other renewable electricity sources into the production mix.

Planned projects

Level	Responsible organization	Objective / timeline	Partners	Financing
CZ	ECO trend Research Centre	Small biogas upgrading unit (2022 – 2024)	FEMKO s.r.o.	OP PIK (EU)
CZ	Czech Biogas Association	Amendment of law on RES and fuels (2019 – 2022)	EBA, MPO, ČPS	own
EU	ErGAR	European Biomethane Trading System (2019 – 2025)	CzBA, národní registry	EU / own

Sector support, measures – national level

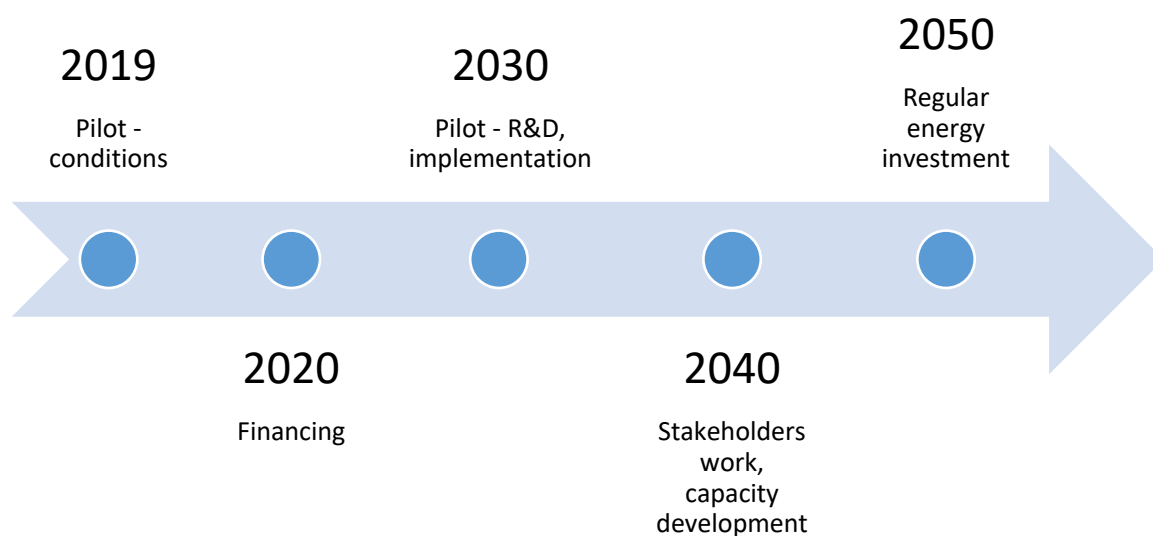
Type	Measures	Deadline	Responsibility
legislative	Pilot test and refine the conditions for connecting the biomethane plant to the natural gas network.	2019	ČPS, GasNet, E.ON
legislative	Operating subsidy schemes for biomethane, dealing with guarantees of origin to be included in the amendment to the Act on Supported Energy Sources.	2022	MPO, ERÚ
research	Pilot and demonstration projects for the production and use of biomethane, improvement of technologies for upgrading.	2025	R&D, CzBA, technology suppliers
environment	Regularly negotiate with the Ministry of Industry and Trade on the legislative environment, interfere with technical conditions, build economically interesting opportunities, publish everything on a continuous basis.	2030	CzBA

environment	Provide regularly at least 1 contribution related to biomethane at each CzBA's event.	2019	CzBA
financing	Establish a sustainable support system for biomethane, especially from waste.	2022	MPO, ERÚ
financing	Promote a topic within research, innovation and awareness programs.	2019	CzBA, TAČR/MPO/MZe

Sector support, measures – regional level (South Bohemia)

Type	Measures	Deadline	Responsibility
legislative	Pilot test and refine the conditions for connecting a biomethane plant to the natural gas network in cooperation with relevant South Bohemian entities.	2019	Czech Gas Association, GasNet, E.ON
research	Pilot and demonstration projects for the production and use of biomethane, improvement of technologies for upgrading in the South Bohemia region.	2030	R&D, CzBA, technology suppliers
environment	Regularly negotiate with E.ON and other suppliers and customers of gas for energy and transport in the region about the legislative environment, interfering with technical conditions, developing economically interesting opportunities.	2030	CzBA
environment	To regularly provide at least 1 contribution at each biogas annual conference of the CzBA issue of biomethan.	2019	CzBA
financing	To support the topic within regional innovation vouchers scheme.	2020	Regional Authority, South Bohemian Science and Technology Park

2.2 Time schedule



2.3 Budget and resources needed

Main budget items for the Action plan:

R&D (till 2030)

- 5,7 mio. € (1950 personmonths)

Demonstration and pilot projects (till 2030)

- Investments 25 mio. €

Work with stakeholders, activities for public administration – till 2050

- 1,5 mio. € (280 personmonths)

Education of target group, consultations – till 2050

- 1,3 mio. € (250 personmonths)

3 Collaboration with stakeholders

At present, the Czech Biogas Association is working on the Action Plan as a national technology platform for the production and use of biogas and biomethane. In addition, members of the research consortium RESTEP (including ČZU and VÚMOP), Bioklastr, EF Group a.s. and selected experts in energy and transport (E.ON, NGVA, etc.). The South Bohemian Region (except CzBA, E.ON, NGVA and ETRC) also represents JAIP and RERA, representing the South Bohemian Economic Chamber, the South Bohemian Agriculture Chamber, the Union of Towns and Municipalities of the South Bohemian Region and the South Bohemian Region.

Roles and responsibilities of different actors for Action Plan implementation

Sector	Who and why?	Who and why – regional level
Public administration	Ministry of Industry and Trade - creation / interpretation of legislation Energy Regulatory Office - technical support conditions Regional Authorities - Authorization of Buildings, Background for Territorial Energy Concepts Inspection bodies (State Energy Inspection, Czech Environmental Inspectorate, Czech Technical Inspectorate, Labor Inspectorate, Fire Brigade, Customs Administration, Regional and Municipal Authorities) - Authorization and certification of new technological solutions.	Ministry of Agriculture and the SAIF - regional workplace - subsidy policy of the Rural Development Program South Bohemian Region - Regional Development, Territorial Energy Concept South Bohemian Agrarian Chamber - operators of BPS South Bohemian Chamber of Commerce - Suppliers and users of local power systems JVTP - innovation vouchers Municipalities interested in local use of biomethane
R&D	Research Institutions – Data sources, technologies, know-how Universities - Vocational education and training of competent workers for the field, research	South Bohemian University VŠTE, Robert Bosch NGVA, CzBA
Entrepreneurs	Suppliers of technologies - prices, supply conditions, biomethane quality, end-user equipment Investors - searching for and evaluating suitable opportunities, project feasibility Biogas operators - Use of biomethane for mobility Transmission and Distribution System Administrators - Entry to DSO	Biogas operators Suppliers of technology and service Agricultural enterprises E.ON, energy companies operating in the region Suppliers of energy and fuels Energy and fuel consumers Transportation companies

	Carriers - Use of biomethane / bioCNG	
Public	Associations, NGOs - creation of contacts, lobby, transfer of foreign knowledge Experts - professional background, interest in the issue	CzBA, AgEnDa, RERA South Bohemian microregions

4 Monitoring Strategy

The monitoring strategy for this Action Plan will be set as follows.

- Evaluation of the overall progress and potential re-thinking of the strategy (every 3 years, responsible body: AgEnDa)
- Evaluation of the R&D activities, update of the achievements (every 3 years, responsible body: Czech Biogas Association)
- Overview and update of the financing opportunities (every 5 years, responsible body: JAIP / AgEnDa)
- In 2030 – Pilot projects review by Czech Biogas Association
- In 2040 – Capacity building and state of awareness review by AgEnDa
- In 2050 – Development of the investments in biogas upgrading units and share of biomethane on the regional biogas production review by Czech Biogas Association.

5 Risk management

Risk	Probability of the risk	Mitigation measure
Biogas plant operators' lack of interest.	Medium	Intensive education and communication through the CzBA.
Non-interest from municipalities, micro-regions, energy consumers, other energy suppliers.	High	Intensive education and communication from AgEnDa, study, pilot and demonstration projects.
Technical and legislative barriers from public administration, energy distributors and fuels.	Medium	Creation of standards and legal prerequisites at national level, regional working groups.
Lack of finance.	Medium	Collaboration with Regional Authority and professional organizations to create pressure to support innovative energy projects.
Insufficient potential of South Bohemian R&D bodies for project implementation.	Low	Creating contacts, strengthening consortia with new subjects and experts.

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

for the South Bohemian Region

Agriculture biogas plants conversion to
waste utilization

English version

prepared by
AgEnDa z.s.

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: September 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Renewable energy / bioenergy

Title: Agriculture biogas plants conversion to waste utilization

1 Objective

The main objective is to replace maize as the dominant substrate for biogas production with alternative crops and especially waste.

For the production of biogas, virtually any organic material that is subject to anaerobic microbial decomposition can be used. This spectrum of substances is very wide, from basic organic substances such as methanol and glycerol to complex organic compounds in the form of tissues of plants or animals. Generally, the primary use of waste materials (agricultural waste, organic fraction of municipal waste) can be recommended, followed by support for the development of production capacities using targeted biomass.

In promoting biogas production from targeted biomass, maize is chosen as the most common alternative. This is mainly due to the relatively high yield per hectare of this crop combined with good biogas yield and very favorable mechanical properties. These properties significantly influence the positive economic effect of using corn.

Targeted crops, including maize, are harvested mostly in the form of silage for biogas production. Alternatives to corn are mainly whole grain silages (known as GPS silages), grasshoppers and forages on arable land, silage of legumes and mixed stands and sunflower silage. Other crops include potatoes and sugar beet. The practical use of these individual alternatives is entirely dependent on the agro-technical possibilities of the biogas plant operator, the technical possibilities of a particular biogas station (eg mixer dimensioning) and legislative constraints.

All of the above-described, intentionally grown, energy crops have certain shortcomings in comparison with maize, which are then effectively disqualified from mass use in practice. The result is always lower economic efficiency of biogas production.

From the above it can be stated that the dominant position of maize among the possible energy substrates of the targeted biomass is a logical result of the agrotechnical characteristics of the individual crops and other properties briefly presented above. However, the cultivation of maize itself is traditional in our conditions, and can be said to be a problem if all the principles of good agricultural practice are respected, especially the intended crop rotation and the limitation of cultivation of broad-leaved crops on sloping land. With the development of biogas production, it is essential to thoroughly control these agrotechnical rules together with the system of sanctions and effective prevention.

Soil areas of maize for silage in the Czech Republic are around 230,000 ha per year, occupying about 6,5 – 7 % of agricultural land. Of that, 30 000 ha were conserved in Southern Bohemia. Corn damages the soil and leads to erosion and degradation.

Overview of related R&D projects

Level	Responsible organization	Objective / timeline	Partners	Financing
EU	ZAGREBACKI HOLDING DOO, Croatia	Bin2Grid : Turning unexploited food waste into biomethane supplied through local filling stations network (2015 – 2018)	<p>SVEUCILISTE U ZAGREBU, FAKULTET STROJARSTVA I BRODOGRADNJE, Croatia</p> <p>WIRTSCHAFT UND INFRASTRUKTUR GMBH & CO PLANUNGS KG, Germany</p> <p>GUSSING ENERGY TECHNOLOGIES GMBH, Austria</p> <p>JAVNO SOOBRAKAJNO PRETPRIJATIE SKOPJE, Former Yugoslav Republic of Macedonia</p> <p>CITY OF SKOPJE, Former Yugoslav Republic of Macedonia</p> <p>INSTITUTO ANDALUZ DE TECNOLOGIA, Spain</p> <p>OBSERVATOIRE REGIONAL DES DECHETS D'ILE DE FRANCE, France</p>	H2020-EU
CZ	Zemědělský výzkum, spol. s r.o.	Use of mixed-crop maize growing technology for the production of silage utilizable in the biogas plant (2017-2020)	<p>agriKomp Bohemia s.r.o.</p> <p>Mendel University in Brno</p>	TAČR Théta

ČR	ENKI, o.p.s.	Liquidation of radiationally contaminated biomass after disease – distribution in the landscape, crop logistics and biogas technology utilization	Státní ústav radiační ochrany, v.v.i., Czech Agriculture University South Bohemian University	Ministry of Internal Affairs – security research
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1.1. Objective scope and targets values

The objective of the Action Plan is to create a knowledge base and new products (alternative crops) and to make bio-waste and waste agricultural and food raw materials available for the biogas and biomethane sector.

The aim is to ensure that the sowing area of silage maize for biogas stations is reduced by 15 % in the South Bohemian region by 10 % and by 50 % by 2040.

1.2. Target indicators

Objective	Target indicator	Method of measurement and validation
Reduction of sowing area of silage maize for biogas production in 2028	15 %	Official statistics: https://www.czso.cz/csu/czso/soupis-ploch-osevu-k-31-5-2017
Implementation of the projects to support the goal	3 by 2028 5 by 2040	Project database, e.g.: https://www.rvvi.cz/cep https://cordis.europa.eu/projects/home_en.html

2 Implementation strategy

2.1. Step by step description

In order to achieve the objective, it is necessary to support research and development and work with stakeholders, especially with public administrations, which must set parameters for biogas stations so that only those who minimize the impacts of the operation of biogas stations on the soil and, on the other hand, use the difficult to exploit waste or alternative biomass. It is important to involve the target group, ie biogas operators and farms.

Support for research

1) The use of cereal and grass silage in the production of biogas

Grain and cereal silage may, under certain circumstances, effectively replace the dominant position of maize as the primary energy crop used to produce biogas. The main limitation is above all the higher content of cellulose and especially pectin, which effectively prevents the use of cereal and grasses as a basic component of the substrate dose.

The aim of the research is to identify the most suitable species and individual hybrids of cereals and grasses which are most suitable for the production of silage in the climatic conditions of the Czech Republic and the possibilities of application of gene engineering for the control of pectin content in cereals.

2) Use of biogas waste

Due to the zero operating support of biogas plants built after 31.12.2013 and the pressure on the use of biodegradable waste, it is very current to focus on biosphere-processing biogas technologies. The key question is the wide variability in the composition of the waste, which causes considerable operational problems, sometimes requiring significant changes or at least some modifications to the technology.

The aim of the research will be the setting of technologies and the management of waste quality as a substrate for biogas stations.

Planned projects

Level	Responsible organization	Objective / timeline	Partners	Financing
EU	ConPlusUltra	Safety and level of renewable energy technologies to increase life, impact on the environment and people's lives (2022 – 2024)	AgEnDa, CzBA	AT - CZ
CZ	Bioklastr	Risk minimization and quality management model using waste as substrates for anaerobic digestion (2021 – 2024)	JČU, VÚZT	TAČR Epsilon

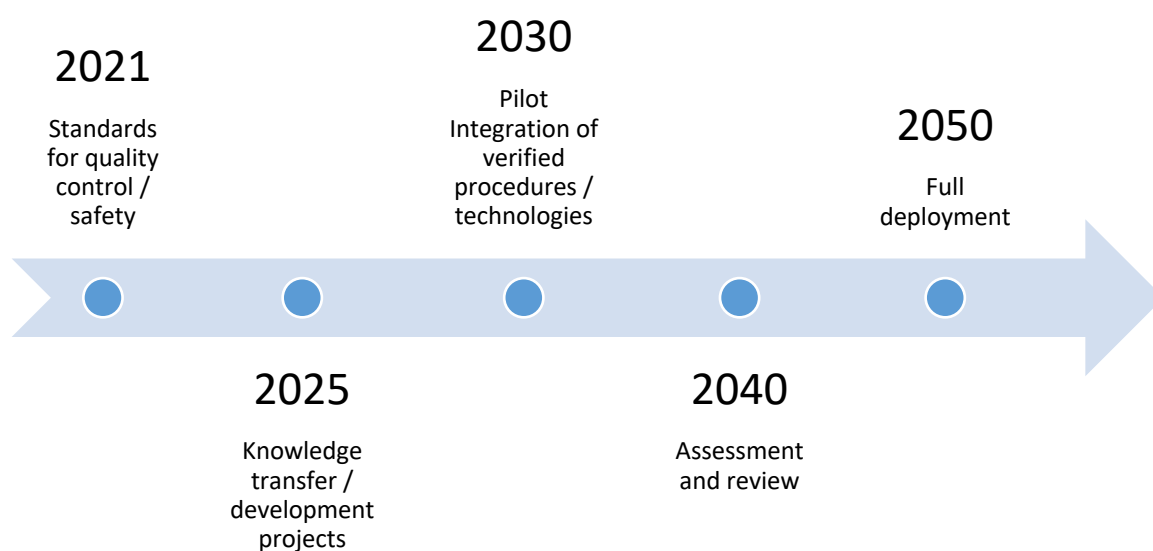
Sector support, measures – national level

Type	Measures	Deadline	Responsibility
legislative	Specify standards for quality management and technology safety, apply audit findings	2021	TIČR/ČIZP/SÚIP
legislative	Creating new and updating existing national industry standards with respect to new substrates	2025	CzBA
research	Initiate project plans for alternative substrates and biogas substratum substrates including logistics and information systems	2030	VaV, CzBA, BPS, MZe
environment	Initiate cross-border or, respectively, European cooperation to exchange experience in the EU and Best Practice in the field	2027	CzBA
environment	To develop an information environment with basic data for substrate alternatives, their modifications and logistics	2028	CzBA
financing	Get resources to fund data collection and create industry standards	2021	MZe/MPO
financing	Promote issues of technology improvement, efficiency, security and reliability in research and innovation programs	2023	CzBA, TAČR/MPO/MZe

Sector support, measures – regional level (South Bohemia)

Type	Measures	Deadline	Responsibility
legislative	Specify standards for quality control and technology safety, apply the conclusions of inspections within the region of the South Bohemia.	2021	TIČR/ČIZP/SÚIP
research	Initiate development projects in the field of alternative substrates and biogas substrate including logistics and IT systems with participation of South Bohemian entities.	2030	VaV, CzBA, BPS, AgEnDa, JAIP, Jihočeská AK a HK, RERA
environment	Initiate cross-border / European cooperation to exchange experiences among the EU regions and related best practice (CZ - ET, CZ - Bavaria, etc.)	2027	CzBA, AgEnDa, JAIP, Jihočeská AK a HK, RERA
financing	Promote issues of technology improvement, efficiency, security and reliability in regional grant programs	2023	CzBA, RERA, JČK

2.2. Time schedule



2.3. Budget and resources needed

Main budget items for the Action plan:

R&D – till 2018

- 4,5 mio. € (1750 personmonths)

Work with stakeholders, activities for public administration – till 2018

- 0,5 mio. € (144 personmonths)

Education of target group, consultations – till 2018

- 1,5 mio. € (180 personmonths)

3 Collaboration with stakeholders

Currently, the Czech Biogas Association is working on the Action Plan as a national technology platform for the production and use of biogas and biomethane. In addition, members of the research consortium RESTEP (including the Czech Agricultural University and VÚMOP), Bioklastr and selected experts in waste management were invited. The South Bohemian Region (except CzBA and ETRC) also represents JAIP and RERA, representing the South Bohemian Economic Chamber, the South Bohemian Agrarian Chamber, the Union of Towns and Municipalities of the South Bohemian Region and the South Bohemian Region.

Roles and responsibilities of different actors for Action Plan implementation

Sector	Who and why?	Who and why – regional level
Public administration	Ministry of Agriculture - subsidy policy for arable land and TTP Ministry of the Environment / Ministry of Industry and Trade – waste utilization Energy Regulatory Office – feed-in tariffs policy, technical support conditions, verification of proposed solutions, modeling of situations, strategic backgrounds	Ministry of Agriculture and the SZIF – Regional branch - subsidy policy for arable land and TTP South Bohemian Authority – development of the region, protection of the land fund South Bohemian Agricultural Chamber - Improving Soil and Agricultural Production
R&D	Research institutions – data and impulse sources, legislative and technical solutions, know-how transfer Higher education institutions – vocational training, obtaining new patents	South Bohemian University Biological Center of the AS CR Breeding stations JAIP

Entrepreneurs	Biogas plant operators – creating demand for alternative substrates and their processing Technology providers – properly set up technologies for substrates and their utilization Agricultural businesses - growing alternative crops Waste companies – use of biowaste	Biogas plants operators Suppliers of technology and service Agricultural enterprises Waste companies operating within the region
Public	Association, NGO's – Contact Forming, Lobby Experts – professional background, interest in issues, know-how	CzBA, AgEnDa, RERA South Bohemian microregions

4 Monitoring Strategy

The monitoring strategy for this Action Plan will be set as follows.

- Evaluation of the overall progress and potential re-thinking of the strategy (every 3 years, responsible body: AgEnDa)
- Evaluation of the project development activities, update of the achievements (every 3 years, responsible body: Czech Biogas Association)
- Overview and update of the state of the art technologies (every 5 years, responsible body: CzBA / AgEnDa)
- In 2030 – Pilot projects review by Czech Biogas Association
- In 2040 – Assessment and full review of the Action plan by AgEnDa
- In 2050 – Final review (full deployment) by CzBA / AgEnDa

5 Risk management

Risk	Probability of the risk	Mitigation measure
Biogas plant operators' lack of interest.	High	Intensive education and communication through the CzBA
Lack of alternative substrates / wastes.	Medium	Creating international contacts initiating R&D projects
Insufficient potential of South Bohemian R&D institutions for project implementation.	Low	Creating contacts, strengthening consortia with new topics and expert members.

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

for the South Bohemian Region

Biogas utilization as regulation and
local energy system

English version

prepared by
AgEnDa z.s.

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: September 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Renewable energy / bioenergy

Title: Biogas utilization as regulation and local energy system

1 Objective

The main objective is to support the preparation and building of regional energy self-sufficiency and local and supra-regional smart grids based on biogas stations and regional needs.

Biogas stations are often perceived by municipalities and their inhabitants as annoying facilities that degrade the environment of the municipality. In addition to negatives, which are mostly limited to a certain increase in road traffic, noise and odor, the biogas plant can also bring significant benefits to the municipality or region, whether in the ecological or economic spheres.

Specifically, biogas plant can be used to:

- 1) energy security and self-sufficiency of the municipality, where in a crisis situation it would be able to supply electricity and heat to one or more municipalities,
- 2) reducing the local emission load by switching to heat from biogas plant or by direct use of biogas in local distribution systems,
- 2 reducing the local emissions by using biomethane to drive vehicles and agricultural machinery,
- 3) regional development and increased competitiveness by downstream production using both energy (mainly thermal) and biogas.

A large part of the municipalities are not and will never be gasified, even in those gas-fueled, there are still a significant number of households or fossil-fired power plants with unpleasant consequences in the form of emissions and local village smog. However, it is clear that, for example, the transfer of heat from the biogas station to the municipality and the individual households is not easy, it is confronted with personal, property and especially financial obstacles.

The advantage of biogas stations as energy sources is also their controllability. There is only a few other renewable resources (such as a pumping hydroelectric power station or a biomass power plant). However, the rise to full power or vice versa reduces power to zero (unlike other sources) takes a second of a second, which predestines this resource for special regulation purposes.

The disadvantage of BPS for targeted use in ancillary services is their low performance and time-limited regulation. On the other hand, there is no problem with fast response and control rate up to 0% power. Therefore, the individual biogas station can be used as a basis for local smart grids, respectively. intelligently managed systems of energy

production and consumption. In BPS, larger, synchronously controlled blocks can also be considered services for the entire energy network (support services, peak power generation, etc.)

Overview of related R&D projects

Level	Responsible organization	Objective / timeline	Partners	Financing
CZ	Unicorn Systems a.s.	Optimization of the operation of electroenergy intelligent networks under the „smart grid“ concept from the economy and safety point of view (2017 – 2019)	VUT Brno	TA0/TH
CZ	Ústav geoniky AV ČR, v. v. i.	Research of socio-dimensional diffusion of RES projects in the Czech Republic: Education for adaptive energy transition (2016 – 2018)	Palacký University in Olomouc	GA ČR
EU	BIOWAY	Project for the construction of the BioLNG network in the Czech Republic and Slovakia	CzBA	EU - CEF

Objective scope and targets values

The objective of this Action Plan is to use the unique features of biogas stations as the only renewable (regulated) renewable energy source, primarily in the region, while ensuring a higher level of self-sufficiency and security of energy supply.

The goal is:

- 1) to prepare / support the project of a local power network in the South Bohemian Region based on a biogas station as the main regulatory power
- 2) to prepare / support the project of local smart grids in the South Bohemian region by 2045 with the full involvement of all inputs and outputs of the biogas station into the circular microregion system
- 3) achieve 10 % self-sufficiency in the transport sector by 2050 (electricity from RES and bioCNG or bioLNG)

Target indicators

Objective	Target indicator	Method of measurement and validation
Utilization of the regulatory power of biogas stations in the South Bohemian Region	2 MW until 2030 10 MW until 2040 25 MW until 2050	Annual Report on the Operation of the Electricity System (www.eru.cz)
Local energy network project in JČK	Documentation until 2035 Implementation until 2040	Documentation for E.ON and Building authority Power traffic reports (ERÚ or OTE)
Local smart grids project	Documentation until 2045 Implementation until 2050	Documentation for E.ON and Building authority Power traffic reports (ERÚ or OTE)
Increasing the degree of local self-sufficiency in the production of renewable energy	by 20 % do 2030 by 50 % do 2050	Power traffic reports (ERÚ or OTE)
Self-sufficiency in transport (from RES)	10 % do 2050	Reports and statistics (ČSÚ, MD)

2 Implementation strategy

2.1 Step by step description

In order to achieve the objective, it is necessary to support research and development and work with stakeholders, in particular with public administration, the energy market regulator and distribution system operators. This will create legislative, technical and economic conditions for the connection of biogas stations to regulatory power, local networks and smart grids. Support will have to be set for these intentions and adapted existing support schemes from national and European sources. For their own implementation, both mayors of municipalities and representatives of micro-regions and biogas stations or energy consumers in the area will be very actively involved.

Support for research

Representatives of the municipalities are not provided with suitable knowledge and methodology for incorporating the biogas plants into the municipality, on the contrary, they mostly search in vain for arguments for or against its existence. In many cases if

there was an interest in incorporating biogas plant various technical, legal and financial barriers would occur.

In addition to these methodological outputs, there are a number of options for using biogas within a given municipality or micro-region. Most of them require innovative solutions or even elements of applied research:

- building a heat-using plant from biogas plant (drying, distilling, cultivating organisms for pharmaceutical production, etc.)
- biogas or biogas operation; by-products from the biogas plant
- Local hot water network
- local biogas (direct biogas consumption)
- filling of pre-cleaned biogas into cylinders and use for heating water and heating
- use of pre-cleaned biogas for agricultural machinery and transport equipment
- production of biomethane and injection into an existing gas pipeline or into a local gas pipeline
- a bioCNG / LNG station

The practical application of biogas plant for use in the scheme of classical supportive services of the energy distribution network is conditional upon the facility being placed into virtual blocks, which will both meet the performance parameters imposed on the regulatory capacities but which will mainly solve the plant requirements for regular shutdowns. This will accomplish a situation where, for example, one demand for a virtual block performance reduction service will be solved by a series of successive complete and / or partial downtimes of different biogas plants.

By analogy, the virtual performance of a virtual block in a non-service-dependent period will be characterized by a series of downtime and reduced plant's performance. The performance services offered (performance increase) will, on the contrary, be realized by the start of the shut down production capacities. The backup power offered will be divided into power levels according to the time at which it can be created. Thus, the proposed virtual block will not only be a classical block of electricity generation but will be able to offer extremely fast support services with a significant reduction but also a significant increase in instantaneous power generation. This model can be complemented by an automatic initiation of the power consumption of a custom installed power consumption where the virtual block can become a significant consumer of electricity.

Much more interesting is the direct involvement of biogas plant in the virtual smart grid control, which will have its part of production and consumption. At a time when there is a rapid reduction in operating support for renewable energy sources, demand for specific solutions is rising. It is likely that this will encourage the involvement of RES in energy production, even without public support, or with its limited amount.

With an increase in the volume of gas storage and the installed biogas plant electrical power, this source (again in a system that will count a total of dozens of MWe inst) is designed to produce peak electricity. In this case, it will not be possible to use these

resources from the power grid operator for support services. On the other hand, it is possible to trade both the positive and the negative deviation currently in the market.

The problem is that biogas plant operators have no experience with the electricity market and are unable to act independently on the market. In most cases, they prefer stable electricity consumption without complications, as they want to focus on their basic business - agriculture.

However, if any of the traders were able and willing to work with these resources, this could be of interest to both the biogas plant (financial) operator and the power grid operator (management).

Another option is to include biogas plant into a regional smart grid that will respond to current demands of electricity consumers and regulate the sources, to balance production in the resources included in this smart grid. Smart Grids are a phenomenon that is only experimentally on the Czech territory and is subject to a certain degree of equipment especially for customers. The version, which will involve only larger suppliers and customers, could be implemented in a relatively short time.

Planned projects

Level	Responsible organization	Objective / timeline	Partners	Financing
CZ	ETRC	Biogas plant as a stabilizing element of the energy system and local self-sufficiency (2020-2024)	E.ON	TAČR Théta
EU	EBA	Biomethane - a medium for regional development, sustainable transport and European security (2021-2023)	CzBA, RERA	H2020
EU	NGVA Europe	Creation of a network of bioLNG stations within European Corridors (2021-2024)	NGVA CZ	EU - CEF

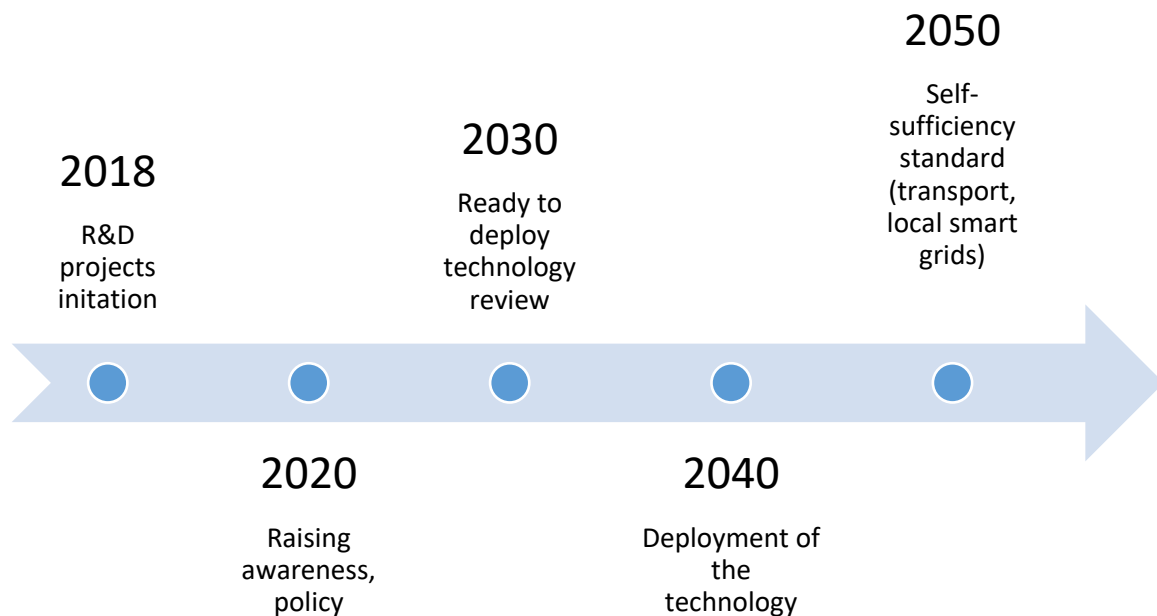
Sector support, measures – national level

Type	Measures	Deadline	Responsibility
legislative	Amendment to the Act on RES - New Operational Support Mechanisms, including local energy engagement and smart grids	2028	MPO, ERÚ
legislative	In the framework of technical regulations, biogas stations can be accepted as one of the most important renewable and locally available renewable energy sources, including appropriate adaptation	2025	ČPS, OTE, ČEPS, ERÚ, energetiky
legislative	European legislation to appropriately commemorate and lead to the optimization of RES not only on the basis of the economy, but also in terms of stability of the electricity system, self-sufficiency, local applicability, etc.	2030	EBA, CzBA
research	To explore various models of local involvement using BPS, including new technologies, processes, systems, and generally technical or economical / technical assumptions	2035	VaV, CzBA, BPS, MPO, ERÚ
environment	Publish trends, legislative proposals, pilot applications, work intensively with public administration	2020	CzBA
financing	Gain resources for studying and regular education, for modeling and for own construction of BPS with innovative technologies or demonstration projects	2025	MPO, MZe
financing	Promote a theme within research, innovation and awareness programs	2020	CzBA, TAČR/MPO/MZe

Sector support, measures – regional level (South Bohemia)

Type	Measures	Deadline	Responsibility
legislative	In the framework of technical regulations, biogas stations can be accepted as one of the most important renewable and locally available renewable energy sources, including the appropriate adaptation of the rules for distribution networks in the South Bohemia.	2025	E.ON
legislative	In the territorial energy concept of the South Bohemia to incorporate the energies, electricity stability, self-sufficiency, local utilization of RES, etc.	2030	RERA, CzBA
research	To explore different models of local involvement and use of biogas production in the South Bohemia region, including new technologies, processes, systems and generally technical or economic-technical assumptions.	2035	CzBA, local biogas plants, E.ON
environment	At least 1 contribution per year at the annual biogas conference on the topic of local applicability and integration of biogas plants.	2020	CzBA
financing	Gain resources for studying and regular education, for modeling and for own construction of biogas plant with innovative technologies or demonstration projects in the South Bohemia,	2025	CzBA, AgEnDa, RERA
financing	To support the topic within innovation vouchers scheme in the South Bohemia.	2020	South Bohemian Authority, JVTP

2.2 Time schedule



2.3 Budget and resources needed

Main budget items for the Action plan:

R&D – till 2035

- 7,5 mio. €, 2430 personmonths

Demonstration and pilot projects

- Investments 20 mio. €

Work with stakeholders, activities for public administration – till 2050

- 2,5 mio. €, 420 personmonths

Education of target group, consultations – till 2050

- 2,1 mio. €, 380 personmonths

3 Collaboration with stakeholders

Currently, the Czech Biogas Association is working on the Action Plan as a national technology platform for the production and use of biogas and biomethane. In addition, members of the research consortium RESTEP (including Czech Agriculture University and VÚMOP), Bioklastr, Czech Off-Grid house and selected experts in the field of power and smart grids (E.ON, NGVA, etc.). The South Bohemian Region also represents JAIP and RERA, representing the South Bohemian Economic Chamber, the South Bohemian Agrarian Chamber, the Union of Towns and Municipalities of the

South Bohemian Region and the South Bohemian Authority (except CzBA, ČSD, E.ON, NGVA and ETRC).

Roles and responsibilities of different actors for Action Plan implementation

Sector	Who and why?	Who and why – regional level
Public administration	<p>Ministry of Agriculture - Rural Development</p> <p>Ministry of Industry and Trade - Legislation</p> <p>Energy Regulatory Office, ČEPS - regulation of the industry, creation of conditions</p> <p>Ministry for Regional Development - conditions for building a local network</p> <p>Regional authorities - Specific approaches to the authorization of local networks and the use of biogas</p> <p>OTE - electricity trade and deviations</p> <p>Towns and municipalities, micro-regions - local biogas-based solutions, local networks, energy self-sufficiency and security of the region</p> <p>Energy Regulatory Office - modification of regulatory rules, shift in access to BPS</p> <p>ČEPS - access to networks, regulation</p>	<p>Ministry of Agriculture and the SZIF - regional workplace - subsidy policy of the Rural Development Program</p> <p>South Bohemian Region - Regional Development, Territorial Energy Concept</p> <p>South Bohemian Agrarian Chamber - operators of biogas plants</p> <p>South Bohemian Chamber of Commerce - Suppliers and users of local power engineering</p> <p>JVTP – innovation vouchers</p> <p>Municipalities interested in local and smart networks</p>
R&D	<p>Universities and research institutions - data sources, legislative and technical solutions, acquisition of new patents, transfer of know-how</p>	<p>South Bohemian University VŠTE, Technology Center Písek</p> <p>Czech Off-Grid Houses, CzBA</p>
Entrepreneurs	<p>Distribution Network Administrators - Network Connection Terms</p> <p>Biogas Energy Customers - Application of biogas plants outputs, including peak and regulatory outputs</p> <p>BPS Investors and Operators - Getting New System and Technology Solutions to Use Biogas In Place, Using Know-How</p>	<p>Biogas plants operators</p> <p>Suppliers of technology and service</p> <p>Agricultural enterprises</p> <p>E.ON, energy companies operating in the region</p> <p>Suppliers of energy and fuels</p> <p>Energy and fuel consumers</p> <p>Transportation companies</p>

	Distribution companies - substitution of gasification, operation of local networks Electricity Traders - Producing consumer-friendly smart grids	
Public	Associations, NGOs - work with municipalities and micro-regions, with citizens, collection of examples of good practice Experts - professional background, interest in the issue	CzBA, AgEnDa, RERA South Bohemian micro-regions

4 Monitoring Strategy

The monitoring strategy for this Action Plan will be set as follows.

- Evaluation of the overall progress and potential re-thinking of the strategy (every 3 years, responsible body: AgEnDa)
- Evaluation of the communication activities, update of the achievements (every 3 years, responsible body: Czech Biogas Association)
- In 2030 – Technology review by Czech Biogas Association
- In 2040 – Assessment and full review of the Action plan by AgEnDa
- In 2050 – Final review (full deployment) by CzBA / AgEnDa

5 Risk management

Describe possible risks and according mitigation measures. If needed, you can use the following table.

Risk	Probability of realising	Mitigation measure
Biogas plant operators' lack of interest.	Medium	Intensive education and communication through the CzBA
Non-interest from municipalities, micro-regions, energy consumers, other energy suppliers	High	Intensive education and communication from AgEnDa, study, pilot and demonstration projects
Technical and legislative barriers on the part of energy and fuel distributors	High	Creation of standards and legal norms at national level, regional working groups
Lack of financial resource	Medium	Collaboration with South Bohemia Authority and professional

		organizations to create pressure to support innovative energy projects
Insufficient potential of South Bohemian R&D institutions for project implementation	Low	Creating contacts, strengthening consortia with new topics and expert members.

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

for the South Bohemian Region

Status quo analysis

English version

prepared by
AgEnDa z.s.

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: October 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Financing and business models

Title: Status quo analysis

1 Objective

The main objective is to evaluate and preserve, or efficiently develop, the existing financial instruments and procedures applicable to the implementation of EE and RES projects. From a regional point of view, the development of the network of their providers and instruments for reducing the interest load or the level of private co-financing.

Economic instruments for the promotion of the use of energy from renewable sources should, together with other instruments, contribute to the protection of climate and air, rural development and industry, thus contributing to the sustainable development of society.

In general, they can be described as tools of indirect action, but this is not the case without exception. They should economically stimulate interest in protecting the environment and balancing the shortcomings of the administrative system. Compared to administrative tools (such as permits, approvals, opinions, and statements), they are more efficient and less costly across the society.

Through economic instruments, the state affects the behavior of regulated entities. Their basic feature is the choice of whether to behave in the interest of environmental protection (in some cases, however, it is not possible to vote, for example, if the obligation to use an economic instrument). Behavior should be environmentally friendly and at the same time economically beneficial, leading to win-win solutions.

In the Czech Republic there is funding of energy efficiency increasing measures possible above all from public support mechanisms ((New) Green Savings Program, Subsidy replacement of old boilers for low-emission types, Program EFEKT). The renewable energy finance activities are partly possible also from public support mechanisms or through green investments funds. The EPC and ESCO market is also functional and developed.

1.1 Objective scope and targets values

- 1) introducing at least 1 new tool for financing RES and EE projects by 2025 - regional loans, a crowdfunding platform etc.
- 2) providing low-interest or interest-free loans for the implementation of RES and EE projects by 2030
- 3) maintaining the existing possibilities to support the realization of renewable energy sources and EE (e.g. New Green Savings) by 2030

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Introduce at least 1 new tool for financing RES and EE projects by 2025 - regional loans, a crowdfunding platform, etc.	Introduction of a new economic instrument – open call, appointing the operator for territory of the South Bohemian Region – 1 tool until 2025	Functional tool
Provide low-interest or interest-free loans for the implementation of RES and EE projects by 2030	Amount of funds provided to support South Bohemian projects: 50 mio. CZK	Contracts for the allocation and use of funds.
To maintain the existing possibilities to support the realization of renewable energy sources and EE (e.g. New Green Savings) by 2030	Amount of funds provided to support South Bohemian projects: 30 mio. CZK	Contracts for the allocation and use of funds.
Establish a regional support program in the sense of reducing co-financing or reducing the interest load.	South Bohemian Regional Program – open call by 2040	Functional tool - its parameters

2 Implementation strategy

2.1 Step by step description

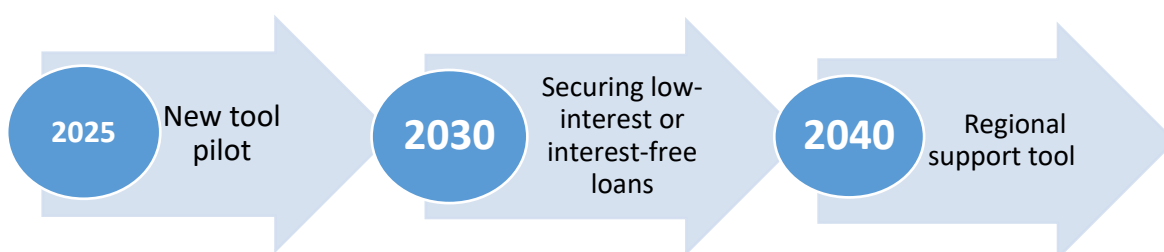
To reach the objective, the following activities are designed.

- 1) A detailed analysis of the current environment, the needs and interest of potential clients in relation to the region's energy concept – which RESs have the greatest prospect in the region and can be effectively supported and in what form. Analysis of economic instruments at national level and proposal for their supplementation within the region.
- 2) Preparation and implementation of tools (programme calls) that have emerged as the most appropriate from previous analysis. The preparation of the programs themselves consists of the elaboration of the grant scheme, including the setting of the conditions for designing and using subsidies / loans,

the process of selecting the applicants, the selection of the method of financing, the procedure of lending, the criteria for assessment the applications,

- 3) Implementation of programs – the implementation of the program consists in the announcement of calls for applications, the assessment of applications, the conclusion of contracts with selected applicants, the allocation of funds, the control and evaluation of fulfillment of conditions by the beneficiaries. Among other things, the implementation of programs should include information support to applicants, not only directly to programs, but also to potential project realizations and possibilities of combining support with other economic instruments at regional and national level,
- 4) Tool development – tools need to be improved and routed based on the experience gained from their implementation and the development of RES and EE technologies. Innovation can be applied, for example, in other calls for programs. Likewise, the content of the individual calls can be adjusted and directed, which may take into account, for example, preferring a regionally available and suitable fuel, etc. The Regionality of the Support Tool will accept the local circumstances and strength of the entities investing in RES and EE.

2.2 Time schedule



2.3 Budget and resources needed

Implementation of tools to support RES and EE projects requires the allocation of adequate resources to applicants. Operational resources are also needed for the regional contact points and technical assistance.

Needless to say, staff needs are required to administer tools when the programme is opened as well as the evaluation, assessment and support. Less demanding is the administration of the program during the project implementation period. Announcement and evaluation of calls and projects can be provided by an external entity, which will increase the overall cost of the program.

For the regional support program, it will be necessary to find a budget of EUR million per year in the budget of the South Bohemian Region or other regional entities (eg the special endowment fund).

Supporting activities by AgEnDa and south-bohemian partners:

- 1) Detailed analysis (12 000 EUR)
- 2) Preparation of tools – programs calls (15.000 EUR)
- 3) Implementation of programs (23.000 EUR)
- 4) Tool development (19:000 EUR)

3 Collaboration with stakeholders

Currently, there is a regionally focused international project mapping funding tools and the conditions for their further development (H2020: E-FIX). In this framework, both Ekoport and JAIP cooperate with local financial institutions and their representatives, as well as with API's regional representation or Energy Centre.

It is important to develop relationships between the Regional Authority (potentially via Regional Development Agency) and financial institutions that have instruments for financing their environment, energy savings and renewable energy sources among their products. Within the preparation of this measure several banks were interviewed (Moneta Money Bank, Česká spořitelna, Československá obchodní banka and UniCredit Bank). Similarly, contacts with financial intermediaries with a strong regional presence (Partners, SwissLife) will continue.

In order to strengthen the regionality, discussions with the Ministry of the Environment will be conducted on the creation of regional representation or cooperation in this respect with institutions such as the SZIF or the regional office. The Region, together with its South Bohemian Technology Park and Regional Development Agency development institutions, has already created a number of support mechanisms and programs (such as innovation vouchers). In this verified system, a new tool will be created under this measure. JVTP and RERA are active in this regard. The following stakeholder groups were identified as necessary actors for the implementation.

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Target group - applicants	Households, businesses	Applicants and implementers	Through the promotion of the programme directly by the regional authority, the regional press and other media.
Donor	Regional Authority	Tool administration, support delivery	Promotion of the program against the target group.
Public institutions	Municipalities	Tools promotion	Compliance with strategic documents, fulfillment of RES and EE development indicators.
	Energy agencies	Tools promotion	Compliance with strategic documents, fulfillment of RES and EE development indicators.

4 Monitoring Strategy

Monitoring its implementation is based on milestones:

- Regular annual meetings with RERA and JVTP as basic development institutions of the South Bohemian Region, evaluation of support programs and financial environment for EE and RES
- Regular contact with public authorities providing environmental funds (MIT, MoE, MoE, SEF, API Agency), inclusion in the creative groups preparing conditions for calls, or at least to comment on emerging programs and challenges
- Feedback from applicants and on the basis of project progress reports, from official statistics (once a year)

5 Risk management

Identified possible risks and the possible measure to mitigate them are the followings:

Risk	Probability of realising	Mitigation measure
The region will not have sufficient resources to implement the tools	High	The region has already had experience and apparatus for implementing a program for replacing old boilers from which it can draw.
Non-interest on the part of potential applicants	Medium	In order to attract applicants' interest, appropriate promotion and information support for the program and the possibility of supplementing it with other economic instruments is necessary.
Misuse of funds, non-payment - non-claim by applicants	Low	The risk should be reduced by setting the program correctly, by selecting applicants and by standard checking and by enforcing contractual requirements.

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

for the South Bohemian Region

Alternative financing methods
(CrowdFunding)

English version

prepared by
AgEnDa z.s.

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: November 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Financing and business models

Title: Alternative financing methods (CrowdFunding)

1 Objective

The main objective of this measure is to create a functional electronic application for providing alternative sources of financing for regional energy projects (RES, EE) and its integration into the normal management practices of private and public investors.

Household energy consumption accounts for a fairly significant portion of total energy consumption. In the Czech Republic, it is a quarter, or 25 %, which is just a little less than the energy consumption in transport.

In Czech households, energy consumption fluctuates. This is due to the fact that, on the one hand, the standard of living of the population is increasing, which is connected with better household equipment by modern electrical appliances. On the other hand, electricity, district heating and fuel are increasing, so people are increasingly choosing energy-saving appliances, or heating homes to save energy.

The vast majority of energy, 85 %, is consumed in most households for heating and hot water. The distribution of electricity consumption for other appliances varies considerably in different households, but its total is not negligible.

Households accounted for 28 percent of total energy consumption in the Czech Republic. For renewables, this share is two-thirds. The reason for such a high ratio is mainly fuel wood, which accounts for 86 % of households in renewable households, another five percent is for wood pellets. Then there are solar thermal systems, photovoltaics and heat pumps.

In the total consumption of brown and black coal in the Czech Republic, households now account for one third. On average, households consumed 3.7 tonnes of brown coal and 2.9 tonnes of black coal.

From the above, it is clear that the use of RES and EE in households and thus the reduction of the consumption of fossil fuels | emissions still has a considerable reserve or potential. The main obstacle to higher use of RES and EE in households is in most cases the financial costs associated with their implementation.

Innovative forms of funding for RES and EE projects, including crowdfunding, can help with the effective expansion of innovative technologies in the South Bohemian households.

Crowdfunding has become very popular in the Czech Republic and vast majority of the projects supported by Crowdfunding platforms is in the cultural and social area. The donation- and reward-based model is still the most used Crowdfunding model.

The lending model has been established in the area of peer-to-peer lending and recently a new platform focused on the loans to small and medium-sized businesses become active.

The projects dealing with the renewable energy sources are generally popular and attractive in the market, but so far no Crowdfunding platform focused on the RES Projects has been established in the Czech Republic.

In the past year the main regulations relevant to Crowdfunding remained mostly stable and unchanged. We understand from unofficial contact with public bodies that the current extent of Crowdfunding regulation is viewed as sufficient and that, therefore, no specific regulatory changes directly affecting Crowdfunding are expected in the near future.

Recently there have been the following significant developments in the Czech Republic regarding Crowdfunding:

- *Equity Model* - while there is still no working equity Crowdfunding platform in the Czech Republic, we perceive an increased interest in creating such a platform. This development may be partly attributable to new legislation governing corporations (Act no. 90/2012 Coll., the Corporations Act, which took effect on 1 January 2014). The Corporations Act enables more flexibility in setting up the corporate governance structure of target companies, thereby making equity Crowdfunding projects more viable in the long term. There have been some announcements with respect to new equity platforms however as at 1 December 2015 no equity Crowdfunding platform has been operational yet.
- *Lending Model* - there has been a significant development in the Lending Model, mostly regarding peer-to-peer lending. New platforms with business loans are also becoming active in the market. Business loans still continue to be outnumbered by loans to private individuals. Some of the newly created lending platforms are established by financial institutions (including banks).
- *Donations or Rewards Model* - crowdfunding platforms based on the Rewards Model continue to be the most successful and popular in the Czech Republic. As in the past, social and cultural projects still form a majority of funded ventures, along with a smaller number of startup companies and projects.

Overview of the related projects in the South Bohemia

Level	Responsible organization	Objective / timeline	Partners	Financing
EU (regional)	ReRa a.s.	CROWD-FUND-PORT. Crowdfunding minimizes business risk-taking and increases entrepreneurship mind-set, which is why an unused crowdfunding potential represents a huge challenge especially in the eastern parts of central European countries. (2017 – 2019)	ISN CONDA BRODOTO Rocketside Gdańsk Entrepreneurship Foundation Creative Industry Forum E-institute Ikosom University of Bologna Metropolitan City of Bologna	Interreg Central Europe
EU (regional)	JAiP o.p.s.	The project "CrowdStream – Crowdfunding to stream innovation" aims at improving the effectiveness of public/private business support for innovative enterprises to access qualitative alternative financing. (2017 – 2019)	Agency for European Integration and Economic Development South Bohemian Agency for Support to Innovative Enterprising ConPlusUltra Ltd. Slovak Business Agency Pannon Business Network Association Poligon, institute for development of creative industries DEVELOPMENT AGENCY ZAGREB - TPZ Ltd. Union of Bulgarian Black Sea Local Authorities	Interreg Danube Transnational Programme

			<p>Innovation and entrepreneurship center TEHNOPOLIS</p> <p>UNIVERSITY OF BELGRADE</p> <p>European Crowdfunding Network</p> <p>Institute for International Business - Vienna</p> <p>University of Economics and Business</p>	
EU (regional)	CrowdFundRES	<p>CrowdFundRES recognises the vast potential of crowdfunding for financing renewable energy projects and brings together the three following target groups: 1) Renewable energy project developers whose access to financing is getting more challenging 2) The part of the public that has an interest in investing even very small amounts of their savings in renewable energy projects 3) Crowdfunding platforms who act as intermediaries facilitating the financial transaction between the public and the project developers.</p>	<p>Abundance, Green Crowding, Lumo, OnePlanet Crowd, REG, BNRG Renewables and Valorem, The University of Dundee, Osborne Clarke, youris.com</p>	H2020

Objective scope and targets values

The main objective of this measure is to create a functional electronic application for providing alternative sources of financing for regional energy projects (RES, EE) and its integration into the normal management practices of private and public investors.

Further goals:

- By 2030 – 5 mio. CZK funded via the application in RES/EE projects

- By 2050 – 50 mio. CZK funded via the application in RES/EE projects

Target indicators

Objective	Target indicator	Method of measurement and validation
Functional web application for crowdfunding activity in RES and EE by 2025.	Number of application users - South Bohemian applicants and providers.	Application logs
By 2030 – 5 mio. CZK funded via the application in RES/EE projects	Amount of funds invested / number of investments in RES and EE in the South Bohemian Region.	Contracts
By 2050 – 50 mio. CZK funded via the application in RES/EE projects	Amount of funds invested / number of investments in RES and EE in the South Bohemian Region.	Contracts

2 Implementation strategy

2.1 Step by step description

To reach the targeted objective, the following activities are suggested.

1. Find a Crowdfunding niche → Renewable Energy Sources / Energy Efficiency

Every new Crowdfunding website/platform is dedicated to a niche. This means that the website will host Crowdfunding campaigns for one particular cause, or genre of products. This is due to the big platforms that are available to Crowdfunding creators. To fast-track the success of your own platform, one can choose a particular niche that is not yet established in the Crowdfunding industry.

Choosing a niche helps to separate your site from the others, and can also provide value to your campaign creators and backers. The campaign creators in the particular niche that you choose, will benefit from using a small time platform to get more recognition from other users that are comfortable backing other campaigns on the site. It is a great way to harvest good backers.

2. Use Crowdfunding technology

As a crowdfunding platform, you must build a reliable secure webpage with certain features. Over the last years, technology improved and costs decreased due to white-labelling solutions, APIs and other services.

A modern front-end, SEO optimized with high usability is recommended. For the backend, you must build at least an account management, payment processing and

dashboards for investors and projects. Best security practices in IT systems and data protection must be implemented. Before hiring a developer to build a website from scratch, we recommend to research the following solutions:

- WordPress plug-ins and themes - examples include IgnitionDeck Crowdfunding WordPress Plugin, Backer and 500 Framework. Costs for the templates are between EUR 100 and EUR 500. Hosting and domain registration fees of a few hundreds EUR per year are on top. Yet, the WordPress plug-ins and themes are mainly for donation-based crowdfunding. You need to make sure it really fits your needs.
- APIs - there are programmes available to connect your front ends to working back-ends. A commission is typically required for the service.

Buying a white-label solution can lower the set-up costs, making a minimum viable product less costly and time-intensive. But in the long term, you are always depended on your white label partner and little specific changings are costly. In-house solutions guarantee greater control, quick amendments on needs of the crowd and the projects owner. When transaction fees apply, in-house solutions are cheaper once your platform grows. In-house solutions are preferred over white label IT solutions especially when the IT added modularly and to integrate with external components: white-label services or Software as a Service (SaaS). Of course, it is preferred to own and control your IT configuration and your database. Maintaining software over time needs continuous investments, especially extensive back end systems. Such systems can often be used in a SaaS structure where maintenance costs are actually shared by all users of the software. Make certain you own your data and that it can always be exported from a SaaS suppliers to prevent yourself from a vendor lock-in.

3. Research the legal side and financial flows

It is usually best to open up a new bank account for the Crowdfunding platform if you are serious about taking a transaction fee on the donations to the website. If you were not already aware, most Crowdfunding websites are taking a transaction fee on each donation to the campaigns on the site. This is a great way to generate an income on the side, by utilizing Crowdfunding. Depending on the usage of the platform, a bank account can be set up and connected to the payment gateway to receive a transaction fee. A good, and safe payment gateway to use for Crowdfunding is Stripe. There are low transaction fees and can be accessible to most countries and regions.

So to start an energy crowdfunding platform you must be fully aware of the underlying regulatory framework. When you start your crowdfunding business, support of a specialised lawyer is a must. Work with a law firm that has current experience advising crowdfunding platforms on getting the correct papers drawn and creating quality contractual documents for the project owners and investors.

Legal regulations related to the crowdfunding:

- Project company or Crowdfunding platform acting under Equity Model can be qualified as an Investment Fund under AMCIF → licence from the Czech National Bank required
- Alternatively, Crowdfunding platform may to a limited extent act as intermediary in direct purchase of shares by investors → licence from the Czech National Bank required
- Project company or Crowdfunding platform acting under Lending Model is not a regulated entity → no licence required
- Project company or Crowdfunding platform acting under Donations or Rewards Model enjoys an exemption under AMCIF and cannot be qualified as an Investment Fund → no licence required
- Provision of payment services as defined under Payment Services Act by a project company or a Crowdfunding platform triggers licensing requirements (licence granted by Czech National Bank)
- The Consumer Credit Act only applies to individuals who are consumers. The Consumer Credit Act does not apply to business relationships.

Legal regulations related to the RES / EE

- Act No. 165/2012 Coll., on Promoted Sources of Energy, which in general unifies support for all promoted energy sources (renewable sources, secondary sources and combined heat and power).

4. Add the content

Once you are finished choosing the niche, platform, and connecting your payment solution to your bank account, next, is the most time consuming step, adding the content to your platform. You should have access to the front end source code, to manipulate the User Interface (UI) to your standards. You will be restricted by the default UI and features from the product if you do not have access to the front end source code. A great advantage of having access to the front end code is that you can hire a developer if you are having issues with manipulating the default UI.

It is best practice to create all of the content, and have all of the images/videos ready before adding the content to the site. This can shave a lot of the time by simply copying and pasting the content on to the site.

Most platforms in Europe struggle at the beginning to find projects. It is recommendable to firstly make an analysis about your business, identifying which clients benefit most from your offer. Maybe the relevant clients are renewable energy project developers, small and medium size entrepreneur or energy contractors. You then can directly reach out to your target clients via mailings in combination with phone calls. Other options are to attend events where your clients participate or push

articles in magazines read by your clients. Another recommendable route is to cooperate with companies with links to energy projects, such as energy consultants, energy product installation companies and others. Become a member of relevant associations like renewable energy and energy efficiency associations but also associations for small and medium sized companies. Finally, it is key to know your market and gain a reputation. Speaking at reputable energy events and organizing events helps.

5. Launch the platform

Once the platform is all set up, next step is to launch the platform. Before launching the platform, however, it is recommended to have Crowdfunding campaigns ready to host their campaign on your platform before launching. The first handful of campaigns on your new platform are likely going to be from friends and family. If those campaigns are not available, you need to start searching for campaigns by joining online communities in your niche, and in the Crowdfunding industry.

It is also recommended to create a pre-launch campaign much like one for a Crowdfunding campaign. This will generate the right following before you launch your platform. Before launching the site, many platforms decide to restrict the platform to those who want to create a campaign by username and password authentication. The launch of your campaign should be a big event, with lots of valuable site traffic.

6. Market the platform

The website is finally created and launched on the internet. The last step is to market the platform. The whole idea is to market the Crowdfunding platform successfully so that many campaign creators are approaching you to create a campaign on your platform. This way, you do not have to do any work to make money. This can be a great solution for those that want to generate a monthly revenue by simply approving or disapproving of Crowdfunding campaigns.

Here are suggestions for different type of activities towards gaining the crowd.

- Matchmaking sessions: RES developers and crowdfunding platforms
- Direct contacts through the project website, survey and workshops
- Contact to the specialized online marketplace (such as Green Dealflow, etc)
- Direct contacts to newly launched platforms
- Promotion of the case studies

2.2 Time schedule



2.3 Budget and resources needed

In particular, the human resources needed to analyze the legislative environment, set up the economic parameters of the platform, create a web environment, communicate with clients and promote it. It is the extent and manner of promotion that is very dependent on the funds spent on the platform.

Even during platform operation, expenditures will be generated mainly by personnel needs, in a similar composition as in the implementation phase.

Possible expenses can be assumed on the example of Zonky's largest Czech investment-crowdfunding platform. It employs more than 100 people and massively invests in promotion. Profitability is not expected until the third year of platform operation. In the case of a narrowly focused platform, costs can be expected to be lower.

Estimated budget:

- Legal research and analysis – 50.000 EUR
- Technical solution development – 100.000 EUR
- Promotion and marketing – 20.000 EUR
- Support services (campaigns) – 25.000 EUR
- Operation: 30.000 EUR / year

3 Collaboration with stakeholders

Within the PANEL 2050 implementation AgEnDa got in close contact with all partners involved in mentioned international projects (CrowdFundRes, CrowdFundPort and Crowdstream). Representatives from all those three projects were invited to take active part at CEESEN conference in Prague (October 2017) and member of CEESEN consortium was hired as consultant for the CrowdStream project in order to ensure the synergies between this Action Plan and crowdfunding topic. Main stakeholders on the regional level for implementation of this Action Plan are as follows:

- Regional Development Agency of South Bohemia (ReRa) – partner of CrowdFundPort and operator of regional Crowdfunding Hub
- South Bohemian Technology Park (JVTP) – potential operator of CF platform for RES / EE topics
- South Bohemian Agency for Support to Innovative Enterprise (JAIP) – partner of CrowdStream project

The following stakeholder groups were identified as necessary actors for the implementation.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Target groups (investors, backers)	Household, businesses	Investors	Through the promotion of the platform through advertising, press and cooperation with public institutions.
	Individual entrepreneurs	Funding of specific projects, income from subsequent payments	Through the promotion of the platform through advertising, press and cooperation with public institutions.
Public institutions	MPO, MŽP, KÚ, municipalities	Platform promotion	Compliance with strategy documents, fulfillment of RES and EE development indicators.
	Energy agencies	Platform promotion	Compliance with strategy documents, fulfillment of RES and EE development indicators.

4 Monitoring Strategy

The monitoring strategy for this Action Plan will be set as follows.

- Evaluation of the overall progress and potential re-thinking of the strategy (every 1 year, responsible body: AgEnDa)
- Legal assessment and feasibility of the project (one time after execution of all needed preparatory activities, responsible body: JVTP, AgEnDa)
- Every 2 years of operation along with the feedback from users / investors, responsible body: JVTP / JAIP

5 Risk management

Identified possible risks and the possible measure to mitigate them are the followings:

Risk	Probability of realising	Mitigation measure
No investor for the CF platform	High	Detailed financial analysis of the project with assessment of its feasibility and recommendations for measures to minimize risks.
Lack of interest from investors	Medium	The potential for the implementation of small RES and EE projects is quite large. The interest of the target groups must be prompted by appropriate promotion and specialized activities (see Chapt. 2)
Lack of interest from backers	Medium	Only specific projects in the field of RES / EE are potentially interesting for backers. To minimize this risk the selection and acceptance of the projects must be very careful.

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

for the South Bohemian Region

Green regional loans

English version

prepared by
AgEnDa z.s.

PANEL 2050 – Partnership for New Energy Leadership 2050
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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Financing and business models

Title: Green regional loans

1 Objective

Main objective of this Action Plan is to prepare and launch regional loans scheme of offering interest-free regional loans for the implementation of RES and EE projects.

In the South Bohemian households, the use of natural gas is the smallest of the whole country, on the other hand, renewable sources of energy are used above the average. It is confirmed that energy consumption of households, in addition to economic, environmental and other factors, affects the availability of resources.

On the national level the largest part of the energy used by households for heating and the most widespread type of energy is electricity. Every household uses it - in southern Bohemia, all 276 thousand households. In the region, heat is second, 39% are used by households, and third is natural gas, which has less than 38% of households. Expansion of natural gas is the lowest in the inter-county comparison due to the small gasification of municipalities, which is limited by the distance from the existing gas pipeline. The problematic availability of natural gas in the region balances the more frequent use of renewable energy sources (RES), such as fuel wood, pellets, heat pumps and photovoltaic systems, as well as frequent use of solid fuels. The use of these types of fuels is the most widespread among the regions.

The vast majority of apartments in which South Bohemian households live are located in warm houses. The most common element of thermal insulation of the house are thermal insulating windows, which have built three quarters of apartments. Insulated walls have two fifths and the roof of the house more than a third of the apartments. The proportion of flats with thermal insulating windows is the same as the whole republic structure, but the region has a lower share of insulated walls of houses and a slightly higher share of insulated roofs of houses. Flats in houses without insulation occupy less than one fifth of households - this is true both in the South Bohemian Region and throughout the Czech Republic.

Electricity in the South Bohemian region employs almost 90% of cooking households, mostly serving as the only source, but 16% of households use it in combination with natural gas. Exclusively or in combination with other fuels, electricity uses 47% of water for heating and 12% of South Bohemian households for heating. Compared with the average Czech household, South Bohemian households use electricity to a greater extent. The annual electricity consumption in the region was on average at 1 flat of 3.8 MWh and the household paid for it on average 15.000 CZK.

Purchased heat is mainly used in residential buildings for heating and water heating. In the South Bohemian region it receives less than two fifths of the total number of households. Compared to the nationwide share, this is somewhat less due to the smaller representation of dwellings in apartment buildings in the structure of the housing stock. The annual consumption of the purchased heat of the average household was 25 GJ per apartment and the household paid about 18.000 CZK.

Natural gas uses only or in combination with other fuels or energy less than a quarter of South Bohemian households for heating and cooking. In the case of cooking, this is especially the use of gas in combination with electricity. About 14% of South Bohemian households serve natural gas. Consumption of natural gas by an average South Bohemian household that used it was estimated at 15 thousand. CZK per year. As already mentioned, the use of natural gas in the households of the South Bohemian Region is widened by at least all regions.

On the other hand, with the use of renewable energy in households, Southern Bohemia ranks among the top. Renewable energy sources (RES) are used by a full third of South Bohemian households. It is more often used for heating in combination with other sources. As a sole source, RES is used by a tenth of South Bohemian households, with South Bohemia taking the first place among the regions.

There are several types of financial instruments that could be even combined. Such instruments may take the form loans or guarantees and other risk-sharing instruments (equities and quasi-equities), and may, where appropriate, be combined with grants.

- *Loans* - most common instrument in any financial scheme, have repayment priority over other financial structures such as equities, have low risk (but higher interest) and are easy to manage.
- *Guarantees* - an investor creates a guarantee in order to de-risk financing (loan or other) and offer cheaper financing, they require less funding than loans alone and have a clear multiplying effect.
- *Equities* - as in the creation of a Company, an investor (also public entities) may contribute to financing contributing as a partner or shareholder, having higher risks but also higher ROI. It usually targets a smaller number of recipients with high investment volume.
- *Quasi-Equity* - a type of financing that ranks between debt and equity according to the exposure to loss in case of insolvency or the level of ownership acquired. It stimulates risky investment with less collateral requirements than equities. A special case is the subordinated loan: It will only be paid back once the senior loans are entirely paid.

Overview of the related projects in the South Bohemia

Level	Responsible organization	Objective / timeline	Partners	Financing
EU (regional)	JAIP	E-FIX - an innovative Energy Financing miX is needed in order to access new sources of finance and facilitate an increased implementation of sustainable energy projects. The E-FIX project will trigger private investments using a mix of inn.	CONPLUSULTRA GMBH CAUCASUS UNIVERSITY LTD WIRTSCHAFTSUNIVERSITÄT WIEN CONDA AG MAZOWIECKA AGENCJA	H2020

		financing mechanisms, to be specific: credit lines for energy performance contracting, crowdfunding models and leasing models for EE and REN projects.	ENERGETYCZNA Sp. z o.o. EKOPORT Z.S. RAZVOJNA AGENCIJA ZAGREBPZ DRUSTVO S OGRANICENOM ODGOVORNOSCU ZA PROMICANJE REGIONALNOG RAZVOJA REGIONALNA ENERGETSKA AGENCIJA SJEVEROZAPADNE HRVATSKE CAUCASUS CONSULTING GROUP-AM "ACBA LEASING" CREDIT ORGANIZATION CJSC ENERGY INVESTMENT CONSULTANTS LLC "GEORGIAN LEASING COMPANY" IPOPEMA Financial Advisory	
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Objective scope and targets values

From the above, it is clear that the use of RES and EE in households and thus the reduction of the consumption of fossil fuels I emissions still has a undeniable potential. The main obstacle for increasing use of RES and EE in households is in most cases the financial costs associated with their implementation.

Interest-free loans provided by the region mainly to households, but also to organizations can make a significant contribution to the development of RES and EE, thus reducing the region's dependence on fossil sources I emissions. The great potential lies in a combination of regional interest-free deposits and state subsidies for photovoltaic power plant installations for households.

Target indicators

Objective	Target indicator	Method of measurement and validation
Launch of a support scheme of interest-free regional loans for the implementation of RES and EE projects by 2025.	Number of applications	Programme documents
Provision of loans for RES and EE projects in the range of min. CZK 10 million through regional interest-free loans until 2030.	The financial amount lent	Contracts
Provision of loans for RES and EE projects in the range of min. CZK 50 million through regional interest-free loans until 2050.	The financial amount lent	Contracts

2 Implementation strategy

2.1 Step by step description

In order to implement this measure following activities are suggested.

1) Preparation of a program of interest-free loans

The preparation of the program consists in the elaboration of a grant scheme, including the conditions for drawing and using loans, the process of selecting applicants, choosing the method of financing, the procedure for granting loans, the criteria for assessing applications,

2) Implementation of the program

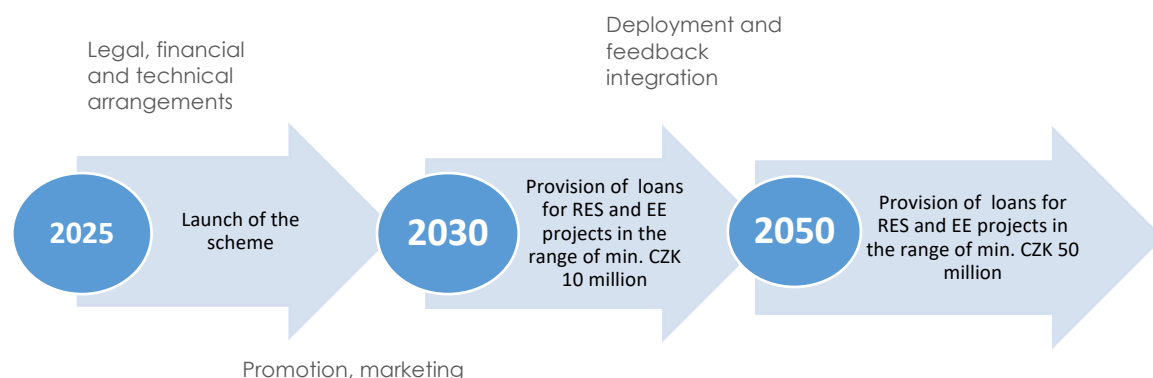
The implementation of the program consists in the announcement of calls for applications, the examination of applications, the conclusion of contracts with selected applicants, the allocation of funds, the control and evaluation of compliance by users.

Among other things, the implementation of the program should include information support to applicants, not only directly to the program, but also to possible project realizations and the possibilities of a combination of interest-free loans with other economic instruments such as crowdfunding, direct support, etc. The repayment schedule should be set up, in order to generate the bulk of the repayable amount through the savings achieved by the implementation of the project.

3) Program development and maintenance

The program of interest-free loans must be upgraded and routed based on the experience gained from its implementation. Innovations can be used in other program challenges. Likewise, the content of the individual calls can be adjusted and directed, which may take into account, for example, preferring a regionally available and suitable fuel,

2.2 Time schedule



2.3 Budget and resources needed

For a scheme of interest-free loans is necessary to allocate adequate resources to applicants, especially for the first call. Further challenges can already be partially or fully covered by the repayment of obligations under previous contracts.

Of course, staffing requirements for program administration are needed, which are intensified at the time of the announcement and evaluation of the calls. Less demanding is the administration of the program during the project implementation period. Announcement and evaluation of calls and projects can be provided by an external entity, which will increase the overall cost of the program.

Estimated budget:

- Legal research and analysis – 10.000 EUR
- Technical solution development – 10.000 EUR
- Promotion and marketing – 11.000 EUR
- Support services (campaigns) – 18.000 EUR
- Operation: 15.000 EUR / year

3 Collaboration with stakeholders

Within the PANEL 2050 implementation AgEnDa got in close contact with the project E-FIX funded by H2020 programme that is now being implemented in the region of South Bohemia and its focus is to ease the access to the new ways of financing RES / EE projects. One of the joint interests lies in initiation of regional loan scheme apart from similar synergies in crowdfunding.

Main stakeholders on the regional level for implementation of this Action Plan are as follows:

- Ekoport z.s. – application partner of E-FIX project
- South Bohemian Agency for Support to Innovative Enterprise (JAIP) – partner of E-FIX project
- Regional Authority of South Bohemia – main decision maker and potential provider of the scheme
- SEVEN o.p.s. – former operator of South Bohemian Energy Agency, influential energy lobby NGO

The following stakeholder groups were identified as necessary actors for the implementation.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Target groups (applicants)	Household, businesses	Loans applicants and integrators	Through the promotion of the platform through advertising, press and cooperation with public institutions.
Loans provider	Regional Authority	Administration, financing	Promotion towards target groups
Public institutions	MPO, MŽP, KÚ, municipalities	Promotion of the scheme	Compliance with strategy documents, fulfillment of RES and EE development indicators.
	Energy agencies	Promotion of the scheme	Compliance with strategy documents, fulfillment of RES and EE development indicators.

4 Monitoring Strategy

The monitoring strategy for this Action Plan will be set as follows.

- Evaluation of the overall progress and potential re-thinking of the strategy (every 1 year, responsible body: Regional Authority, AgEnDa)
- Legal assessment and feasibility of the project (one time after execution of all needed preparatory activities, responsible body: Regional Authority, Ekoport)
- Every 2 years of operation along with the feedback from users, responsible body: Regional Authority

5 Risk management

Identified possible risks and the possible measure to mitigate them are the followings:

Risk	Probability of realising	Mitigation measure
The Region will not have sufficient resources to implement the program	High	The region has already had experience and apparatus for implementing a program for replacing old boilers from which it can draw.
Lack of interest from the potential applicants	Medium	In order to attract applicants' interest, appropriate promotion and information support for the program and the possibility of supplementing it with other economic instruments is necessary.
Misuse of funds lent, non-payment - non-claim by applicants	Low	The risk should be reduced by setting the program correctly, by selecting applicants and by standard checking and by enforcing contractual requirements.

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

for the South Bohemian Region

Subsidy schemes for off-grid and
self-sufficient systems

English version

prepared by
AgEnDa z.s.

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: October 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Financing and business models

Title: Subsidy schemes for off-grid and self-sufficient systems

1 Objective

The main objective of this measure is to initiate a regional subsidy program to support the implementation of energy self-sufficiency and off-grid systems.

The specific objectives are the distribution of resources to support the implementation of energy self-sufficiency and off-grid systems in min. a range of CZK 10 million up to 2040 and CZK 30 million by 2050.

Without support from public sources, self-sufficiency and island technology are not paid at present - they are particularly investment-intensive. That is why they invest only in well-positioned and at the same time aware of the investors. A major expansion of these highly progressive and environmental friendly facilities and buildings is a major incentive for the state, EU.

Due to the nature of resources and the existence of selected programs for entrepreneurs (TAČR Epsilon, OP PIK, MPO - TRIO) and for citizens (New Green Savings), the measure will focus not only on the creation of a specific regional program but also on extension, enlargement, and regionalization of existing support schemes.

Overview of the related projects

Level	Responsible organization	Objective / timeline	Partners	Financing
EU (regional)	UCEEB	FINERPOL - New Growth & Jobs policies combining ERD funds with Financial Instruments (FIs) for energy investment in buildings	Extremadura Energy Agency Extremadura Regional Government, Autonomous Province of Trento, Western Macedonia University of Applied Sciences, CEIIA - Centre of Excellence and Innovation for the Automotive Industry, City of Prague, Plymouth City Council	Interreg Europe

Objective scope and targets values

The maximum use of RES is an off-grid system where all electrical energy is consumed in a closed system and stored in accumulators. The primary use of the off-grid system is where it is not possible to connect to the network, for example in remote areas, in developing countries, but also for mobile homes, caravans, boats, assembly or rescue cars. The use of the off-grid system is, of course, possible even in the case of conventional buildings with an available public network connection. In the case of an off-grid system, modularity is a great advantage, thanks to which it is possible to quickly build this network and expand it as necessary.

In general, we can state the following reasons for the implementation and operation of the off-grid system:

- Remoteness, absence of network connection, high cost of building a network connection
- The need for a backup source in case of frequent power blackouts

The off-grid system is the most cost-effective way of using RES because of the necessary investment in energy storage - in the form of batteries. High-capacity batteries are very expensive and have a relatively limited lifetime. Because of the need for frequent battery replacement, the environmental benefit of the off-grid system is debatable as opposed to, for example, the on-grid system. It can be said that the off-grid system is roughly 2-3 times more expensive than the on-grid system.

For this reason, only those projects where the off-grid system offers clear advantages over the standard solution should be supported. Greater potential is thus the fulfillment of projects aiming at the maximum possible but economically acceptable self-sufficiency, feasible in the form of energy savings and renewable energy technologies.

Target indicators

Objective	Target indicator	Method of measurement and validation
Launch of a subsidy scheme to support the implementation of energy self-sufficiency and off-grid systems by 2030.	Number of applications (80 in total)	Programme documents
Funding of off-grid and self-sufficiency projects in the range of min. CZK 10 million through regional subsidy scheme until 2030.	The financial amount granted for South Bohemian subjects: 10 mio. CZK	Contracts
Funding of off-grid and self-sufficiency projects in the range of min. CZK 30 million through regional subsidy scheme until 2050.	The financial amount granted for South Bohemian subjects: 30 mio. CZK	Contracts

2 Implementation strategy

2.1 Step by step description

In order to implement this measure following activities are suggested.

1) Preparation of a subsidy scheme for off-grid and self-sufficiency houses

The preparation of the scheme consists in the elaboration of a grant scheme, including the setting of the conditions for funding (eligibility criteria), the process of selecting applicants, the choice of financing method, the subsidy procedure, the criteria for evaluation of applications.

A key part of the program will be the evaluation of the projects' effectiveness from an environmental and economic point of view. Subsidy should be provided to projects with the most efficient use of resources.

2) Implementation of the scheme

The implementation of the program consists in the announcement of calls for applications, the assessment of applications, the conclusion of contracts with selected applicants, the allocation of funds, the control and evaluation of fulfillment of conditions by the beneficiaries.

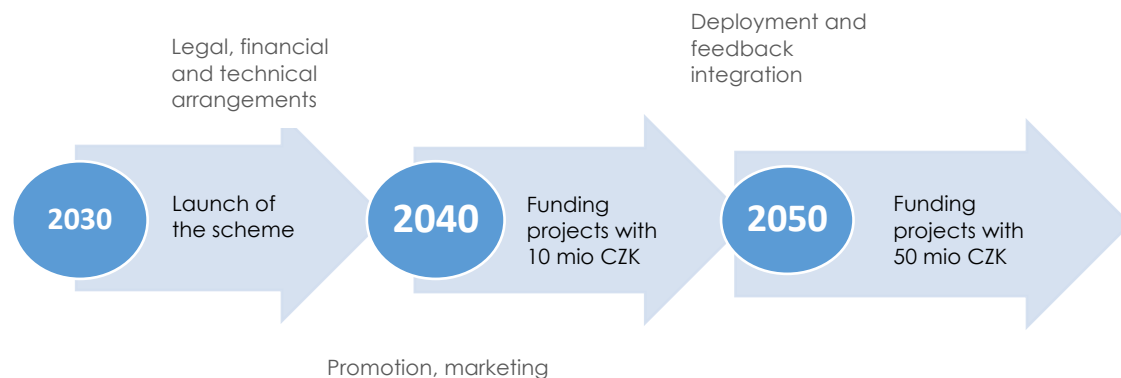
Among other things, the program should provide information support to applicants from the South Bohemian Region, not only directly to the program, but also to possible project implementations and possibilities of combining support with other economic instruments such as crowdfunding, interest-free loans, etc.

3) Scheme development and maintenance

The subsidy scheme must be upgraded and routed based on the experience gained from its implementation and development of RES and EE technologies. Innovations can be used in other program challenges. Likewise, the content of the individual calls can be adjusted and directed, which may take into account, for example, preferring a regionally available and suitable fuel, etc.

2.2 Time schedule

In line with the above described steps, the main activities would be the followings:



2.3 Budget and resources needed

Implementation of a subsidy program to support self-sufficiency and off-grid projects requires the allocation of adequate resources to applicants.

Of course, staffing requirements for program administration are needed, which are intensified at the time of the announcement and evaluation of the calls. Less demanding is the administration of the program during the project implementation period. Announcement and evaluation of calls and projects can be provided by an external entity, which will increase the overall cost of the program.

Estimated budget:

- Legal research and analysis – 10.000 EUR
- Technical solution development – 8.000 EUR
- Promotion and marketing – 11.000 EUR
- External evaluation (technology) – 15.000 EUR
- Operation: 15.000 EUR / year

3 Collaboration with stakeholders

This Action plan has been elaborated with close cooperation with Czech Off-grid house and closely linked to the first dose of Action plans focused on establishment of the regional technology platform. The challenge included in this measure is to initiate top down approach in order to accelerate development of off-grid and self-sufficient buildings as case studies and references for new investors / costumers.

In 2017 AgEnDa has been approached by the partner of the international initiative FINERPOL (Interreg Europe) – University Centre for Energy Efficient Buildings CTU in Prague in order to initiate cooperation between PANEL 2050 and FINERPOL. One of the main result of this collaboration was the engagement of Czech Off-Grid House as the key forerunner and the other significant contribution was the elaboration of this Action Plan.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Target groups (applicants)	Household, businesses	Scheme applicants and integrators	Through the promotion of the platform through advertising, press and cooperation with public institutions.
Funds provider	Regional Authority	Administration, financing	Promotion towards target groups
Public institutions	MPO, MŽP, KÚ, municipalities	Promotion of the scheme	Compliance with strategy documents, fulfillment of RES and EE development indicators.
	Energy agencies	Promotion of the scheme	Compliance with strategy documents, fulfillment of RES and EE development indicators.

4 Monitoring Strategy

The monitoring strategy for this Action Plan will be set as follows.

- Evaluation of the overall progress and potential re-thinking of the strategy (every 1 year, responsible body: Regional Authority, AgEnDa)
- Legal assessment and feasibility of the project (one time after execution of all needed preparatory activities, responsible body: Regional Authority, UCEEB)
- Every 2 years of operation along with the feedback from users, responsible body: Regional Authority

5 Risk management

Identified possible risks and the possible measure to mitigate them are the followings:

Risk	Probability of realising	Mitigation measure
The Region will not have sufficient resources to implement the program	High	The region has already had experience and apparatus for implementing a program for replacing old boilers from which it can draw.
Lack of interest from the potential applicants	Medium	In order to attract applicants' interest, appropriate promotion and information support for the program and the possibility of supplementing it with other economic instruments is necessary.
Misuse of funds provided	Low	The risk should be reduced by setting the program correctly, by selecting applicants and by standard checking and by enforcing contractual requirements.

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLANS

for the Region of Estonia

English version

prepared by
Estonian Wind Energy Association

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Action Plan 1: Supporting wind energy developments in Estonia

1 Objectives

Objective: The ambitious objective described in the Estonian Renewable Energy 100% scenario includes a major reliance on wind energy. Over half of the necessary electricity would be generated by wind energy in 2030.

1.1 Objective scope and target values

The goal of the current action plan is to enable the adaption of wind energy generation on a large scale. According to the plan 49.8 % of the electricity consumption would be covered by off-shore wind energy and 12.4 % by on-shore wind turbines in 2030. In this scenario the nominal power of off-shore wind turbines increases from the current 300 MW to 360 MW and off-shore wind parks will be built with a nominal power of 600 MW until 2025.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Wind energy is represented in media	On average there is at least one article about wind energy in the Estonian media	Search Engine statistics, Google Trends.
On-shore development projects	360 MW installed capacity in the year 2025	Data from the distribution and transmission grid operators about connected and operational wind turbines.
Off-shore development projects	600 MW installed capacity in the year 2025	Data from the distribution and transmission grid operators about connected and operational wind turbines.
Wind parks in planning and under construction	The year-by-year capacity of planned wind parks should be at a level where it is realistic to achieve an installed capacity of 1200 MW by the year 2030.	Planning documents.

2 Implementation strategy

The action plan is directed on specific establishment of off-shore wind parks in West Estonia and the Estonian Wind energy association has crucial role in increasing the support of local government and them issuing necessary building permits as well as increasing local community awareness.

Estonian Wind energy association will support the local entrepreneurs in advocating for the necessary building permits and engagement of local stakeholders and wider public.

This will be the basis for creating standardised planning and application system for building permits for off-shore wind parks.

2.1 Step by step description and timeline

Wind energy is becoming currently more and more economically competitive. There have been each year dissemination events about the advances in renewable energy.

The planning and investment decisions for the first Estonian off-shore wind farm will be made until 2020.

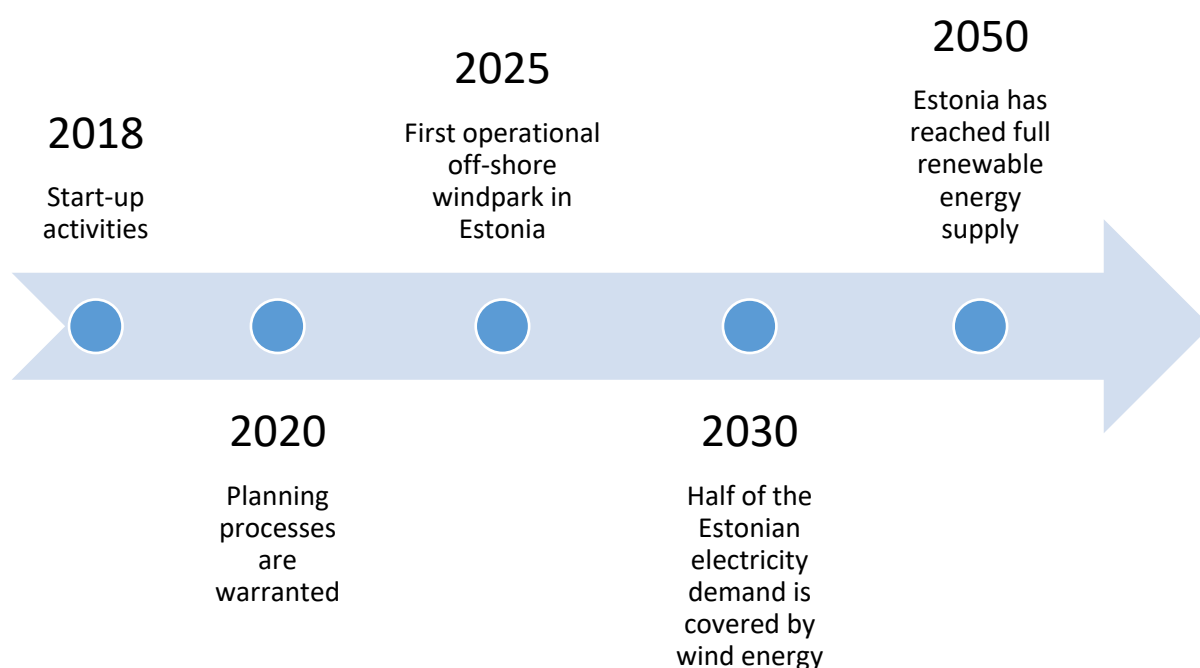
New on-shore wind parks will be extended and new ones will be planned continuously. Also the dissemination and negotiation activities will be continued.

Under market conditions competitive electricity storage possibilities will be available probably in the 2020-ies, which will enable the addition of more wind capacity into the Estonian electricity system.

The first off-shore wind park will be operational in 2025.

In 2030 Estonia has the potential to generate half of its electricity demand from wind energy.

2.2 Timeline



2.3 Budget and resources needed

The activities will be financed by EU Structural Funds and by wind energy association member companies.

3 Collaboration with stakeholders

The targeted stakeholders are local municipalities, entrepreneurs, local residents and scientists.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Supporting parties	Estonian Wind Energy Association	Supporting the planning process	Information broker
Political decision-makers	Local municipalities	Planning process	Information events to local residents
Implementing parties	Entrepreneurs	Implementers	Negotiations, study visits

4 Monitoring Strategy

Indicators, like the total installed wind power is monitored annually on the basis of statistical data. National indicators like the share of wind energy in the total energy generation, are monitored also each year, but with a certain lag, that is caused by the availability of national data.

5 Risk management

Risk	Probability of realizing	Mitigation measure
Local stakeholders and especially activists are continuously against the development of wind parks	Medium	The opponents have to be shown that the NIMBY principle is harmful for the local community in the long run.
Wind developers are not willing to cooperate with local communities	Low	Wind energy developments don't advance at the expected pace. The investors find other locations where to invest.
Local municipal governments are not able to balance between the emotions of the local stakeholders and interests of investors.	medium	The local government has to see that the NIMBY principle is harmful for the local community in the long run.



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ACTION PLANS

for the Region of Estonia

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TREA

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Action Plan 2: Increase of knowhow about renewable energy production among locals

1 Objective

Reduce the resistance among locals against development of renewable energy production units and new economic models in energy.

1.1 Objective scope and targets values

The aim is to reduce the resistance of locals towards wind parks. The main cause for resistance is the visual impact in the landscape, additionally also possible noise, vibration and impact on birds and bats.

Community resistance stems mostly from insufficient knowledge and inadequate engagement in the planning process and evaluation of environmental impacts.

The action plans focuses on actions for 2019-2023.

The actions will be evaluated by regular interviews and questionnaires that by 2025 would show that the awareness level in the society has increased and support for renewable energy production development has grown to 80%.

The actions can be divided into three larger groups:

- Organising general conferences (i.e. annual national conference 'Research and Use of Renewable Energy Sources', Green Forum Rohevik, Mooste regional energy conference etc) and thematic regional seminars. The aim will be bringing together different stakeholders, distribution of thematic knowledge and promoting discussion on renewable energy development. Also presenting best practices and found solutions to main bottlenecks in renewable energy development.

- Info seminars, trainings, and workshops in regions where development of wind parks is being considered. The aim is to bring together different stakeholders (developers, entrepreneurs, local community, local environmental organisations, local government, relevant national organisations etc), to inform them of the planning and development process of wind parks and accompanying opportunities and challenges.

- Info days and workshops for wind park developers and local government officials to educate them on more efficient advocacy and engagement practices.

These actions will be organised with larger renewable energy associations and organisations like Estonian Renewable energy Association, Estonian Biofuel Association, Estonian Biogas Association, Nordic Council of Ministers in Estonia, and Tartu Science Park, Centre of Renewable Energy of Estonian University of Life Sciences, Tartu and Tallinn

Regional Energy Agencies. Those organisations will assist with advocacy actions like positive media portrayal and participating in the before mentioned events.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Organising general annual national conferences like 'Research and Use of Renewable Energy Sources', Green Forum Rohevik, Mooste regional energy conference etc) and thematic regional seminars. Planning the thematic focus of said events. The aim will be increased knowledge of stakeholders and promoted discussion. Also presentation of best practices	1-2 annual national conferences per year 3-4 thematic seminars per year in relevant regions 500-600 participants in the public events	Conference and seminar programmes Number of presentations dealing with wind park development Number of presentations dealing with public advocacy and engagement Participant lists of the events
Info seminars, trainings, and workshops in regions where development of wind parks is being considered. The aim is to bring together different stakeholders (developers, entrepreneurs, local community, local environmental organisations, local government, relevant national organisations etc), to inform them of the planning and development process of wind parks and accompanying opportunities and challenges	4-5 thematic seminars per year in relevant regions 150-200 participants per year	Seminar programmes Number of presentations dealing with wind park development Number of presentations dealing with public advocacy and engagement Participant lists of the events
Info days and workshops for wind park developers and local government officials to educate them on more efficient advocacy and engagement practices	4-5 thematic info days per year in relevant regions	Info day programmes Info day participant lists

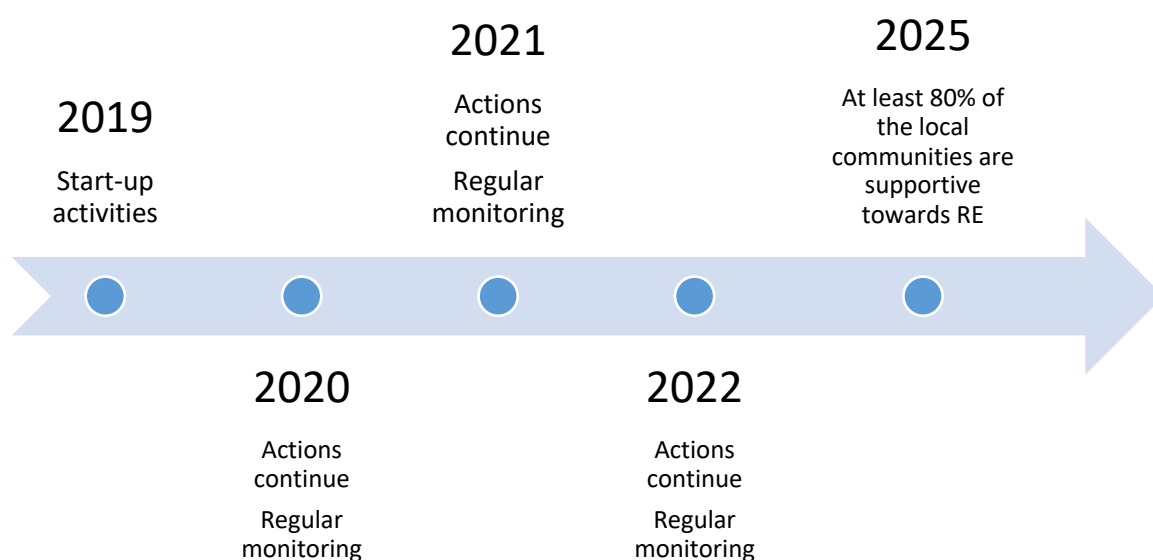
2 Implementation strategy

2.1 Step by step description

Throughout the five years continuous educating of different target groups will take place.

2.2 Time schedule

The events, trainings and seminars will take place several time a year for the upcoming five year period.



2.3 Budget and resources needed

The budgets will be covered jointly with local governments (in whose region the events take place) and with renewable energy organisations.

Year	Action	Participants (predicted)	Preliminary cost (EUR)
2019	Conferences (1)	~ 150-200 in	7 000-10 000
	General info seminars (3)	~ 30-40 in	3000-5000
	Round tables and workshops for developers (2)	~ 8-10 in	2000-3000
2020	Conferences (2)	~ 150-200 in	12 000-17 000
	General info seminars (4)	~ 30-40 in	4000-6000
	Round tables and workshops for developers (3)	~ 8-10 in	3000-4000

2021	Conferences (2)	~ 150-200 in	13 000-18000
	General info seminars (3)	~ 30-40 in	3000-5000
	Round tables and workshops for developers (2)	~ 8-10 in	2000-3000
2022	Conferences (2)	~ 150-200 in	15 000-20 000
	General info seminars (3)	~ 30-40 in	4000-6000
	Round tables and workshops for developers (2)	~ 8-10 in	2000-3000
2023	Conferences (2)	~ 150-200 in	15 000-20 000
	General info seminars (3)	~ 30-40 in	4000-6000
	Round tables and workshops for developers (2)	~ 8-10 in	2000-3000

3 Collaboration with stakeholders

The action plan actions will be carried out with Estonian Renewable Energy Association, Estonian Biofuel Association, Estonian Biogas Association, Union of Estonian Environmental Assessors, Nordic Council of Ministers in Estonia, and Tartu Science Park, Centre of Renewable Energy of Estonian University of Life Sciences, Tartu and Tallinn Regional Energy Agencies.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Tartu Regional Energy Agency	Planning and carrying out the conferences, seminars, info days, trainings etc	Regular meeting of energy groups – regulars' table Coordination meetings of the working group
	Estonian Wind energy Association		
	Union of Estonian Environmental Assessors	Advocating the conferences, seminars, info days, trainings etc	
	Estonian Renewable Energy Association		

	Centre of Renewable Energy of EMU		
Political decision-makers	Local governments, Ministry of Environment	Participation in the regional and national events	
Target groups	Local community representatives Local government representatives Developers Policy makers	Participation in the regional and national events	Citizen action groups / DIY groups Thematic workshops Regular meeting of energy groups – regulars' table

4 Monitoring Strategy

Indicators used for the assessment of the efficiency of the actions will be reviewed annually and will be event specific. The summaries of the indicators and their evaluation will be made after each event as well as annually.

The regional acceptance of wind park development will be assessed before and during each planning process via specific questionnaire. The results will be also communicated to the local government, developers and Ministry of Environment.

5 Risk management

Risk	Probability of realising	Mitigation measure
Local governments are opposing the development of new wind parks	medium	The advocacy measures will be overseen and adjusted to the new conditions.
Developers are not willing to cooperate with local communities	low	The training and consultancy measures to developers will be overseen and adjusted to the new conditions.
Local governments are unable to equally represent the interests of developers and local community	medium	The training and consultancy measures to local governments will be overseen and adjusted to the new conditions. TREA will offer to act as an intermediary in the process if needed.



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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Action plan 3: PV100 – Installing solar panels to Tallinn municipal buildings (Tallinn Energy Agency)

1 Objectives

When joining the Covenant of Mayors Tallinn took up the challenge to increase its renewable energy share to 20% by 2020.

Tallinn energy agency suggested installing solar panels on municipal buildings in 2019 and 2020 to reduce city's CO₂ emissions. Installing the solar panels would not only help achieve Covenant of mayors' goals but would also help Tallinn in reaching the European Green Capital title.

The aim is to be an example in developing distributed micro-production of renewable energy in municipal buildings.

1.1 Objective scope and target values

With its 17th July 2018 decree Tallinn city government established a working team who would lead the planning and implementing process of installing 100 solar panels on Tallinn municipal buildings.

The team is led by the head of Tallinn energy agency and it brings together most relevant stakeholders in the city (Tallinn environmental agency, and specialists from different municipal organisations dealing with climate and energy issues)

By august the team had come up with initial plan for installing solar panels on Tallinn's municipal buildings.

Target objective is 100 solar energy stations in Tallinn.

With the approval of the city government Tallinn energy agency and its team will lead the process of analysing suitable objects, preparing the actual installing project and technical advising of the relevant municipal organisations. The installing of the solar panels will be the responsibility of Tallinn City Management department.

Conditions for installing solar panels

The team has decided that to install the solar panels following conditions have to be met.

- 1) The building's roof direction (cardinal point) is suitable for solar energy production and the roof construction is suitable for the instalment without additional investments.
- 2) The solar stations will be dimensioned according to the building's electricity consumption pattern and demand, thus without additional need for investments in electrical systems.

Advocating solar energy production to wider public

- 3) All installed solar panels will work as a unified system and their production information will be summarized in public information channel.
- 4) Tallinn city homepage will present real time production, summarised production so far and saved CO2 emission levels.
- 5) The system will be built up so that any additional solar panels installed later can be joint in this unified system.

Unified management of solar stations

- 6) All the solar panels will operate as unified system and all the technical error reports and alerts will be converged into one place thus speeding up the response time for management.

1.2 Target indicators

The aim is to build up to 100 solar stations which will enable Tallinn to produce up to 2 GWh of solar energy and save up to 2000 tons of CO2 a year. This will be monitored through the online public tool on Tallinn city homepage that will present real time production, summarised production so far and saved CO2 emission levels.

Objective	Target indicator	Method of measurement and validation
Install up to 100 solar stations on the roofs of Tallinn's municipal buildings	In two years the production will be up to 2 GWh The investment will be 3 million €, with payback period of 10 years The public tool on Tallinn homepage that monitors and presents real time production, summarised production so far and saved CO2 emission levels	In real time it is possible to see production levels in different points of time Summarised info will show unused fossil energy and saved CO2 emissions

2 Implementation strategy

2.1 Step by step description

The planning, installing and management of solar panels on Tallinn municipal buildings will be carried out by Tallinn city management department according to the public tenders' law.

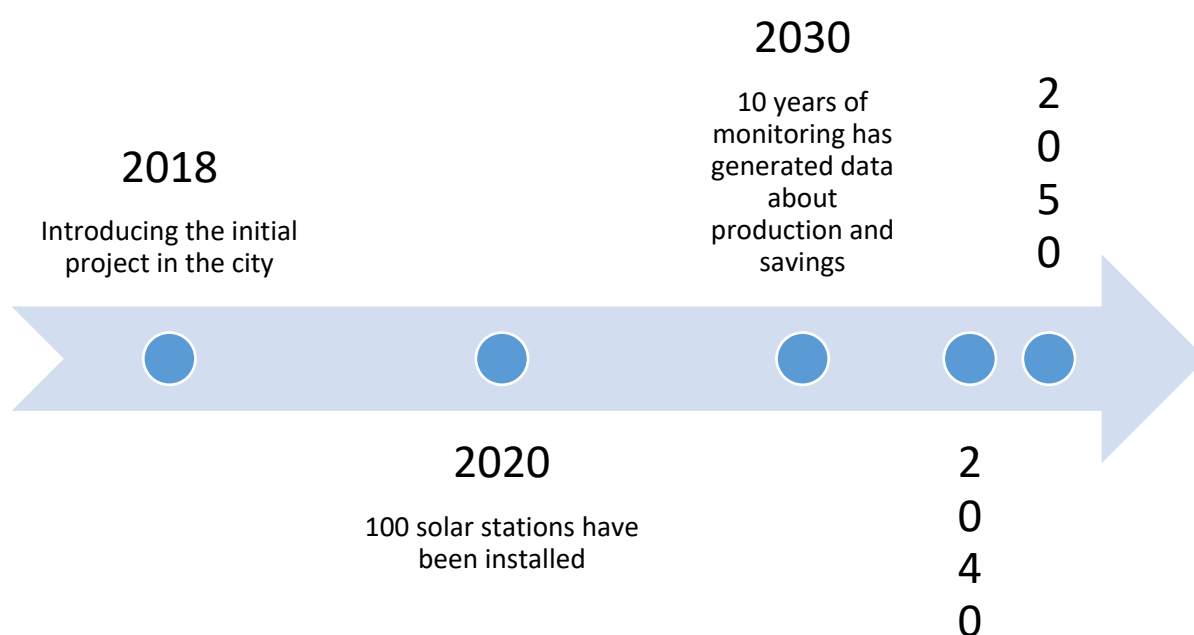
The project of installing solar panels on Tallinn municipal buildings will be led by Tallinn energy agency.

When the solar stations have been installed in 2020 then Tallinn Energy agency will be responsible for analysing the production, monitoring their operation, summarising production info and running the online tool. They will also be in charge of monitoring the economic efficiency of the installed solar stations.

Objectives listed in sub-section 1.1 will be carried out as follows:

- 1) Choosing and analysing suitable buildings for installing solar stations, taking into account their usage prediction in the upcoming 15 years
- 2) Analysing the suitability of installing solar panels according to the roof direction and absence of shades.
- 3) Suitable buildings will go through detailed building inspection to assess the suitability of roof constructions.
- 4) Suitable buildings (roof and constructions) will go through detailed analysis of their energy consumption and demand and the condition of buildings electrical system.
- 5) Carrying out the planning and building tenders
- 6) Negotiating conditions with the grid operator to merge the stations into the public grid.
- 7) Applying for building permits and signing necessary contracts with builders etc.
- 8) Installing the solar stations and carrying out relevant monitoring
- 9) Joining the stations to the public grid
- 10) Signing the management and maintenance contracts

2.2 Time schedule



2.3 Budget and resources needed

The planned cost of the project is 3 million euros however the exact cost will be determined by the public tenders. The cost will be covered from the city budget in 2019 and 2020.

3 Collaboration with stakeholders

The initial suggestion made by the Tallinn energy agency was to install the solar panels on the roofs of municipal schools and kindergartens. So actions have been taken to collaborate with the building managers.

Collaboration with key stakeholders like municipal management organisations and the managers of chosen buildings is crucial in the success of this project.

Roles and responsibilities of different actors for Action Plan implementation

The key responsibility in implementing the project lies with Tallinn energy agency and Tallinn city management department. The beneficiaries are the organisations operating in the chosen buildings. The project will lead to reduced energy costs for the city and increased positive environmental impact, thus the reputation of the city will improve.

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Tallinn energy agency and Tallinn city management department	Tallinn energy agency leads the project with relevant responsibilities as noted before. Tallinn city management department is in charge of the technical implementation	
Political decision-makers	Tallinn city government, Tallinn city board		
Target groups	Management of municipal properties, public educational buildings		Information about the project, the energy produced and emissions saved is publicly available on the city homepage

4 Monitoring Strategy

Tallinn city homepage will present real time production, summarised production so far and saved CO2 emission levels.

When the solar stations have been installed in 2020 then Tallinn Energy Agency will be responsible for analysing the production, monitoring their operation, summarising production info and running the online tool. They will also be in charge of monitoring the economic efficiency of the installed solar stations.

5 Risk management

Risk	Probability of realizing	Mitigation measure
Building inspections deems many buildings unsuitable for solar panels' installation	low	To avoid installing solar panels on buildings with not strong enough roofs, building inspections will thoroughly be carried out on all possibly suitable buildings. This will reduce the risk of collapses or technical damage.
Political support changes after local elections	medium	The funds will not be available from the city budget



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Roadmap scheme

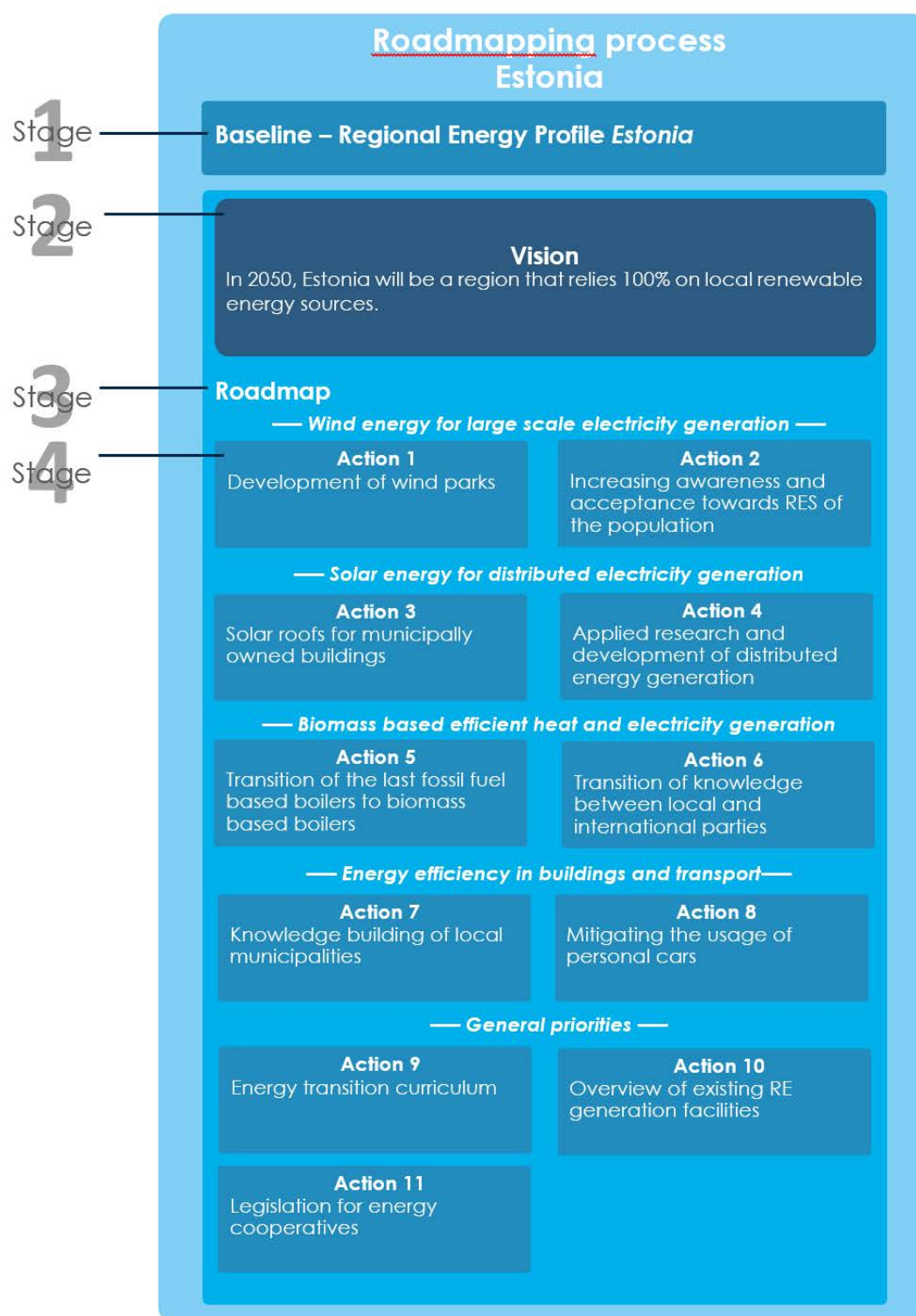


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Action Plan 4: Research and development work on distributed generation of renewable energy

1 Objectives

The main objective is to enable the economically sound application of distributed renewable energy production for consumers. From 2021 onwards new buildings have to be nearly zero energy buildings and be equipped with on-site renewable energy generation.

Each academic worker in the energy field will publish on average at least one relevant article each year. At least half of these articles will be presented at International conferences

The Estonian University of Life Sciences educates engineers in courses about distributed renewable energy generation. At least 16 bachelor students graduate each year and at least 12 master's degrees are awarded. At least two company visits will be organized for the students majoring in energy each year.

1.1 Objective scope and target values

The goal of the current action plan is to enable the adaption of distributed energy generation from renewable energy sources for households and small businesses. In the context of the current action plan this means primarily photovoltaic applications on buildings. The current number in 2018 is 1100 micro power stations and the target value in 2030 will be 30000.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Adaption of Energy on microgeneration buildings	Number of rooftop PV installations	Data from the distribution grid operator about grid connections with prosumer status.
Availability of knowledge about energy	Number of publications on applied research	Web of Science and Scopus databases for publications

microgeneration on buildings		
Projects on applied research on renewable energy	The number of projects increases by 20% by 2030	According to Estonian Science Information System www.etis.ee
Dissemination of results in scientific conferences	Number of participants	Registration lists
Availability of engineers competent in renewables	Number of graduates: 12 master's degrees and 16 bachelor's degrees each year from the EULS, which would be 1/3 of the total in Estonia.	National statistics of University graduates
Building based smart energy systems with electricity storage	The target is to have 5000 buildings with energy storage in 2030	Data from the distribution grid operator about grid connections with prosumer status.
Investments into renewable energy applications	1 billion Euros until 2030	Estonian Statistics, Governmental Tax Office

2 Implementation strategy

The installation of photovoltaic panels on buildings is currently getting more and more popular. Therefore the near future is concentrated on the applied research related to these issues. The practical research results are presented in conferences like the conference on Renewable Energy Research and Applications in the Estonian University of Life Sciences in each year.

The next foreseeable trend is household electrical storage, that is predicted to reach market maturity in the 2020-s. Therefore research on this topic has also already begun. Storage possibilities that are close to the consumer will significantly widen the possibilities for distributed renewable energy generation. These possibilities are explored in the Renewable Energy research laboratory of the Estonian University of Life Sciences (Fig 1).

It is predicted that until the year 2030 distributed renewable energy generation will become economically the most reasonable energy generation method. This knowledge is promoted by organizations like universities and associations like the Estonian Solar Electricity Association.

2.1 Step by step description

In the early 2020s new solar capacities will enter the market which will make solar energy development even more cost efficient. The increased use of distributed renewable energy production systems needs new technological and economical models that will be

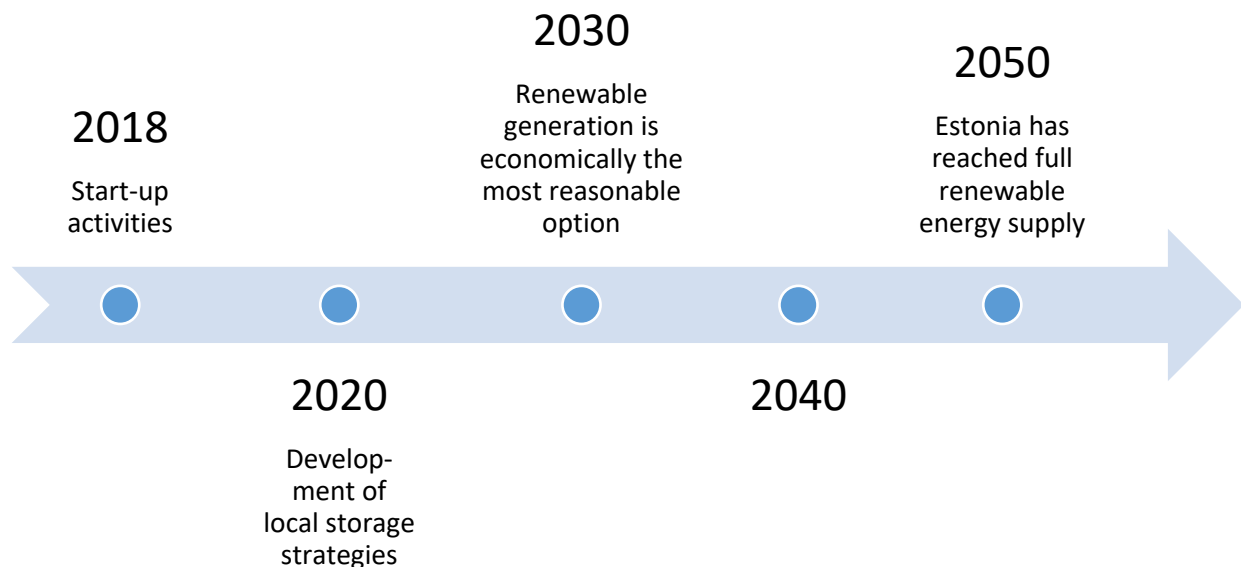
developed by the renewable energy research laboratory in the Institute of Technology of Estonian University of Life Sciences (Fig. 1).



Fig. 1. Renewable Energy research laboratory of the Estonian University of Life Sciences

By 2030 the local distributed renewable energy production has become the most economically feasible solution. Advocacy will be carried out by Estonian Universities as well as by the Estonian Solar energy association.

2.2 Time schedule



2.3 Budget and resources needed

Activities will be financed by EU Structural Fund projects and by relevant companies. The Estonian University of Life Sciences finances some activities, like study visits to companies, with its own budget, approximately 5000 €/y.

3 Collaboration with stakeholders

The targeted stakeholders are students, local municipalities, house owners and entrepreneurs.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Students	Future implementers	The values of sustainability are communicated and skills are developed for the implementation of renewables
Political decision-makers	Local municipalities	Implementers	Information events
Target groups	Entrepreneurs	Implementers	Information events, study visits

4 Monitoring Strategy

Indicators, like number of graduating energy engineering students are monitored annually on the basis of statistical data. National indicators like the share of renewables in the total energy generation, are monitored also each year, but with a certain lag, that is caused by the availability of national data.

5 Risk management

Risk	Probability of realizing	Mitigation measure
Political risk. Financing of renewable energy projects from the EU and national budgets will be stopped	Medium	Part of the projects the heating companies will carry out for their own financing.

Renewable energy related higher education is liquidated under the cover of merging different curricula	Medium	Curricula that are related to renewable energy
EULS events on renewable energy will be closed	Small	At least one event will be arranged



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Action Plan 5: Greening Estonian energy

1 Objective

Every year, heat production in Estonia will increase by 1% and electricity production will increase by 0.1% in the biomass fuel bases.

The magazine "Combustible and Non-combustible Energy Resources" will be issued once a year.

Members of the Association will publish at least one relevant article each year in the aforementioned magazine.

Every year, two thematic information days and company visits will be organized for the members of the Association.

One of the members of the Association will make one relevant presentation per year at a seminar or conference.

1.1 Objective scope and targets values

Action-Oriented objective is to completely eliminate fossil fuels, including natural gas, in heating systems of local municipalities, replacing it with indigenous renewable energy sources such as wood, straw, reeds, etc., or heat pumps. This increase the share of biomass fuels in energy production.

The magazine "Combustible and Non-combustible Energy Resources" 1150 copies in hard copy are annually given and are available electronically on the EBA website. The total number of readers is about 5,000.

The members of the Association are involved in at least two events annually with a total of 40 people.

During the year, the members of the Association prepare at least two articles or presentations.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Eliminate fossil fuels, including natural gas, in heating systems of local municipalities and replacing	No boiler houses in local municipalities on fossil fuels in 2030	Inventory, statistical analysis

it with indigenous renewable energy sources such as wood, straw, reeds, etc., or heat pumps		
Magazine "Combustible and Non-combustible Energy Resources"	1150 pieces	Issuing and uploading magazine to EBA homepage
Info day and company visit	2 times per year	Information on EBA webpage
Article, presentation	2 pieces	Information on EBA webpage

2 Implementation strategy

2.1 Step by step description

As a result of the annual publication of the EBU, the dissemination of knowledge and the promotion of best practices, local governments will transfer fossil fuel boilers to renewable energy sources.

The issue of the annual thematic magazine introduces the possibilities of using renewable energy sources, the latest technologies and equipment, and the best practices.

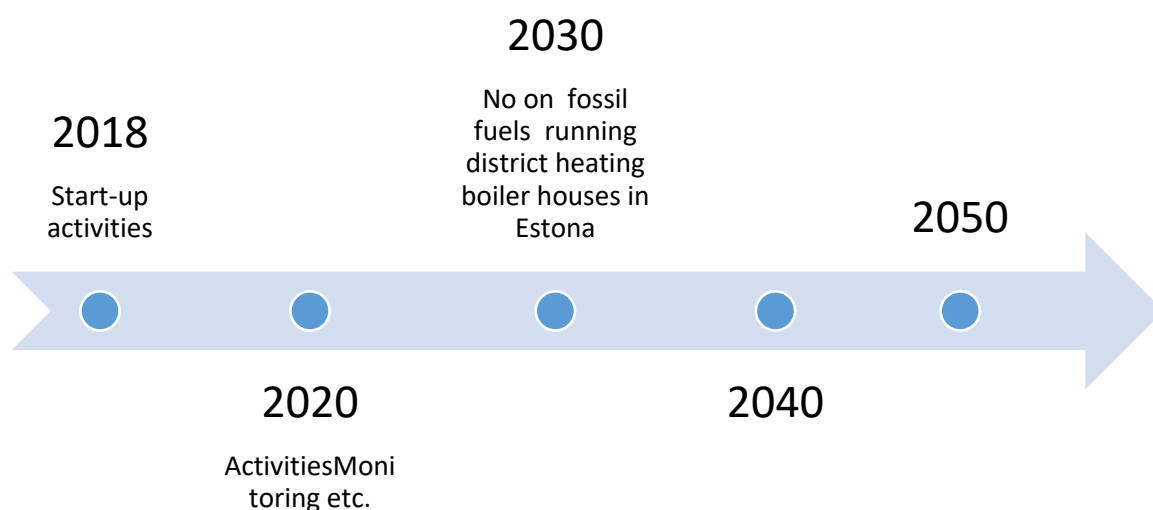
Annual business visits, information days and articles, presentations will also disseminate knowledge in the field and encourage more use of renewable energy sources in energy generation.

EBU activities are organized by the board and active members.

2.2 Time schedule

By 2030, fossil fuels for the production of heat for the supply of heat for social objects and housing sector via district heating networks will no longer be used in Estonia.

One EBA magazine will be published each year, 2 thematic events will be organized and one article and a presentation will be prepared.



2.3 Budget and resources needed

Activities will be financed by EU Structural Funds, Estonian Environmental Investment Fund (financing of EBA magazine approximately 5000 €/y) heating companies and local municipalities. The task of EBA is to promote the transition to renewable energy sources and monitor the transfer of boiler plants to renewable energy sources and maintain a register. Some activities are financed by EBA's budget approximately 500 €/y.

3 Collaboration with stakeholders

As stakeholders, both local governments, heat companies, and the Environmental Investment Centre (KIK) are involved. Local governments and heat companies are launching projects for the conversion of boiler houses to biofuels, and the KIK shares EU and Estonian national subsidies. KIK also finances the issuing of the publication Combustible and Non-combustible Energy Resources.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Environmental Investment Fund	EU and national grants issuer. Grant for magazine	Application calls are published annually
Political decision-makers	Ministry of Economy and Communication Affairs,	Preparation of regulations and	Published in State Gazette

	Ministry of Environment		
Target groups	Local municipalities, district heating companies	<p>Transition of boiler houses to renewable resources.</p> <p>Target groups of magazine are local municipalities, engineers, specialists and students on the field of renewable resources and companies, other interested parties</p>	<p>About tenders are reported in the Public Procurement Register</p> <p>EBA homepage</p>

4 Monitoring Strategy

The desired results are monitored annually either through the EBU website or on the basis of statistical analysis.

5 Risk management

Risk	Probability of realizing	Mitigation measure
Political risk. Financing of renewable energy projects from the EU and national budgets will be completed	Medium	Part of the projects the heating companies will carry out for their own financing.
Supporting the issue of a magazine will be completed	Medium	Partial financing from EBA budget
EBU events will be closed	Small	At least one event will be arranged



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Action Plan 6: Developing local and international technology transfer in renewable energy (EMÜ)

1 Objective

The objective is to strengthen EMU position in the lead of technology transfer and increase the technology transfer from the university to the society in the field of renewable energy and energy efficiency thus helping to increase the knowledge-intensity of Estonian energy industry.

1.1 Objective scope and targets values

To achieve the objective two levels of actions have been planned: (a) Participation in the International Energy Agency workgroups and (b) development of cooperation between the university and local entrepreneurs.

- Joining Task37 workgroup of the International Energy Agency in 2019.
- Developing cooperation with renewable energy organisations. By 2025 EMU has 40 active cooperation contracts with the local and international sectoral entrepreneurs.

1.2 Target indicators

Joining Task37 workgroup of the International Energy Agency:

- EMU is actively participating in the Task work
 - Meetings attended
 - Report developments participated in
 - New projects started
- Developing cooperation with renewable energy organisations
 - Technology transfer oriented promotional materials that introduce our competences and possible services we offer to entrepreneurs
 - Public conferences and seminars oriented to entrepreneurs
 - Open day in the University to introduce our work and capacities in technology transfer as well as our laboratory services.
 - Promoting knowledge and materials gained from the International Energy Agency workgroups

2 Implementation strategy

2.1 Step by step description

In 2019 Emu will sign a contract to take part in the international energy agency work. This will enable us to increase our capacity in renewable energy sector and also provide better services to the market.

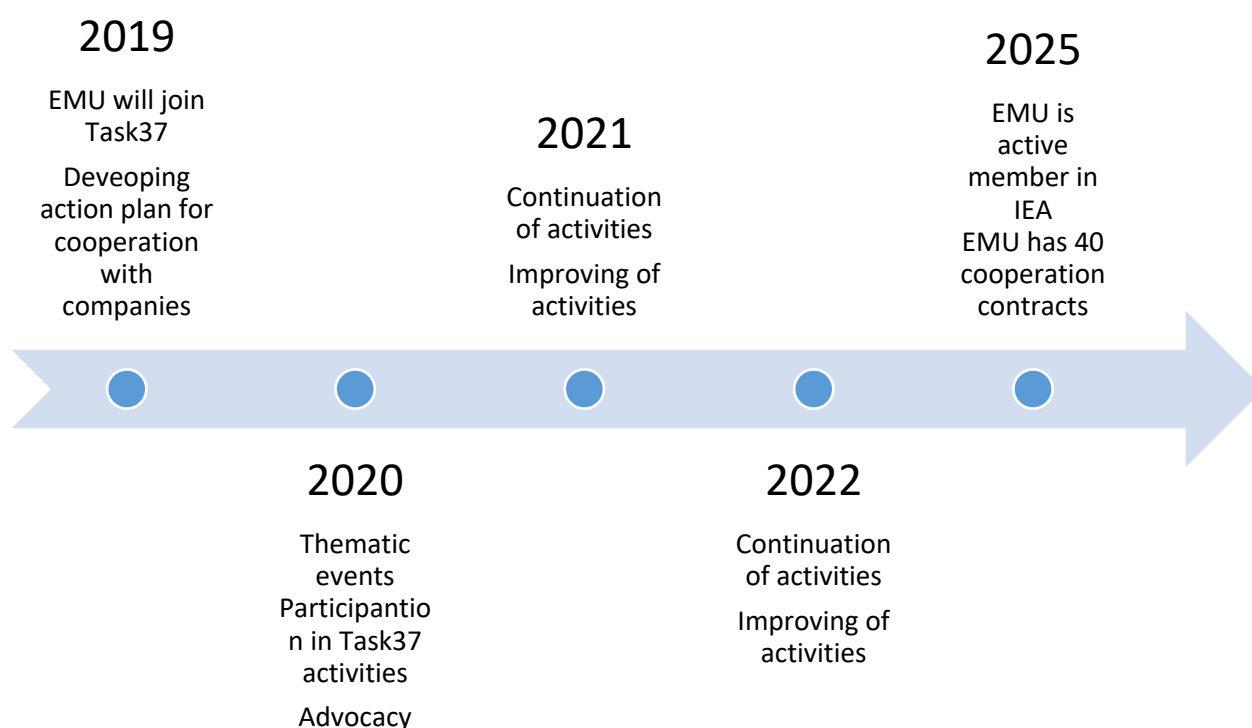
In parallel promotional materials will be created that introduce our competences and possible services we offer to entrepreneurs.

Roundtables will be held with renewable energy sector entrepreneurs to map the barriers in technology transfer. This will be revised annually.

Based on the mapping a more detailed actions will be developed that would enable the cooperation between entrepreneurs and the university to improve.

For improving knowledge and technology transfer thematic events will be created that are targeted to entrepreneurs (conferences, seminars, trainings, info days)

2.2 Time schedule



2.3 Budget and resources needed

The participation in the International Energy agency workgroups will be supported by the Ministry of Communications and Economic Affairs.

Improving cooperation with entrepreneurs and technology transfer between EMU and companies University's internal resources will be used. It is expected that better cooperation will result in higher number of applied research projects which in turn can help fund further activities.

3 Collaboration with stakeholders

The participation in the International Energy agency workgroups will be supported by the Ministry of Communications and Economic Affairs. All actions in relation to this international cooperation and resulting improvement of related technology transfer will be jointly coordinated with the ministry to ensure the best possible effect on Estonian economy.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Estonian University of Life Sciences	Carries out the activities. Monitoring and evaluation.	leader
Political decision-makers	Ministry of Communications and Economic Affairs	Supports the actions on national level	Regular meetings
Target groups	Entrepreneurs in the field of renewables and energy	Market uptake of new knowledge and solutions	Regular meetings, workshops. Participation in public events (seminars, conferences, etc)

4 Monitoring Strategy

The efficiency of planned actions will be evaluated at least annually together with the Ministry of Communications and Economic Affairs. The efficiency of events will be evaluated after each event.



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Action Plan 7: Increasing the awareness of local governments about improving energy efficiency in public buildings (improvement of local government energy management skills)

1 Objective

The aim is to increase the local government's knowledge about energy efficiency measures and how to implement those in the municipal buildings. It is needed for several reasons:

- a) All public buildings which are authorized for construction from 2019, and private sector buildings which are authorized for construction from 2020, must be near zero energy buildings. At the same time, the majority of municipal buildings are built before the minimum energy consumption requirements are developed and these buildings use significantly more energy than the minimum requirements.
- b) Enhancing the competence of local government professionals, the issue of energy efficiency of buildings and appropriate solutions, as local authorities play a central role in building and operating permits for buildings
- c) Enhancing the competence of local government representatives so that they can set an example and inspiration for energy efficiency.

1.1 Objective scope and targets values

The activities set out in this Action Plan are aimed at enhancing the capacity of local governments and the competence of relevant municipal employees in the field of energy efficiency. More than 9 million square meters of space is owned and operated by the public sector, which, according to the building register, accounts for more than 6.7% of all buildings in Estonia, of which 5.6 million square meters are owned by local governments and their associated agencies.

The Action Plan covers the period 2019-2023.

The activities planned in the Action Plan are divided into three major groups:

- Organization of general information conferences and seminars aimed at raising awareness of regulations, construction solutions and bottlenecks in the planning and construction / renovation of buildings by various stakeholders, including local government professionals. Introducing good practices and discussing problematic cases

- Trainings and workshops on specific topics (regulations, market failures, subsidies, construction technologies, construction technical solutions, etc.) for municipal professionals.

- Information days and information seminars for architects, designers and local government representatives to explain the views of different stakeholders on energy efficiency and building construction.

Thematic conferences are regularly organized, such as Knowledge-based Construction, Research and Use of Renewable Energy Sources, etc., in cooperation with organizations active in the field of energy efficiency and energy-efficient construction such as the Ministry of Economic Affairs and Communications; SA Kredex; TalTech; Tallinn Energy Agency; EMU Centre of Renewable Energy; Estonian Association of Cities and Municipalities; Estonian Association of Heating and Ventilation Engineers, etc.

Organizations continue to keep the topic in the media active.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Organization of general information conferences and seminars aimed at raising awareness among various stakeholders, including local government professionals, of regulations, construction-technical solutions and bottlenecks in the planning and construction/renovation of buildings. Introducing good practices and discussing problematic cases	1-2 national thematic conferences per year 3-4 thematic seminars per year in different regions of Estonia 600-700 people attending conferences and seminars / year	conferences and seminars' programs the number of reports on the energy performance of buildings the number of presentations of the various stakeholders lists of participants in conferences / seminars
Trainings and workshops on specific topics (regulations, market failures, subsidies, construction technologies, engineering solutions, etc.) for municipal professionals	4-6 thematic seminars per year in different regions of Estonia 150-200 participants / year	seminars programs the number of reports on the energy performance of buildings the number of presentations of the various stakeholders lists of seminar participants

Information days and information seminars for architects, designers and local government representatives to explain the views of different stakeholders on energy efficiency and building construction.	3-5 thematic information days a year in different regions of Estonia	programs for information days and seminars lists of participants in information days and seminars
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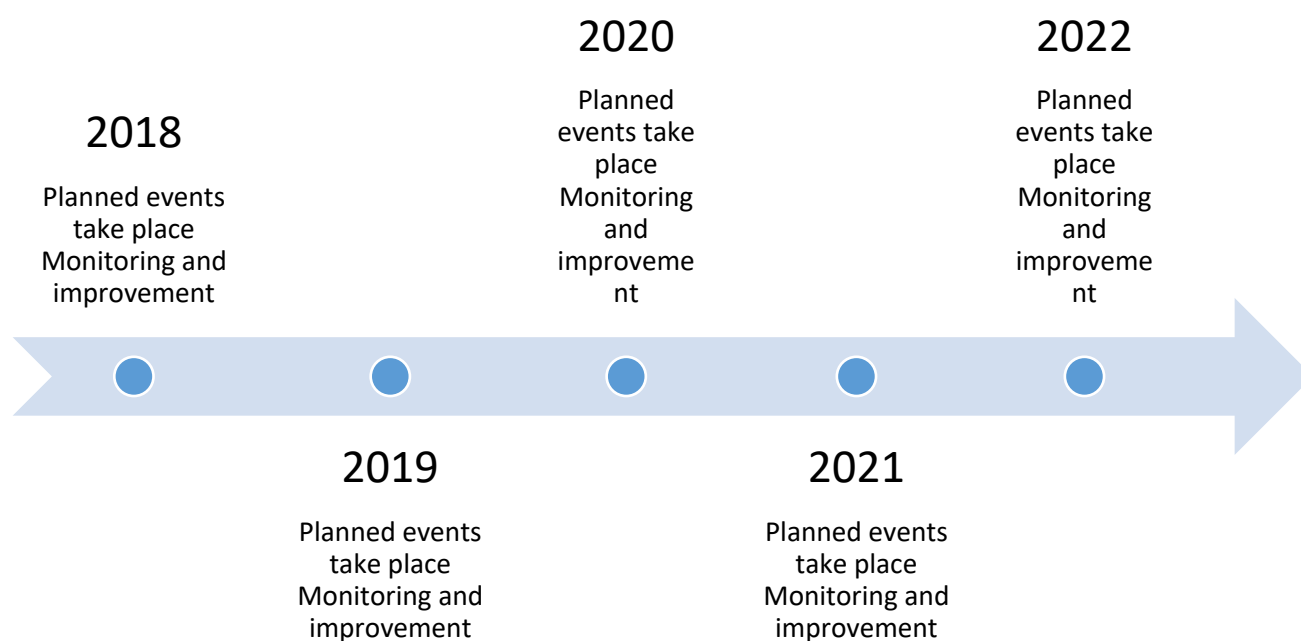
2 Implementation strategy

2.1 Step by step description

The Action Plan covers the period 2019-2023 and the planned events and trainings will take place annually.

2.2 Time schedule

Continuous training and information of public sector specialists, including local governments, on the energy efficiency of buildings and relevant modern technologies and regulations in the field will continue.



2.3 Budget and resources needed

Conferences (150-200 participants) -1

Year	action	Participants (prediction)	Predicted cost (EUR)
2019	Conferences (1)	~150-200 in	7 000-10 000
	General info seminars (3)	~30-40 in	3000-5000
	Roundtables and workshops for developers (2)	~8-10 in	2000-3000
2020	Conferences (2)	~150-200 in	12 000-17 000
	General info seminars (4)	~30-40 in	4000-6000
	Roundtables and workshops for developers (3)	~8-10 in	3000-4000
2021	Conferences (2)	~150-200 in	13 000-18000
	General info seminars (3)	~30-40 in	3000-5000
	Roundtables and workshops for developers (2)	~8-10 in	2000-3000
2022	Conferences (2)	~150-200 in	15 000-20 000
	General info seminars (3)	~30-40 in	4000-6000
	Roundtables and workshops for developers (2)	~8-10 in	2000-3000
2023	Conferences (2)	~150-200 in	15 000-20 000
	General info seminars (3)	~30-40 in	4000-6000
	Roundtables and workshops for developers (2)	~8-10 in	2000-3000

3 Collaboration with stakeholders

The Tartu Regional Energy Agency has involved the Ministry of Economic Affairs and Communications in the preparation of this action plan; SA Kredexi; TalTech; Tallinn Energy Agency; EMU Centre of Renewable Energy; Estonian Association of Cities and Municipalities; Representatives of the Estonian Association of Heating and Ventilation Engineers.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	<p>Tartu Regional Energy Agency</p> <p>Ministry of Economic Affairs and Communications</p> <p>SA Kredex;</p> <p>TalTech;</p> <p>Tallinn Energy Agency;</p> <p>EMÜ Centre of Renewable energy;</p> <p>Estonian Association of Cities and Municipalities</p> <p>Estonian Association of Heating and Ventilation Engineers</p>	<p>Scheduling conferences and seminars;</p> <p>Programming conferences, seminars and information days</p> <p>Marketing conferences, seminars and information days</p>	<p>Regular meeting of energy groups – regulars' table</p> <p>Coordination meetings of the working group</p>
Political decision-makers	<p>Local governments</p> <p>Ministry of Economic Affairs and Communications</p>	Participation in both national conferences and seminars and information days in local areas	
Target groups	<p>Local government specialists</p> <p>Developers</p> <p>Architects</p> <p>Designers</p> <p>Policy makers</p>	Participation in both national conferences and seminars and information days in local areas	<p>Citizen action groups / DIY groups</p> <p>Thematic workshops</p> <p>Regular meeting of energy groups – regulars' table</p>
etc			

4 Monitoring Strategy

The expected result indicators will be agreed on an annual basis and will be specified during the planning of each individual conference / seminar / information day. The results will be summarized after each specific conference, seminar and annual event. The feedback will be used for the development of next events.

5 Risk management

Risk	Probability of realising	Mitigation measure
Great occupation of local government representatives and consequent low participation in conferences, seminars, workshops	medium	Direct communication with target group, more personalized approaches
Project-based funding for conferences, training, information days	high	Longer-term state-owned co-operation agreements for financing by the state and joint organizations of local governments
Similar conferences, seminars, information days organized by various organizations and companies	medium	Coordinating the dates of events (calendars).



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Action Plan 8a: Increasing the modal share of cycling and walking in the city

1 Objective

The objective of the activity is to enhance the usage of cycling and walking in the city traffic thus improving the health of citizens and decreasing the usage of private cars in the city and in neighbourhood.

1.1 Objective scope and targets values

The modal share in the Tartu city is according to recent studies as follows:

Walking – 21,5%

Cycling – 8%

Public transport – 21,5%

Cars and trucks – 46%

Other means of transport – 3%

During the last 10 years the usage of personal cars is increasing in average by 1% in year and walking is decreasing in average by 1,5% in year. The modal share of cycling has risen from 0 to 8% but this is not satisfactory level taking into account the compactness of the city and relatively big share of students in the population. There are 2 main reasons behind of mentioned developments: city sprawl and increase in living standards. When we come to cycling the main problem is to connect different cycling roads and – paths in to one logical network.

The main focus will be paid on the development of cycling network and on the development of bike-sharing.

1.2 Target indicators

To measure the status of the objective will be used two indicators – the modal share of walking and the modal share of cycling in the city. Indicators will be calculated using surveys and data from traffic counters at least once during 5-year period.

Objective	Target indicator	Method of measurement and validation
Increase of usage of Bicycles in the everyday movements	<ul style="list-style-type: none"> Modal share of cycling in the city 	<ul style="list-style-type: none"> Survey, data from traffic counters
Increase of walking modal share in daily movements	<ul style="list-style-type: none"> Modal share of walking in the city 	<ul style="list-style-type: none"> Survey, data from traffic counters

2 Implementation strategy

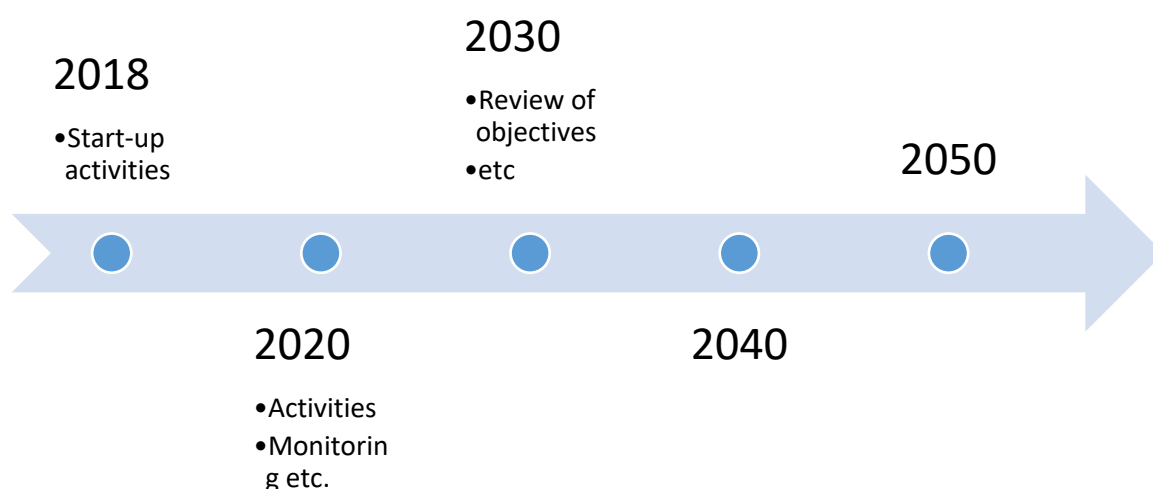
2.1 Step by step description

The target is to reach the modal share of cycling in the modal split of the city 20% by 2030 (increase by 1% in year) and reach the modal share of walking in the city modal split at minimum 30% by 2030 (increase by 0,8% in year).

Activities/tasks to achieve targets and fulfil objectives:

- Creating a bike-sharing system including 750 bicycles and 70 stations. – done by 2020.
- Redesigning street space in the city centre in order to give more space for light traffic – minimum in total 2 streets (Ülikooli, Vabaduse) redesigned by 2021 and minimum 4 streets in total redesigned by 2025.
- Construction of light traffic tunnel and bridge in Riia street (crossing of railroad) – works will be finished by 2025.
- Construction of new light traffic roads in Vaksali street and in direction to Ilmatsalu settlement – finished by 2022.
- Renovation of existing pedestrian sidewalks in total 10 km – done by 2030.

2.2 Time schedule



2.3 Budget and resources needed

The total estimated costs of activities are 8 000 000 € and will be financed from the city budget and EU funds. Activities will be implemented using human resources of Tartu City Government in the frame of day-to-day activities.

3 Collaboration with stakeholders

Public stakeholders will be engaged via set of public events and info days.

4 Monitoring Strategy

Monitoring of indicators will be carried out continuously but evaluation of achievements will be done in interval of 5-years (2020, 2025, 2030,...) Indicators will be calculated using surveys of movements and data gathered from traffic counters. Responsible part of monitoring and evaluation is the service of roads and the service of traffic management of Tartu City Government.

5 Risk management

Risk	Probability of realising	Mitigation measure
Insufficient financing – delay in activities	medium	Long term planning and including activities in the city development plan and development strategy.



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for the Region of Estonia

English version

prepared by
City of Tartu

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Action Plan 8b: Increasing the share of public transport / Reducing the use of private cars in the city

1 Objective

The objective of the activity is to enhance the usage of public transport and thus decreasing the usage of private cars in the city and in neighbourhood.

1.1 Objective scope and targets values

The modal share in the Tartu city is according to recent studies as follows:

Walking – 21,5%

Cycling – 8%

Public transport – 21,5%

Cars and trucks – 46%

Other means of transport – 3%

During the last 10 years the usage of personal cars is increasing in average by 1% in year and walking is decreasing in average by 1,5% in year. There are 2 main reasons behind of mentioned developments: city sprawl and increase in living standards.

The situation is worrying and city government is looking for ways to stop at first the rise of usage of personal cars and after that to decrease the usage of personal cars in the city.

The main focus is paid to enhance the quality level of public transport and establishment better connections with neighbouring municipalities.

1.2 Target indicators

To measure the status of the objective will be used two indicators – the modal share of car transport and the modal share of public transport in the city. Indicators will be calculated using surveys, data from traffic counters and data from electronic ticketing system at least once during 5-year period.

Objective	Target indicator	Method of measurement and validation
Reduction of private car usage	Modal share of car usage in the city	Survey, data from traffic counters, data from electronic ticketing system
Increase of usage of public transport	Modal share of public transport usage in the city	Survey, data from traffic counters, data from electronic ticketing system

2 Implementation strategy

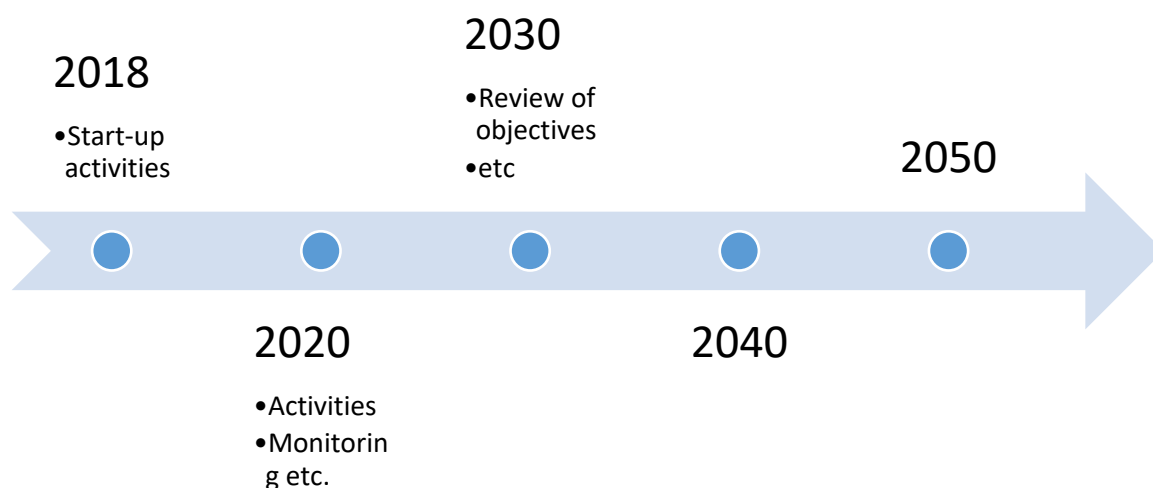
2.1 Step by step description

The target is to reach the usage of private cars in modal split below 30% by 2030 (reduction at minimum 1,5% in year) and reach the usage of public transport in modal split at minimum 30% by 2030 (increase minimum 0,8% in year).

Activities/tasks to achieve targets and fulfil objectives:

- Connecting city bus lines with larger settlements (more than 500 inhabitants in radius of 5 km from city border) in the city neighbouring area – done by 2025.
- Creating priority lines for public transport in the city – minimum in total 2 streets by 2021 and in total 4 streets by 2025.
- Redesigning street space in the city centre in order to give more space for light traffic and public transport – minimum in total 2 streets (Ülikooli, Vabaduse) redesigned by 2021 and minimum 4 streets in total redesigned by 2025.
- Creating “Park and Ride” car parks in the city border – at minimum 2 car parks in total created by 2022 and 4 car parks in total by 2030.

2.2 Time schedule



2.3 Budget and resources needed

The total estimated costs of activities are 3 000 000 € and will be covered by Tartu City. Activities will be implemented using human resources of Tartu City Government in the frame of day-to-day activities.

3 Collaboration with stakeholders

Roles and responsibilities of different actors for Action Plan implementation

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Tartu City Government	Different departments and services	Leader and responsible for fulfilling tasks	Main actor. Continuous involvement, daily meetings
Tartu City Government	Mayor and deputy mayors	Drafting of city development strategy and development plan, budgeting,	Meetings, common drafting of public acts
Tartu city council		Decision maker - approval of city development plan, - city development strategy, - budget	Meetings of city council commissions, city council meetings
Light traffic commission		Consultant – designing plans, traffic management, light traffic policy	Meetings (once in months)

District unions of citizens		Consultant designing plans, traffic management –	Public meetings
Public transport service provider, company GoBus		Service provider – daily operation of public bus lines	Daily management, phone calls, e-mails, meetings
Governments of neighbourhood municipalities		Decision makers – arrangement of public transport in neighbourhood municipalities	Meetings

4 Monitoring Strategy

Monitoring of indicators will be carried out continuously but evaluation of achievements will be done in interval of 5-years (2020, 2025, 2030,...) Indicators will be calculated using surveys of movements and data gathered from traffic counters and from public transport ticketing system. Describe when and how target indicators will be checked against the implementation plan. Responsible part of monitoring and evaluation is the service of traffic management of Tartu City Government.

5 Risk management

Risk	Probability of realising	Mitigation measure
Insufficient financing may cause delay in activities	medium	Long term planning and including activities in the city development plan and development strategy.
Misunderstanding between stakeholders may affect the fulfillment of activities	medium	Sufficient involvement and preparation of alternatives will diminish the risk
Low cooperativeness of neighborhood municipalities may affect prolongation of city bus lines to neighborhood settlements	medium	Proper planning and preparation (analysis, calculations, engagement of public...) will significantly diminish the risk



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Action Plan 9: National energy transition training program (University of Tartu, EMÜ)

1 Objective

1.1 Objective scope and targets values

The objective is to train public officers and energy specialists on energy transition aspects to increase the public and private capacity in transitioning to low carbon economy. By 2021 the Johan Skytte Institute of Political Studies of University of Tartu together with Estonian University of Life Sciences has developed in-service training course which focuses on different aspects of energy transition and helps to strategically plan and carry out transition to low carbon economy for public and private organisations.

In the end of 2020 the course will be launched as part of UTs Open university official courses

By 2025 at least 150 participants have graduated from the course.

1.2 Target indicators

The observed indicators will be on three tiers:

- Number of participants in the course
- Feedback collected from the course participants
- Feedback collected from course trainers.

Based on the feedback and evaluation of indicators adjustments will be made to the training program.

2 Implementation strategy

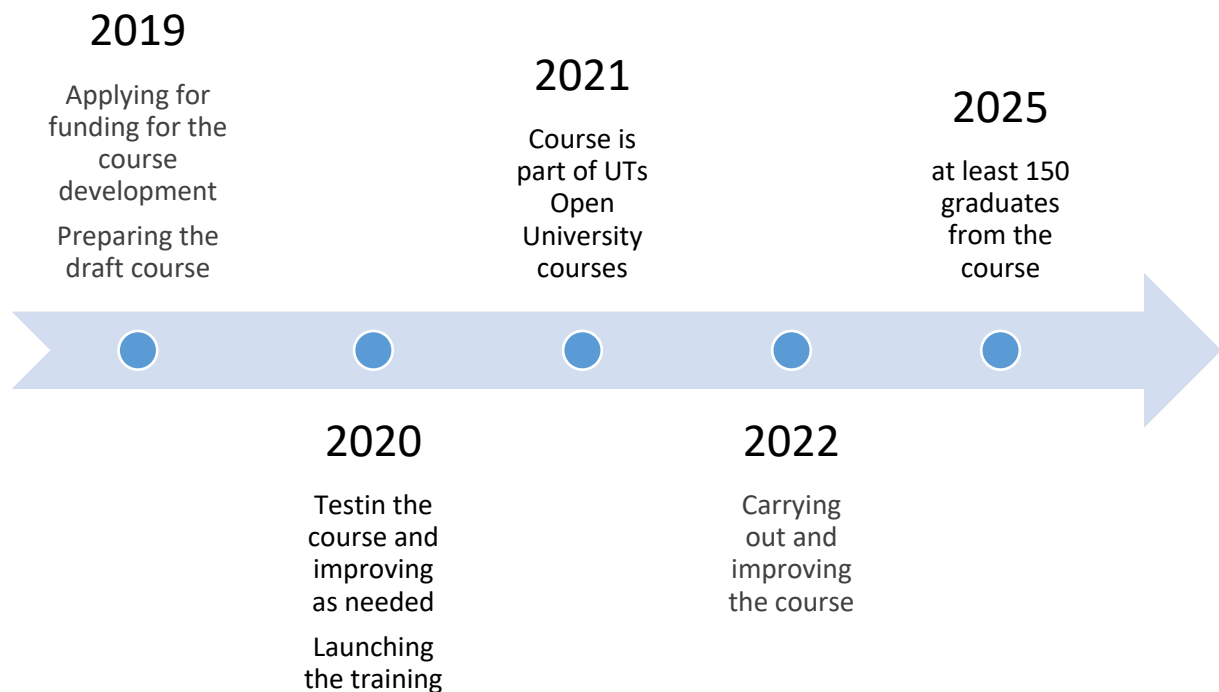
2.1 Step by step description

For developing high quality capacity building course on energy transition following steps should be taken:

- applying for funds from different programmes.
- Preparing draft course outline and materials
- improving the course outline and materials in the meeting with key target group representatives (local governments, energy companies)

- testing the course
- improving the course based on the feedback gained from the test group
- launching the course as part of the University of Tartu's Open University official courses
- marketing the course
- improving the course layout and materials based on the feedback from the participants and teachers.

2.2 Time schedule



2.3 Budget and resources needed

The estimated budget consists of:

- Preparation of materials
- Room rent
- Lecturer fees
- Course materials

The course development and implementation will be funded by the Erasmus+ programme as well national programs intended for capacity building and vocational training program development in adult lifelong learning.

3 Collaboration with stakeholders

The targeted stakeholders are local municipalities, public and private organisations.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Supporting parties	Local municipalities, public and private organisations	Supporting and giving input to the planning process	Regular meetings, dissemination activities
Political decision-makers	University of Tartu, Estonian University of Life Sciences	Planning process	Regular meetings
Implementing parties	University of Tartu, Estonian University of Life Sciences	Implementer	Carries out the trainings, advocacy and dissemination of info

4 Monitoring Strategy

The course will be evaluated on three tiers:

- Number of participants in the course
- Feedback collected from the course participants
- Feedback collected from course trainers.

Based on the feedback and evaluation of indicators adjustments will be made to the training program.

5 Risk management

Risk	Probability of realising	Mitigation measure
The project proposals intended for developing the training course will not get funded	medium	Application for funds will be divided between different sources
Not enough students in the courses	low	Marketing methods will be revised and improved.



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Action Plan 10: Increasing the energy management capacity of local level administration (EMÜ)

1 Objective

The objective is to create a geographical up-to-date overview of renewable energy production units.

1.1 Objective scope and targets values

The objective is to create a geographical up-to-date overview of renewable energy production units. EMÜ will develop online and printed map of Estonian Renewable production units (all categories) and keep it up to date.

Creation of visual material showing current renewable energy production units in all categories can be used for research, development, to increase of public knowledge and as an analytical material to improve the political decision-making.

1.2 Target indicators

The indicators measured to evaluate the success of current action will be:

- public map creation
- Annual update of the map
- Distributing the map via the homepage of centre of renewable energy of EMÜ and in national public events (conferences, info seminars, etc) as a printed map.

The efficiency of the actions will be assessed annually.

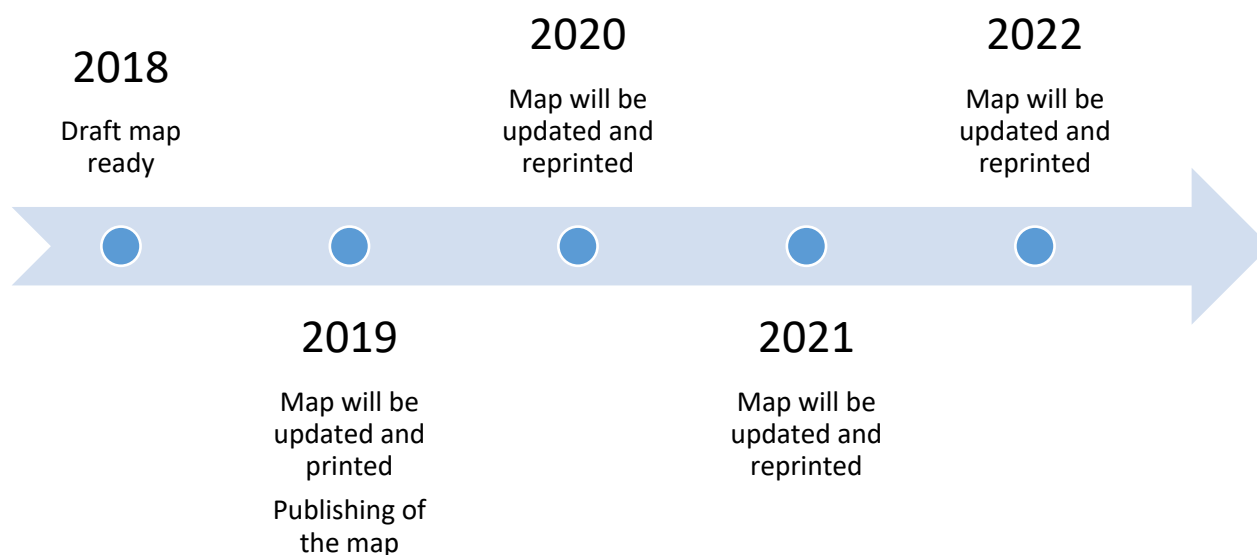
2 Implementation strategy

2.1 Step by step description

1. Data for the map creation will be collected.
2. Different data sets will be combined into one map that is based on Google maps service
3. Print file will be created and printed, showing the latest situation in Estonian Renewable energy production.

4. The map will be distributed in the homepage, national events and in our partners materials

2.2 Time schedule



2.3 Budget and resources needed

The actions planned will be covered by Estonian University of Life Sciences. Further distribution of the developed materials by our partner organisations will be funded by them.

3 Collaboration with stakeholders

The map tool is developed together with the Estonian Renewable energy association, Estonian wind energy association, Estonian biofuels association, Estonian Biogas association and Estonian Ministry of Economic and communication affairs.

Estonian University of Life Sciences is responsible for the developing and creating the map and organising the regular update. The relevant organisations will be responsible for the annual data input as well as distributing the end results.

4 Monitoring Strategy

The implementation of the action plan is monitored annually during the meeting with relevant stakeholders.



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Action plan 11: Developing a Supportive Ecosystem for Energy Cooperatives (TREA)

1 Objectives

Background: Estonia as well as the European Union have set long term goals in terms of increasing the share of renewable energy sources in their energy production. The current goal of Estonia is to achieve 25 % of renewable energy in the total energy production by 2020. A new EU directive advises to raise this goal to 27 %.

The wider use and availability of renewable energy sources is a fertile ground for the involvement of communities and private persons on the energy market. The affordability of renewable energy technologies like solar, wind, biomass and ground source energy enables citizens to participate in energy production, sales and for own use. Action from the local and state level governments is necessary to involve residents in community based energy production.

A mentor programme for Energy Cooperatives conducted during the years 2014 to 2015 showed that Estonia has no favourable ecosystem for the formation of Energy Cooperatives. The main barriers are legal regulations that restrain possible initiatives. Common beliefs, mentality and low reputation and experience of cooperative activities in the population are among other reasons. Resulting from these factors the most suitable functioning principles and models for possible energy cooperatives in Estonia haven't been determined. This situation significantly restricts the development of energy cooperatives and the main prerequisite to build up a supportive ecosystem is the motivation, will and possibilities to develop really functional energy cooperatives.

The main objective: is to create a supportive environment for energy cooperatives in Estonia that includes all aspects necessary to establish an energy cooperative. These aspects include: legal grounds, availability of information, expert support and networking opportunities between experts, enthusiasts and energy cooperatives to exchange knowledge and experiences.

1.1 Objective scope and target values

The aim of the action plan is to develop on the basis of practical examples and expert experiences practical models for energy cooperatives in Estonia. The plan includes the creation of a cooperation platform for people interested in energy cooperation topics. A central theme is the promotions of the use of IT-solutions for the management and leadership of energy cooperatives.

Objective 1: Estonia has at least 10 functioning energy cooperatives in 2025.

Objective 2: Estonia has an all-round supportive ecosystem for the creation of energy cooperatives by 2025.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
At least 10 functional energy cooperatives by 2025	<ul style="list-style-type: none"> By 2020 there are 3 functional energy cooperatives in Estonia (pilot projects, examples for creating the models) By 2025 there are 10 functional energy cooperatives in Estonia 	<ul style="list-style-type: none"> Data from the Information register for enterprises Annual financial reports of the cooperatives, energy consumption and production data, to validate the working of the cooperative)
Platform for communal energy production	<ul style="list-style-type: none"> The cooperation platform is in active use; The registered users of the platform are from different sectors and fields of activity New users get high quality information 	<ul style="list-style-type: none"> Number of registered users Profile of registered users Information about possible new projects
Estonia has by 2025 a business ecosystem that motivates and supports the establishing of energy cooperations	<ul style="list-style-type: none"> By 2020 the first main suitable models for the development of energy cooperations in Estonia are identified. By 2025 the laws of Estonia don't restrict the founding of Energy Cooperations By 2025 the financing schemes enable the founding of Energy Cooperations The awareness of citizens and communities about Energy Cooperations has risen 	<ul style="list-style-type: none"> Existence of functioning energy cooperatives Legal regulations are favourable towards energy cooperatives Support schemes towards ECs Info days and interviews with forerunners Monitoring of new initiatives from the beginning until they are operating (for example for the first 3 years, if necessary shorter or longer)

	<ul style="list-style-type: none"> • The attitude of citizens and communities towards Energy Cooperations has become more positive 	<ul style="list-style-type: none"> • Registration lists from the info days, number of new initiatives
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2 Implementation strategy

Analysis of the current state of affairs. Tartu Regional Energy Agency (TREA) has collected data and owns an overview of the situation that restrict the forming of ECs in 2018. A good input for the monitoring of the current situation is the detailed analysis of legal acts, financing problems and other restrictions studied in the ECs Mentoring Programme conducted by the Estonian Development Fund. Valuable insights about possible risks and barriers can also be derived from the activities of the participants after the end of the programme in 2015. The foundation of three pilot ECs is supported and monitored to determine the most suitable model for ECs in Estonia. Different aspects are analysed like the main legal restrictions, financing possibilities, ownership forms and involvement strategies.

Experiences, best practices and information are exchanged about different EC models. Such information is also exchanged with partners from other EU member states, especially Scandinavian countries and Germany which have a long history of community based energy generation.

EC models are developed by 2020 on the basis of analyses of the functioning principles of the first Estonia ECs, best practices and experiences from other countries. Fitting models may be also added later, according to changes in the ecosystem for ECs.

Recommendations for changing legal regulations are formulated on the basis of the aforementioned findings. They are mainly directed towards the Ministry of Economic Affairs and Communications to initiate legislature change that support the establishing of ECs. Expert opinions are given to policymakers if necessary in the process of changing regulations. It is recommended to develop a financing scheme for the support starting ECs.

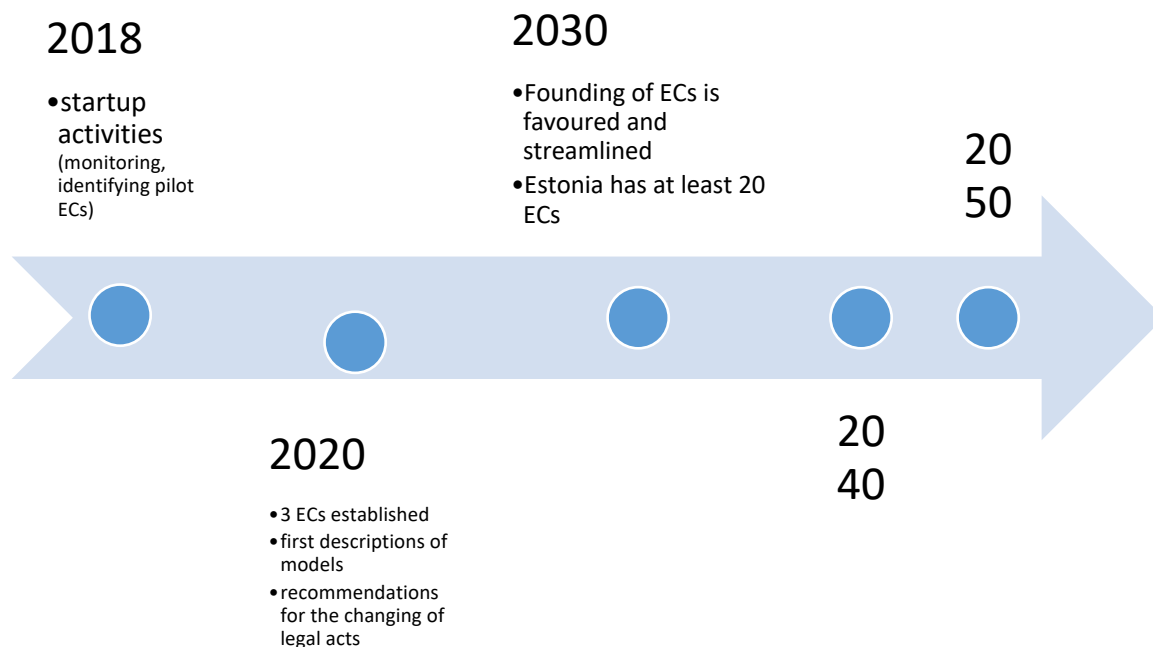
Regular information seminars, workshops and courses (for example about financing possibilities) are arranged to increase the interest of individuals and communities towards ECs, at least two times a year.

General awareness raising. Information about ECs is distributed regularly during the whole process in different media sources: articles introducing the concept or a specific topic in newspapers, magazines, social media, also broadcasts about the info days.

Cooperation platform. During 2020 – 2025 a cooperation platform is developed for people who are interested in the topic of ECs. The communication between stakeholders including members of the ECs, founders, experts and officials from the local government and ministry levels. ECs can exchange experiences and answers to arising questions through the platform. The most popular topics on the platform indicate also the need for which topics should be covered in future courses and info days.

2.1 Timeline

By 2025 at least 10 energy cooperations are established



2.2 Budget and resources needed

Structural Funds of the European Union are the main financing sources for ECs in the first years of operation (e.g. Interreg or Horizon2020 programmes). They continue to be the main financing source also after 2020, in the new EU financing period. New financing sources include national programs like funds from the Centre of Environmental Investments (KiK) or the local municipalities where the ECs are formed. Local municipalities could also be members of the ECs.

3 Collaboration with stakeholders

The potential founders of ECs like village communities, eco-friendly communities or apartment building cooperatives are the main partners for TREA in the first 2 years. Also foreign organizations mainly in the Baltic Sea area. The Foundation Private Forest Centre will also support TREA, especially related to forestry cooperatives that have the potential to establish an EC in the future.

Crucial partners are local municipalities, where the ECs are formed. They can be present on site and supply and mediate information. TREA is frequently cooperating with thematic experts especially on technology. Experts from other fields are involved if needed, for example lawyers, financial advisors and influencers.

The Estonian Ministry of Economic Affairs will become an important partner in the second year of the action plan. There are responsible for forming the legal framework around ECs.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	TREA	Implements the main activities of the action plan, monitors progress	Social media, info days, seminars, advisory meetings
Political decision-makers	Estonian Ministry of Economic Affairs and Communication Ministry of Finance Ministry of the Environment	The Ministry of Economic Affairs and Communication can start the process of changing legal regulations, Ministry of Finance can influence the distribution of structural funds. Ministry of the Environment can influence the funds for environmental investments.	Legal documents are published on the national website for legal documents: Riigi Teataja
Implementing parties	Potential EC founders like village communities, eco-friendly communities, island communities, forest cooperatives or apartment building cooperatives	Founding of ECs	Info days and materials
Financers	EU structural funds, The Estonian State, Centre of Environmental Investments (KiK)	Coordination of the distribution of structural funds and other financing possibilities in Estonia	Announcing funding possibilities

4 Monitoring Strategy

The implementation of the action plan is monitored annually during the evaluation of the fulfilment of the work plan of TREA. More thorough summaries are made in 2020 and 2025, years in which key performance indicators are clearly defined. The number of ECs will be constantly monitored by TREA.

In case the goals are not met, reasons are analysed and minor rearrangements are made in the action plan.

5 Risk management

Risk	Probability of realizing	Mitigation measure
Lac of political motivation for supporting the foundation of ECs	Medium	In the new currently developed renewable energy directive the requirement or recommendation to support the formation of ECs is included.
Opposition of large energy corporations against the formation of ECs. Their influence towards the legislature to restrict the creation of a supportive legal environment for ECs.	Low	Pressure from the EU towards it's member states to support the founding of ECs.
An economic downturn – budget cuts, financing possibilities get scarce, banks don't issue loans and citizens have no money to establish ECs. The founding of ECs is postponed.	medium	Recommendation to start at a smaller scale, search for alternative financing possibilities. After a downturn there is always a rise.



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WWF Hungary

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Priority area: Energy efficiency in the residential building sector

Action Plan: Energy adviser office for every district

1 Objective

By 2025 half of the district centre will establish local energy adviser office, by 2030 all district centre will provide this service. By 2035, half of the households will use the service.

1.1 Objective scope and targets values

To exploit the huge energy efficiency potential in residential buildings, end users need advice on how they can reduce their energy bills in a most cost-efficient way. For this, adviser offices are needed on local level where energy efficiency consultants can guide the end users from the idea to the implementation, including planning, financing option, and create link between end users and relevant local companies. Households can request services regarding wide spread of topics, such as upgrading lighting system, replacement of old doors and windows, sun control and shading, thermal rehabilitation, renewable energies, etc.. This kind of initiative has existed in one district of Budapest (Zuglói) for two years. The experiments of this pilot project could provide useful information for establishing such offices in the project region.

Since the municipality level is highly fragmented, resulting that 83% of the municipalities' population is below 2000 inhabitants, the most reasonable level for creating the offices would be on district level (LAU 1). There are altogether 23 districts. The offices would be situated in the district centres, but would cover not only the district centres, but other part of the district as well. The district centres are: Borsod-Abaúj-Zemplén County: Cigánd, Edelény, Encs, Gönc, Kazincbarcika, Mezőcsát, Mezőkövesd, Miskolc, Ózd, Putnok, Sárospatak, Sátoraljaújhely, Szerencs, Szikszó, Tiszaújváros and Tokaj; Heves County: Bélátpátfalva, Eger, Füzesabony, Gyöngyös, Hatvan, Heves, Pétervására.

It is also important to not only establish these offices, but also make it attractive for the households, and convince them to use the service. Therefore it is crucial that by 2035, half of the households (200 thousands) will use the service. If we assume that 12 offices will start in 2025, and other 11 in 2030, it means that by 2035 the summed up years in operation will be 175 years (12 offices will be in operation for 10 years at that time, 11

offices in for 5 years). Therefore in average they will have 22 clients weekly, which seems a realistic number, and even make the part-time opening hours service possible.

The time-frame for achieving the desired goals is strict, however, the implementation of this action plan can corresponds significantly to archiving the vision. From the 16 district centre, 5 municipalities already have Sustainable Energy and Climate Plan (SECAP). These cities can be a forerunners in the action plan, and their successful engagement could corresponds to meet the intermediate target, i.e. at least 8 cities will have local energy adviser office in 2025.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
By 2025 half of the district centre will establish local energy adviser office, by 2030 all district centre will provide this service.	number of registered offices	Memorandum of association from the offices to the county councils
By 2035, half of the households will use the service.	number of visitors	Documentation of the adviser offices

2 Implementation strategy

2.1 Step by step description

To reach the targeted objective, the following work packages were identified.

WP1 General management. The county councils are those organizations that are able to oversee the local governments. Their existing roles and connections enable them to be the main responsible for the action plan. Their general role is to engage the district centres and convince them to join the initiative as soon as possible. Besides that, they are responsible for overall project manager and ensure that the other work packages will be implemented in the planned way. General management is necessary until the opening time of the last office and until the visiting clients do not reach the desired level.

WP2 Ensuring human resource and network building. The popularity of the offices significantly depends on the ability of the staff. It is essential to have experts on board with excellent communication skills and who have great overview on the energy performance of buildings, preferably building energy engineers. To create smooth service, at least two employees are needed for one office. To ensure that the quality of the offered service is high, and follows the market and the technical development,

networking is needed among the employees. Strong networking strengthens the professional knowledge, and makes it possible for the employees to help each other answering any kind of specific question raised by the clients. Chambers of engineers, which exist in both counties, can be facilitators in advising experts for the positions. This work package ideally will finish in 2030 when the last office start to operate and the networking channels are in operation.

WP3 Service portfolio development. For an individual, the possible energy efficiency and renewable energy measures on household level is one big topic and hard to overview the different possibilities. Therefore clear service portfolio is needed which set out what kind of service can the office provide and distinguish the different kind of subtopics. The experts have to provide help from the idea phase until the implementation phase, including:

- on-site consultation
- setting-up different options with cost analysis
- helping to create connection between the client and the constructor/distributor
- helping in alternative financial instruments, if needed.

This process has to be unified for all the offices. This work package would be implemented in a strong connection with WP2, with the same timeline and responsibility.

WP4 Engagement of relevant companies/distributors. There could be significant difference in the quality of implementation. Badly implemented energy efficiency measures cannot achieve the calculated energy savings. To avoid this risk, offices can advise companies/distributors with good references. For this the deep mapping of the local market is needed by the energy advisers. The responsible persons for this work package are the hired energy consultants, and should be done in a few months after the establishment of the office.

WP5 Marketing. Without additional activities the risk is high that the offices will be neglected because of the low energy awareness, or potential clients just do not receive information about the offices. The previous one will be the focus of another action plans, and latter can be avoid with sufficient marketing campaigns and with small incentives. The existing media channels can be used for this purpose. Therefore municipalities and the district centres should be responsible for this task. Marketing activities are needed until the targeted number of clients is not reached.

2.2 Time schedule

In line with the above described steps, the main activities would be the followings:



2.3 Budget and resources needed

The calculated cost of the human resources is around EUR 60 thousand per office per year (with two persons, 20 working hours/week). This could be (or at least partly) covered by commissions from the companies after each successfully implemented energy measures.

Another major cost factor is the renting cost of offices. This can be solved if the municipality can provide a suitable property. However, it is crucial that the offices have to be in a good location, which can be easily access by public transport.

3 Collaboration with stakeholders

The previously identified forerunners were invited to a dedicated roadmapping workshop. During the PANEL project county-level long term climate strategies were developed and approved by the county councils this year. The aim is to connecting the action plans to this official strategy. In order for this, the Mining and Geological Survey of Hungary, who developed the climate strategy for Borsod-Abaúj-Zemplén County – which covers the 2/3 of the project region – was also taking part in the roadmapping workshop and provided useful experiences.

The outcome of the workshop was summarized in an online table, and was circulated among the forerunners/most active stakeholders. This created the possibility for those who could not attend the workshop to provide feedback, and also for those who could attend the meeting to develop further their ideas.

Since the proposed action plans call for wider participation, they will be promoted to the identified interest groups through the CEESEN website.

Roles and responsibilities of different actors for Action Plan implementation

The following stakeholder groups were identified as necessary actors for the implementation.

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	county councils	overall project management, engagement of district centres and chambers of engineers	Since the action plan contributes to the implementation of the official county-level strategy, approved by the county council, who support the PANEL 2050 project, there is no need for specific involvement action

	district centres	creating local offices	Since county councils have existing connections to district centres, their involvement have to be done by the councils, using their existing communication channels.
Contributors	chambers of engineers	ensuring human resource and development of service portfolio	Chambers of engineers are in operation on county-level, which means they can be involved by the county councils. Regarding the involvement of experts, the chambers can use their existing communication channels.
	companies and distributors	implementation of energy efficiency/renewable energy measures	The hired senior energy advisers already should have connection to the relevant companies and distributors; there it is their responsibility to involve them.
	municipalities	promoting the initiative to local households	They have to be involved by the district centres, since they already have a strong relation.
Target groups	households	as a target group they role is to be open for increasing the energy efficiency/renewable based production in their household and take the advice given by the energy advisers.	Municipalities have a close connection to local households. In the frame of WP 5 their role is to involve households.

4 Monitoring Strategy

The evaluation of monitoring parameters will take place in every 5 years, with a starting year 2025.

- In 2025, at least 12 offices will be in operation. If the target number is not achieved, the responsibilities and the specific work packages have to be re-evaluated and amendments have to be done in order to reach the 2030 targets. It will be checked by the county councils with the numbers of received memorandum of association from the offices.

- In 2030 all offices are in operation and 80 thousand household (40% of the 2035 target) will receive the service. Since the number of clients is the most important indicator, in this year it is also important to revise the responsibilities and the relevant actions if the targeted number is not achieved. The target numbers will be checked again by the county councils. In terms of the targeted number of clients, the validation will be done with the help of the documentation from the offices.
- In 2035, 200 000 thousand clients will receive the service. If the target is not achieved, the revise is needed in terms of implementation environment in order to reach the target value with the shortest delay.

5 Risk management

Identified possible risks and the possible measure to mitigate them are the followings:

Risk	Probability of realising	Mitigation measure
Identified companies/distributors are not able to finance the personal cost of the energy advisers.	High	There are significant development disparities among the districts. The risk can mitigate if the first offices open where the market conditions are the most favorable. In this way the action can result significance income to the companies/distributors which make the financing for the less developed areas possible.
Lack of interest from the households	Low	Significant share of the household expenditures are to cover the energy bills. Therefore possible clients are interested to save cost and energy. A dedicated work package will ensure that the household receive information about the energy adviser offices.

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SUSTAINABLE ENERGY NETWORK

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Heves counties

English version

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Deliverable 3.7

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Priority area: Low-carbon transportation sector

Action Plan: Share your car!

1 Objective

By 2050 75% of the total passenger km will happen by carpooling.

1.1 Objective scope and targets values

In the European Union but also in Hungary the transport is among the few sectors which GHG emission is increasing continuously. In Eastern-Europe the main reason behind that is the growing mobility needs which covered by old and increasing number of passenger cars. The average age of passenger car is increasing in Hungary: while in 2002 the average age was 11.7 years, in 2017 it was 14.1 years. The number of passenger cars is also increasing, in the investigating period with 32% (2002: 2.63 million, 2017: 3.47 million). Since the market of cheaper second-hand cars is growing, this trend seems to be growing in the upcoming years.

In both counties the number of passenger cars per 1000 inhabitants is below the country-average: while the average number for the country is 325, in Heves 303, in Borsod-Abaúj-Zemplén 262. The reason behind this is probably the higher unemployment rate. In both counties the settlement pattern is fragmented, and the accessibility of the majority of the settlements is limited. Therefore if no specific action will take place, then it is likely that the economic development will result more passenger cars in the region, and the GHG trend of the public transport will keep increasing.

A cheap and effective action to reverse this trend is the carpooling. This means sharing car journeys so that more than one person travels in a car, and prevents the need for others to have to drive to a location themselves. Carpooling usually means to divide the travel expenses in equal parts between all the occupants of the vehicle, which means the aim of the travel is not earning money for the driver. Sharing car does not mean only less travel cost, but it also reduces air pollution, carbon emissions, traffic congestion on the roads, and the need for parking spaces.

In the United States 44% of the trips was with carpooling in 2009¹. In Switzerland and in France dedicated lanes are only for carpooling cars, while in the Netherlands there are dedicated carpool pick-up places with shelters.

In Hungary one widely-known carpooling system is in operation, called Oszkár, however, as a common experience of the roadmapping team its usage did not reach a critical mass so far, therefore its reliability and flexibility is limited.

The aim of the action is to increase the number of carpooling in three ways:

- Creating online peer-to-peer ridesharing platform. This allows people to arrange ad hoc rides on very short notice, through the use of smartphone applications or the internet. Passengers are simply picked up at their current location. This way carpooling could provide effective mobility for individuals in remote settlements.
- Creating supportive infrastructure: adopting the good international examples with creating pick-up places and where possible designating dedicated lanes.
- Massive campaigning. Letting individuals know about the advantage of carpooling and introducing the platform and incentives.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
By 2030 25%, by 2040 50%, by 2050 75% of the total passenger km by cars will happen by carpooling.	% of carpooling passenger km per total passenger km by car	Carpooling kms: documentation from the online platform Total kms: official statistics

2 Implementation strategy

2.1 Step by step description

To reach the targeted objective, the following work packages were identified.

WP1 General management. Overall project leadership is needed in order to manage the different WPs, keeping together the different project activities and monitor the progress. For this kind of region-wide activity the only type of organization which can fill the role is the county council. The two county councils are responsible for overall project manager

¹

<https://web.archive.org/web/20131023135048/http://nhts.ornl.gov/tables09/ae/work/Job24716.html>

and ensure that the other work packages will be implemented in the planned way. General management is necessary until target not reached.

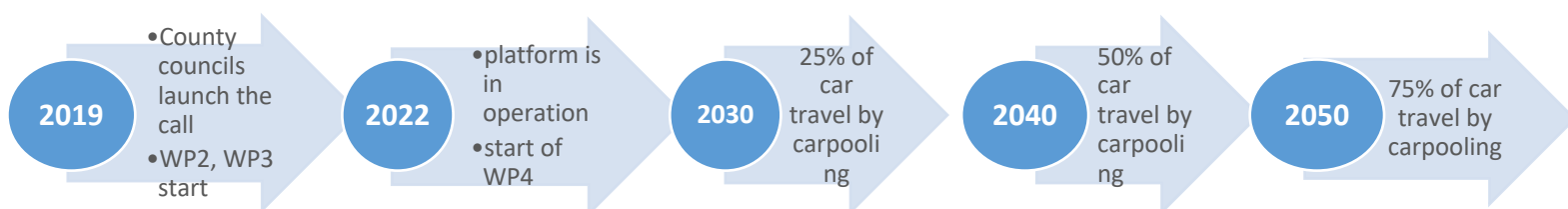
WP2 Online ridesharing platform. Creating online peer-to-peer ridesharing platform allows passengers to easily pick drivers and change cars when necessary. This is crucial for the spread of carpooling. Similar platform was created by Waze, but only available in the USA, Brazil and Israel. County councils are responsible for creating the online platform by hiring an IT company, or engage Waze or Oszkár (the previously mentioned carpooling system in Hungary). Oszkár do not have this kind of platform, therefore they could open for this kind of cooperation. This platform has to be developed in the first two years, by 2022.

WP3 Creating supportive infrastructure. In this work package good international examples would adopted to the region. The priority would be the establishment of pick-up places especially among popular routes. The responsible parties are also the county councils, but this work package can be implemented effectively in cooperation with the National Transport Authority. This infrastructural development has to be done in the first 5 years, by 2024.

WP5 Marketing. Without additional activities the risk is high that the individuals are not interested in carpooling. Therefore dedicated marketing campaign is needed by professional agency which convinces individuals to use the service by highlighting the social, economic and environmental advantages of carpooling. With reaching the critical mass, carpooling can be a real alternative for other transport mode. The county councils are responsible for hire professional agencies for the implementation of the work package. Marketing would be most efficient when the platform is available for use, and the first pick-up places are operating. Therefore the WP should start in 2022 and should continue until 10% of the total passenger km by cars will happen by carpooling.

2.2 Time schedule

In line with the above described steps, the main activities would be the followings:



2.3 Budget and resources needed

In this phase of the action development it is impossible to assess the budget. From the three main actions the most costly is the infrastructural development. Its cost depends on the number of new infrastructural object, but EU Cohesion Fund is available for this kind of infrastructural development. However, it should be investigate whether the action could be eligible under innovation funds, and this way the budget for the whole action would be ensured.

3 Collaboration with stakeholders

The previously identified forerunners were invited to a dedicated roadmapping workshop. During the PANEL project county-level long term climate strategies were developed and approved by the county councils this year. The aim is to connecting the action plans to this official strategy. In order for this, the Mining and Geological Survey of Hungary, who developed the climate strategy for Borsod-Abaúj-Zemplén County – which covers the 2/3 of the project region – was also taking part in the roadmapping workshop and provided useful experiences.

The outcome of the workshop was summarized in an online table, and was circulated among the forerunners/most active stakeholders. This created the possibility for those who could not attend the workshop to provide feedback, and also for those who could attend the meeting to develop further their ideas.

Since the proposed action plans call for wider participation, they will be promoted to the identified interest groups through the CEESEN website.

Roles and responsibilities of different actors for Action Plan implementation

The following stakeholder groups were identified as necessary actors for the implementation.

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	county councils	leader for all WPs	Since the action plan contributes to the implementation of the official county-level strategy, approved by the county council, who support the PANEL 2050 project, there is no need for specific involvement action
Contributors	National Transport Authority	collaborating in WP3 – creating supportive infrastructure	They have to be involved by the county councils.
	IT companies	implementation of WP2 – creating the	They have to be involved by the county councils..

		online platform	
	Oszkár	implementation of WP2 – creating the online platform	They have to be involved by the county councils..
Target groups	individuals	as a target group they role is to be open for carpooling	WP 4 will ensure their involvement and establish the suitable communication channels.

4 Monitoring Strategy

The evaluation of monitoring parameters will take place in every 5 years, with a starting year 2025.

- In 2025, the online platform and the supportive infrastructural elements have to be developed, and the marketing campaign has to be launched.
- In 2030, 25%, of the total passenger km by cars will happen by carpooling The target numbers will checked by the county councils. The validation will based on the statistics from the platform. If the target is not reached, the revision of WP2, WP3 and WP4 has to be done, end revise/restart them if needed.
- In 2040, 50%, of the total passenger km by cars will happen by carpooling The target numbers will checked by the county councils. The validation will based on the statistics from the platform. If the target is not reached, the revision of WP2, WP3 and WP4 has to be done, end revise/restart them if needed.
- In 2050, 75%, of the total passenger km by cars will happen by carpooling The target numbers will checked by the county councils. The validation will based on the statistics from the platform. If the target is not reached, the revision of WP2, WP3 and WP4 has to be done, end revise/restart them if needed.

5 Risk management

Identified possible risks and the possible measure to mitigate them are the followings:

Risk	Probability of realising	Mitigation measure
Individuals will not be interested in carpooling.	Medium	Dedicated work package will focus on advertise the advantage of carpooling and the created online platform.

The spread of self-driving cars reshape the whole transport sector	Low	The wide spread of self-driving cars will reshape the whole transport sector but especially the public transport sector, and self-owned cars will lost their importance. This probably will not happen in the project region by the end of the action.
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Priority area: Decentralized renewable energy production

Action Plan: Green district heating against air pollution

1 Objective

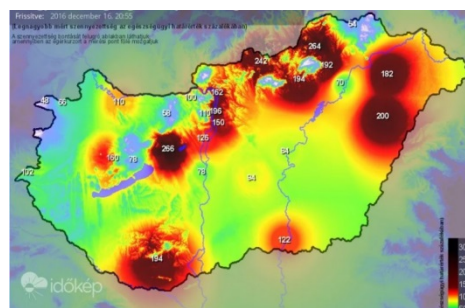
By 2035 20, by 2050 40 settlements will have green district heating which not only supply the public buildings but the residential buildings as well.

1.1 Objective scope and targets values

40% of the total primary energy in Hungary is consumed by buildings, from which 70% is for heating purposes. Beside of energy efficiency measures, to decarbonize the sector renewable based heating supply is needed. In the meantime, In the meantime, after China, particulate matter pollution causes the second highest premature death per capita, with average lost 16 years, and 21,75 billion USD loss for the economy¹, and Hungary is currently under infringement procedure by the European Commission because of the concentration of PM₁₀. The main driver of the air pollution is the insufficient heating of the household sector.

The project region is highly affected by particulate matter emission from the household sector. In pair with the local unfortunate geographical circumstances – i.e. north-south valleys which perpendicular to the main wind direction – in some area the particulate matter concentration is extremely high. One example for this is the densely populated valley of river Sajó. The Hungarian Air Quality Network's meter in Sajószentpéter – one of the biggest settlement in the valley – has one of the worst records regarding particulate matter concentration among the meters. The following map is a good example that the region is highly affected by the smog:

To raise the share of renewables, and decrease the air pollution, district heating can be a good solution. Since the network is supplied by one or few boiler station filters can reduce the air pollution and it can be monitored constantly. It also makes easier to shift the whole heating supply to renewable fuels or waste heat. Moreover, its efficiency can be increase significantly when it produces combined heat and



1. figure: PM content in Hungary during in a winter season-day.
Source: omsz.hu

¹<https://read.oecd-ilibrary.org/environment/the-cost-of-a-en#page60>

power, and also district heating can supply the cooling demand as well.

In Hungary 94 settlements have district heating system, covering in total 15% of the heating demand of dwellings. However, except from a few examples, district heating is only operating in bigger cities. The only small settlement-scale district heating is in operation in Pornóapáti. The village just next to the Austrian border followed the examples from the neighboring villages in the Austrian side of the border and built its biomass-based district heating system in 2005. Despite its successful operation, no other village in Hungary followed this example.

The aim of the action plan is to support municipalities in building green district heating systems not for the public buildings, but also for residential buildings. Since providing the heat via biomass based boiler stations is economically more viable than the geothermal energy, it is assumed that the major part of the district heating will be fueled by biomass. However, other possibilities have to be examined where it is possible, e.g. in the neighboring area of geothermal dwells which are already in operation (Kistokaj), or where waste heat is available.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
By 2035 20, by 2050 40 settlements will have green district heating system.	number of municipalities	Memorandum of association of the district heating.

2 Implementation strategy

2.1 Step by step description

To reach the targeted objective, the following work packages were identified.

WP1 General management. The county councils are those organizations that are able to oversee the local governments. Their existing roles and connections enable them to be the main responsible for the action plan. Their general role is to engage the municipalities and convince them to join the initiative as soon as possible. Besides that, they are responsible for overall project manager and ensure that the other work packages will be implemented in the planned way. General management is necessary until the targets are not reached.

WP2 Technical handbook of biomass boiler stations and district heating systems. Technical guidance for building the district heating system is needed for the municipalities. This can be collected in a handbook which includes the technical, economical, financial aspect of small scale district heating system. The major contributors for this work can be the Hungarian District Heating Association (MATÁSZSZ),

research institutes (Budapest University of Technology and Economics, Corvinus University of Budapest) and district heating utilities. This should be prepared in the first year of the action, before any physical implementation.

WP3 Mentoring scheme. Despite there are only few small scale district heating systems in Hungary, it is very common on Western Europe, especially in Austria. In the frame of this work package the county councils with the help of the above mentioned research institute would invite the actors of good regional examples to a platform, which can be served as a mentoring scheme at the first 10 years of the action plans, until the district heating systems can take the role on this and can help the other municipalities. This should be prepared in the first year of the action, before any physical implementation.

WP4 Building the district heating systems. After the supporting system has been developed with the preparation of the handbook and the mentoring scheme, county councils have to launch the call and engage municipalities to the action. The actors of this work package should be at first those municipalities which are taking part in the action plan "Heating supply of public building with local bioenergy", and those where air pollution from household heating is the worst. Latter should be identify by the Hungarian Meteorological Service.

WP5 Marketing and dissemination. Without additional activities the risk is high that there will be no interest from the municipalities to join the activity. Therefore the county councils have to develop marketing campaign which highlights the advantage of the action. This effort will be supported also by the action "Climate-aware Decision Makers Program". The campaign has to be maintained until the needed number of municipality join the action. Also, after the first 10 years "lesson learnt" documentation has to be developed in order to help the implementation of same initiatives in other regions.

2.2 Time schedule

In line with the above described steps, the main activities would be the followings:



2.3 Budget and resources needed

The cost of building district heating system is highly depends on country-specific and local circumstances. The same investment in Pornóapáti cost ~ EUR 1,5 million in present

value. If we assume this amount as an average cost, then the total cost for 40 systems is ~ EUR 60 million.

This can be covered by EU Structural Fund or third party financing. Also its competitiveness can be increased by state aid. Currently the level of VAT is 18%. Its further reduction could lower the payback period.

Those municipalities which are most affected by air pollution should receive additional fund from the National PM₁₀ Program.

3 Collaboration with stakeholders

The previously identified forerunners were invited to a dedicated roadmapping workshop. During the PANEL project county-level long term climate strategies were developed and approved by the county councils this year. The aim is to connecting the action plans to this official strategy. In order for this, the Mining and Geological Survey of Hungary, who developed the climate strategy for Borsod-Abaúj-Zemplén County – which covers the 2/3 of the project region – was also taking part in the roadmapping workshop and provided useful experiences.

The outcome of the workshop was summarized in an online table, and was circulated among the forerunners/most active stakeholders. This created the possibility for those who could not attend the workshop to provide feedback, and also for those who could attend the meeting to develop further their ideas.

Since the proposed action plans call for wider participation, they will be promoted to the identified interest groups through the CEESEN website.

Roles and responsibilities of different actors for Action Plan implementation

The following stakeholder groups were identified as necessary actors for the implementation.

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	county councils	overall project management, engagement of municipalities and contributors	Since the action plan contributes to the implementation of the official county-level strategy, approved by the county council, who support the PANEL 2050 project, there is no need for specific involvement action
	Hungarian District Heating	participating in the handbook and mentoring scheme	They have to be involved by the county councils.

Contributors	Association (MATÁSZSZ)	development	
	OMSZ	participating in WP4	They have to be involved by the county councils.
	municipalities with relevant experience	participating in the mentoring scheme	They have to be involved by the research institutes and by the MATÁSZSZ which already have connections to them.
Target groups	municipalities	as a target group they role is to participating in the action and ensure that the target will be reached.	Since county councils have existing connections to municipalities, their involvement has to be done by the councils, using their existing communication channels.

4 Monitoring Strategy

The evaluation of monitoring parameters will take place in every 5 years, however, since the action has a long time-frame, the key milestones are the following.

- By the end of 2020, the handbook and the mentoring scheme have to be finalized and sent out to municipalities. Since without this supporting scheme the local programs cannot be started, proper agenda have to be developed which ensure that there will be no delay in the implementation of WP2 and WP3.
- By 2035 20 settlements will have green district heating system. This milestone has to be checked by the city councils, from the summed up documentation from the municipalities. If the target number will not be reached, city councils have to consultate with the municipalities and update the supporting scheme based on their feedback.
- By 2050 40 settlements will have green district heating system. The method of monitoring is the same as in the previous point.

Besides of these points, city councils have to monitor the process in every five years, and if the risk is high that the milestone will not be achieved, then they have to implement the same action as it was described above.

5 Risk management

Identified possible risks and the possible measure to mitigate them are the followings:

Risk	Probability of realising	Mitigation measure
Municipalities are not able to finance the action	High	Cost can be reduced with appropriate planning and process optimization. Former will be addressed by the guidebook and the mentoring scheme, the latter by the methods described in chapter 2.3.
Lack of interest from the mayors	Medium	Dedicated WP (Marketing and dissemination) will mitigate this risk, and also the connected action "Climate-aware Decision Makers Program".

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Priority area: Energy efficiency in the residential building sector

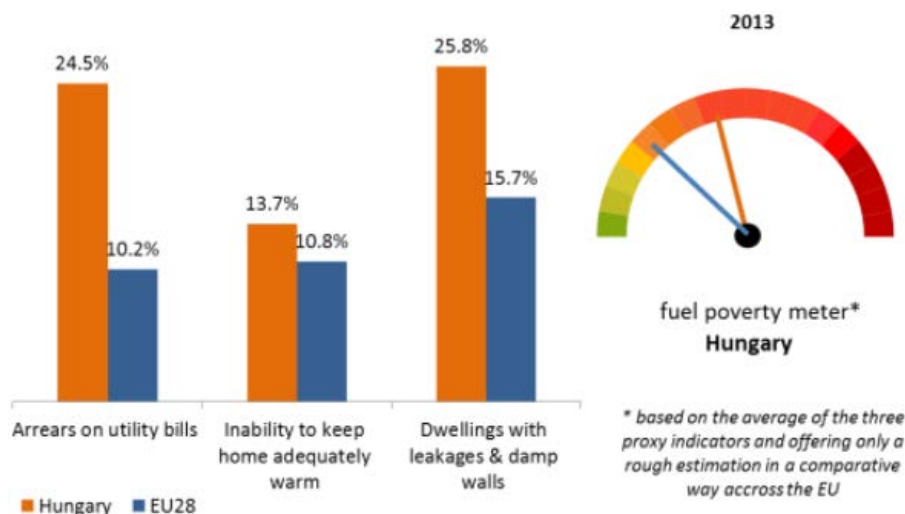
Action Plan: Real solution for energy poverty

1 Objective

By 2030 40 thousand energy poor household will have modern, high efficient heating appliances.

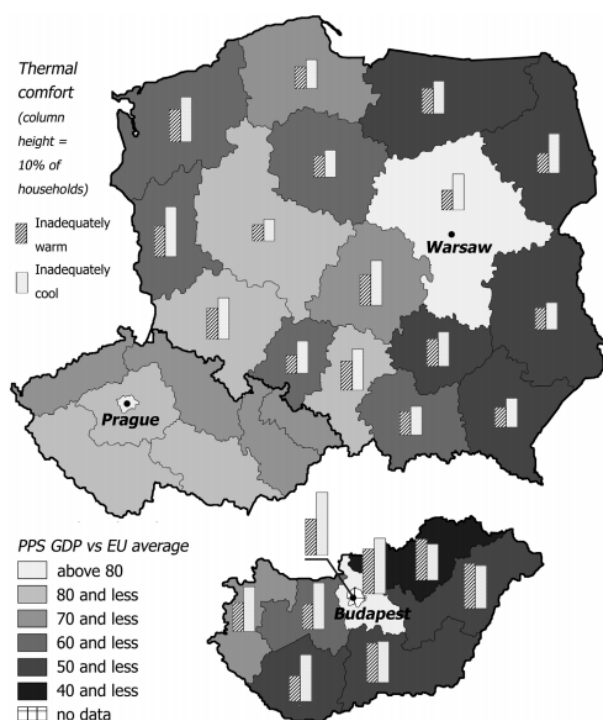
1.1 Objective scope and targets values

Currently there is no official definition for energy poverty in the Hungarian national regulatory system. As the European Commission pointed out, according to the different kind of indicators, the share of energy poor household is 50% higher than the European average.



1. Figure Fuel poverty isn Hungary. Source: European Commission. Country Factsheet Hungary - State of the Energy Union 2015.

Bouzarovski and Herrero mapped the regional variation in the shares of households who experience inadequately warm or cool homes, and also the PPP-adjusted GDP per capita data on NUTS 2 level. As Figure 2 shows, the region with lowest PPS adjusted GDP per capita value compared to EU average is the Northern Hungary region – which is also the study area of the PANEL 2050 project – where the issue of the thermal comfort is



2. Figure: Regional variation in the shares of households who experienced inadequately warm or cool homes, mapped against PPP-adjusted GDP per capita figures. Source : Bouzarovski S, Herrero ST. *Geographies of injustice: the socio-spatial determinants of energy poverty in Poland, the Czech Republic and Hungary. Post-Communist Economies 2016.*

around the regional average. If we aggregate the two indicators, one can state that this region in CEE perspective is one of the most vulnerable one regarding energy poverty.

In 2017, WWF Hungary in the frame of its Earth Hour campaign sent out a questionnaire to the nearly 3200 municipalities in Hungary in the topic of heating and energy efficiency. More than 700 municipalities filled out the online survey (~ 25% of the municipalities), in which 78% of the municipalities answered that there is a significant social group in their settlement who have difficulties to pay the utility bills. In Heves county the rate is slightly less, 76%, but in Borsod-Abaúj-Zemplén County much higher, 88%.

Energy poverty is a complex social issue. The most affected social group in the country are Roma people, living in segregated areas, in low-comfort apartments and elderly people who are living alone. For them heating with firewood can be lead to more stress and

other health problem because of the necessary heavy physical work needed for firewood utilization and also they are more sensitive to in-house temperature.

Most of the energy poor household using firewood. At the time of the last census, in 2011, in Heves county 41% of the households, in Borsod-Abaúj-Zemplén county 43% used firewood solely or with other fuel. Observing the trends, the firewood utilization is likely to be more intensive than it was in 2011. Using firewood has the advantage to avoid the arrears on utility bills, and also the boiler can be fuelled by other "cheap" fuels, as lignite, household waste and wood from illegal logging. In the last few years the issue of burning household waste becoming more and more significant in rural areas and it receive much attention as the executive body fails to stop this illegal activities. Also, the increasing demand for firewood put high pressure on the forest areas which jeopardize its conservation value. Furthermore, despite the EU regulation, burning wood can cause negative effect regarding GHG emissions even comparing with fossil fuels.

Heating with inadequate fuels in inefficient boilers and fireplaces causes serious air pollution. According to an OECD report (The Cost of Air Pollution - health impacts of road transport. 2014), the death from ambient particulate matter and ozone per million

inhabitants is the second highest in Hungary in the World after China: 937,6 death per million inhabitants compared to 953,7. Hungary and 8 other member states are now under infringement procedure by the European Commission because of bad air quality. In Hungary, Italy and Romania the PM10 concentration is persistently above the threshold. The major source of PM10 emission is the household heating sector.

As a measure to tackle energy poverty, the government launches the Cost of Overhead Reduction Programme, in which retail electricity, natural gas and district heating prices are regulated by law. Although this contributing to lessening the burden of energy bills to a certain extent, it support mostly consumers in urban areas, while many low-income rural households relying on firewood are not eligible. For firewood utilization, the government announces year by year a Social Fuel Programme. Municipalities with less than 5 thousand inhabitants can apply for firewood or coal. This initiative is more useful regarding alleviating energy poverty, however its budget is low, last year was around 16 million euro.

Therefore, as the Governance of the Energy Union directive introduced this year, dedicate activities are needed to successfully tackle energy poverty. This action would focus on increasing the energy efficiency of the heating in energy poor household, with the main elements:

- Replacing the old fireplaces/boilers with new, high efficient one.
- Rising the awareness regarding appropriate quality of fuels and building local knowledge on hand-building stoves.

In the frame of the program dedicated fund and credit with no interest rate would be available for energy poor household to replace their old heating appliances. As a requirement, applicants have to take course about the health consequences of low quality fuels. However, the success of this initiative is highly depending on the regulation side, i.e. controlling the illegal burning of household waste, ban of burning lignite/coal on household level. As a result, by 2030 40 thousand energy poor household (10% of the total number of households) will have modern, high efficient heating appliances, and do not use coal/household waste as a fuel, and in case of wood they only use dry firewood from legal source.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
By 2025 15 thousand, by 2030 40 thousand energy poor household will have modern, high efficient heating appliances	number of new heating appliances	Documentation of installations/buildings.
By 2035, all household which taking part of the program, learn about environmental and health consequences of	number of trainees	Documentation of the trainings.

low quality fuels, and heat according to that		
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2 Implementation strategy

2.1 Step by step description

To reach the targeted objective, the following work packages were identified.

WP1 General management. The county councils are those organizations that are able to oversee the local governments. Their existing roles and connections enable them to be the main responsible for the action plan. Their role is to monitor the implementation of the action plan, and revise it if it is needed. The municipalities role is to launch the call on local level and ensure that the applicants are meet the criteria of energy poor households defined by the county councils.

WP2 Identification of eligible heating appliances. Map the available boilers which are the best value for money. This can be done with the involvement of the chambers of engineers. Strategic partnership agreement with producers on large number of boilers can result significant save in the cost. As for fireplaces, the cost of hand-building stoves can be reduced if local volunteers trained by experts can help the builders. Also, the material need of tiled stones and masonry heaters can be partly covered by locally available natural resources, e.g. clay. The identification of suitable heating appliances and the development of such hand-building stoves building training should be finalized in one year. The training will be implemented in WP3.

WP3 Trainings on adequate heating and hand-building stoves. Those energy poor households, who applied for the program, have to participate in trainings about the adequate heating on household level, which includes the health and environmental consequences of inadequate heating, and how one can heat with highest efficiency. The training program has to be developed by 2020, with the involvement of the chambers of engineers. Where it is possible trainers can be local NGOs, in other places the local energy adviser from the energy adviser offices described in other action plan. The training should be launched during the whole action. In addition, in voluntary basis energy poor people can be participating in a volunteer program where they trained who to build hand-building stoves. Later they can help with the replacement of old fireplaces/stoves. This training should be done with the involvement of stove constructors This should also be launch until the end of the action.

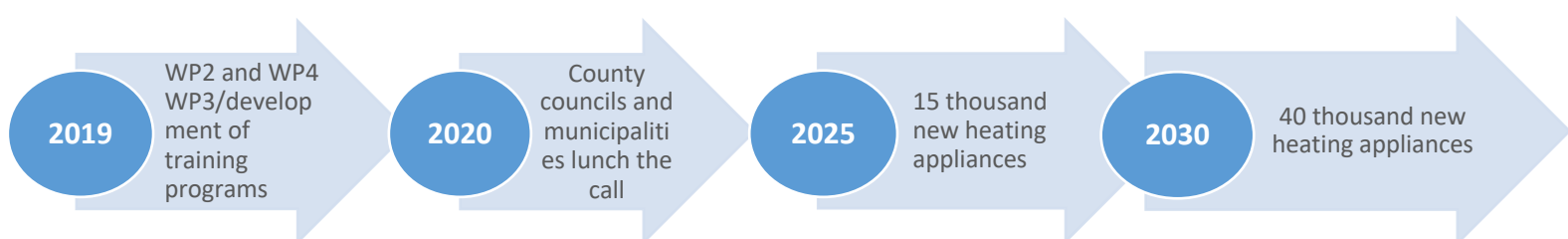
WP4 Air pollution control system. The aim of the action is not only to tackle the energy poverty but also to stop air pollution from household heating appliances. Burning household waste is illegal, however, the control of this regulation is not sufficient: if someone reported to violate the law, the authority only check their heating appliance in working hours, often not immediately. This controlling system has to be developed by the

district administrator's office and the environmental authority in the first year of the action.

WP5 Dissemination. Successful implementation of the action can be a good example for other regions, since this issue is common in Central and Eastern Europe. Therefore it is important to disseminate the results and experiments in the final phase of the action.

2.2 Time schedule

In line with the above described steps, the main activities would be the followings:



2.3 Budget and resources needed

The estimated budget of the replacement of the 40 thousand heating appliance is roughly EUR 40 million. This cost can be reduced by the activities describe in WP2.

In one hand, this can be partly covered by national fund. The Governance of the Energy Union directive require member states to use a share of their energy efficiency measures to help vulnerable customers, including those affected by energy poverty. Also, this action plan is in line with the following directives: 2015/1185/EU, 2015/1187/EU and 2015/1189/EU, which regulate the energy labelling of solid fuel boilers and packages of a solid fuel boiler, supplementary heaters, temperature controls and solar devices, and also set up the ecodesign requirements for solid fuel local space heaters and fuel boilers.

On the other hand, this action can be connected to the Municipality Green Credit Program action, which can offer small loans with no interest rate to households. The high efficient heating results saving in the energy bills which can be used for paying back the loan.

The needed human resource for the training can be covered by NGOs or energy advisers from the "Energy efficiency adviser office for every district" action. Municipalities could help in providing place for the training, e.g. in public buildings.

3 Collaboration with stakeholders

The previously identified forerunners were invited to a dedicated roadmapping workshop. During the PANEL project county-level long term climate strategies were developed and approved by the county councils this year. The aim is to connecting the action plans to this official strategy. In order for this, the Mining and Geological Survey of Hungary, who developed the climate strategy for Borsod-Abaúj-Zemplén County – which covers the 2/3 of the project region – was also taking part in the roadmapping workshop and provided useful experiences.

The outcome of the workshop was summarized in an online table, and was circulated among the forerunners/most active stakeholders. This created the possibility for those who could not attend the workshop to provide feedback, and also for those who could attend the meeting to develop further their ideas.

Since the proposed action plans call for wider participation, they will be promoted to the identified interest groups through the CEESEN website.

Roles and responsibilities of different actors for Action Plan implementation

The following stakeholder groups were identified as necessary actors for the implementation.

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	county councils	overall project management, monitoring	Since the action plan contributes to the implementation of the official county-level strategy, approved by the county council, who support the PANEL 2050 project, there is no need for specific involvement action
	municipalities	launch the action on local level	Since county councils have existing connections to district centres, their involvement have to be done by the councils, using their existing communication channels.
Contributors	chambers of engineers	identification of eligible heating appliances	Chambers of engineers are in operation on county-level, which means they can be involved by the county councils.
	boiler producers and builders	deliver the needed number of new	They have commercial interest in participating the action. They have to be connected by

	of hand-building stoves	heating appliances	the chambers of engineers
	environmental NGOs	developing and implementing the trainings.	They have to be involved by the municipalities.
Target groups	energy poor households	as a target group they role is to increase the energy efficiency on household level and mitigate air pollution	Municipalities have a close connection to local households. In the frame of WP 1 their role is to involve households.

4 Monitoring Strategy

The evaluation of monitoring parameters will happen in 2021, 2025 and 2030, as the followings:

- By end of 2020, the identification of eligible heating appliances and the development of the training program have to be done. Without that, municipalities can not launch the call. County councils are responsible for checking this, and make the needed changes if necessary.
- In 2025, at least 15 thousand households will have new heating appliances. Municipalities are in charge to make the documentations, the county councils will check the milestone, and revise the actions if needed.
- In 2030, 10% of the households, 40 thousand will have new heating appliances. The monitoring process will be the same as in the previous point.

5 Risk management

Identified possible risks and the possible measure to mitigate them are the followings:

Risk	Probability of realising	Mitigation measure
Lack of financial source	Medium	As it was presented in chapter 2.3, the estimated cost of the action is significant; however, it can reduce with the above mentioned actions.
Energy poor households keep burning household waste	Low	Dedicated work package will ensure that those energy poor household which participated the program stopped burning household waste.

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Priority area:

Low-carbon transportation sector

Action Plan: Public transport goes green!

1 Objective

By 2050 the public vehicle fleet will be electric or use alternative fuel.

1.1 Objective scope and targets values

In the European Union but also in Hungary the transport is among the few sectors which GHG emission is increasing continuously. Public transport can contribute effectively to reverse this trend. For this, on one hand the level of service has to be developed in order to make public transport more attractive and to make it more competitive with passenger cars. On the other hand the new vehicles have to be as environmental friendly as possible in the current technology development of the sector. The action plan contributes to the latter one, aiming that in 2050 the public vehicle fleet will be electric or fuelled by advanced biofuel.

Currently in Borsod-Abaúj-Zemplén county the vehicle fleet consists 500 buses, which average age is 16 years. In terms of the railway, only half of the railway lines are electrified. In Heves county the situation is almost the same. As a good example, in Miskolc the local public transport company purchased 75 CNG-fuelled buses. New buses are needed anyway because of the high age of the fleet, therefore it is important that the new buses run with renewable energy.

The transport sector is in a rapid change: diesel-fuelled vehicles probably will disappear in long term. In terms of passenger cars it is likely that mainly electric vehicles will be the majority of the future's fleet, but in case of heavy duty vehicles the trend is not that clear. Although there are already some bus models which are electric or hydrogen fuel cell, but it is likely that in middle term the most cost-efficient way for shifting a fleet from fossil fuels to other is the CNG or the biofuel-based buses. However, since the timeframe of the action is up to 2050, it cannot be foreseen that which kind of fuel will contribute to climate change mitigation in the most cost-efficient way in terms of buses. Regarding railway, railway lines should be electrified, however, for under-utilised rails hydrogen train can be also an option.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
By 2040 all the railway lines will be electrified or used by hydrogen train.	% of railway line	Transportation statistic
By 2050 the public transport bus fleet will be electric or fuelled by advanced biofuel	% of bus fleet	Transportation statistic

2 Implementation strategy

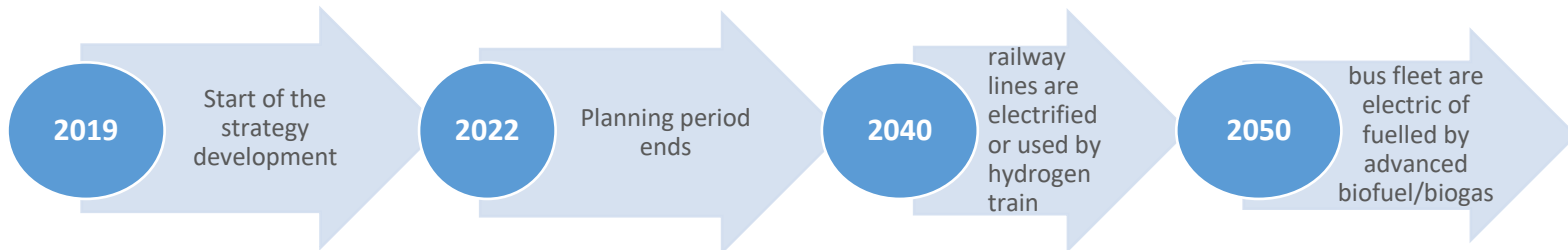
2.1 Step by step description

Because of the above mentioned unpredictable technology development, the implementation of the action plan can be only described in general:

- County councils: as they are the project leader of the other actions, they have to engage the public transport companies, and convince them to put effort on the implementation of this action.
- Railway: the technological environment is matured, however, the electrification of the railway is highly capital-intensive. Therefore regional railway development strategy is needed which identifies the priority of the railway lines and assesses the needed costs and potential funds. Where electrification is not feasible due to under-utilization, the option of hydrogen trains has to be analyzed. It has to also include a specific agenda for the development of all the targeted railway lines. It has to be developed by the state-owned Hungarian railway company, the MÁV-START Zrt.
- Buses: local development strategies also have to be developed by the local bus companies, which set up agenda how can the bus fleet renew in light of the action target. In short term the oldest buses have to be replaced by CNG buses or biofuel bus which are the cheapest available alternative fuelled-buses in the market. The strategies have to be developed by the two public transport companies (ÉMKEK Zrt, KMKK Zrt.). The strategies have to be revised in every five years.
- Biofuel and biogas market development: the environmental benefit of first generation biofuel is not evident, but biogas or second generation biofuels can result in significant reduction in GHG emission comparing to fossil fuels. If the bus fleet will shift to these kinds of biofuel, local demand will emerge, which can be a good basis for locally based biogas or biofuel production. As a first step, dedicated strategy is also needed for local biofuel market development. The strategies have to be developed by the county councils in cooperation with research institutes.

2.2 Time schedule

In line with the above described steps, the main activities would be the followings:



2.3 Budget and resources needed

This action plan is the most cost intensive, and in this phase of the action development it is impossible to assess the budget. The action is in line with the eligible topic of EU Structural Fund, therefore it can be a major financial source for this action.

3 Collaboration with stakeholders

The previously identified forerunners were invited to a dedicated roadmapping workshop. During the PANEL project county-level long term climate strategies were developed and approved by the county councils this year. The aim is to connecting the action plans to this official strategy. In order for this, the Mining and Geological Survey of Hungary, who developed the climate strategy for Borsod-Abaúj-Zemplén County – which covers the 2/3 of the project region – was also taking part in the roadmapping workshop and provided useful experiences.

The outcome of the workshop was summarized in an online table, and was circulated among the forerunners/most active stakeholders. This created the possibility for those who could not attend the workshop to provide feedback, and also for those who could attend the meeting to develop further their ideas.

Since the proposed action plans call for wider participation, they will be promoted to the identified interest groups through the CEESEN website.

Roles and responsibilities of different actors for Action Plan implementation

The following stakeholder groups were identified as necessary actors for the implementation.

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties		leader for all WPs	Since the action plan contributes to the implementation of the official county-level strategy, approved by the county council, who support the PANEL 2050 project, there is no need for specific involvement action
	MÁV Start	as the railway company their role is to implement the planned development	County councils have to engage them.
	ÉMKK	as the bus company in Borsod-Abaúj-Zemplén county, their role is to implement the planned development	County councils have to engage them
	KMKK	as the bus company in Heves county, their role is to implement the planned development	County councils have to engage them
Contributors	research institutes	Contributing in the development of the local biofuel market development strategy.	County councils have to engage them
	biofuel producer	Possibly, if the market conditions are positive, potential biofuel producers could supply the bus fleet.	County councils have to engage them
Target groups	individuals	as a target group they role is to use the public transport	The public transport companies have to advertise their effort for going green. The awareness-rising action help the communication to be successful.

4 Monitoring Strategy

The evaluation of monitoring parameters will take place in every 5 years, however, since the action has a long time-frame, the key milestones are the following:

- In 2022, the strategies are prepared. Since without these documents the other actions cannot be started, proper agenda have to be developed which ensure that there will be no delay.
- In 2040 all the railway lines will be electrified or used by hydrogen train. The validation will be based on transportation statistics. If the target is not reached, the strategies have to be revised.
- In 2050 the public vehicle fleet will be electric or fuelled by advanced biofuel/biogas. The validation will be based on transportation statistics. If the target is not reached, the strategies have to be revised.

5 Risk management

Identified possible risks and the possible measure to mitigate them are the followings:

Risk	Probability of realising	Mitigation measure
Lack of financial source.	High	The dedicated strategies have to map the potential financial sources.
Other development priority in the transport companies	Medium	County councils have to convince them to put effort on the implementation of this action. The other parallel running actions can be a good basis for this.

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Priority area: Energy efficiency in the residential building sector

Action Plan: Residential Energy Loan Program

1 Objective

By 2030 20 thousand, by 2050 60 thousand household will implement energy efficiency measures/renewable energy investments with the help of the loan with 0% interest from municipalities.

1.1 Objective scope and targets values

There is a huge potential for energy savings in the two counties. As it was pointed out in the Regional Energy Profile, the heating need for the 420 thousand dwellings is 4865 GWh, corresponding with 23% of the total energy consumption. Two-third of the household building stock built before 1980, and the rate of retrofitting is low. There is no regional-level statistic, but on national level from the 2.8 million household 2.5 have no insulation at all. The main factor which is hindering the speed of building retrofitting is the lack of capital.

On national level, long term loan is available for energy efficiency measures and renewable energy systems for the residential sector. The incentive scheme launched by the Hungarian Development Bank is based on European Investment Fund, and available until the end of 2022.

This loan with 0% interest rate, and maturity time of up to 20 years is a novel opportunity for the residential sector, however, its popularity is not on the level as it was expected. The administrative burden which comes with the application was reduced multiple time over the years, however, there are still some limiting factor which hinder its widely use:

- 10% own contribution
- loan up to 5 million HUF (~EUR 16 100) require mortgage
- up to a defined tax dept and arrears on utility bills, application is not possible.

Municipality loan on energy efficiency measures and renewable energy investments could provide alternative solution for those potential applicants who are not eligible or do not want to apply for the national loan. The previous one is especially important for energy poor households, which are targeted in the "Real solution for energy poverty" action plan. Since municipalities have a more direct contract to their local citizens than

the central authorities, they are not constrained to apply strict limiting factor, however, on the other side only a part of the municipalities have the financial possibility to offer loan for residents. Where it is possible, is an efficient tool for:

- creating saving for local resident
- their additional purchasing power can boost the local economy
- reducing local air pollution and pressure on local biomass resources.

The targeted number is ambitious, but the timeline is long enough to make it realistic. The intermediate target ensures that the action will start on time and do not miss any possibility at the early stage of the action.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
By 2030 20 thousand, by 2050 60 thousand household will implement energy efficiency measures/renewable energy investments with the help of the loan with 0% interest from municipalities.	number of household (instead of loans, which means that one household can apply for loans more times)	documentation from the municipalities
By 2030 at least 50, by 2050 at least 150 municipalities provide loans for local residents.	number of municipalities	documentation from the municipalities

2 Implementation strategy

2.1 Step by step description

County councils have the connections, the role and responsibilities to launch the initiative and ensure that the targets are reached in time.

Credit risk is always occurs even if the interest rate is zero. As a first step a guide should be developed for the municipalities which includes the minimum requirements they have to establish and what are the legal steps in case of failure to repay. Moreover, the guide should advice maximum amount of loans for different kind of purpose and payback time. This should be favors households with lower income, e.g. letting energy poor household to have longer payback time. For this work municipalities who are experience in providing such loans and the Hungarian Development Bank should be involved.

As a next step, city councils have to raise the attention of municipalities to the action, and develop campaign if the number of participated municipalities does not reach the desired number.

This action should be strongly connected to the “Energy adviser office for every district” action plan. If that action plan starts in time, then residents could only apply for the loan if they visited the adviser office. Also, energy advisers have to evaluate the proposed investment and assess its specific CO₂ emission, which can be the basis of the prioritization of the applications if shortcoming of available loan occurs.

It is necessary to revise the action every five years, and also collect the experience and make “lesson learnt” report which can be useful for other region. The supported activities always have to react to the technology development.

2.2 Time schedule

In line with the above described steps, the main activities would be the followings:



2.3 Budget and resources needed

If we assume that the average payback time is 5 years, then in time around 8700 households should have to have loan in the same time. Calculating with the average loan of EUR 13 thousand, then the estimated budget is around EUR 113 million

Besides of that human resource is needed from the municipality in order to manage the loan programs.

3 Collaboration with stakeholders

The previously identified forerunners were invited to a dedicated roadmapping workshop. During the PANEL project county-level long term climate strategies were developed and approved by the county councils this year. The aim is to connecting the action plans to this official strategy. In order for this, the Mining and Geological Survey of Hungary, who developed the climate strategy for Borsod-Abaúj-Zemplén County – which covers the 2/3 of the project region – was also taking part in the roadmapping workshop and provided useful experiences.

The outcome of the workshop was summarized in an online table, and was circulated among the forerunners/most active stakeholders. This created the possibility for those who could not attend the workshop to provide feedback, and also for those who could attend the meeting to develop further their ideas.

Since the proposed action plans call for wider participation, they will be promoted to the identified interest groups through the CEESEN website.

Roles and responsibilities of different actors for Action Plan implementation

The following stakeholder groups were identified as necessary actors for the implementation.

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	county councils	overall project management, engagement of municipalities	Since the action plan contributes to the implementation of the official county-level strategy, approved by the county council, who support the PANEL 2050 project, there is no need for specific involvement action
	municipalities	creating the loan programs on municipality level	Since county councils have existing connections to district centres, their involvement have to be done by the councils, using their existing communication channels.
Contributors	Hungarian Development Bank	contribution in the development of the guide	City councils have to build connection with the development bank. Communication can be happen online.
	municipalities with existing energy loan program	contribution in the development of the guide	City councils have to build connection with these municipalities. Communication can be happen online.
Target groups	households	as a target group they role is to be open for increasing the energy efficiency/renewable based production in their household.	Municipalities have already close connection to local households, and can advise them efficiently to use the available loan.

4 Monitoring Strategy

The evaluation of monitoring parameters will take place in every 5 years, however, since the action has a long time-frame, the key milestones are the following.

- By the end of 2020, the guidebook for municipalities in creating residential energy loan program has to be finalized and sent out to municipalities. Since this is the key document and without that the local programs cannot be started, proper agenda have to be developed which ensure that there will be no delay in the development of the guidebook.
- By 2030, 20 thousand household will use the loan. This milestone has to be checked by the city councils, from the summed up documentation from the municipalities. If the target number will not be reached, city councils have to consult with the municipalities and update the guidebook based on their feedback.
- By 2050, 60 thousand household will use the loan. The method of monitoring is the same as in the previous point.

Besides of these points, city councils have to monitor the process in every five years, and if the risk is high that the milestone will not be achieved, then they have to implement the same action as it was described above.

5 Risk management

Identified possible risks and the possible measure to mitigate them are the followings:

Risk	Probability of realizing	Mitigation measure
Municipalities do not want their available budget for energy loans	High	Mayors have to be convinced about the advantage of this kind of loan programs. The guide will serve this aim as well.

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Priority area:

Decentralized renewable energy production

Action Plan: Heating supply of public building with local bioenergy

1 Objective

By 2035 3 thousand, by 2050 10 thousand hectare of municipal property/leased land will serve as a source of local biomass supply for heating public buildings.

1.1 Objective scope and targets values

As the Regional Energy Profile pointed out, the solid biomass potential of the region is significant. Although there is no available statistic about the abandoned arable land in the region, it was a consistent, clear experience among the members of the roadmapping team that it is a common part of the landscape.

The aim of the action is to turn this abandoned land to biomass production which can cover at least the heating supply of the public buildings. Preferably the land is owned by the municipality, however, where it is possible, municipalities can join the action with leased land. Biomass supplied public buildings are common in Central- and Eastern Europe, however, there are only some examples when the whole supply chain is owned by municipality.

Biomass can only be climate friendly if the sustainable management is ensured. Since abandoned land would turn into biomass production, which rotation period is short, the carbon debt is negligible.

WWF Hungary has an ongoing successful pilot project in the region, in Tiszatarján. Beside of restoring and diversifying the area's natural floodplains the project also produces local biomass. The municipality owns land in the floodplain area of the river Tisza, which was covered by wild bushes of the highly invasive *Amorpha* species. The areas were clearcutted by local unemployed workers and sold the biomass to nearby power plants. Lower areas of the floodplain was populated by grazing animals like grey cattle and water buffalo to prevent the return of invasive species, while in the upper areas short rotation willows were planted which now cover the heat demand of the public buildings. For this, the supply chain also had to be established.

This pilot project can be a good example for other local municipalities the region, however, it cannot be copied in the same way, since local circumstances highly influence its feasibility.

Therefore guidebook would be developed in the action which includes step-by-step guidance for municipalities in the establishment of the biomass plant and local supply chain. Fortunately there are also multiple good examples in the region. A platform which

collects the main actors of these good examples could serve the potential participant municipalities as a mentoring scheme.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
By 2035 3 thousand, by 2050 10 thousand hectares of municipal property/leased land will serve as a source of local biomass supply for heating public buildings.	number of hectare	Documentation from the municipalities
By 2050 at least 250 municipalities will participate in the program.	number of municipalities	Documentation from the municipalities

2 Implementation strategy

2.1 Step by step description

To reach the target objective, the following work packages were identified.

WP1 General management. The county councils are those organizations that are able to oversee the local governments. Their existing roles and connections enable them to be the main responsible for the action plan. Their general role is to engage the municipalities and convince them to join the initiative as soon as possible. Besides that, they are responsible for overall project manager and ensure that the other work packages will be implemented in the planned way. General management is necessary until the targets are not reached.

WP2 Guidance for establishing the biomass supply chain. Technical guidance for establishing the plantations and supply chain is needed for the municipalities. The needed experience and knowledge is accumulated in research institutes, such as in the Forest Research Institute, in the Szent István University or in the University of Sopron. A guidebook, prepared by the experts from these research institutes can be a good tool for this guidance. This should be prepared in the first year of the action, before any physical implementation.

WP3 Mentoring scheme. Local biomass based value chain is a mature form for providing local heat supply. In the frame of this work package the county councils with the help of the above mentioned research institute would invite the actors of good regional examples to a platform, which can be served as a mentoring scheme at the first 10 years of the action plans, until the first local supply chains can take the role on this and can

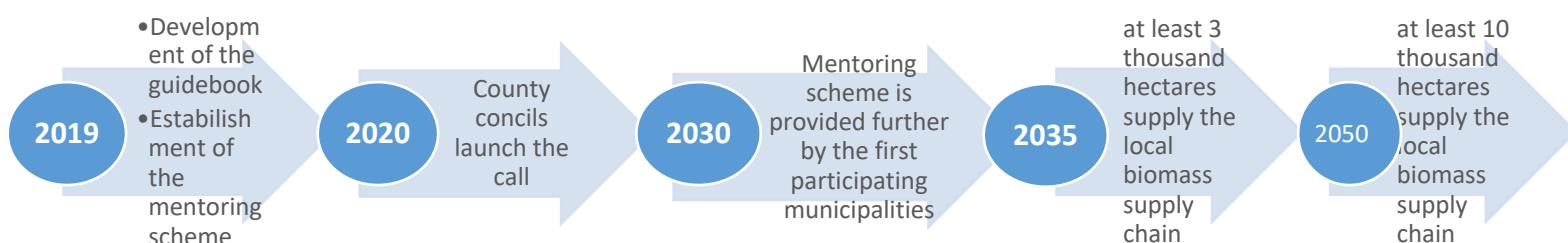
help the other municipalities. This should be prepared in the first year of the action, before any physical implementation.

WP4 Implementation of biomass plant and supply chain development. After the supporting system has been developed with the preparation of the guidebook and the mentoring scheme, county councils have to launch the call and engage municipalities to the action. The actors of this work package are the participating municipalities, and with the documentation of the action they can assure that the target will be reached.

WP5 Marketing and dissemination. Without additional activities the risk is high that there will be no interest from the municipalities to join the activity. Therefore the county councils have to develop marketing campaign which highlights the advantage of the action. This effort will be supported also by the action “Climate-aware Decision Makers Program”. The campaign has to be maintained until the needed number of municipality join the action. Also, after the first 10 years “lesson learnt” documentation has to be developed in order to help the implementation of same initiatives in other regions.

2.2 Time schedule

In line with the above described steps, the main activities would be the followings:



2.3 Budget and resources needed

The cost of establishment of biomass plants and supply chain significantly varies municipality to municipality. Human resource and machinery are the most costly factors which can water down the economic viability of the action. In terms of human resource, the Public Work Scheme can provide cheap labour, while machineries can be used among more municipalities. With this kind of cost reduction the biomass can be a competitive alternative of natural gas, which cost is expected to rise in the future.

3 Collaboration with stakeholders

The previously identified forerunners were invited to a dedicated roadmapping workshop. During the PANEL project county-level long term climate strategies were developed and approved by the county councils this year. The aim is to connecting the action plans to this official strategy. In order for this, the Mining and Geological Survey of Hungary, who developed the climate strategy for Borsod-Abaúj-Zemplén County – which

covers the 2/3 of the project region – was also taking part in the roadmapping workshop and provided useful experiences.

The outcome of the workshop was summarized in an online table, and was circulated among the forerunners/most active stakeholders. This created the possibility for those who could not attend the workshop to provide feedback, and also for those who could attend the meeting to develop further their ideas.

Since the proposed action plans call for wider participation, they will be promoted to the identified interest groups through the CEESEN website.

Roles and responsibilities of different actors for Action Plan implementation

The following stakeholder groups were identified as necessary actors for the implementation.

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	county councils	overall project management, engagement of municipalities and contributors	Since the action plan contributes to the implementation of the official county-level strategy, approved by the county council, who support the PANEL 2050 project, there is no need for specific involvement action
Contributors	research institutes	participating in the guidebook and mentoring scheme development	They have to be involved by the county councils.
	municipalities with relevant experience	participating in the mentoring scheme	They have to be involved by the research institutes which already have connections to them.
Target groups	municipalities	as a target group they role is to participating in the action and ensure that the target will be reached.	Since county councils have existing connections to municipalities, their involvement has to be done by the councils, using their existing communication channels.

4 Monitoring Strategy

The evaluation of monitoring parameters will take place in every 5 years, however, since the action has a long time-frame, the key milestones are the following.

- By the end of 2020, the guidebook and the mentoring scheme have to be finalized and sent out to municipalities. Since without this supporting scheme the local programs cannot be started, proper agenda have to be developed which ensure that there will be no delay in the implementation of WP2 and WP3.
- By 2035, 3 thousand hectares of municipal property/leased land will serve as a source of local biomass supply for heating public buildings. This milestone has to be checked by the city councils, from the summed up documentation from the municipalities. If the target number will not be reached, city councils have to consult with the municipalities and update the supporting scheme based on their feedback.
- By 2035, 10 thousand hectares of municipal property/leased land will serve as a source of local biomass supply for heating public buildings in 250 municipalities. The method of monitoring is the same as in the previous point.

Besides of these points, city councils have to monitor the process in every five years, and if the risk is high that the milestone will not be achieved, then they have to implement the same action as it was described above.

5 Risk management

Identified possible risks and the possible measure to mitigate them are the followings:

Risk	Probability of realising	Mitigation measure
Municipalities are not able to finance the action	High	Cost can be reduced with appropriate planning and process optimization. Former will be addressed by the guidebook and the mentoring scheme, the latter by the methods described in chapter 2.3.
Lack of interest from the mayors	Medium	Dedicated WP (Marketing and dissemination) will mitigate this risk, and also the connected action "Climate-aware Decision Makers Program".

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Priority area: Raising Awareness of Climate Change

Action Plan: Climate Change Education and Awareness in primary education

1 Objective

By 2035 all students will have learn in schools operating according to eco-school standards and where integrated climate awareness-raising is integrated into their curriculum.

1.1 Objective scope and targets values

Individual consumers are in the end of the consumption chain, their decision making affect the production side and this way the carbon footprint of the whole human activity. Therefore it is crucial to strength their knowledge about the connection between their consumption patterns and climate change. For this, the shift from cost-based decision to life-cycle approach is needed: consumers have to be aware of the carbon footprint of the product, not only with the help of labels, but with the awareness of the GHG emission of different processes.

The potential in climate awareness-raising is significant: in the EU the residential energy consumption is 27% of the final energy use, while in Hungary 32%. According to a survey from 2012, only two-third of the individuals in Hungary is aware of the cause and effect relationship between the energy consumption and climate change.

The aim of the action is to make climate change education as a priority area for primary education. The action is in line with multiple national level action plans and regulation, and it combines the aim of these documents. The most relevant document is the Energy and Climate Awareness Raising Action Plan, which identifies a series of governmental measures, applying relatively short time-frame (most of them by 2020). It concerns primarily the following five themes,

- energy efficiency and energy conservation
- renewable energy use
- transport energy savings and emissions reduction
- resource-efficient and low-carbon-intensity of economic and social structures
- climate adaptation.

Its implementation action can be grouped to the following four groups:

- Communication and dissemination measures
- Educational measures
- Financial measures
- Planning and implementation measures

The action plan would contribute to the second one in two ways. The first one is to support elementary, grammar school and vocational school to become eco-school. In the frame of the Environment and School Initiatives, from 2000, educational establishments can apply for the eco-school status. In an eco-school the principles of environmental education is not only secured in the education, but in every aspect of the operation of the school, such as the in the canteen catering, the school excursion or the waste management, altogether in three topics: pedagogy, social interactions and technical-economical aspects. In Hungary 28% of the students learn in schools which have eco-school status. In the region 27 institutes have constant eco-school status (it also can be earned for one year, most of the eco-school have this kind of status). The aim of the action plan is that by 2050 all the educational establishments will meet the requirements of an eco-school.

The other aim of the action is to ensure that climate awareness-raising will be an integrated part of the educational program, and one student learns it from the very early age until the end of the secondary school in a coherent, comprehensive and innovative educational system. In Hungary the curriculum is defined centrally, and the core curriculum let only small freedom for the schools to differ from the core curriculum, however, in the relevant regulation stated that environmental education should be develop further, but in reality it is not happening. Now one school can be differ from the core curriculum by 10%, however, it is under revision and probably schools will have more freedom in the development of the curriculum. Therefore on hand, it is essential to make pressure on the central government to make the climate awareness rising topic to a key element of the core curriculum. On the other hand the action have to convince schools to use their freely usable courses to rise the climate awareness of the students.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
By 2025 35%, by 2040 65%, by 2050 100% of schools will meet the eco-school standards.	number of eco-schools	Documentation from the Educational Authority
2025-re 30%, 2030-ra 60%, 2035-re 100% of students will learn according to the curriculum where climate awareness-raising is a key element	% of students in elementary and secondary schools	Documentation from the Educational Authority

2 Implementation strategy

2.1 Step by step description

To reach the targeted objective, the following work packages were identified.

WP1 General management. Responsibility is needed for the general management including the engagement of the educational establishments and the monitoring of the implementation process. County councils do not have a strong connection to the schools, but in cooperation with the county Klebelsberg Institution Maintenance Centre they have to be able to fill this role.

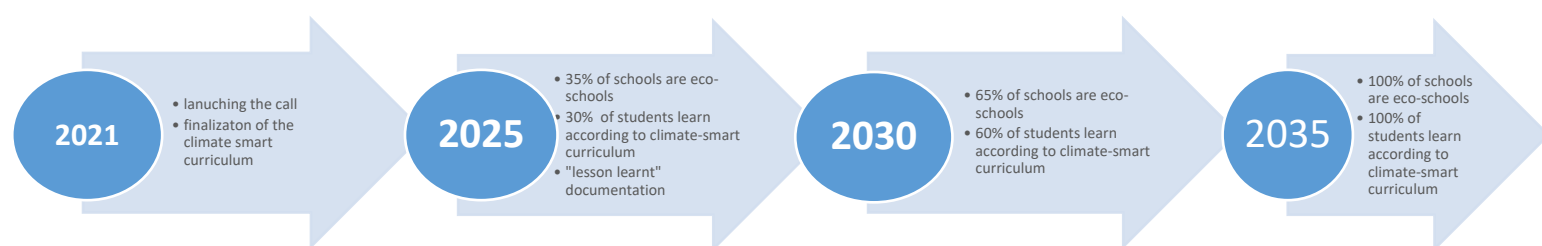
WP2 Spread of eco-schools. On national level the Hungarian Institute for Educational Research and Development is responsible for the eco-school network in collaboration with the Ministry of Human Capacities and with the Ministry of Agriculture. WP 1 responsible parties have to engage the schools to join the network, while the above mentioned national organizations have to help the member schools with providing stable network and creating supportive environment on long term, and make the network more attractive for the non-member schools.

WP3 Climate smart curriculum. Schools which joined the action need guidance how can they integrate climate awareness-rising to the curriculum. This document needs methodological knowledge regarding education, and expert knowledge about climate change. Methodological knowledge can be ensured by the Institute of Education of the Eszterházy Károly University from Eger, and also experiences from the implementation of the Environment and Energy Efficiency Operative Programme 1.2.1 – Local climate strategy and climate awareness rising. The projects funded by this programme will be implemented in the next two years. Latter can be collected by the Ministry for Innovation and Technology who responsible for that programme. Needed expert knowledge can be gained from local green NGOs. In this way the proposed programme can reflect the regional specialities in terms of mitigation and adaptation possibilities. This curriculum has to be developed by end of 2021.

WP4 Marketing and dissemination. Without additional activities the risk is high that there will be no interest from schools to join the activity. Therefore the county councils and the county Klebelsberg Institution Maintenance Centre have to develop marketing campaign which highlights the advantage of the action. The campaign has to be maintained until the action reaches its target. Also, after the first 5 years "lesson learnt" documentation has to be developed in order to help the implementation of same initiatives in other regions.

2.2 Time schedule

In line with the above described steps, the main activities would be the followings:



2.3 Budget and resources needed

The action plan does not need new human capacity for the implementation. Therefore there is no need for dedicated budget. However, it can cause higher workload among teachers. This risk is addressed in chapter 5, risk management.

3 Collaboration with stakeholders

The previously identified forerunners were invited to a dedicated roadmapping workshop. During the PANEL project county-level long term climate strategies were developed and approved by the county councils this year. The aim is to connecting the action plans to this official strategy. In order for this, the Mining and Geological Survey of Hungary, who developed the climate strategy for Borsod-Abaúj-Zemplén County – which covers the 2/3 of the project region – was also taking part in the roadmapping workshop and provided useful experiences.

The outcome of the workshop was summarized in an online table, and was circulated among the forerunners/most active stakeholders. This created the possibility for those who could not attend the workshop to provide feedback, and also for those who could attend the meeting to develop further their ideas.

Since the proposed action plans call for wider participation, they will be promoted to the identified interest groups through the CEESEN website.

Roles and responsibilities of different actors for Action Plan implementation

The following stakeholder groups were identified as necessary actors for the implementation.

Stakeholder groups		Role and responsibility	Involvement and communication strategy
	county	overall project management,	Since the action plan contributes to the

Implementing parties	councils	engagement of schools	implementation of the official county-level strategy, approved by the county council, who support the PANEL 2050 project, there is no need for specific involvement action
	Klebelsberg Institution Maintenance Centre	engagement of schools	They have to be involved by the county councils.
Contributors	green NGOs	participating in the development of the curriculum	They have to be involved by city councils and by the Klebelsberg Institution Maintenance Centre.
	Hungarian Institute for Educational Research and Development	participating in the spread of the eco-school network	They have to be involved by city councils and by the Klebelsberg Institution Maintenance Centre.
	Institute of Education of the Eszterházy Károly University	participating in the development of the curriculum	They have to be involved by city councils and by the Klebelsberg Institution Maintenance Centre..
	Ministry for Innovation and Technology	participating in the development of the curriculum	They have to be involved by city councils and by the Klebelsberg Institution Maintenance Centre..
Target groups	schools	as a target group they role is to participating in the action and ensure that the target will be reached.	They have to be involved by city councils and by the Klebelsberg Institution Maintenance Centre.

4 Monitoring Strategy

The evaluation of monitoring parameters will take place in every 5 years, with a starting year 2025.

- In 2025, 35% of the schools are eco-schools, 30% of the students learn according to climate-smart curriculum and "lesson learnt" documentation will be completed. If

the target number is not achieved, the responsibilities and the specific work packages have to be re-evaluated and amendments have to be done in order to reach the 2030 targets. It will be checked by the county councils with the documentations from the Educational Authority.

- In 2030 65% of the schools are eco-schools and 60% of the students learn according to climate-smart curriculum. The target numbers will be checked again by the county councils.
- In 2035, 100% of the schools are eco-schools and 100% of the students learn according to climate-smart curriculum. If the target is not achieved, the revision is needed in terms of implementation environment in order to reach the target value with the shortest delay.

5 Risk management

Identified possible risks and the possible measure to mitigate them are the followings:

Risk	Probability of realising	Mitigation measure
lack of teachers, high workload for those who are in praxis	Medium	Probably the planned pay rise for teachers will mitigate this risk, but if it is not happen, then lobbying is needed for central government to raise the salary for teachers.
lack of interest from schools to join the action	Medium	Dedicated WP (Marketing and dissemination) will mitigate this risk, and also the Hungarian Institute for Educational Research and Development will advertise the eco-school network.

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Priority area:

Raising Awareness of Climate Change

Action Plan: Climate-aware Decision Makers Program

1 Objective

By 2023 change awareness-raising training series for mayors and member of local municipal councils is in operation.

1.1 Objective scope and targets values

In Hungary the municipality system highly segmented: the number of municipalities is ~ 3170. In the project region there are 479 municipalities, resulting the average size of 2 thousand inhabitants. If we exclude the two county centers – Miskolc and Eger – than the average inhabitants per municipality is 1560.

Municipalities have a key role in energy transition. There are four main categories how can municipality effect the local climate policy¹:

- *Municipality as consumer.* Sub-national governments can limit their own consumption and ecological footprint through municipal operations management, including such efforts as promoting the energy efficiency of municipal buildings and the greening of public transport vehicles. This is the most widespread form of local action, driven in many cases by the direct financial benefits of energy savings. For the available relevant structural fund they can apply without own resource.
- *Municipality as a facilitator.* The municipality can facilitate coordination with private and community actors, such as by establishing public-private partnerships for the provision of services and infrastructure. They also can support household level investments for instance by campaigns, or providing loans, expertise.
- *Municipality as provider.* Governing by provision is accomplished through the use of material and infrastructural means in the provision of direct services (water, electricity, public housing, etc.). By influencing infrastructure development and service delivery, local governments can modify public consumption and waste disposal patterns. A local or regional government can thus impact local climate change action as the majority shareholder in the local utility companies for utilities and other public goods in the field of energy, transport, water and waste services.

¹ <https://www.oecd.org/governance/regional-policy/44232263.pdf>

In Eastern-Europe where the utility companies are mostly still owned by local governments, can be a good opportunity.

- *Municipality as regulator.* Local governments may enact regulations to curb CO₂ emissions if they have legal jurisdiction over relevant policy areas such as energy, transport, land use and waste. They also may develop local climate strategy including CO₂ emission or renewable energy target, and concrete implementing actions.

Handbook about the climate smart local governance was published under the Hungarian EU presidency in 2011, with the title: Climate-Friendly Cities: A Handbook on the Tracks and Possibilities of European Cities in Relation to Climate Change. However, it was a common experience of the roadmapping team that decision makers, or at least the majority of them are not aware of their responsibility and possible actions on local level.

The aim of the action plan is a development of a training program which are compulsory for all mayors and member of local councils to take.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
By 2023 change awareness-rising training series for mayors and member of local municipal councils is in operation and all the current decision makers at that time take the courses.	% of local decision makers	Attendance list of the training program

2 Implementation strategy

2.1 Step by step description

To reach the targeted objective, the following work packages were identified.

WP1 General management. The county councils are those organizations that are able to oversee the local governments. Their existing roles and connections enable them to be the main responsible for the action plan. Their general role is to engage the municipalities and convince them to take part in the training session. Besides that, they are responsible for overall project manager and ensure that the other work packages will be implemented in the planned way. General management is necessary until the targets are not reached.

WP2 Development of the training program. The above mentioned handbook provides a comprehensive knowledge about climate smart local governance. In this work package county councils engage the authors of the handbook to give a “train the trainers” workshop about the updated context of the handbook. The future trainers would be the local energy advisers from the action “Energy adviser office for every district”. If there will be difficulties with the implementation of that action, future trainers can be local green NGOs. Training programme should include the following topics, in light of the above mentioned categories:

- energy efficiency and energy conservation
- renewable energy use
- transport energy savings and emissions reduction
- resource-efficient and low-carbon-intensity of economic and social structures
- climate adaptation.

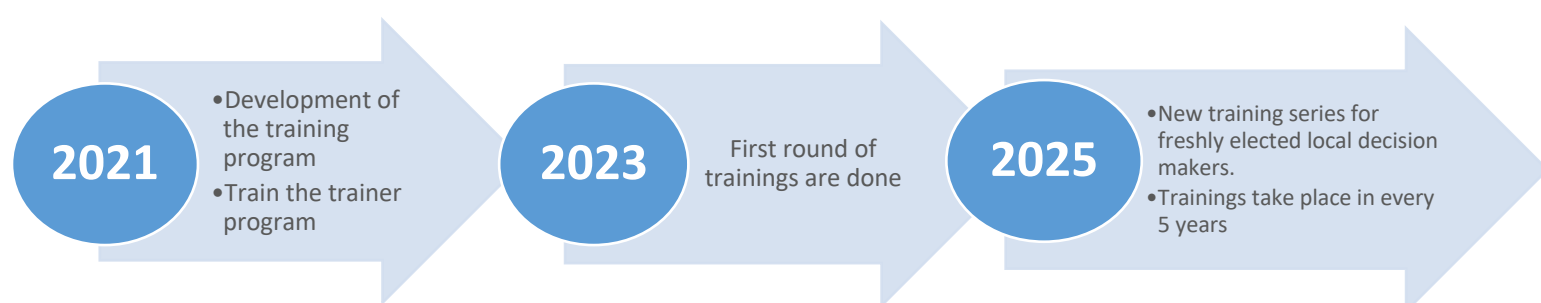
This have to be done in the first two years of the action, by end of 2021.

WP3 Implementation of the training program. Within two years the trainers have to implement the trainings. The training program should have at least five courses about each of the above listed topics. The responsible party for the organization of training series are the county councils. Since the Hungarian National Association of Local Authorities already implemented similar training course, they should be a collaborator in the WP. It is important that the trainings have to be replicate after new local elections after every five years.

WP4 Marketing and dissemination. Without additional activities the risk is high that there will be no interest from the municipalities to join the activity. Therefore the county councils have to develop marketing campaign which highlights the advantage of the action. County councils do not have the right to make the training compulsory for local decision makers, therefore lobbying is necessary for the national government to make this movement. Also the first training series, “lesson learnt” documentation has to be developed in order to help the implementation of same initiatives in other regions.

2.2 Time schedule

In line with the above described steps, the main activities would be the followings:



2.3 Budget and resources needed

Human resources are needed for the project management, the development of the training program and the implementation of the trainings. For the first one, in city council the needed human resource is given. As for the second one, the authors have the needed knowledge for the development of the training program. Since the handbook was written by numerous experts, the needed human resource for one person is not that significant, therefore hopefully it can be a pro bono activity. Since trainers of the trainings are from other action, the cost of their human resource is already covered.

Classroom for the trainings can be ensured by local governments.

Collaboration with stakeholders

The previously identified forerunners were invited to a dedicated roadmapping workshop. During the PANEL project county-level long term climate strategies were developed and approved by the county councils this year. The aim is to connecting the action plans to this official strategy. In order for this, the Mining and Geological Survey of Hungary, who developed the climate strategy for Borsod-Abaúj-Zemplén County – which covers the 2/3 of the project region – was also taking part in the roadmapping workshop and provided useful experiences.

The outcome of the workshop was summarized in an online table, and was circulated among the forerunners/most active stakeholders. This created the possibility for those who could not attend the workshop to provide feedback, and also for those who could attend the meeting to develop further their ideas.

Since the proposed action plans call for wider participation, they will be promoted to the identified interest groups through the CEESEN website.

Roles and responsibilities of different actors for Action Plan implementation

The following stakeholder groups were identified as necessary actors for the implementation.

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	county councils	overall project management, engagement of municipalities and contributors	Since the action plan contributes to the implementation of the official county-level strategy, approved by the county council, who support the PANEL 2050 project, there is no need for specific involvement action

Contributors	green NGOs	trainers of the trainings (if needed)	They have to be involved by the county councils.
	energy advisors	trainers of the trainings	They have to be involved by the county councils.
	authors of the „Climate-Friendly Cities: A Handbook on the Tracks and Possibilities of European Cities in Relation to Climate Change.” handbook	development and implementation of the “train the trainer” program	They have to be involved by the county councils.
	Hungarian National Association of Local Authorities	collaboration in WP3	They have to be involved by the county councils.
Target groups	mayors and member of local municipality councils	as a target group they role is to participating in the action and ensure that the target will be reached.	In the frame of WP5 Marketing and dissemination effort.

3 Monitoring Strategy

The timeframe of the action is short, the target indicators have to be reached by 2023, however, the training program have to be maintained in a long term. Therefore the evaluation has to be done after every milestones and then in every 5 years. The key milestones are the following:

- By the end of 2021, development of the training program and the “train the trainers” program have to be finished. . Since without this the local trainings cannot be started, proper agenda have to be developed which ensure that there will be no delay in the implementation of WP2.
- By 2023 first round of trainings have to be finished. This milestone has to be checked by the county councils, from the summed up attendance list. If the target number will not be reached, city councils have to consulate with the

above described contributors of the action plan and update the supporting scheme based on their feedback.

In 2025 trainings for newly elected local decision makers have to be done, and from that time in every 5 years. County councils have to monitor the process of the maintaining of the programme, and revise the action if the attendance decreasing or the training program has to be updated.

4 Risk management

Identified possible risks and the possible measure to mitigate them are the followings:

Risk	Probability of realising	Mitigation measure
Local decision makers are not interested in taking part in the action	High	Dedicated WP (Marketing and dissemination) will mitigate this risk, and also the connected climate awareness rising actions.

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Priority area:

Decentralized renewable energy production

Action Plan: Eco villages for guidance

1 Objective

By 2050 at least 75 ecovillages will exist in the region.

1.1 Objective scope and targets values

According to Robert Gilman, ecovillages are human-scale full-featured settlements in which human activities are harmlessly integrated into the natural world in a way that is supportive of healthy human development, and can be successfully continued into the indefinite future¹.

In terms of energy management, buildings in ecovillages meet or are close to the passive house standard, while the used materials have environmentally low impact. The energy needs are covered by renewable energy in the buildings. The mobility needs are covered by transport mode with low carbon footprint: bicycle, public transport or shared electric car. Besides of energy needs, other activities also apply close-to-nature solutions, which also lower the carbon footprint of the community, e.g. locally grown organic food.

Ecovillage can be either traditional, when existing rural villages and communities decide to design their own pathway into the future, using participatory processes to combine life-sustaining traditional wisdom and positive new innovation, or either intentional, which created by people who come together afresh with a shared purpose or vision.

Some ecovillages are existing in Hungary, in Visnyeszéplak, Gyűrűfű, Galgahévíz, one also in the region, in Gömörszőlős. All of them are intentional with only few families, and focusing more on the organic agriculture, rather than the energy independency.

The aim of the action plan is that by 2050 at least 75 ecovillages will exist in the region. These villages can serve as a knowledge center of climate smart solutions, where energy is used in efficient way, the energy consumption supplied by local renewable energy sources, and the mobility and nutritional needs covered by low-carbon solutions, preferably with growing carbon pools. This action plan is the most complex one, therefore its implementation closely connects to the following action plans:

- Heating supply of public building with local bioenergy
- Green district heating against air pollution

¹ Gilman, Robert (Summer, 1991). "The Eco-village Challenge".

- Climate-aware Decision Makers Program
- Climate Change Education and Awareness in primary education
- Public Transport goes green
- Share your car

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
By 2030 10, by 2040 30, by 2050 75 ecovillages will exist in the.	number of ecovillages	Memorandum of association of ecovillages

2 Implementation strategy

2.1 Step by step description

To reach the targeted objective, the following work packages were identified.

WP1 General management. The county councils are those organizations that are able to oversee the local governments. Their existing roles and connections enable them to be the main responsible for the action plan. Their general role is to engage the municipalities and convince them to join the initiative as soon as possible. Besides that, they are responsible for overall project manager and ensure that the other work packages will be implemented in the planned way. General management is necessary until the targets are not reached.

WP2 What makes an ecovillage? – handbook and workshops for the planning phase. Creating ecovillage requires extensive knowledge, in different topics, e.g. energy management, agriculture, wastewater treatment, water management, etc.. A comprehensive handbook which includes all the required knowledge in the frame of national circumstances and dedicated workshops could guide the inhabitants creating their own ecovillage. The development of this handbook and the implementation of the training programs needs broad cooperation among multiple research institutes, NGOs and existing ecovillage communities. The handbook should be prepared in the first year of the action, before any physical implementation. Workshop needs to be done in the first few (2-3 years).

WP3 Mentoring scheme. The root of the ecovillage movement is from the 1970s, which means that in some areas four-five decades experience could help new ecovillage communities. In the frame of this work package the county councils with the help of the above mentioned ecovillages would invite the actors of good regional examples to a platform, which can be served as a mentoring scheme at the first 20 years of the action plans, until the new local ecovillages can take the role on this and can help the other

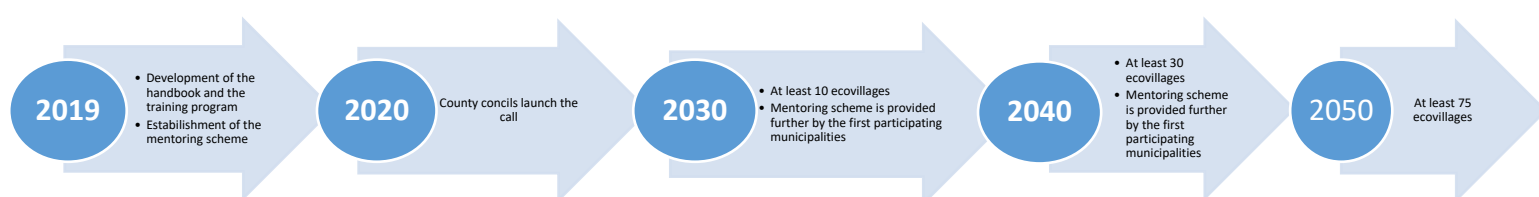
ecovillage communities. This should be prepared in the first year of the action, before any physical implementation.

WP4 Creating the ecovillages. Forerunners After the supporting system has been developed with the preparation of the handbook and workshop and the mentoring scheme, at first county councils have to launch the call and engage municipalities to the action. Then municipalities have to take the role and support individuals in community building. It is assumed that mainly intentional ecovillages will be established. Therefore for municipalities with highly decreasing population in the frame of this action can have the chance to engage individuals from urban areas to move to the village and be active part of the ecovillage community. They also have to create the required infrastructure. It is also important that the most active individuals have to take a forerunner role and be the facilitator of the improvement of the local ecovillage.

WP5 Marketing and dissemination. Without additional activities the risk is high that there will be no interest from the municipalities and from the individuals to join the activity. Therefore the county councils and the municipalities have to develop marketing campaign which highlights the advantage of the action. This effort will be supported also by the action “Climate-aware Decision Makers Program” and by the “• Climate Change Education and Awareness in primary education” action. The campaign has to be maintained until the needed numbers of ecovillages have been established. Also, after the first 15 years “lesson learnt” documentation has to be developed in order to help the implementation of same initiatives in other regions.

2.2 Time schedule

In line with the above described steps, the main activities would be the followings:



2.3 Budget and resources needed

The target groups of the action plans are individuals who are the potentially new inhabitants of the ecovillages. Their homemaking cost can be reduced by the Family Housing Allowance (CSOK), which can be required by married couples for used or newly built houses and apartments if they promise that they will have one, two, three or four children. The size of support depends on the number of children the couple plans to

have. The maximum support is EUR 32 thousand, with the same amount loan with fix payment.

Since the building materials are should be natural one preferably from local sources, the associated cost can be reduced significantly compared to other family houses. These practises should be included in the handbook. Also, traditionally ecovillages are also strong community, where the inhabitants help each other, which can reduce the cost of human resources.

3 Collaboration with stakeholders

The previously identified forerunners were invited to a dedicated roadmapping workshop. During the PANEL project county-level long term climate strategies were developed and approved by the county councils this year. The aim is to connecting the action plans to this official strategy. In order for this, the Mining and Geological Survey of Hungary, who developed the climate strategy for Borsod-Abaúj-Zemplén County – which covers the 2/3 of the project region – was also taking part in the roadmapping workshop and provided useful experiences.

The outcome of the workshop was summarized in an online table, and was circulated among the forerunners/most active stakeholders. This created the possibility for those who could not attend the workshop to provide feedback, and also for those who could attend the meeting to develop further their ideas.

Since the proposed action plans call for wider participation, they will be promoted to the identified interest groups through the CEESEN website.

Roles and responsibilities of different actors for Action Plan implementation

The following stakeholder groups were identified as necessary actors for the implementation.

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	county councils	overall project management, engagement of municipalities and contributors	Since the action plan contributes to the implementation of the official county-level strategy, approved by the county council, who support the PANEL 2050 project, there is no need for specific involvement action
	municipalities	engagement of individuals and creating necessary environment for ecovillage	In the frame of WP5 WP5 Marketing and dissemination effort.

		communities	
Contributors	green NGOs	participating in the handbook, training programme and mentoring scheme development (especially the Ecological Institute for Sustainable Development)	They have to be involved by the county councils.
	research institutes	participating in the development of the handbook and the implementation of the training program	They have to be involved by the county councils.
	architects specialized on ecohouses	participating in the development of the handbook and the implementation of the training program	They have to be involved by the county councils.
	communities with relevant experience	participating in the mentoring scheme and in the implementation of the training program	They have to be involved by the ecovillages who take part in the development of the handbook
Target groups	individuals	as a target group they role is to participating in the action and ensure that the target will be reached.	In the frame of WP5 Marketing and dissemination effort.

4 Monitoring Strategy

The evaluation of monitoring parameters will take place in every 5 years, however, since the action has a long time-frame, the key milestones are the following.

- By the end of 2020, the handbook, the training programme and the mentoring scheme have to be finalized and sent out to municipalities. Since without this supporting scheme the local programs cannot be started, proper agenda have to be developed which ensure that there will be no delay in the implementation of WP2 and WP3.

- By 2030 at least 10 ecovillages will be in the region. This milestone has to be checked by the city councils, from the summed up documentation from the municipalities. If the target number will not be reached, city councils have to consult with the municipalities and update the supporting scheme based on their feedback.
- By 2040 at least 30 ecovillages will be in the region. The method of monitoring is the same as in the previous point.
- By 2050 at least 75 ecovillages will be in the region. The method of monitoring is the same as in the previous point.

Besides of these points, city councils have to monitor the process in every five years, and if the risk is high that the milestone will not be achieved, then they have to implement the same action as it was described above.

5 Risk management

Identified possible risks and the possible measure to mitigate them are the followings:

Risk	Probability of realising	Mitigation measure
Municipalities and individuals are not interested in taking part in the action	High	Dedicated WP (Marketing and dissemination) will mitigate this risk, and also the connected climate awareness rising actions.

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

for Directorate of Aukštaitija National Park and Labanoras Regional Park

English version

prepared by
Ignalina Nuclear Power Plant Region
Development Agency

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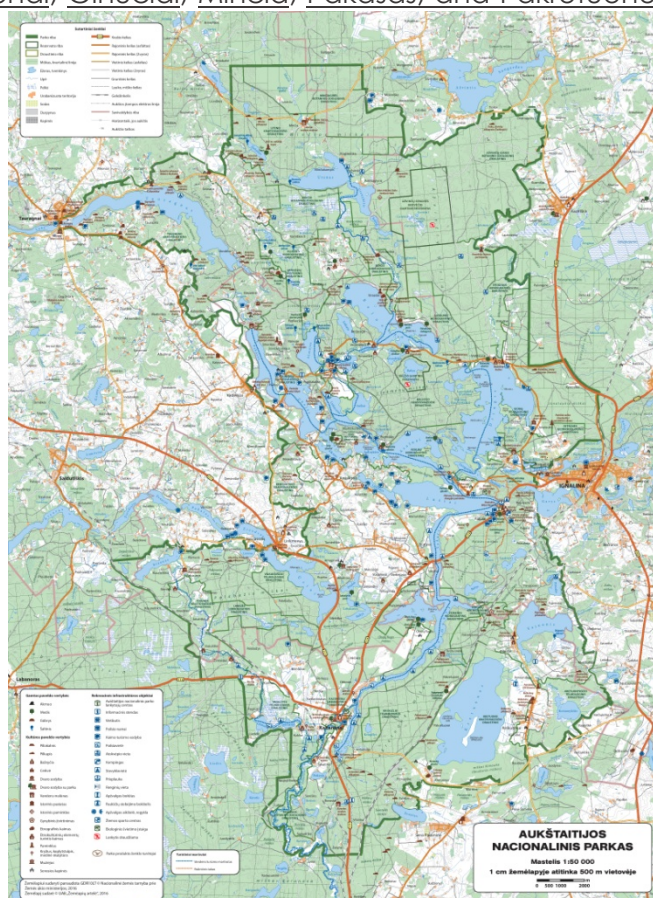
Priority area: Energy efficiency of public and apartment buildings, modernization of public spaces, buildings and street lighting, and business enterprises in terms of heat and energy economy

Directorate of Aukštaitija National Park and Labanoras Regional Park

1. Introduction

Directorate of Aukštaitija National Park and Labanoras Regional Park ties two parks: Aukštaitija National Park (ANP) and Labanoras Regional Park (LRP).

ANP is the oldest national park in Lithuania, founded in 1974 to preserve the unique ecosystem of headwaters of the river Žeimena and its natural and cultural values at the crossing of the three landscape areas. The park area covers 40574 ha; water occupies 15.5% of the territory; forests – 69%. This is the second largest national park in Lithuania. The park is located in eastern Lithuania, in districts of Ignalina, Švenčionys and Utena. In addition to plenty of water and forest resources, there are six water mills in the park: water mills of Bruknyė, Gaveikėnai, Ginučiai, Minčia, Pakasas, and Pakretuonė. These objects



are well preserved and attract many tourists. The water mills also perfectly illustrate how in the former times clean energy has been extracted and adapted to local needs, i.e. for the processing of cereals.

LRP was established in the eastern part of Lithuania, in the districts of Švenčionys, Molėtai and Utena, in 1992. The administration of the park is located in Labanoras town. The park covers an area of 55344 hectares. It is the largest regional park in Lithuania, distinguished by the diversity of landscapes, and an incredible diversity of flora and fauna.

The Directorate of the park carries out a wide range of services related to the supervision of vegetation, wildlife and landscape, protection of natural and cultural heritage, nature research, and educational activities.

The Nature School was set up particularly for educational activities, the main goals of which are to carry out environmental education and promote advanced environmental protection ideas.



2. Action Plan title

Publicity of alternative energy development opportunities and implementation of pilot projects on energy efficiency in Aukštaitija National and Labanoras Regional parks

2.1. Objective

By expanding the range of activities carried out by the Nature School, the Directorate of parks will aim to reach the following objectives during the period of 2019-2027:

- To consult business entities and private owners operating in the area of parks on the installation of alternative energy sources in new facilities and their adaptability to

existing facilities. This will be done without an economic benefit and further contributing to the preservation of the natural environment of the park, the promotion of eco-tourism and clean energy ideas.

- To implement educational programs for park visitors, to carry out thematic seminars on topics of the alternative energy development for employees of other parks in order to achieve sustainable and progressive development of the parks, thus, developing the local economy without concentrating on prohibitions and restrictions, but at the same time very responsibly and as active as possible.
- To carry out applied research and collect information on natural resources, including those related to renewable energy sources.

The Directorate also plans to prepare and implement pilot projects aimed at the increase of energy efficiency and reduction of the use of resources in the parks

:

- Reconstruction of a bicycle path by installing a lightning system of solar panels.
- Acquisition of golf-type electric vehicles for organisation of educational activities and tours in the parks.

In order to achieve these goals, the Directorate of parks must approve programs on the development of alternative energy in protected areas, to train their employees or attract new specialists and enable the provision of new services: setting of location and time for consultations and training, service advertisement, networking with the local community. Also, in the ongoing research plans it is needed to include applied research related to the development of alternative energy and the accumulation of data on renewable energy sources.

These activities also correlate with one of the functions of the Directorate: direct involvement in the process of preparation and harmonization of territorial planning and construction projects. Consultations of highly qualified specialist would help to better define the territorial potential for alternative energy development opportunities and to make more wise decisions with specific long-term solutions.

2.2. Objective scope and targets values

During the period of 2019-2027, it is planned to train at least two specialists who could then advise on the topics of alternative energy development and hold thematic seminars. Every year it is planned to provide at least 10 consultations and seminars per month for 10-30 people. Also, to annually organise at least one large event by presenting the best examples implemented in the territory of the parks and making them public on social networks and on the website of the Directorate.

During the period of 2019-2027, to carry out at least one applied science research on the development of alternative energy in the parks and constantly collect data of indicators related to renewable energy sources, their use and production volume.

During 2019-2020, to prepare two pilot projects in the field of energy efficiency improvement.

2.3. The basis of the plan preparation

According to the newly approved objectives in the regulations of the Aukštaitija National Park and Labanoras Regional Park Authority on December 5, 2016, the institution undertakes:

9.7. to carry out environmental protection (ecological) education to promote ideas for preservation of nature;

9.9. to regulate economic activity and development of construction works in the National and Regional parks according to the Planning Scheme of the National Park and Management Plan of the Regional Park, as well as other complex and special documents and legal acts for territorial planning;

9.10. to nurture the cultural traditions, crafts, businesses of the Aukštaitija region, to promote environmental protection ideas and the legacy of material and spiritual culture, to carry out educational and cultural activities.

These objectives coincide with the objectives of this document and provide a basis for the validity of the planned measures.

Target indicators

Task	Target indicator	Evaluation method
To carry out consultations on the introduction of alternative energy sources in new facilities for business entities and private owners operating in the parks	10 consultations per month	Lists of participants of consultations
To implement educational programs for park visitors and to hold thematic seminars on the topics of alternative energy development for employees of other parks.	1 educational activity per month, 1 large event per year	Lists of participants, publicity material
To carry out applied research and collect information on natural resources, including those related to renewable energy sources	1 study over a period; continuous data collection	Material of the study and its publicity
To prepare at least two pilot projects in the field of energy efficiency improvement	2 projects	Prepared and approved applications

3. Implementation strategy

In order to implement these measures, it is necessary to:

- provide employees with capacity building opportunities in the areas of alternative energy development and data collection on RES;
- formulate and approve educational programs, and include them in strategic and activity plans;
- make a plan for consultations, educational activities, and events;
- make a publicity plan;
- determine the nature and sample of research study, and set the timetable for implementation of works;

- implement activities;
- prepare dimensions for pilot projects and evaluate economic alternatives;
- prepare an investment plan and project applications;
- submit applications;
- sign the implementation contract;
- implement projects.

Time schedule, budget and resources needed

Task	Start of implementation - scheduled end	Responsible employee	Source of funding
To carry out consultations on the introduction of alternative energy sources in new facilities for business entities and private owners operating in the parks	2019-2027	Aukštaitija National Park and Labanoras Regional Park Authority	Institution funds, project funds
To implement educational programs for park visitors and to hold thematic seminars on the topics of alternative energy development for employees of other parks.	2019-2027	Aukštaitija National Park and Labanoras Regional Park Authority	Institution funds, project funds
To carry out applied research and collect information on natural resources, including those related to renewable energy sources	2019-2027	Aukštaitija National Park and Labanoras Regional Park Authority	Institution funds, project funds
To prepare at least two pilot projects in the field of energy efficiency improvement	2019-2020	Aukštaitija National Park and Labanoras Regional Park Authority	Institution funds, project funds

4. Collaboration with stakeholders

Since most of the territory of Aukštaitija National Park is located in the Ignalina district municipality, cooperation between the two project participants must be highly active and complement each other, especially since the objects and nature of the park are the main source of attraction for tourism development and the main cause of regional development. A sustainable energy sector can bring not only direct benefits, but also increase notoriety, create the image of an advanced area, and make an exceptional example of sustainable development technologies and preservation of natural resources.

5. Monitoring strategy

The Directorate of parks plans to implement ISO 9001 Quality Management Standard in the near future, through which all monitoring procedures will be prepared and described. In order to successfully implement this plan, the emphasis should be given to the training of staff and their continuing professional improvement. The efficiency of the implementation of pilot projects and the usefulness of the proposed technological solutions will also depend on the effectiveness of the monitoring system. To implement effective monitoring, we plan to purchase expert consultations that will help to prepare interesting and effective educational programs and make suggestions for their updates. Experts will also help to formulate the proposals of pilot projects from technical and energy efficiency sides, and to monitor the implementation of projects from the technical side. Finally, the Director of the Directorate of parks will be responsible for the monitoring and successful implementation of the whole plan.

6. Risk management

Risk	Probability	Risk mitigation strategies
Lack of human resources and competences	High	In case there is a lack of human resources and competences, there are chances of cooperation with educational institutions, the Lithuanian Energy Institute and advanced enterprises operating in the energy sector, provided that non-local specialists/representatives from any of these institutions are given an opportunity to implement specialized consultations and conduct research locally.
Absence of interest in alternative energy development	Average	Activities in the National Park are weaker due to stereotypical notions that bureaucratic barriers to obtaining permits are overpowering and there are additional factors limiting the activity due to higher requirements for environmental protection and preservation of the landscape. Publication of successful examples, implementation of pilot projects, simplification of restrictions and making their presentation to the public more attractive – all of this would increase interest in the development of alternative energy activities.
Technological ineffectiveness of pilot project proposals	Average	In order to ensure that pilot projects are not only beneficial from the energy side, but also become an example for other parks, we plan to hire technology specialists and together with them prepare all proposals and evaluate alternatives.



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ACTION PLAN

for Future Society institute

English version

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Priority area: Energy efficiency of public and apartment buildings, modernization of public spaces, buildings and street lighting, and business enterprises in terms of heat and energy economy

Future Society institute

1. Introduction

Public body Future Society Institute (further abbreviated as Institute) running from June 23, 2012 all over Lithuania and is oriented towards the creation of public welfare. Strategic goal of the Institute: to achieve public welfare in accordance with the principles of sustainable and sustainable development, to analyse and identify actions that foster wellbeing within the society, to participate in national policy formation by engaging various active groups of people: youth, scientists, businessmen, artists and NGOs, while also to derive expert conclusions from it through the consultation of governmental and nongovernmental organisations, private and public institutions and businesses. The institution has successfully applied advanced methods of cooperation between science, business and the public sector in the regions in order to bring tangible changes in various fields, including the area of sustainable social and economic development. Due to its specific nature, the INPP region is an attractive place to develop research activities and to reach fundamental changes.



2. Action plan title

The implementation of social and technological applied research on the renewable energy sector in the region

2.1. Objective

As the region is less economically and technologically advanced than the national average, and according to social welfare parameters is the worst in the country, the application of research methods is necessary for a thorough analysis of the situation, to find better solutions and a direction for development.

Monitoring of the development of the Ignalina NPP region, prepared during 2004-2008, provided a comprehensive and precise basis for the decision-making. Therefore, in the near future, it is necessary to renew research activities in order to evaluate the efficiency of the implementation of energy plans, to make timely adjustments, as well as possibly changing scenarios in the light of technological development and research results.

According to its importance, the Lithuanian energy sector is one of the most significant in the country and very important in our region. Energy is one of the key determinants of social development and economic growth; energy production and the use of it determine the quality of the environment at the local, regional and global levels. The inclusion of public interest in the development of the energy sector is currently considered to be one of the most important instruments for sustainable development.

The contribution of this partner to the implementation of the strategy would be very useful due to its experience and capabilities, as other partners lack skills in the field of research and are oriented towards the implementation of other types of measures. The Institute also has an advantage as it does not operate in the INPP region, thus avoiding direct interests and a biased approach to the research, as well as preparation of conclusions and suggestions.

The objective of the measure is to analyse the regional indicators of sustainable energy development, to identify trends and their relevance to the principles of sustainable development, and to consult companies / organizations on the preparation, implementation and monitoring of energy plans. Also, after conducting the research, to provide free data to regional companies / organizations and further motivate them to implement the energy plans.

The main tasks are: to select and analyse the characteristics of sustainable energy development by using the accumulated informational material and statistical data, and to determine the interdependence between the environmental, economic and social indicators related to the energy sector. Also, provide local enterprises and organizations with the opportunity to receive competent advice on issues related to the preparation, implementation and monitoring of energy plans

It is very important to use the principles of circular economy when providing consultations, where the priority is considered to be sustainable development of the territory, and when developing the service or product there is a determination or foresight for its final use, recycling, etc., and the environmental impact. The principles of the circular economy were established in May, 2018, and approved new rules that will help to achieve the goals

of the circular economy. It is expected to have a positive impact on the economies of the EU countries and will enable the EU to become a global leader in waste management and recycling.

Read more by following this link: <https://www.vz.lt/pramone/2018/05/22/ziedines-ekonomikos-startui-pasiruosta-itvirtinti-tikslai-ir-taisykles#ixzz5XTwN78se>

2.2. Objective scope and targets values

Scope of the measure actions: Data collection of the Ignalina NPP region, its analysis, comparison with indicators of the country and the nearest regions and drawing of conclusions; number of enterprises and institutions consulted in one year.

The analysis will use statistical data from regional municipalities, organizations, the Lithuanian Department of Statistics and the Lithuanian Environmental Protection Agency. Energy-related environmental, economic and social indicators will be analysed. It includes: total energy emissions, per capita emissions, emissions of various pollutants, gross domestic product, direct domestic and foreign investments, scope of heat production, production capacity of renewable energy sources, unemployment rate, population density, average wages, etc.

2.3. The basis of the plan preparation

This measure is planned on the basis of the National Energy Independence Strategy (2018), which is also the basis for the preparation of the regional strategy. Chapter VI "Need for Research and Development of the Business", points out priority research directions. It is extremely important to develop some of them only at the national but also at the regional level:

- 70.1. planning of the future development of the energy sector, energy economy;
- 70.2. modernization of existing energy production technologies, taking into account new challenges and requirements;
- 70.3. development and integration of new energy production and accumulation technologies, with low emissions of greenhouse gases and less air pollution, and resistant to climate change;
- 70.4. technologies of energy production from local and renewable energy sources;
- 70.8. the functioning of electricity markets, power mechanisms and active involvement of consumers in the operation of the electricity system and markets."

Target indicators

Task	Target indicator	Evaluation method
To carry out the analysis of sustainable energy development indicators of the region, to identify trends and their relevance to the principles of sustainable development	The research is conducted and presented to the public	Service contract, service delivery act, investigation document, materials for publicity
Conduct consultations on development and implementation of	15-20 consultations per year	Service contracts, execution acts,

energy plans and monitoring of indicators		descriptions of consultation, lists
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3. Implementation strategy

The implementation of this measure should be periodic, linked to changes in the regional strategy and carried out at least once during the implementation of the strategy. The years 2019-2027 is chosen for this period. The implementation of the measure should therefore be carried out in 2025. This year is important as the results of the implementation of the measures will already be visible and preparations finished for a strategy and action plans of a new period. Consultations should be carried out on a regular basis, arranging specific days of open consultations according to the need or by agreement on the timing and nature of the consultations on a case-by-case basis.

3.1. Time schedule, budget and resources needed

Task	Start of implementation - scheduled end	Responsible employee	Source of funding
To carry out the analysis of sustainable energy development indicators of the region, to identify trends and their relevance to the principles of sustainable development	2019-2027, once a year	Future Society Institute	Funds of regional municipalities
Conduct consultations on development and implementation of energy plans and monitoring of indicators	2019-2027	Future Society Institute	Funds of regional municipalities, enterprises

4. Collaboration with stakeholders

Project participants (stakeholders) as well as regional enterprises and organizations should be responsible for accumulating energy-related data in a consistent manner according to their areas of activity and to share it in the study. At the same time, without waiting for the research it is very important to know how to analyse the data for themselves, to respond in a timely and competent manner, to publicize the achievements to the region's society, to devote time for learning the innovations in the energy sector, and to organize staff capacity building.

5. Monitoring strategy

During the implementation of this measure the reliability of the data and publicity of the carried-out research is important. Gathering of data from a variety of sources including official ones, such as the Lithuanian Department of Statistics, the Lithuanian Environmental Protection Agency and local municipalities and enterprises, will allow to see the real situation, compare it with the results of local community surveys, and other countrywide surveys.

6. Risk management

Risk	Probability	Risk mitigation strategies
Incorrectly selected research sample	Low	In order to avoid this risk, it is necessary to involve in the study more specialists of the energy sector, to set clear research goals and objectives, and to inform the participants of the study in advance about the possibility of getting involved in the determination of the sample.
The study participants are uninterested in the outcome of the research, low competence	Average	It is necessary to cross-examine the research data from different sources, apply additional methods, provide data in official ways.
Low activity of companies in terms of the usage of consultations, a lack of interest for engaging in ongoing research, both at the regional level and at companies / organizations	Average	Make sure that consultations can be acquired on a convenient time and place; simplify research questions and data presentation, make it attractive and easy to understand.
Lack of funding for research implementation	Average	In case that the targeted funds do not cover the implementation of research, it would be possible to use the country's educational institutions that train specialists in the field of energy or research implementation.



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Priority area: Energy efficiency of public and apartment buildings, modernization of public spaces, buildings and street lighting, and business enterprises in terms of heat and energy economy

Ignalina district municipality administration

1. Introduction

Ignalina District Municipality is located in the north-eastern part of Lithuania and is famous for its natural resources: lakes, forests and hilly terrain. Due to large internal and external emigration, the population of the district is constantly decreasing and in recent years it has decreased to a bit over 17 thousand. The district is developing agriculture, wood processing industry, tourism.

The Ignalina district is distinguished by its achievements in energy efficiency projects for public and apartment buildings. All public buildings have been renovated in the territory of the Ignalina District Municipality. Schools, kindergartens, cultural, medical institutions, administrative and community buildings are arranged in a modern fashion not only in the city, but also in the rural areas. It has allowed to save about 45 percent of the cost, allocated to the provision of energy resources.

40 public buildings have been renovated in total, with a budget of about 10 million euros. Not only did it change the aesthetic picture of the buildings, but also improved the working conditions and lead to significant heat savings. Thus, Ignalina has made a significant contribution to the implementation of the Energy Efficiency Improvement Program for Public Buildings, approved by the Government of the Republic of Lithuania on 2014. Its purpose is to increase the energy efficiency of buildings owned by the state and municipalities and to renew public buildings owned by the state and municipalities by 2020.

In 2018, the renovation of the last 11 residential buildings in Ignalina started, which will be completed in the first half of 2019. The total number of apartment buildings in Ignalina is 104.

Upon completion of the renovation, the next step, which will allow to save more on the costs of heat energy, is the transition of the Ignalina city heating networks to operation in low-temperature mode. Since 2014, only biofuels have been used in the Ignalina heat supply system. According to the information provided by the company, 127 users (buildings) are connected to Ignalina city heating networks. With EU support by the end of 2019, all out of 127 buildings connected to the system will have been renovated. The heat supply to the networks is provided by the only heat supplier and producer, UAB "Ignalinos šilumos tinklai" (Ignalina Heat Networks, private limited liability company) boiler house, the shareholder of which is the Ignalina District Municipality.

"Ignalinos šilumos tinklai" commissioned "The Feasibility Study for the Transfer of Ignalina City Heating Networks to Low-Temperature Mode" in 2017. This study was carried out by UAB "Ekotermija". The information below is based on the findings of this study.

In 2013-2017, the heating was supplied according to the given temperature schedule. It shows that at the maximum network load the outgoing supply flow (T1) and return (T2) line temperatures are $+95\text{ }^{\circ}\text{C}$ (T1) and $+49.5\text{ }^{\circ}\text{C}$ (T2), respectively; at the minimum load outgoing flow (T1) and return (T2) lines, are $+70\text{ }^{\circ}\text{C}$ (T1) and $+45\text{ }^{\circ}\text{C}$ (T2).

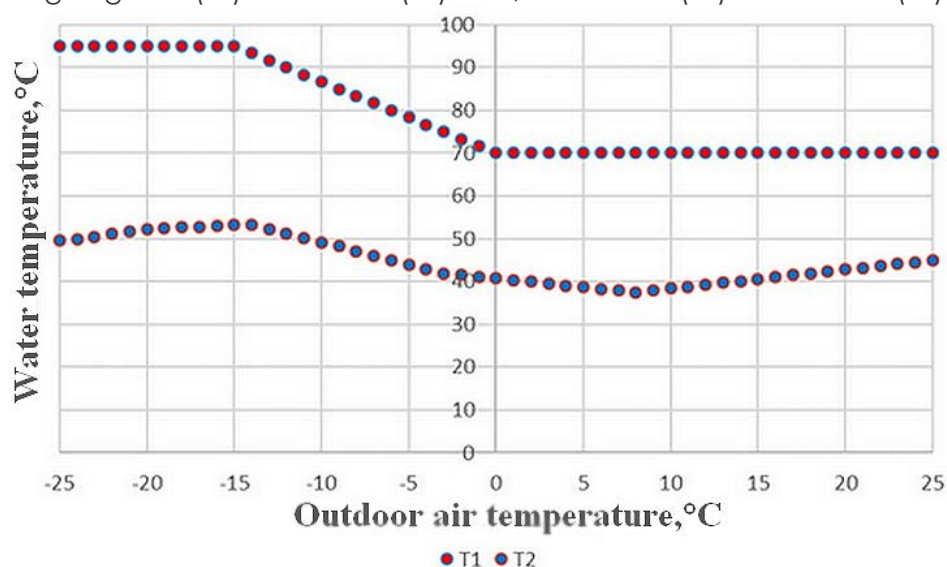


Fig 1. Temperature graph of Ignalina city heat supply networks for 2013-2017.

Comparison of the temperatures of Ignalina city heating networks with the temperatures of the renovated apartment heating system is given in Figure 2.

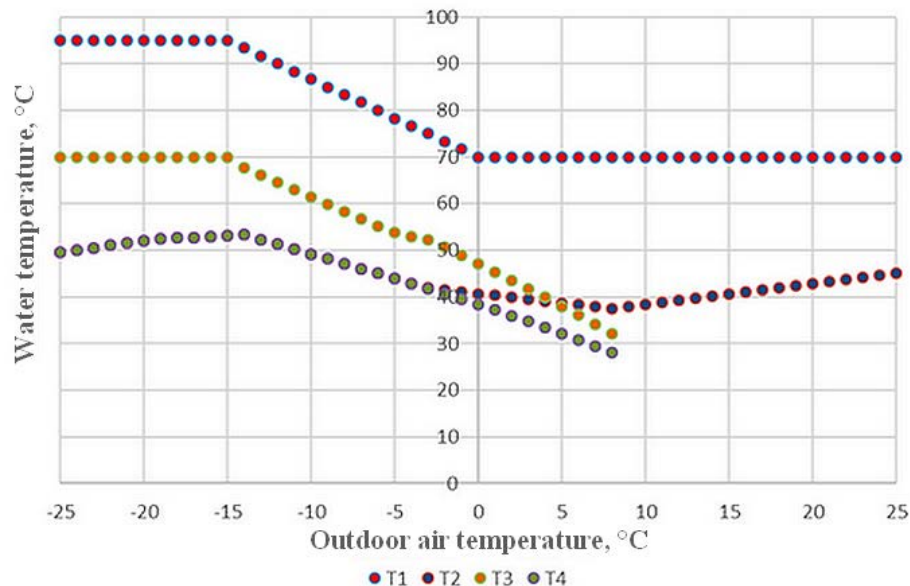


Fig 2. The temperature graphs of the Ignalina city heating networks for 2013-2017 and the renovated apartment heating system

Boiler fuel conversion factor in 2016 amounted to 65.65%. Heat losses in the networks from 2014 to 2016 did not change and amounted to about 12.7% of the amount of heat produced from the boiler house and delivered to the networks.

2. Action Plan title

Transition of Ignalina city heat networks for operation in low-temperature mode

2.1. Objective

The main goals for the heat network economy are:

- to consume less biofuels by using reduced temperature parameters while achieving the same heating effect. To reduce emissions of CO₂, CO, NO_x, particulate matter and emissions of other harmful substances;
- to reduce network losses by additionally reducing environmental pollution;
- after installing the low-temperature system in networks, extend the operational time of the pipeline.

The main objectives:

- To supply consumers from the renovated buildings with water of no lower than 53 °C at the maximum load; the temperature of water outgoing from the heat supplier is 65 °C;
- In order to improve the heat exchange in heat exchangers, given lower temperature differences, it is necessary to install a partial purification filter substation on the return line of the boiler room. With this station, a part of the water circulating through the network is continuously filtered, thus, collecting sludge, which usually would set on the heat exchangers in heating points. The sludge on heat exchangers increases pressure losses and worsens heat exchange (a higher temperature difference is required to transfer the same amount of power);
- Replacing heat pumps and boilers with new, optimal size and power.

2.2. Objective scope and targets values

At present, 6 pumps of the network are installed and operating in the boiler station, but only 2 are used, because after the renovation all the rest are not needed. These pumps, like boilers, are subject to change not only into new ones, but also into ones with lower power. The conductivity of heat transmission networks is determined by the diameters of the tracks. The project on modernization of networks was prepared in 2009, i.e. when many heat consumers still were not involved in renovations and used 100% of the project power. In 2019, renovations will be finished for all consumers, and their average heating power will drop up to 45%. Based on this, conductivity of networks should be sufficient due to increased flow.

Water quality must also be taken into account when choosing a low-temperature water supply. Based on the legislation of the Republic of Lithuania: "26.2. The water temperature in the hot water system of a building should be 50-60 °C to prevent legionnaires' disease. It is also possible to increase the hot water temperature to 66 °C in the water heater and to 60 °C in the consumers' taps." Network performance and conductivity can be explained more precisely by in-depth simulations and/or calculations.

2.3. The basis of the plan preparation

The measure was prepared in accordance with the company's strategic plans and the "Feasibility Study for the Transfer of Ignalina City Heating Networks to Low-Temperature Mode" carried out in 2017.

Target indicators

Task	Target indicator	Evaluation method
To supply lower temperature to heat networks	To supply 65°C cogeneration water to the heat points for consumers who get water of 53°C	Temperature range
To install a partial purification filter substation	Equipped substation	Documents proving the installation and operation of the substation, physical examination
To replace heat pumps and boilers	Heat pumps and boilers with optimum power	Equipment acquisition documents, physical examination

3. Implementation strategy

To implement this measure, it is necessary to maintain the following sequence of actions:

- In order to find out and optimize the conductivity of the network and losses of heat and pressure, it is necessary to create a hydraulic model for network and to perform a simulation of network operation modes. Based on the results of simulations, it is necessary to further plan the development of the network and optimize its work.
- After starting to reduce the temperature schedule, actual hot water temperatures in consumers' taps should be checked. Having noticed that the heat point is no longer able to heat the water to 50-55 °C, the temperature should not be lowered more until the heat pump has been properly adjusted.
- In order to ensure that the most distant consumers would receive water within the required temperature and pressure, temperature and pressure sensors with remote data transmission to the heat supply operator should be installed at these heat points.

3.1. Time schedule, budget and resources needed

Task	Start of implementation - scheduled end	Responsible employee	Source of funding
Supply lower temperature to heat networks	2019-2027	UAB "Ignalinos šilumos tinklai"	Company, municipal and support funds
Install a partial purification filter substation	2019-2027	UAB "Ignalinos šilumos tinklai"	Company, municipal and support funds
Replacement of heat pumps and boilers	2019-2027	UAB "Ignalinos šilumos tinklai"	Company, municipal and support funds

4. Collaboration with stakeholders

The introduction of these measures is important not only for the company, the municipality, residents of the city, but also for the region and the whole country. A unique model would be created, because in the city all renovated public and apartment buildings, which are connected to centralized heating system, would get low temperature water, which cannot be found in any other Lithuanian city.

5. Monitoring strategy

Most of the indicators related to the heat supply are recorded and processed by the employees of the heat supplier, since most of the data is important for calculating costs and fees of the residents and to choose investments. Monitoring of environmental indicators is carried out both by employees of the company itself and by controlling authorities, i.e. Environmental Protection Agency. According to its competence and powers, the supervision of energy companies is carried out by the State Energy Inspectorate under the Ministry of Energy.

6. Risk management

Risk	Probability	Risk mitigation strategies
Lack of funds for implementation of measures	Average	If neither the enterprise itself nor the municipality is capable of independently implementing these changes, it is necessary to seek for national or EU support.
The implemented measures will not produce the desired effect	Average	It is necessary to prepare for the process in great detail, to collect all the necessary data for decision-making, to involve competent persons in the decision-making process, and to perform simulations and calculations.



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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

for Ilgiai Community

English version

prepared by
Ignalina Nuclear Power Plant Region
Development Agency

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: November, 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Modernization of households

Ilgiai Community

1. Introduction

Association Ilgiai Community, established in 2013, is near the eastern border of Lithuania and at a crossing between three countries. Rimšė parish (Ignalina district), in which the community is located, holds the external border of the EU, and just a few kilometres away – the state enterprise Ignalina NPP. The community is active and youthful, and the community slogan is: "A strong family – a strong community."

In 5 years, the Community has implemented 20 projects for families, children and young people in the countryside. The most significant project is the renovation of an old, inoperative school building. This building now houses Children's Day Care Centre of Rimšė Region (further: the Centre) with an open youth area, also equipped with modern infrastructure for sports and leisure in the open air.



The Centre is constantly visited by more than 40 children, and more than 45 young people between the ages of 14 and 29 regularly visit the open youth area. The Centre's activities are focused on the families of Rimšė parish who experience social exclusion (including those who are listed as at risk, poorly educated or growing many children), as well as young people who spend a lot of time on the streets and are poorly occupied.

The reconstructed building has high energy efficiency (A + energy class). During the construction, particularly modern and advanced technologies were used, as well as economical lighting, heat pumps and recuperation system, and a full roof, ceiling and wall insulation. The combination of all these and other means allows the building to be operated at a very low cost. In addition to its direct purpose – to promote quality leisure time for children and young people, and to create a centre for the whole family – the community uses the Day Care Centre as an exclusive attraction object, which is visited by representatives of other communities and public institutions with a purpose to gain experience and knowledge of how to set up a building for public needs that would not cause troubles in the future maintenance. Thus, the activities of this stakeholder contribute to the sustainable development of the region not only through its measures, but also through educational activities.

2. Action Plan title

Installation of a solar power plant for the needs of the Ilgiai Community

2.1. Objective

The community continuously develops progressive ideas and consistently pursues its goals, including the development of the use of RES for community purposes.

Since the community does not have targeted funding and acts on a voluntary basis, the constant lack of funds means that the community is strongly interested in saving money for the maintenance of the building and generating additional funds for the implementation of new projects.

Thus, the main objective forms naturally: to install equipment for renewable energy production that would save energy and generate additional income.

For its innovative ideas about economical building maintenance and application of modern local energy solutions, this community is known not only in the Ignalina NPP region but also in whole Lithuania. For this reason, in the future, as one of the activities, the community could work on the provision of educational services related to the efficient use and exploitation of energy resources in the public sector. Educational activities would be provided to interested groups: communities, social welfare enterprises, etc.

The main tasks associated with the objective are:

- To reduce operating costs of the Community building – to install a solar power plant for the production of electricity.
- To prepare educational programs on a topic of the efficient energy application in the public sector.

2.2. Objective scope and targets values

At present, the building is heated by electricity and despite the fact that a very high A + energy class is achieved, the cost of electricity can be further reduced. For the production of electricity, two solar power plants (at least 7kW power) with net metering (double-sided) are planned to be set up, and in this way ensure minimum maintenance costs for the premises. The solar power plant will be installed on top of the community building, i.e., Children's Day Care Centre of Rimšė Region (roof area 220 m²) and nearby on a public building of a local authority (roof area 427 m²). The produced electricity will be used for building purposes (lighting, heating, kitchen, e-library activities, gym, etc.). The building will be accessible to rural residents, who can participate in creative activities, exercise, existing computer equipment. The open hours of the building will be extended.

During the project, the community along with the youth who visit the Centre will create and prepare an introductory program "Energy Safari: the Green, Smart House", as well as provide visitors with information about how much electricity the building produced during the period (day, week, month, year, etc.), for what purposes it has been used and so on. The community will include these upgraded objects and the updated introductory program in a regional cognitive-tourism program for visitors "Eco/Energy Safari: a trip from the XIX century in the XXI century" on energy theme" (source: <http://ilgiubendruomene.lt/lankomos-vietos>).

Community members and volunteers will carry out preparatory and other small works in the installation of power plants

The installation of solar power plants at the Day Care Centre and Multifunctional Community Centre will stimulate energy savings. Buildings will be pilot environmental projects that present opportunities to produce "green" energy. At the same time, the buildings will make electricity for their own needs, and the saved funds will be allocated to the sustainable economic and social development of the subdistrict territory: this will create conditions for additional activities of rural residents, new social services, and organization of high-quality cultural events for various groups of rural residents.

The local project has a positive impact on sustainable development: planned investments are related to the promotion of the use of energy from renewable sources as well as the introduction of new low carbon technologies, promoting the rational use of resources. The local project contributes to the development of green technologies and production methods, as well as to changing patterns of consumption and consumer environmental education.

2.3. The basis of the plan preparation

The preparation of the plan is based on the long-term Strategic Plan of Ilgiai Community, on the real need to save costs and generate additional income, and also on calculations, according to which at a total annual electricity demand of 7500 kWh/month for the full power of the Centre the recommended nominal power of the solar power plant is 7 kWp. According to the current tariff on the installation of solar power plants and electricity consumption, the payback without support is calculated after 16.2 years, respectively saving from 95 to 18 percent of costs by season for electricity without solar power.

Target indicators

Task	Target indicator	Evaluation method
To install solar power plants on top of the community building, i.e., Children's Day Care Centre of Rimšė Region (roof area 220 m ²) and on a nearby public building of the local authority (roof area 427 m ²)	Installation of two power plants of 7 kWp, one on the community building, i.e., Children's Day Care Centre of Rimšė Region (roof area 220 m ²) and another on a nearby public building of the local authority (roof area 427 m ²)	Installed, operating equipment
To prepare and implement educational program "Energy Safari: the Green, Smart House"	6-8 educational activities per year	Photo, lists of participants

3. Implementation strategy

There is only a shortage of funds for the implementation of a solar power plant measure, as all other preparatory work has already been completed: demand, power and investment size are estimated. It is necessary to look for financial resources by submitting applications for funds that finance these types of activities.

To implement the measure for the preparation of the educational program, it is necessary to appoint responsible persons, to bring professional consultants and together formulate the content of the program, to plan a publicity company and to launch the program.

3.1. Time schedule, budget and resources needed

Task	Start of implementation - scheduled end	Responsible employee	Source of funding
To install solar power plants on top of the community building, i.e., Children's Day Care Centre of Rimšė Region (roof area 220 m ²) and on a nearby public building of the local authority (roof area 427 m ²)	2019	Ilgiai community leader	Funding from the Community, Ignalina district municipality and support funds
To prepare and implement educational program "Energy Safari: the Green, Smart House"	2019-2027	Ilgiai community leader	Community funds

4. Collaboration with stakeholders

The two measures are of particular relevance to the whole region, as there are about 80 rural communities and NGOs gathered for community-based activities in the region. Most of the communities are active, implementing various projects, constantly communicating, organizing holidays, various education activities, and at the same time lacking funds and good ideas. The Ilgiai community is an example of successful yet familiar experiences that can inspire and encourage other communities to act in a similar direction, i.e., to promote efficient energy projects in their communities, seek to reduce costs in energy consumption, and generate funds by producing clean energy.

5. Monitoring strategy

In order to control and manage the consumption of energy resources effectively, the Chairman of Ilgiai Community and members of the community responsible for energy must first have detailed information on the consumption of energy resources. It is therefore important to put in place a monitoring system that will be based on a regular assessment of energy processes in order to efficiently evaluate changes in energy costs and identify necessary improvements.

Monitoring instruments are an integral part of the strategic plan, so it is important to in advance assess the need for all proposed measures. As all energy efficiency improvement measures of this Action Plan are limited to two buildings, i.e., Children's Day Care Centre and the local authority building, the monitoring will be carried out in the following way:

- Members of the community, responsible for energy, will collect this data in each building on a monthly basis:
 - heat consumption for heating, data at the beginning and end of the heating season;
 - electricity consumption;
 - warm water consumption;
 - hot water consumption.
- The members of the community will meet twice a year to discuss energy indicators and, when needed, to propose additional measures to increase energy efficiency.
- Also, once every three years, energy specialists will be hired to discuss new measures, technologies and opportunities to further reduce energy consumption in the Ilgiai community.

6. Risk management

Risk	Probability	Risk mitigation strategies
Absence of appropriate support funds or unsuccessful participation in competitions	Average	Without the support funds, it is possible to bring the community to donate funds for the implementation of measures by organizing an attractive fun celebration or to look for specific sponsors to whom community-based activities would be attractive and meaningful.

Lack of experience for a successful implementation of the measures	Vidutinė	In the city of Visaginas, which is next to Rimšė, there are many elderly specialists on the field of energy who, given favourable conditions, can be included in meaningful community activities, especially to work with youth in educational programs on topic of energy.
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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

for Ignalina Nuclear Power Plant Region Development Agency

English version

prepared by
Ignalina Nuclear Power Plant Region
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Priority area: Energy efficiency of public and apartment buildings, modernization of public spaces, buildings and street lighting, and business enterprises in terms of heat and energy economy.

Ignalina Nuclear Power Plant Regional Development Agency

1. Introduction

Ignalina Nuclear Power Plant Regional Development Agency (further abbreviated as the Agency) was established as a non-profit organization and a public body on November 7, 2002, after the Government of the Republic of Lithuania approved the Decommissioning Programme for Unit 1 of the Ignalina NPP. The Agency is the main institution in the Ignalina NPP region for implementation of regional development policy, consulting and technical assistance; and it also represents the interests of the three above-mentioned municipalities (Ignalina and Zarasai districts and Visaginas).

Up to 2008, the Agency has been administering socio-economic measures to mitigate the consequences of the decommissioning of the power plant. From 2009 to 2014 the Agency did not administer the measures but carried out administrative supervision of ongoing projects. A large part of the funds targeted at the region were devoted to the creation of new jobs through direct support for businesses, also for non-governmental local initiatives, energy projects, and for improvements of social and engineering infrastructure. During this period more than 150 business projects were implemented, in which more than 600 new jobs were created. The renovation of Ignalina apartment buildings has also started.

The Agency together with regional authorities is currently giving their best efforts to renew funding for socio-economic measures, and also want that the measures listed in the Plan would be included in the negotiations with the European Commission on the funding content of the decommissioning of power plant unit 2.



Action plan title

The incorporation of the package of socio-economic measures, which include measures for the energy sector, aimed at mitigating the consequences of decommissioning of the State Enterprise Ignalina NPP in the final agreement between the Republic of Lithuania and the European Commission on the funding of the decommissioning of the State Enterprise Ignalina Nuclear Power Plant.

1.1. Objective

With the joint efforts of the regional municipality and the authorities of the Republic of Lithuania to draw the attention of the European Union to the fact that, with the consent of the country in January 1, 2009, to decommission the power plant, the region suffered serious damage, the consequences of which cannot be overcome without additional support. The aim of the Action plan is to ensure a balanced and sustainable development of the region in the context of the country and the European Union, to compensate the losses incurred by residents and businesses of the region as a result of the loss of the largest employer and customer of various services in the region, and to partly compensate for a moral damage caused by radioactive waste storage in the region.

The objectives of the Plan:

- Implementation of programs for businesses and households seeking to use or produce renewable energy;
- Modernization of the public sector energy economy;
- Development of solar and bio energy sector.

Having received the funds for the implementation of socio-economic measures, including the implementation of energy measures, it is very important that they would be managed locally. This would let to speed up the process, have a more sensitive response to changes in the situation and ensure better communication. Over the period between 2002-2014 the Agency has accumulated the experience, developed methodologies and competences, which would allow to start the process in a timely manner and without significant additional costs.

1.2. Objective scope and targets values

The maximum objective is to include the entire package of socio-economic measures in the agreement between the European Commission and the Republic of Lithuania on the allocation of funding for the implementation of the Ignalina Nuclear Power Plant Second Block Decommissioning Program.

The Action Plan of the implementation of the Ignalina Nuclear Power Plant Region 2019-2027 development program is composed of 20 measures, amounting to Eur 178.20 million. Only energy-related measures are included in this document:

No	Objectives	Measures	Responsible for implementation	Estimated need for funds (Eur million)	Expected funding sources
				2019-2027	
1.	To promote the development of the Ignalina NPP region and the implementation of local initiative projects	1.1. To implement projects for the promotion of small and medium-sized business development in the Ignalina NPP region (to promote the development of the implementation and improvement of innovative technologies, the processing of local agricultural production, and projects for the efficient use of energy resources)	Visaginas municipality, Ignalina and Zarasai districts municipalities	9	Funding for the Decommissioning of the State Enterprise Ignalina Nuclear Power Plant and EU support funds, State budget, Visaginas Municipality, Ignalina District Municipality, Zarasai District Municipality, private funds
		1.2. Demolition / modernization of abandoned / unsafe buildings and arrangement of the territory in order to create suitable conditions for creating innovative business in the INPP region		9	Funding for the Decommissioning of the State Enterprise Ignalina Nuclear Power Plant and EU support funds, State budget, Visaginas Municipality, Ignalina District Municipality, Zarasai District Municipality, private funds
2.	To support the implementation of energy efficiency projects	2.1. To implement energy efficiency projects of public buildings of the Ignalina NPP region		6.2	Funding for the Decommissioning of the State Enterprise Ignalina Nuclear Power Plant and EU support funds, State budget, Visaginas Municipality, Ignalina District Municipality, Zarasai District Municipality

	2.2. To implement energy efficiency projects (modernization of street lighting networks, installation of electric vehicle charging stations)		1.7	Funding for the Decommissioning of the State Enterprise Ignalina Nuclear Power Plan and EU support funds, State budget, Visaginas Municipality, Ignalina District Municipality, Zarasai District Municipality, private funds
	2.3. To implement renewable energy projects for public buildings		13.5	Funding for the Decommissioning of the State Enterprise Ignalina Nuclear Power Plan and EU support funds, State budget, Visaginas Municipality, Ignalina District Municipality, Zarasai District Municipality, private funds
	2.4. To implement the renovation program for private houses		16.5	Funding for the Decommissioning of the State Enterprise Ignalina Nuclear Power Plan and EU support funds, State budget, Visaginas Municipality, Ignalina District Municipality, Zarasai District Municipality, private funds
	2.5. To develop solar power and biomass production		13.5	Funding for the Decommissioning of the State Enterprise Ignalina Nuclear Power Plan and EU support funds, State budget, Visaginas Municipality, Ignalina District Municipality, Zarasai District Municipality, private funds

3.	To apply temporary compensatory mechanisms in the Ignalina NPP region	3.1. To compensate for the loss of revenue of electricity supply and distribution companies after applying the electricity tariff reduction to residents of the Ignalina NPP region (30 percent lower electricity tariff in 2019-2027)	Ministry of Energy of the Republic of Lithuania, "ESO" public limited liability company	13.5	State budget funds
4.	To implement infrastructure development projects in order to increase the attractiveness of the residential and investment environment	4.1. Projects for the preparation and implementation of technical documentation for the development of engineering and transport infrastructure of the INPP region	Visaginas municipality, Ignalina and Zarasai districts municipalities	10.5	Funding for the Decommissioning of the State Enterprise Ignalina Nuclear Power Plant and EU support funds, State budget, Visaginas Municipality, Ignalina District Municipality, Zarasai District Municipality
In total:				93.4	

1.3. The basis of the plan preparation

The ambitions of the region to seek the attention of the European Commission for the financing of social and economic measures from the funding of the decommissioning of the Ignalina NPP have a clear basis. In the annex to the Treaty on the accession of Lithuania to the European Union – Protocol No 4 – the second and third articles state:

"Article 2

1. During the period 2004-2006, the Community shall provide Lithuania with additional financial assistance in support of its efforts to decommission and to address the consequences of the closure and decommissioning of the Ignalina Nuclear Power Plant (hereinafter "the Ignalina Programme").

Article 3

1. Recognising that the decommissioning of the Ignalina Nuclear Power Plant is of a long-term nature and represents for Lithuania an exceptional financial burden not commensurate with its size and economic strength, the Union shall, in solidarity with Lithuania, provide adequate additional Community assistance to the decommissioning effort beyond 2006.
2. The Ignalina Programme will be, for this purpose, seamlessly continued and extended beyond 2006. Implementing provisions for the extended Ignalina Programme shall be decided in accordance with the procedure laid down in Article 56 of the Act of

Accession and enter into force, at the latest, by the date of expiry of the current Financial Perspective.

3. The Ignalina Programme, as extended in accordance with the provisions of Article 3(2) of this Protocol, shall be based on the same elements and principles as described in Article 2 of this Protocol.”

The Plan itself is based on the Program for the Development of the Ignalina Nuclear Power Plant Region in 2019-2027 and the valid strategic plans of the municipalities: Strategic Action Plan of the Ignalina District Municipality for 2018-2020, Strategic Development Plan of the Zarasai District Municipality for 2015-2021, Strategic Development Plan of the Visaginas Municipality for 2016–2022, the National Energy Independence Strategy confirmed by the Seimas of the Republic of Lithuania on June 26, 2012, by Resolution No. XI-2133 and renewed on August 28, 2017.

Target indicators

Task	Target indicator	Evaluation method
To obtain additional funding for the implementation of socio-economic measures in the Ignalina NPP region in order to mitigate the consequences of decommissioning of the Ignalina Nuclear Power Plant	Implementation of 9 measures in the period for Eur 93.40 million	Signing of implementation agreements, implementation of works and services, preparation of reports on absorption of funds
Assignment of regional socio-economic measures administration functions to the Ignalina NPP Regional Development Agency	Administration of the implementation of the Action Plan	Signing of an administrative contract, implementation of services, preparation of reports

2. Implementation strategy

In order to implement this Action Plan, the following actions are necessary:

- To present and approve the Action Plan at the Ignalina NPP Regional Development Council;
- To submit the approved Action Plan to the Government of the Republic of Lithuania;
- To seek the inclusion of the Action Plan in the document on the course of negotiations with the European Commission for funding of the decommission of the second block of the Ignalina Nuclear Power Plant;
- To seek the appointment of the Agency as the administrator of the Action Plan;
- To seek funds for the implementation of the Action Plan;
- To implement the Action Plan.

2.1. Time schedule, budget and needed resources

Task	Start of implementation - scheduled end	Responsible employee	Source of funding
To obtain additional funding for the implementation of socio-economic measures in the Ignalina NPP region in order to mitigate the consequences of decommissioning of the Ignalina Nuclear Power Plant	2019-2027	Visaginas municipality, Ignalina district municipality, Zarasai district municipality, Ministry of Energy of the Republic of Lithuania, "ESO" PLC, Ignalina Nuclear Power Plant Regional Development Agency	Funding for the Decommissioning of the State Enterprise Ignalina Nuclear Power Plant and EU support funds, State budget, Visaginas Municipality, Ignalina District Municipality, Zarasai District Municipality, private funds
Assignment of regional socio-economic measures administration functions to the Ignalina NPP Regional Development Agency	2019-2027	Ministry of Energy of the Republic of Lithuania, Ignalina Nuclear Power Plant Regional Development Agency	

3. Collaboration with stakeholders

In the preparation of this document in order to receive targeted funding for the implementation of measures provided in the Plan the cooperation of project participants (stakeholders) plays a key role. Only combined efforts, timely exchange of information, and intensive and responsible representation of interests in negotiating with national and EU authorities can influence significant changes in the region. The measures and this document were prepared by incorporating leaders of stakeholders and specialists, who in turn represent not only the interests of institutions but also of various groups.

Mayors of municipalities, energy specialists, managers of district heating companies, and Bronis Ropė, Member of the European Parliament and former Chairman of the Regional Development Council of the Ignalina NPP – all contributed to the preparation of the Action Plan document.

4. Monitoring strategy

Two institutions will probably be responsible for the preparation process and the monitoring of the implementation of the Action Plan: the Ministry of Energy of the Republic of Lithuania

and the Ignalina Nuclear Power Plant Regional Development Agency. This will depend on the decision of the Government of the Republic of Lithuania on the assignment of the function of the implementation administrator.

5. Risk management

Risk	Probability	Risk mitigation strategies
The Action Plan will not be included on time in the negotiations with the European Commission regarding the financing of the decommissioning of unit 2 of the Ignalina Nuclear Power Plant	Average	To actively monitor the negotiation process, to establish direct contact with the negotiators, so that information transfer would not clash with bureaucratic barriers and would not be affected by unfavourable solutions.
Lack of competency in the process of preparation and implementation of the Action Plan	Average	Despite the fact that the municipalities of the Ignalina NPP region and the Agency had similar experience in the period 2002-2014, it is still necessary to realistically assess existing competencies and capacities and, if necessary, to promptly use the necessary external specialists.



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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

for Public Body Euroregion
„Country of Lakes“
Directorate Office in Lithuania

English version

prepared by
Ignalina Nuclear Power Plant Region
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PANEL 2050 – Partnership for New Energy Leadership 2050
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Priority area: Energy efficiency of public and apartment buildings, modernization of public spaces, buildings and street lighting, and business enterprises in terms of heat and energy economy

Public Body Euroregion „Country of Lakes“ Directorate Office in Lithuania

1. Introduction

Euroregion “Country of Lakes” is historically and geomorphologically distinguished by a great number of lakes; therefore, the organization was named as the “Country of Lakes”. After the establishment of the Euroregion in 1998 it consisted of several municipalities (Kraslava in Latvia, Braslaw in Belarus, Ignalina in Lithuania). Today Euroregion is a strong organisation uniting 34 municipalities: 15 in Latvia, 8 in Lithuania and 11 in Belarus.

In the context of the all euroregions of the European Union, the Euroregion “Country of Lakes” is the region located on the external border of the EU, which clearly identifies the problems that can be solved through international cross-border programs, and is also initiator of innovative projects and promotes regional and international cooperation.

Euroregion territory reaches over 40 thousand km², of which 45 percent is in the territory of Belarus, 32 percent in Latvia, and 23 % in Lithuania. Euroregion has over 900 thousand inhabitants, of which 46 % live in Belarus, 33 % in Latvia, and 21 % in Lithuania.

Offices for the administration of Euroregion “Country of Lakes” were established in three countries. Since 2003 the interests of Lithuanian municipalities are represented by the Euroregion “Country of Lakes” Lithuanian Directorate Office, which is active in developing joint projects both internally and with institutions of Latvia and Belarus.

2. Action plan title

Development of alternative energy sources and improvement of energy efficiency in the Euroregion "Country of Lakes"

2.1. Objective

Strategic objectives of Euroregion "Country of Lakes" for 2014–2020: to implement innovative and creative projects in the field of energy, to establish solid foundations for cooperation and promote the Euroregion.

To achieve these goals the region plans to:

- to educate the society and specialists of municipalities and its subordinate institutions on alternative energy topics and to get them acquainted with the latest solutions and technologies in the field of energy;
- to combine science and business with the development and usage of new technologies in the field of energy, and in the production and use of non-traditional building materials;
- to develop sustainable lighting systems;
- to promote modernization of households by applying alternative energy solutions.

With the successful implementation of its goals the Office could carry out monitoring and control of the implementation of this plan, as well as significantly contribute to the search of funding sources both in appealing to international funds and to local investments or budget funds.

2.2. Objective scope and target values

In order to fulfil the objectives, the Euroregion "Country of Lakes" plans to implement the following actions:

- To initiate the preparation and implementation of the "Green Management II" project. Preliminary project budget is EUR 2,5 million. The project is about alternative energy, new solutions and technologies that do not harm the environment and humans, save natural resources and provide a different quality of life. With this project the Euroregion will develop its energy efficiency.
- To initiate the preparation and implementation of the "Green House" project. Preliminary project budget is EUR 2 million. The project is about scientific-practical methods of alternative energy use, use of new technologies and of non-traditional building materials. The project is in line with the EU environmental and energy policies.
- To initiate the preparation and implementation of "MicroLight" project. Preliminary project budget is EUR 1 million. Via this project it is planned to increase the use of alternative lighting solutions, which would help to make lighting more energy efficient. For example, installation of lighting points in small spaces: at stops, at entrances to educational institutions, at stairways, lighting with motion sensors, etc.
- To initiate the preparation and implementation of "Usage of energy crops and natural resources" project. Preliminary project budget is EUR 0,9 million. During the

implementation of the project, new methods and technologies for the use of natural resources in households will be explored, approved and implemented (e.g., use of hemp, recycling of secondary waste, taking advantage from water, sun, wind energy).

2.3. The basis of the plan preparation

This action plan is based on the Euroregion "Country of Lakes" strategy for 2014-2020, which was prepared as an outcome of the project "Third STEP for the strategy of Euroregion "Country of lakes" – planning future together for sustainable social and economic development of Latvian-Lithuanian-Belarusian border territories" (3rd STEP, LLB-1-083) under the Latvia-Lithuania-Belarus Cross Border Cooperation Programme. Grupa93 Ltd (Latvia) has prepared the strategy together with regional municipalities. The strategy was approved at the meeting of the Tripartite Council of Euroregion "Country of Lakes" in Utena, Lithuania, on June 6, 2014.

Target indicators

As the projects are not drafted yet, precise indicators are not foreseen.

Task	Target indicator	Evaluation method
To educate the public and specialists of municipalities and subordinate institutions on alternative energy topics, to get them acquainted with the latest solutions and technologies in the field of energy	Project "Green management II" is drafted	Financing Agreement is signed
To join science and business together for the development and application of new technologies in the field of energy, and also for the production and use of non-traditional building materials	Project "Green House" is drafted	Financing Agreement is signed
To develop sustainable lighting systems	Project "MicroLight" is drafted	Financing Agreement is signed
To promote the modernization of households by adapting alternative energy solutions	Project "Usage of energy crops and natural resources" is drafted	Financing Agreement is signed

3. Implementation strategy

The strategy for co-operation and implementation of the plan is carried out by following these steps:

- All partners identify their main interests (3-5) or needs, which allows to find similar partners in the project.
- The offices of Directorates or several municipalities join forces in the preparation of projects or the planning of activities;

- One of the partners leads the preparation of the project and submission of the application;
- After receiving the support, the project is implemented, the results and good practices are promoted;
- The Office carries out consistent control and monitoring of the implementation of the action plan;
- A report on executed activities and projects is presented at the Tripartite Council.

3.1. Time schedule, budget and needed resources

Task	Start of implementation - scheduled end	Responsible employee	Source of funding
To educate the public and specialists of municipalities and subordinate institutions on alternative energy topics, to get them acquainted with the latest solutions and technologies in the field of energy	2020-2025	A representative of the Latvian Directorate Office	EU funds and the state and municipal budgets
To join science and business together for the development and application of new technologies in the field of energy, and also for the production and use of non-traditional building materials	2020-2025	A representative of the Latvian Directorate Office	EU funds and the state and municipal budgets
To develop sustainable lighting systems	2020-2025	A representative of the Lithuanian Directorate Office	EU funds and the state and municipal budgets
To promote the modernization of households by adapting alternative energy solutions	2020-2025	A representative of the Lithuanian Directorate Office	EU funds and the state and municipal budgets

4. Collaboration with stakeholders

The prepared strategy and the action plan are the result of close cooperation between the local authorities of Latvia, Lithuania and Belarus and the Directorate offices.

Participation in the activities of the Euroregion facilitates the cooperation between local government partners, creates the opportunity to better understand their neighbours in the border region, get acquainted with their activities, share best practices, and thus, promote and improve cooperation at the international level. And of course, it is also a great opportunity to participate in activities of other Euroregions.

The employees of the municipal administrations and other institutions of the Euroregion positively and cheerfully evaluate the joint activities carried out together with the partners. Employees of regional municipalities and subordinate institutions, as well as representatives of businesses and community, contributed to the development of strategic goals and look forward to further productive cross-border cooperation in programmes and projects.

5. Monitoring strategy

The Euroregion's activity is evaluated according to the number of official meetings, and the number of implemented joint projects and events.

The monitoring of the implementation of the plan is carried out in this way:

- Each of the offices twice a year, in accordance with its regulations, is required to submit activity reports and activity plans to founders. The leaders and specialists of the eight municipalities analyse the provided data, evaluate the implemented work and discuss future activities. Each of the municipalities has one vote, so all decisions are taken by a majority vote. This ensures transparency and prioritization of activities.
- The Tripartite Council holds meetings of representatives from all 34 municipalities twice a year. During the meetings, the offices report on activities, discuss future projects, discuss relevant questions, and address cross-border issues. Each of the municipalities has one vote, so all decisions are taken by a majority vote. This ensures transparency and prioritization of activities.

6. Risk management

A successful implementation of the plan depends on many factors. First of all, the presence of trilateral or bilateral support programs during the relevant period, as well as tripartite political and economic relations between the states. This is especially true of Belarus: since the visa regime limits free communication between states, cross-border relations are not sustainable.

The implementation of the plan also depends on the priorities chosen in the particular case. Although the energy sector is truly important and relevant, but policy makers for development of trilateral co-operation mostly choose to implement projects that are more attractive to the public, such as cultural heritage, tourism, promotion of active lifestyle, and reduction of social exclusion.

Risk	Probability	Risk mitigation strategies
Lack of funding	Average	Although INTERREG funding measures are most convenient and precisely aimed at promoting cross-border cooperation of this region, it is necessary to look more broadly and to use the support of other European Union funding mechanisms. Also, as a possible way to get funding could be an investor search or a private-public-partnership approach.

Unfavourable tripartite political situation	Average	Although Belarus seeks to be a European state, tripartite or bilateral decisions are often taken longer than expected or are just unsolvable. In this case, the implementation of the plan can be carried out through bilateral cooperation or by implementing target actions in each country individually and then sharing results and implementation experiences.
The energy sector in the region is not considered to be a priority	Average	A comprehensive introduction of regional politicians and the public to the priorities and aspirations of the European Union, in the energy sector can be an additional and significant incentive for the implementation of the goals and measures set out in the plan. The development and modernization of the energy sector, unlike of many other sectors, can generate additional financial flows and significantly improve the economic situation.



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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

for Visaginas municipality administration

English version

prepared by
Ignalina Nuclear Power Plant Region
Development Agency

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: November, 2018



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Priority area: Energy efficiency of public and apartment buildings, modernization of public spaces, buildings, energy infrastructure and street lighting, and business enterprises in terms of heat and energy economy

Visaginas municipality administration

1. Introduction

Due to the reduction of environmental pollution, at the same time as CO₂, and the development of energy efficiency, the Visaginas municipality will implement various measures to achieve these indicators by 2022:

- the share of heat generated from renewable energy sources: 63 percent (32% was in 2015);
- modernization of 20 km of engineering and street lighting networks. In the near future it is planned to implement a project "Modernization of Visaginas City Lighting System". This will contribute to the cleaning of the environment and it is planned to have CO₂ savings (ton / year) of about 575 t.
- to insulate 100 percent of public buildings, i.e. 25 buildings;
- to renovate 50 apartment buildings from existing 254. Currently only one apartment building is renovated.

Visaginas also seeks to become a centre for innovative industry development, in which science and business closely co-operate. For this purpose, by the year 2022, it is planned to process and adapt 8.9 ha of land and sign a minimum of 3 cooperation agreements between local businesses, education and applied science organizations and business representatives, as well as to initiate at least 2 pilot projects involving scientists, business representatives, INPP and other organizations.

Also, the project "Implementation of Sustainable Mobility Measures in Visaginas City" is being implemented in the Visaginas municipality, the objective of which is in accordance with the Operational Programme for the European Union Funds' Investments in 2014-2020, approved by the European Commission in on September 8, 2014, Decision No C(2014)6397, the fourth priority "Promoting energy efficiency and production and use of renewable energy", measure 04.5.1-TID-R-514 "Implementation of sustainable movement measures" and its objective: promoting sustainable mobility and developing environmentally friendly transport in order to reduce carbon emissions. After implementation of the sustainable mobility measures, residents of the Visaginas municipality will be encouraged to choose public urban and suburban transport, as well as other sustainable transport solutions: biking, hiking. The attitude of passengers towards the public transport and their behaviour will be changed. It will also reduce environmental pollution. By implementing the project's objective, a sustainable mobility system will be created which will result in inclusion, as well as the promotion of non-motorised transport, increased traffic safety and security.

Action Plan title

Reorganization of the centralized heating system into a closed one and increasing the energy efficiency of public and apartment buildings in Visaginas municipality

1.1. Objective

Goal: To increase the city's energy efficiency by reducing losses.

Objective: To modernise the heat economy and implement energy-saving measures.

1.2. Objective scope and targets values

It will be possible to reduce the cost of energy resources and, accordingly, the prices of heating and hot water by implementing a complex of energy actions: by investing in a cogeneration biofuel power plant and in the modernisation of the heating networks, by also reconstructing residential and public buildings, modernizing the heating system and improving the thermal characteristics of the buildings.

1.3. The basis of the plan preparation

Strategic development plan for 2016-2022 approved by Decision No TS-3 of Visaginas Municipal Council in January 28, 2018.

Target indicators

Task	Target indicator	Evaluation method
Reorganization of the open centralized heating system of the Visaginas city to a closed system	The centralized heating system of Visaginas city is transformed into a closed one	Implemented project – 1 unit
Installation of a cogeneration power plant in the Visaginas municipality	Cogeneration (biofuel) power plant is installed	Installed or not
To reconstruct public buildings using energy saving measures	Number of insulated buildings; Percentage of institutions with other implemented energy saving measures	100 percent
To promote the implementation of energy saving measures in apartment buildings	Number of renovated apartment buildings	50 units
To implement measures for the use of renewable energy sources in the municipal energy sector	Number of implemented projects related to the use of RES	5 units
To review the special plan for heat and gas (infrastructure development) sectors and make appropriate	The special plan for heat and gas (infrastructure development) sectors has been updated	1 unit

decisions in order to improve the energy system		
Public awareness, counselling and education in the field of energy efficiency improvement	Number of implemented public awareness and education measures	According to the need
Take ownership of the assets owned by the state and entrusted to the state enterprise Visaginas Energy for management, and after the reorganization to become the owner of the municipal enterprise Visaginas Energy	Municipal enterprise is established	An established municipal enterprise –1 unit
To organize the reorganization of the municipal company Visaginas Energy into a private limited liability company	Private limited liability company is founded	Private limited liability company was founded – 1 unit

2. Implementation strategy

Having assessed the strategic status of the Visaginas municipality, and possibilities and trends of development of individual sectors, the strategic vision was formulated: Visaginas is an innovative industrial development centre with well-developed business, active leisure and sports infrastructure which is also convenient for work, safe and healthy living.

The goal is to make Visaginas the centre of innovative industrial development, in which science and business closely co-operate. Together with the leaders of the EU and the world, it will strive to create modern technologies and develop innovations, giving priority to the development of energy types and information technologies. In promoting the creation of new jobs, it is planned to create favourable conditions for the development of business and science in Visaginas by creating an ecosystem of cooperation between business, science and educational organizations, and by the establishment of an industrial park and information technology centre.

To implement the vision of the Visaginas municipality, the following long-term socio-economic goals are defined:

- balanced development of the municipality's economy, developing Visaginas as an innovative industrial centre;
- rise in the quality of life in the municipality;
- increasing the attractiveness of the municipality for investment;
- increasing the competitiveness of municipal enterprises;
- development of high-quality personal service networks;
- creating a cosy, convenient and secure environment;
- effective absorption of various financial mechanisms, encouraging the development and the attractiveness of the municipality.

2.1. Time schedule, budget and resources needed

Task	Start of implementation - scheduled end	Responsible employee	Source of funding
Reorganization of the open centralized heating system of the Visaginas city to a closed system	2016-2020	Strategic Planning and Investment Management Division, Local Economy and Construction Division	EU funds, State and municipal budgets
Installation of a cogeneration power plant in the Visaginas municipality	2016-2020	State enterprise Visaginas Energy	EU, State budget, other funds and sources
To reconstruct public buildings using energy saving measures	2016-2022	Visaginas Municipality Administration	EU, State budget, other funds and sources
To promote the implementation of energy saving measures in apartment buildings	2016-2022	Visaginas Municipality Administration, UAB "Visagino būstas" (eng. Visaginas Housing)	EU, State budget, other funds and sources
To implement measures for the use of renewable energy sources in the municipal energy sector	2016-2020	State enterprise Visaginas Energy, Visaginas Municipality Administration	EU, State budget, other funds and sources
To review the special plan for heat and gas (infrastructure development) sectors and make appropriate decisions in order to improve the energy system	2019-2020	Visaginas Municipality Administration	Municipal budget
Public awareness, counselling and education in the field of energy efficiency improvement	Iki 2022	Visaginas Municipality Administration	Municipal budget
Take ownership of the assets owned by the state and entrusted to the state enterprise Visaginas Energy for management, and after the reorganization to become the owner of the municipal enterprise Visaginas Energy	2018-2019	Visaginas Municipal Council, State enterprise Visaginas Energy, Ministry of Economy of the Republic of Lithuania	Municipal budget, State budget

To organize the reorganization of the municipal company Visaginas Energy into a private limited liability company	2019-2020	Visaginas Municipal Council, "Visaginas Energy"	Municipal budget, resources of "Visaginas Energy"
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3. Collaboration with stakeholders

In implementing the strategic development plan, cooperation is established with municipal politicians, administration and subordinate municipal institutions and enterprises, investors, business, academic and cultural community, other interest groups, residents of the municipality and guests.

4. Monitoring strategy

The monitoring process of the implementation of the Strategic Development Plan of Visaginas Municipality for 2016-2022 includes:

1. Integrating the provisions of the Strategic Development Plan into the Strategic Action Plan and annual plans;
2. Systematic collection of indicators and other information on the implementation of the Strategic Development Plan;
3. Preparation, discussion, approval, publicity of a draft report on the implementation of the strategic development plan (the draft report is prepared every two years).

The department of the Municipality Administration responsible for strategic planning annually sends out queries on the implementation of the Strategic Development Plan to the structural units of the Municipality Administration and other executives responsible for the implementation of measures and approved by the Strategic Development Plan. The information received is accumulated and evaluated. With this information every two years the draft report on the implementation of the Strategic Development Plan is prepared, which is then submitted to the Visaginas Municipal Council for consideration and approval. The form of the report on the implementation of the strategic development plan is approved by the order of the Director of the Visaginas Municipality Administration.

Having evaluated received comments and results of the implementation of the strategic development plan, the Strategic Development Plan and the Strategic Action Plan are supplemented and changed.

The report on the implementation of the strategic development plan is publicly available on the website of the municipality: www.visaginas.lt.

5. Risk management

Risk	Probability	Risk mitigation strategies
Political	Low	The planned measures are in line with regional and municipal strategic planning documents
Social	Low	Publicity and proper planning provided for the implementation of measures

Financial	Average	Accurate planning of funding and planning for the implementation of measures
Institutional	Low	Monitoring of factors that can influence the consequences of this risk



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Priority area: Energy efficiency of public and apartment buildings, modernization of public spaces, buildings and street lighting, and business enterprises in terms of heat and energy economy

Visaginas Technology and Business Vocational Training Centre

1. Introduction

In European buildings, about 40% of the total amount of energy recovered or imported is consumed; one third is used in industrial, commercial and public buildings (offices, schools, hospitals, hotels, etc.), the remainder goes to residential buildings. This shows significant potential for energy consumption reduction.

At present, the main legislative guide for energy efficient buildings in the EU up to 2020 is the Directive 2010/31/EU of the European Parliament and the European Council on the energy performance of buildings. This Directive encourages the improving of the energy performance of buildings in the European Union, taking into account external climatic conditions and local characteristics, as well as the requirements and cost-effectiveness of indoor climatic conditions. Directives that are also directly related are: Directive 2009/28/EC April 23, 2019, of the European Parliament and the European Council on the promotion of the use of energy from renewable sources, and Directive 2006/32/EC on April 5, 2009, of the European Parliament and the Council on the final energy consumption efficiency and energy services. Energy efficiency targets for 2020 in Directive 2010/31/EU:

- reduce energy consumption by 20% by 2020;
- 20% of energy must be produced from renewable energy sources by 2020;
- reduce total greenhouse gas emissions by 20% by 2020 (compared to 1990 levels) and by 30% if an international agreement is reached;
- from 2018 public buildings, and from 2020 all new buildings have to be near zero-energy buildings.

European Union directives provide for new qualitative and quantitative requirements for the energy performance of buildings and the use of RES to be implemented from 2018 in newly built public buildings, and from 2020 onwards in all newly built buildings. The energy performance of buildings, in accordance with Lithuanian legislation, is assessed by the energy classes that are given to the buildings during energy certification. It is planned to continuously improve the insulating properties of building partitions, reduce the influence of partition thermal bridges, increase the tightness of buildings, to use more efficient ventilation (including recuperative) systems for buildings and to increase the use of energy from buildings or the environment from renewable sources for heating buildings and preparing hot water.

The Energy Efficiency Plan was prepared by taking into account the aforementioned requirements and in accordance with the following legal acts of the Republic of Lithuania:

Energy law, Heating Law, Renewable Energy Law, Construction Law, Resolution No. XI-2133 "On Approval of the National Energy Independence Strategy" of the Lithuanian Parliament in June 26, 2012, as well as the November 26, 2014 Resolution No. 1328 "On Approval of the Program for Increasing the Energy Efficiency of Public Buildings" by the Government of the Republic of Lithuania.

A work group was set up to ensure the establishment and implementation of an energy efficiency management system at Visaginas Technology and Business Vocational Training Centre (further abbreviated as VTBVTC). The main task of the working group was to develop an energy efficiency improvement plan, as well as to establish procedures for the implementation and maintenance of the planned measures, including data collection, analysis and other measures that will ensure the successful implementation of the prepared plan.



2. Action Plan title

Visaginas Technology and Business Vocational Training Centre Energy Efficiency Improvement Plan, Stage II

2.1. Objective

Visaginas TBVTC Energy Efficiency Improvement Plan vision is to improve the technical and energy normative properties of the training centre buildings in order to achieve the essential maintenance of the building requirements, reduction of thermal energy consumption and rational use of energy resources, reduction of electricity costs and expenses for heating and improvement of the quality of training conditions. Taking into account the tasks of the state and regional energy sector and in accordance with the National Action Plan for Energy Efficiency 2017-2019, approved on July 7, 2017 by the Minister of Energy of the Republic of Lithuania, Order No 1-181, Section 3 and related documents, the VTBVTC aims to achieve the following goals by 2025:

- to improve the energetic characteristics of the Visaginas Technology and Business Vocational Training Center's dormitory building (Festivalio str. 9,

Visaginas), to ensure economical and efficient energy consumption in this building;

- to carry out modernization of the lighting system in all VTBVTC buildings, to ensure energy saving and efficient use of energy;
- to carry out modernization of heating infrastructure in all buildings, installing thermostatic control of heating devices.

2.2. Objective scope and targets values

In order to accomplish the objectives, VTBVTC plans to implement these actions:

- To carry out internal repairs of the dormitory building (Section IV), changing windows, doors, modernizing heating and electricity networks, adjusting the control of the heat substation. Deadline is set for 2020.
- To carry out insulation works on the dormitory building (Festivalio str. 9, Visaginas): to insulate the external walls of the building (facades), balconies, roofs, replace windows, external and lobby doors (Section III). Deadline is set for 2025.
- To carry out modernization of the lighting system at the VTBVTC Energy Sector Training Centre and the Training Department, with the installation of low-cost lamps and lighting control systems. Deadline is set for 2025.
- To carry out modernization of the heating infrastructure in the dormitory by installing thermostatic control of heating devices. Deadline is set for 2020.
- To carry out modernization of the heating infrastructure at the VTBVTC Energy Sector Training Centre and the Training Department, installing the thermostatic control of heating devices. Deadline is set for 2025.
- Upgrade ventilation system at VTBVTC Energy Sector Training Centre. Deadline is set for 2020.

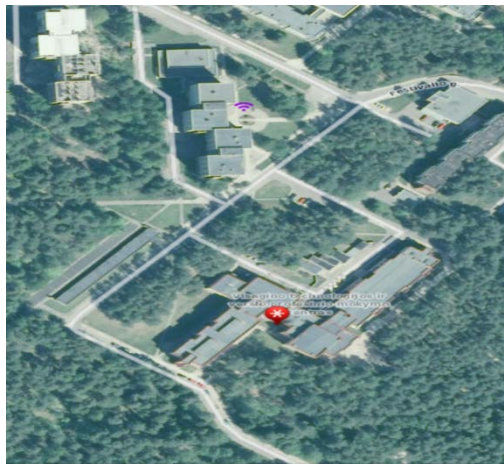
In order to effectively manage all energy efficiency components, an energy efficiency management system will be created which will be an integral part of the ISO 9001 quality management system, already implemented in VTBVTC.

2.3. The basis of the plan preparation

As we enter the fourth industrial revolution, it is extremely important to strengthen the infrastructure of vocational training centres, which respond precisely to these already existing trends, which integrate digital and physical processes in the production process. It is said that successful economic areas will be those that will be able to meet the need for a new industrial era of knowledge.

Visaginas Technology and Business Vocational Training Centre strives to respond flexibly and promptly to economic and social challenges. When the VTBVTC Energy Sectoral Practical Training Centre started operating in 2014, it created the largest and most well-equipped base in the country for the development mechatronics, electrical and welding professions. At present, thirteen primary vocational education programs are taught at the Visaginas Technology and Business Vocational Training Centre. The number of students in the Visaginas Technology and Business Vocational Training Centre is growing even with a decrease in the number of pupils in the region, in the municipality and in the country.

The centre has six buildings, the main educational building of VTBVTC consists of 3 sectors: administrative, educational and industrial. The Visaginas TVPMC management buildings have been built more than 25 years ago, in accordance with the norms, rules and technologies of that time. Over the past decades, regulatory requirements have changed, optimal microclimate support facilities and systems of the building became outdated.



The energy audit of buildings carried out in 2010 found that the condition of all buildings does not meet many of the standard requirements for special construction and hygiene requirements, and also the use of energy is extremely uneconomical. The VTBVTC main building's energy consumption per year is 1271.44 MWh (2009 data), the heating system of the building is connected to the Visaginas city district heating system (gas heating). Taking into account the results of the audit and the recommendations, a plan for increasing the energy efficiency of Visaginas TVPMC (phase I) was completed, which was fully implemented in 2016.

In Phase I it was planned to carry out renovation of the Energy Sector Training Centre (production sector) and the education facilities (Festivalio str. 7). The plan has been successfully implemented. The Energy Sector Training Centre has been operating in the production building since 2014, with EUR 2 580 514 investment from the European Regional Fund, of which 510 856 euros were for the cost of repairs (renovation and internal work). In 2016, the Centre completed the renovation of the education building and an investment of 534 418 euros was made in the building's thermal insulation under the Special Program of Climate Change. Regrettably, due to a lack of funds and funding constraints, work on the modernization of the lighting system and heating networks was not carried out, as planned in the 1st phase of Energy Efficiency Plan.

There was no significant investment in repairing the dormitory building (Festivalio str. 9), which was built 35 years ago and has not been renovated since, the condition of the building is not in line with modern requirements and hygiene norms

:

- PVC windows, outdoor, lobby and wooden balcony doors in the building are old, only the front entrance doors are new. Windows leak cold air through cracks, resulting in heat loss, the situation is the same with exterior, lobby and balcony doors. The thermal characteristics of the windows, the exterior, lobby and balcony doors are not in accordance with STR 2.05.01:2013 "Design of Building Energy Efficiency".

- The outer walls of the building are 0.51 m thick brick masonry, plastered from inside, strip foundation for reinforced concrete blocks, insulation layer is not installed. Due to a lack of an insulated thermal insulation layer, heat loss occurs through walls and floors. The thermal characteristics of the outer walls are not in accordance with STR 2.05.01:2013 "Design of Building Energy Efficiency".
- The building roof is superposed. Roof deck is made of reinforced concrete slope with a top welded coating. The roof covering is installed without thermal insulation layer, its heat transfer coefficient exceeds the set normative value, due to these reasons heat losses occur. Covering characteristics are not in accordance with STR 2.05.01:2013 "Design of Building Energy Efficiency".

It is obvious that it is necessary to perform renovation and interior repair of the dormitory building, to modernize lighting and heating networks.

It must be noted that after the implementation of the Phase I of the Energy Efficiency Improvement Plan, the energy consumption of the main VTBVTC building decreased from 1271,44 MWh (2009 data) to 605,96 MWh (2018 data). It is concluded that the energy efficiency measures applied have been effective and have created suitable conditions for work and learning; therefore, complex solutions are needed to further reduce energy consumption, i.e. to implement the Phase I of the Energy Efficiency Improvement Plan.

Target indicators

Task	Target indicator	Evaluation method
To carry out internal repair works of the dormitory building (Section IV), changing windows and doors, modernizing heating and electricity networks, adjusting the control of the heat substation.	Section IV is repaired, internal repairs carried out, heat point I is adjusted. Energy consumption will decrease by at least 10% per year.	Accounts, Energy Audit Report
To carry out insulation works of the dormitory building (Festivalio str. 9, Visaginas): to insulate the outer walls of the building (facades), the balconies, flatten and insulate the roof, replace the windows and the external and lobby doors, and doors of the balconies (Section III).	Dormitory building is insulated, section III renovated. Energy consumption will decrease by at least 40% by 2030	Accounts, Energy Audit Report
To carry out modernization of the lighting system at the VTBVTC Energy Sector Training Centre and educational building, installing low cost lamps and lighting control systems.	The modernization of the lighting system is completed, 100% of all lighting has LEDs. Light control system is installed.	Accounts, Energy Audit Report
To carry out modernization of the heating infrastructure in the dormitory by installing thermostatic control of heating devices.	100 percent dormitory rooms fitted with thermostatic heating device.	Accounts, Energy Audit Report

To carry out modernization of heating infrastructure in the VTBVTC Energy Sector Training Centre and in the educational facility, installing thermostatic control of heating devices.	100% of the rooms have a thermostatic heating device. Energy consumption will decrease by at least 10% per year by 2030.	Accounts, Energy Audit Report
Perform ventilation system upgrade works at VTBVTC Energy Sector Training Centre.	An additional ventilation system is installed at the 1 st sector welding workshop at the Energy Sector Training Centre. Energy consumption will decrease by at least 5% per year.	Accounts, Energy Audit Report

3. Implementation strategy

Whether the implementation of the plan is successful depends on the approval of the Ministry of Education, founder of Visaginas TBVTC, and on the ability of the institution to attract external funds for the implementation of the planned measures. Realizing its responsibility, Visaginas TBVTC undertakes to:

- Establish and implement an energy efficiency management system, which will be an integral part of the ISO 9001 Quality Management System, implemented in the VTBVTC;
- Provide the necessary resources (human resources, internal resources, etc.) for a successful implementation of the plan;
- To take into account energy efficiency indicators in the long-term planning process, to include all planned measures in the institution's strategic plan;
- Include all staff members and students in the implementation and improvement of the energy management system;
- To promote purchase of energy-efficient products and services;
- To raise awareness of the implemented energy efficiency management system and motivate other Visaginas municipality institutions to implement energy efficiency measures;
- To share good practices with institutions in the entire INPP region and to organize good practice visits.

3.1. Time schedule, budget and needed resources

Task	Start of implementation - scheduled end	Responsible employee	Source of funding
To carry out internal repair works of the dormitory building (Section IV), changing windows and doors, modernizing heating and electricity networks, adjusting the control of the heat substation.	2018 October - 2020 December	Director, Deputy Director for Infrastructure, Project Manager	EU structural funds, state funds of the Republic of Lithuania. Budget: 300 000 €

To carry out insulation works of the dormitory building (Festivalio str. 9, Visaginas): to insulate the outer walls of the building (facades), the balconies, flatten and insulate the roof, replace the windows and the external and lobby doors, and doors of the balconies (Section III).	2023-2025	Director, Deputy Director for Infrastructure, Project Manager	EU structural funds, state funds (Infrastructure fund of the Ministry of Education and Science), other sources. Budget: 300 000 €
To carry out modernization of the lighting system at the VTBVTC Energy Sector Training Centre and educational building, installing low cost lamps and lighting control systems.	2018-2025	Director, Deputy Director for Infrastructure	VTBVTC revenue. Budget: about 100 000 €
To carry out modernization of the heating infrastructure in the dormitory by installing thermostatic control of heating devices.	2018-2020	Director, Deputy Director for Infrastructure	EU structural funds, state funds, VTBVTC revenue. Budget: 40 000 €
To carry out modernization of heating infrastructure in the VTBVTC Energy Sector Training Centre and in the educational facility, installing thermostatic control of heating devices.	2018-2025	Director, Deputy Director for Infrastructure, Project Manager	EU structural funds, state funds, VTBVTC revenue. Budget: 50 000 €
Perform ventilation system upgrade works at VTBVTC Energy Sector Training Centre.	2018-2020	Director, Deputy Director for Infrastructure, Project Manager	EU structural funds, state funds, VTBVTC revenue. Budget: 100 000 €

4. Collaboration with stakeholders

This plan is part of the Strategic Plan of Visaginas TBVTC for 2020-2025, therefore, a large part of the institution's community participated in its preparation. Staff of the Visaginas Municipality Administration were consulted on information about requirements and funding opportunities. For collection of information about requirements and funding opportunities consultations were also conducted with the employees of the Visaginas Municipality Administration, specialists of the INPP Regional Development Agency and other employees of the educational institutions of the INPP region. This plan was also coordinated with the representatives of the Ministry of Education and Science and received their approval.

A working group was formed for creation and implementation of an energy efficiency management system. This working group is responsible for implementation of this plan. Once the Energy Efficiency Plan is completed, it will be presented to the heads of

municipal institutions of Visaginas and will also be posted online and open for everyone to read.

5. Monitoring Strategy

A successful energy efficiency management system is based on a regular process evaluation to effectively measure changes in energy costs and identify necessary improvements. The implementation of the energy efficiency management system of VTBVTC will allow to solve issues related to accounting and analysis of energy consumption data, thus reducing energy consumption.

The deputy director for infrastructure is responsible for the reduction of consumption. In order to ensure the functioning of the energy efficiency system, the following factors will be implemented in the institution:

- The deputy director for infrastructure is responsible for the management and annual inspection of buildings (with the help of specialists, if necessary), which is in accordance with the Construction Technical Regulation STR 1.07.03:2017 "Maintenance of Buildings".
- The responsible person takes meter readings (for heat, electricity and cold water) and enters the data into a joint Excel file for systematic gathering and analysing of information.
- The responsible person performs analysis of the collected data once a month (more often on demand) and informs the deputy director for infrastructure and the working group in case of deviations;
- The deputy director for infrastructure accumulates monthly data on the average outdoor air temperature and records them in the monitoring report;
- The deputy director for infrastructure regularly complements the energy consumption analysis model and analyses this data by comparing energy consumption with indicators of the previous period;
- The deputy director for infrastructure submits the energy audit once a year.

The implementation and further maintenance of the energy efficiency management system will be ensured by the deputy director for infrastructure. Accounting of monthly energy consumption in the institution will be done in writing and accumulated for analysis. Responsible employees will collect the following monthly data:

- heat consumption for heating, data of the start and end of the heating season;
- electricity consumption;
- consumption of warm water;
- consumption of hot water.

Data will be collected and stored in separate files for each building. Once a year, the director together with the deputy director of infrastructure and the members of the working group will organize a monitoring meeting, where the implementation of the plan and the operation of the energy efficiency management system will be assessed.

6. Risk management

Risk	Probability	Risk mitigation strategies
Bad planning quality	Average	Risk factors may originate from unmet technical requirements / limitations applicable to construction work and equipment and from impossible to reach indicators. Risk management and prevention measures: construction and energy specialists with sufficient experience will be included in the planning process.
Lack of financing	High	Risk factors may appear due to poorly assessed sources of funding and the need for funding, external factors, and changes in the state tax policy. Applicable risk management measures are related to the planned contract work and acquisition of equipment. For risk management, as far as investment needs are concerned, there should be planned actions to monitor and control the scope of performed work, the quality of technology and materials, and the supply / performance of the technology.
Monitoring is poorly conducted	Average	Risk factors may appear due to lack of human resources and low qualifications of existing staff. Applicable risk management and prevention measures: monitoring and data collection procedures are described in detail; an annual energy audit for data verification is organized. Employees are sent to capacity building courses.



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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

for State enterprise “Visaginas energy”

English version

prepared by
Ignalina Nuclear Power Plant Region
Development Agency

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Energy efficiency of public and apartment buildings, modernization of public spaces, buildings and street lighting, and business enterprises in terms of heat and energy economy

State enterprise “Visagino energija”

1. Introduction

State enterprise “Visagino energija” (further as Visaginas Energy) is a state-owned company providing heating and hot water to residents of Visaginas city. Currently, the company is on the verge of change, as the Ministry of Economy of the Republic of Lithuania passes the ownership rights to the Visaginas municipality, thus, the company will become a municipal enterprise. This is an important change for the city and the organization, as the strategic management of the company will be organized locally. It is expected that the company will become more flexible and able quickly adapt to the needs of the city.

The mission of the company is to reliably supply heat and hot water to all consumers of Visaginas city and to ensure reliable water supply and wastewater treatment services at the lowest cost and with a minimal impact on the environment.

The company has the following strategic directions:

- Heat supply activities;
- Thermal energy production activities;
- Water supply and wastewater management activities.





2. Action Plan title

Renovation of heat pathways as well as trunk mains and distribution mains of drinking water and sewer networks in Visaginas municipality

2.1. Objective

Visaginas Energy ensures the production of heat and hot water, the extraction, improvement and supply of drinking water, sewage collection and treatment, and sludge management, while also optimizing the costs and incurred expenses in order to be profitable.

Particular attention is given to increasing the company's value. The company seeks to become advanced, operating according to market needs and providing high-quality services. During the implementation of the strategy, the company will modernize the heat and water management, and improve its image. The company will invest in new technologies, which will provide opportunities for reducing costs in the future, and correspondingly the prices of provided services. During the implementation of the strategy, it is planned to annually improve the dissemination and presentation of information by increasing the company's marketing and improving customer service.

The company will ensure the most efficient and best management practice, will ensure fair and competitive salary and the good environment.

2.2. Objective scope and targets values

Reconstruction of heat networks in Visaginas city.

The heat energy is supplied to the consumers of Visaginas municipality by ground and underground engineering networks. A part of centralized heat networks is modernized. Reduced energy losses; they make no more than 10% in renovated mains. An up-to-date problem remains the modernization of heating networks of some city areas, where no capital investments were made since the start of construction of the city (in 1975), i.e., for about 40 years.

Strategic directions of heat supply activities:					
Strategic aim. By optimizing the heat supply activities to also renew the existing fixed assets of the heat supply business.	E-01. Effect criteria: Reduced company losses, %.	2019	2020	2021	2022
		0.2%	0.2%	0.2%	0.2%
Goal: To renew heat supply networks by improving their condition, meeting the increasing requirements for reliability and stability of energy supply, and reducing heat energy losses.	R-01.01. Result criteria: The percentage of losses calculated from the reported quantity of heat: - initial value (2017) – 12.8%; - target value (2019-2022) – 12%.	12.6%	12.4%	12.2 %	12%
Objective. By increasing the efficiency of heat supply, to annually replace the old, worn out mains with new ductless pre-insulated pipes, also optimizing the diameter of the pipes.	P-01.01.01. Product criteria: Length of reconstructed networks, km	4.9	4.6	0.7	2.5

9.5 km old, worn out mains will be replaced by newly-built ductless pre-insulated pipes between 2019-2020; all this will reduce heat losses in the network and ensure the reliability of the heat supply to consumers.

By decision of the Visaginas Municipal Council in 2009, the reorganization of an open centralized heating system into a closed system was started. Since 2011, urban area I of the city of Visaginas has a closed heat supply system (236 heat stations with modern control and data-scanning technologies, representing about half of the city's consumers), while urban areas II and III have open type heat system (about 200 heat stations). The Visaginas municipality carries out a project VDH.02 "Modernization and updating of the centralized heating system" under the Ignalina programme. During this project, it is planned to replace the heat stations (~200) in the urban areas II and III, thus, the city of Visaginas would move to a closed centralized heat supply system (planned for 2019-2020).

The maintenance of two types of centralized heating systems requires additional costs. After the city of Visaginas transfers to a closed heating system, the company's costs for the preparation of the heating water will decrease.

A modern closed system of centralized heating will reduce energy losses, but energy consumption is likely to continue to decline (with effective, automatic adjustment), therefore, there is a forecasted that the quantity of heat energy production may decrease (about 5-10%), and likewise the Company's income.

Renovation of trunk mains and distribution mains for drinking water and sewer networks.

Due to the constant chlorination and fluoridation of drinking water from 1978 to 2007, sediment formed in the pipelines and the lower part of the steel pipeline has been affected by chemical corrosion. During the pipeline inspection after accidents, it was

found that on the surface of the steel pipes, on average per one meter of pipelines, there were 6 pipe indentations and craters from 2 to 6 mm deep. The pipelines are exposed to the hydrostatic pressure from the inside and the ground pressure from the outside. For this reason, the pipelines cannot withstand loads, many accidents happen, and it disrupts the supply of water to the users of Visaginas municipality, and it is necessary to discharge water from the repaired pipeline, resulting in significant water losses. Therefore, in order to increase the efficiency of drinking water supply, it is planned to renovate the networks each year according to plans.

Strategic direction of water supply and wastewater treatment activities:					
Strategic aim. To optimize the costs incurred by the company by modernizing infrastructure and upgrading equipment.	E-03. Effect criteria: Reduced company's costs for ongoing repairs and maintenance works, %.	2019	2020	2021	2022
		1%	3%	4%	4%
Goal: While optimizing water management activities, to renovate existing fixed assets (pipelines) of drinking water supply and sewage collection, reducing the losses of drinking water supply in trunk main networks.	R-03.03. Result criteria: Proportion of losses calculated from the amount of extracted water: - current value (2017) – 25%; - target value: 2022 – 20%. Reducing losses by 20% until 2022 the costs will reduce by Eur 200 thousand.	25%	24%	23%	20%
			2.7	2.0	3.3
Objective. To carry out renovation of trunk mains and distribution mains of drinking water and sewage collection.	P-03.03.01. Product criteria: Length of reconstructed networks, km				

2.3. The basis of the plan preparation

This document is prepared in accordance with the action strategy for 2018–2021 of the state enterprise Visaginas Energy approved by the Order No 4-59 of the Minister of Economy of the Republic of Lithuania

Target indicators

Task	Target indicator	Evaluation method
Reconstruction of heat networks in Visaginas city.	12.7 km	Reports
Renovation of trunk mains and distribution mains of drinking water and sewage collection	8 km	Reports

3. Implementation strategy

The company pays special attention to operational efficiency. Operational efficiency is aimed at lowering of service costs by optimizing the number of employees and implementing modern solutions in all areas of activity.

The strategic planning system of Visaginas Energy consists of the following interconnected key strategic planning documents:

- Action Strategy of the state enterprise Visaginas Energy;
- Strategic plan for the development of the management area (departments);
- Rolling plans.

Responsible persons for the preparation of plans: heads of departments of Visaginas Energy, Head of the Production Technology Department, Chief Accountant, Head of Economics Department, Senior Economist.

The General Manager of Visaginas Energy prepares and together with the annual financial report submits the annual activity report for the financial year of Visaginas Energy to the Ministry of Economy. The audit for annual financial statements and activities is performed by an audit firm selected in accordance with the procedures established by the Law on Public Procurement of the Ministry of Economy. After completing the audit of the annual financial statements and verifying that the company's activity report data is consistent with the annual financial statements, the auditor's conclusions and the audit report are submitted to Visagino Energija and the Ministry of Economy. Other audits of Visaginas Energy activity are carried out in certain cases according to the procedures established by law.

During the implementation of the strategy, the control of operational processes and expenses will be carried out and the expenses for the company's internal administration will be reduced.

3.1. Time schedule, budget and resources needed

The main source of the company's finances is the funds received from consumers for the provided services. Other sources of funding include the EU Structural Funds and the State Budget for the implementation of ongoing projects, as well as borrowed funds for the implementation of projects and the maintenance of working capital. The Visaginas Energy company calculates the investment required for the implementation of projects based on the submitted preliminary offers and then choosing the optimal option and price.

Task	Start of implementation - scheduled end	Responsible employee	Source of funding
Reconstruction of heat networks in Visaginas city.	2019-2022	Visaginas Energy	EU, company funds
Renovation of trunk mains and distribution mains of drinking water and sewage collection	2020-2022	Visaginas Energy	Company funds

4. Collaboration with stakeholders

During the implementation of the Strategy, Visaginas Energy plans to co-operate with the Visaginas municipality and the National Commission for Energy Control and Prices.

5. Monitoring strategy

In compliance with the requirements of laws, regulations and other legal acts in force in the Republic of Lithuania, the following will be ensured:

- reliable supply of heat and hot water, increase of production efficiency, monitoring, analysis and improvement of heat supply processes, thus, reducing technological losses;
- uninterrupted production of heating and hot water;
- introduction of modern and environmentally friendly technologies;
- uninterrupted drinking water extraction, supply and sewage collection, treatment and sludge management.

6. Risk management

Risk	Probability	Risk mitigation strategies
Lack of funding	Average	The length of the renovated sections will be planned according to the available funding
Personnel change	Average	The employees of the company are constantly provided with capacity building



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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

for Zarasai district municipality administration

English version

prepared by
Ignalina Nuclear Power Plant Region Development
Agency

PANEL 2050 – Partnership for New Energy Leadership 2050
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CENTRAL EASTERN EUROPEAN
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Priority area: Energy efficiency of public and apartment buildings, modernization of public spaces, buildings and street lighting, and business enterprises in terms of heat and energy economy

Zarasai district municipality administration

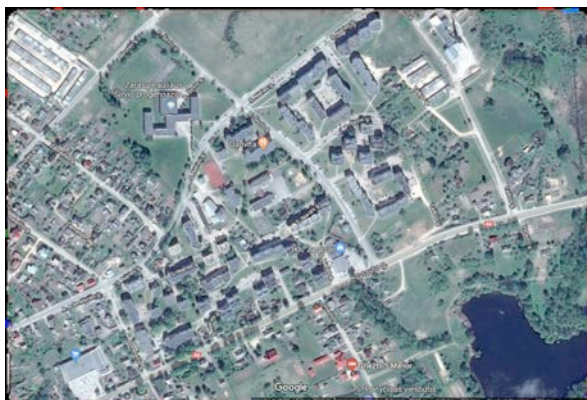
1. Introduction

Zarasai district is located on the north-eastern part of Lithuania 3 km from the state border with the Republic of Latvia and 23 km from the second largest city of Latvia – Daugavpils – which has about 100 000 inhabitants. Utilised agricultural area and forests prevail in the Zarasai district municipality. 38 percent of the district territory counts as the utilised agricultural area, 39 percent as forests, 11% as meadows and pastures.

The Zarasai district municipality is the least urbanized out of the three regional municipalities, therefore, the share of centralized heating here is small. Centralized heating is supplied to the towns of Zarasai and Dusetos, where mostly chips and sawdust are burnt, and where also stand fuel oil boilers.

The property of Zarasai District Municipality mostly consists of public and apartment buildings. Improvement of this area would allow more efficient use of energy resources and save costs that would be directed to other needs in the future.

A total of 90 apartment buildings are built in Zarasai. The largest concentration of apartment buildings is located in the north-eastern part of the city, i.e., 46 residential apartment buildings. So, precisely this urban area is chosen for the complex development in the near future.



2. Action Plan title

To renovate public and residential buildings and reduce pollution in the municipality of the Zarasai district

2.1. Objective

During the implementation of complex energy renovation of P. Širvio - S. Nėries urban area in Zarasai city it is planned:

- To renew (modernize) 16 residential apartment buildings;
- To renovate (modernize) the street lighting system of the urban area;
- To renew (modernize) a part of heat supply pipelines;
- To renew (modernize) internal infrastructure of the urban area;
- To install an electric vehicle charging station.

The project will improve the energy efficiency of buildings, reduce CO₂ emissions, improve the living environment of Zarasai, and improve the quality of life for the local residents. It is estimated that after implementation of the planned measures, the average heat energy savings of apartment buildings will reach about 50%. After installing LED lights and replacing cables, the electricity consumption will reduce. The modernization of heat pathways will reduce losses in networks.

2.2. Objective scope and targets values

After implementation of the project, it is planned to evaluate the following indicators: the actual thermal energy consumption for heating the house premises, kWh/year and kWh/m²/year; savings of kWh/year and EUR; payback, year.

Measure name	Unit of measurement	Number of units	Desired result
Promotion of a complex renovation / modernization of apartment buildings	Number of buildings / their useful area, m ²	16/28199.49	Reduce heat energy consumption by at least: 2027.85 MWh/year
Renovation and modernisation of street lighting network	Luminaires quantity / percentages	154/100%	Reduce electricity consumption by at least: 77.98 MWh/year
Changing of heat supply pathways	Pathway length, m / percentages	1039.80/29.8%	Reduce heat energy consumption by at least 185.75 MWh/year
Installation of electric vehicle charging stations	Units	1	Charging station with 4 spots for electric cars is fully set up

2.3. The basis of the plan preparation

The plan is based on a Feasibility Study on the Energy Efficiency Improvement of P. Širvio - S. Nėries urban area in Zarasai city, prepared by UAB "Eurointegracijos projektai" in 2018 and ordered by Zarasai District Municipality Administration. The Feasibility Study was

prepared in accordance with the Resolution No. 547 of the Government of the Republic of Lithuania on June 1, 2016: "On Approval of the Description of the Procedure for the Preparation and Implementation of Programs for Energy Efficiency Improvement in Urban Areas", and recommendations on the preparation of energy efficiency improvement programs for urban areas.

The planned implementation of the complex energy renovation project for P. Širvio - S. Nėries urban area in Zarasai city is in line with Zarasai District Municipality Development Strategy for 2015-2021, which includes measures related to energy efficiency improvement in the district.

Target indicators

Task	Target indicator	Evaluation method
Promotion of a complex renovation / modernization of apartment buildings	16 buildings	Contracts, implemented works
Renovation and modernisation of street lighting network	154 luminaires	Contracts, implemented works
Changing of heat supply pathways	1039,80 metres of tracks	Contracts, implemented works
Installation of electric vehicle charging stations	1 charging station with 4 spots for electric cars	Contracts, implemented works

3. Implementation strategy

The priority in the complex energy renovation project for P. Širvio - S. Nėries urban area in Zarasai city is given to the renovation (modernization) of apartment buildings. It is also important to upgrade (modernize) the district lighting system, heat pathways, the inner infrastructure in the specific urban area, and etc.

In order to implement the complex energy renovation project of the specific urban area, it is planned to prepare an Energy Efficiency Improvement Program for the mentioned urban area and set up a Monitoring Commission for the implementation of the Program, consisting of experienced staff of the municipality administration with all necessary competencies and experience in implementing this type of project.

During the implementation of the project information tools will be provided for the presentation of the project, its activities, project benefits, best practices and results to the target groups and the general public.

3.1. Time schedule, budget and resources needed

Task	Start of implementation - scheduled end	Responsible employee	Source of funding
Promotion of a complex renovation / modernization of apartment buildings	2019-2022	UAB "Zarasų būstas" (Zarasai Housing), Zarasai District Municipality Administration, residents of apartment buildings	Apartment building owners' funds; budget funds of Zarasai District Municipality; EU structural funds and State funds.
Renovation and modernisation of street lighting network	2019-2022	Zarasai town parish	
Šilumos tiekimo trasų keitimas	2019-2022	AB "Panevėžio energija" (Panevėžys Energy)	
Installation of electric vehicle charging stations	2019-2022	Zarasai District Municipality Administration, Zarasai town parish	

4. Collaboration with stakeholders

The participants of the complex energy renovation project for P. Širvio - S. Nėries urban area in Zarasai city are the following:

- Zarasai District Municipality Administration: carries out functions of public administration and public services assigned to it by laws and other legal acts;
- UAB "Zarasų būstas": carries out the functions of the common property administrator in apartment buildings and other premises;
- Zarasai town parish: carries out street lighting supervision;
- AB "Panevėžio energija" (heating network of the Zarasai district): produces and supplies heat energy to the residents of Zarasai;
- UAB "Zarasų vandenys": carries out the extraction, improvement and supply of drinking water to consumers, as well as sewage collection and cleaning.

5. Monitoring strategy

As these measures are included in the strategic plans of the municipality, the focus will be given to the implementation of the measure, to a collection of relevant indicators, evaluation of the fulfilment of the indicators, and adjustment of strategic and operational plans.

6. Risk management

Risk	Probability	Risk mitigation strategies
Lack of funding	High	As this is a large-scale complex measure, there is a high probability that there may be a lack of funding for different tasks. Then, the instrument should be split up and implemented gradually, by selecting a priority order.

Change in political decisions	Average	Due to the political changes, the continuity of decision making should be ensured by the inclusion of measures in the municipality's strategic and operational plans.
Low population involvement	Low	Greater involvement and support of the residents could be ensured by providing them with additional information, including them in the decision-making process, and through active publicity companies.



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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ENERGY ACTION PLAN

Ape County Municipality

prepared by:

Ape County Municipality

PANEL 2050 - Partnership for New Energy Leadership 2050

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

Summary

Energy planning is a continuous process of long-term development and planning, which involves assessing the current situation, determining the measures to be implemented and monitoring the results achieved. Based on monitoring results, actions to be carried out in the coming years are defined. Sustainable energy planning in the Municipality focuses on energy consumption and cost reduction, while promoting use of renewable energy resources. Energy planning applies to any activity of the Municipality related to the use of energy resources and raw materials.

Although the legislation of the Republic of Latvia does not require municipalities with a population of less than 10,000, which includes Ape County Municipality, to implement an energy management system, implementation of an energy management system might be economically feasible to these municipalities.

Utilising the opportunity to develop an energy plan on its own within the scope of the Project “Energy Management in Vidzeme” (*Energopārvaldība Vidzemē*), Ape County Municipality has decided to implement energy management in the County gradually by developing a pilot plan for a specific building – social care centre “Trapene”.

A task force was established to develop the pilot plan, which was comprised of the head of the Technical Unit of SCC “Trapene”, the head of the Utilities Unit of the Municipality's Agency, the accounting economist of the Municipality and the head of the Territorial Development Unit.

During the course of development of the pilot project, six out of twenty-six buildings heated by the Municipality were selected for the comparison of accounting data. Since SCC “Trapene” had the largest specific energy consumption, this building was selected for the development of the energy management pilot project. The pilot plan analyses the current situation in SCC “Trapene” in the field of energy resources consumption, provides recommendations for improvements, defines results to be achieved and presents a monitoring program.

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Introduction

The Energy Efficiency Law¹ adopted in 2016 stipulates the right of local governments to develop and implement an energy efficiency plan that includes certain energy efficiency objectives and measures. An energy management system may be developed and introduced as part of implementation of this plan or separately (in accordance with ISO 50001).

Energy management is an effort to effectively achieve energy efficiency through the use of available resources. It is a systematic control of energy consumption with the aim of reducing it, which leads to the search for the most economically efficient solutions for the management of municipal sites by improving the level of energy efficiency and, in the long term, reducing financial costs and CO₂ emissions. An Energy Management System (EMS) includes various tools, guidelines and procedures that enable the Municipality:

- to make systematic recording and analysis of energy consumption data;
- to determine the necessity of energy efficiency measures at municipal sites, and prioritize them;
- to know the energy efficiency indicators of municipal sites in order to plan new measures and assess the performance of the implemented energy efficiency measures in them;
- to be able to manage municipal structures and other infrastructure included in the EMS in a rational manner, reducing energy costs and channelling savings for development.

The main principles of energy management are defined in LVS EN ISO 50001: 2017. It is a European standard, which has been adopted as a national standard without any modifications to its content. The standard defines and determines the areas that an organisation needs to take into account when designing an energy management system, including by identifying the responsibility of the organisation's management and other stakeholders, developing an energy policy, etc.

¹ Para II and III of Section 5 of the Energy Efficiency Law (effective as of 29.03.2016), published in "Latvijas Vēstnesis", 52 (5624), 15.03.2016

Vidzeme Planning Region

Action plan: Ape County Energy Management Pilot Plan

1 Objective

The objective of the Plan is to reduce energy consumption by 2% each year, compared to baseline consumption, to reduce heating energy consumption by 4% each year, compared to baseline consumption, and to reduce water consumption by 1% each year, compared to baseline water consumption in the building of social care centre "Trapene".

1.1 Objective scope and targets values

Table 1.1

Indicators for achievement of annual targets %

Type of energy resource	Unit of measure	Baseline value	Annual savings %
Electricity	MWh/per year	67.03	2
Resources for heating	MWh/per year	348.74	4
Water	M ³ / per year	3935	1

The procedure for determining baselines, the description of the selected building and the background for selecting the particular building is given in the section below.

1.1.1 Legal background

- Laws and regulations of the Republic of Latvia – Section 5 of the Energy Efficiency Law, which states that local governments have the right to: 1) develop and adopt an energy efficiency plan as a separate document or as a component of the spatial development programme of a local government, which includes energy efficiency targets and measures; 2) separately or as a component of the implementation of its energy efficiency plan put in place an energy management system;
- Cabinet Regulation of 12.12.2000 No. 431 "Hygiene Requirements for Social Care Institutions".

- Cabinet Regulation of 09.07.2013 No. 383 "Regulations for Energy Certification of Buildings".
- municipal planning documents – Ape County Development Program for the Period from 2014 to 2020; order No.A/3-07/ 33 of municipality management of 14.03.2018 "On the Development of an Energy Efficiency Plan for Social Care Centre "Trapene"".

1.1.2 Description of the selected building

Laws and regulations do not currently render compulsory for small municipalities to develop an energy management plan and implement it. Ape County Municipality is also a small municipality. Taking into account the rapid growth of energy prices and to contribute to the reduction of the greenhouse effect, Ape County Council has decided to initiate the introduction of energy management measures.

It is planned to implement energy management in the County gradually by developing an energy plan as a pilot project for one building – social care centre "Trapene". Figure 1.1 shows the care centre.



Figure 1.1. SCC "Trapene"

Figures 1.2, 1.3, 1.4, 1.5, 1.6 show separate technical solutions that characterise the current state of energy consumption in SCC "Trapene". Figure 1.2 shows that convection type heaters with the option to control the amount of flow of the heat carrier are installed.



Figure 1.2. Installed radiators with thermostats

Figure 1.3 shows the state of the kitchen ventilation system and the technical solution. Figure 1.4 shows that the Centre still has old wooden windows, which cause considerable heat loss as they are not sealed. Figure 1.5 shows the boiler rooms of the Centre in which the heat carrier pipes are insulated. Figure 1.6 shows that the Centre is equipped with energy-efficient LED lighting.



Figure 1.3. Kitchen ventilation system



Figure 1.4. Old wooden windows without sealing



Figure 1.5. Boiler room



Figure 1.6. New LED lighting fixtures

The particular building has been selected for the pilot project of the energy plan due to the following considerations:

- it is the only building that operates without interruption 24 hours a day throughout the year;
- the building has a higher energy consumption due to the building's operating profile, because the clients need a higher room temperature regime;
- several types of energy resources for heating – electricity, firewood and pellets – are used simultaneously in the building.

1.1.3 Energy assessment (historical energy consumption)

In order to determine the strengths and weaknesses of buildings that would help to set realistic and relevant targets, it is important to understand the current situation. One of the most important stages for this analysis is the determination of the historic energy consumption. The following steps were taken:

1. analysing the consumption of firewood, heating pellets, electricity and water for 2015, 2016 and 2017 after accounting data;
2. calculating the theoretical amount of energy consumed by heating after accounting data.

Since none of the buildings has a heating meter installed, a publicly available energy consumption calculator was used in the calculations. According to this calculator, the calorific value per ton of pellets is assumed to be 4.0 MWh, the produced heat is 3.2 MWh at boiler efficiency of 0.8; the calorific value per cubic meter of wood at 30% moisture is 2.38 MWh and boiler efficiency at 0.6 is 1.43 MWh.

To make sure that the building in question has been selected correctly, data about five other municipal buildings – Dāvis Ozoliņš Ape Secondary School, Pre-school “Vāverīte”,

Ape County Council Building, Vireši Gathering House and J.Vītols Memorial Museum "Anniņas" – were collected.

For easier visualisation, collected data are summarised in comparative diagrams. The diagrams in Figure 1.7 show that the largest monthly consumer of electricity in winter is Ape Secondary School, whereas the consumption of SCC "Trapene" is more balanced by months and is the highest in summer months. Furthermore, Figure 1.8 shows that SCC is the highest consumer of water in the entire County throughout the year. Figure 1.9 shows that SCC has the highest heat consumption per heating unit.

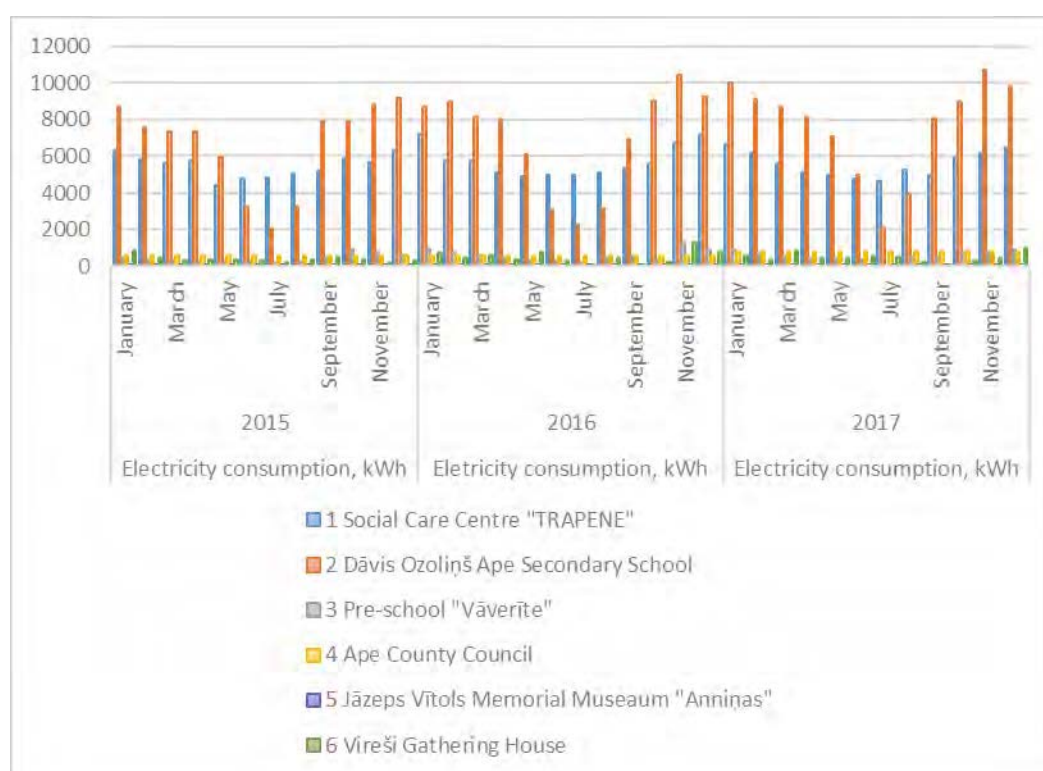


Figure 1.7. Historical energy consumption of different municipal buildings, kWh/per month

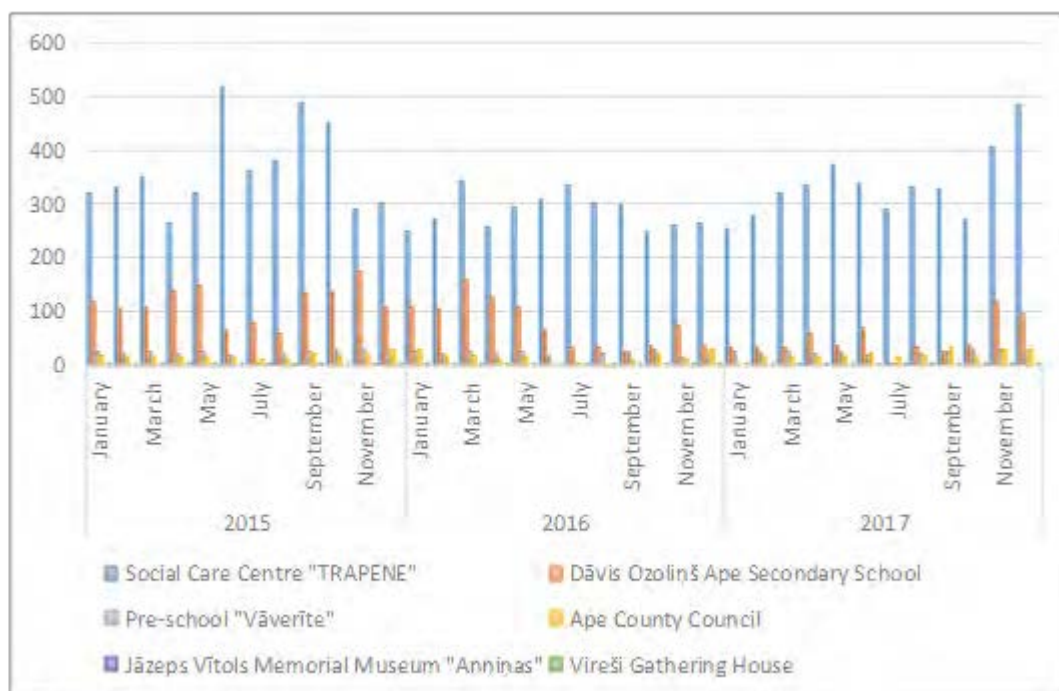


Figure 1.8. Historical water consumption of different municipal buildings, m³/per month

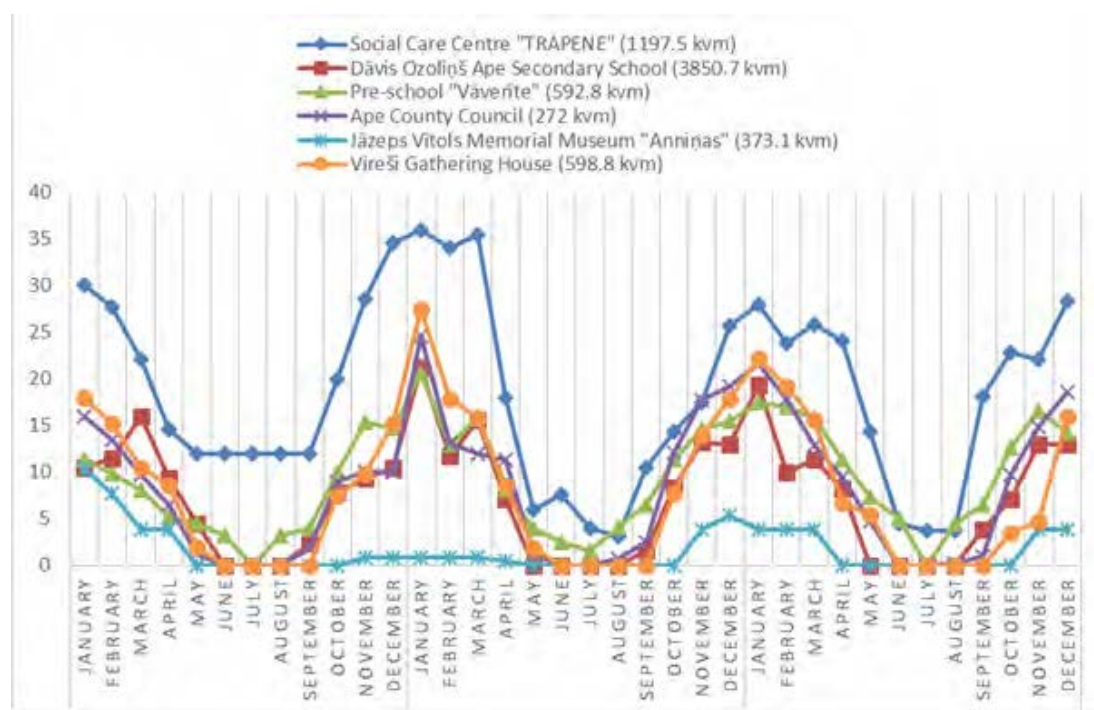


Figure 1.9. Historical specific heat consumption of different municipal buildings, kWh/m² per month

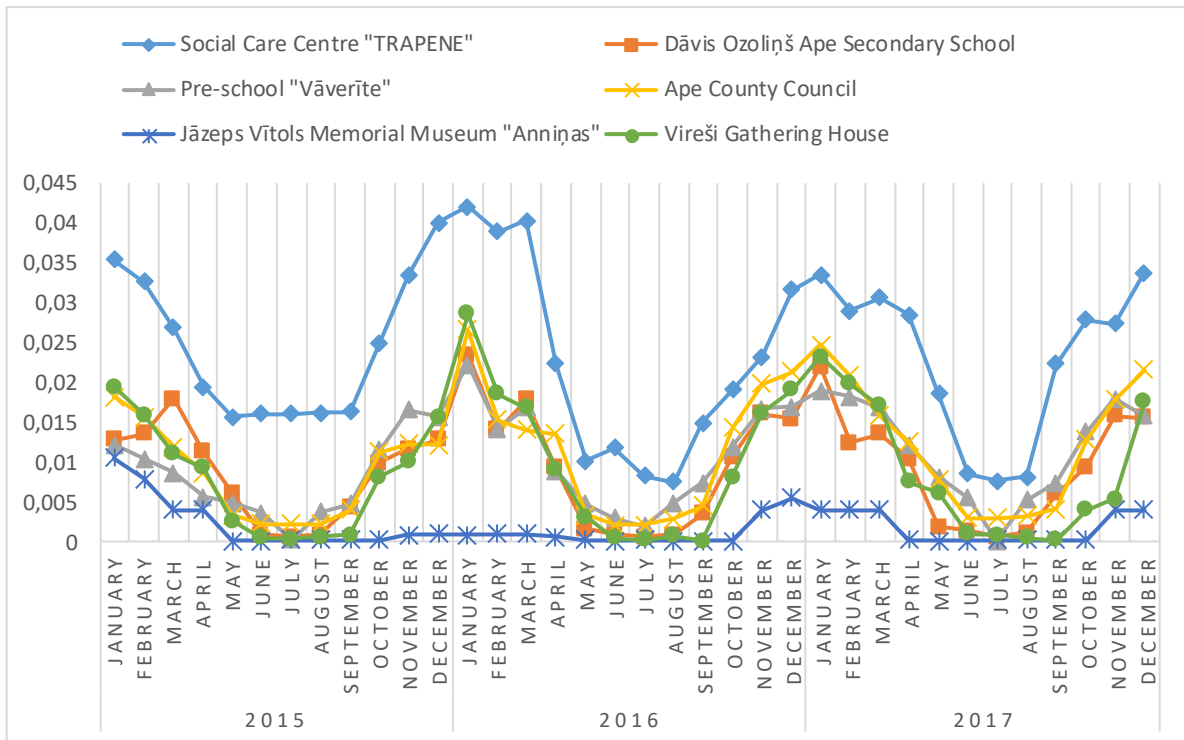


Figure 1.10. Historical specific energy consumption of different municipal buildings, MWh/per month

A separate diagram has been developed for electricity used for heating purposes (Figure 1.10), since each building has its own specific energy consumption. For example: A lot of energy in SCC "Trapene" and Ape Secondary School is used to operate kitchens that are not in other buildings.

It can be concluded from the diagrams that the largest consumer of energy and heat resources in winter is Apes Secondary School, while SCC "Trapene" is less cyclic, with the specifics that premises are heated in summer months too.

1.2 Target indicators

Energy performance indicators reflect the specific energy consumption per square meter of the building or another unit.

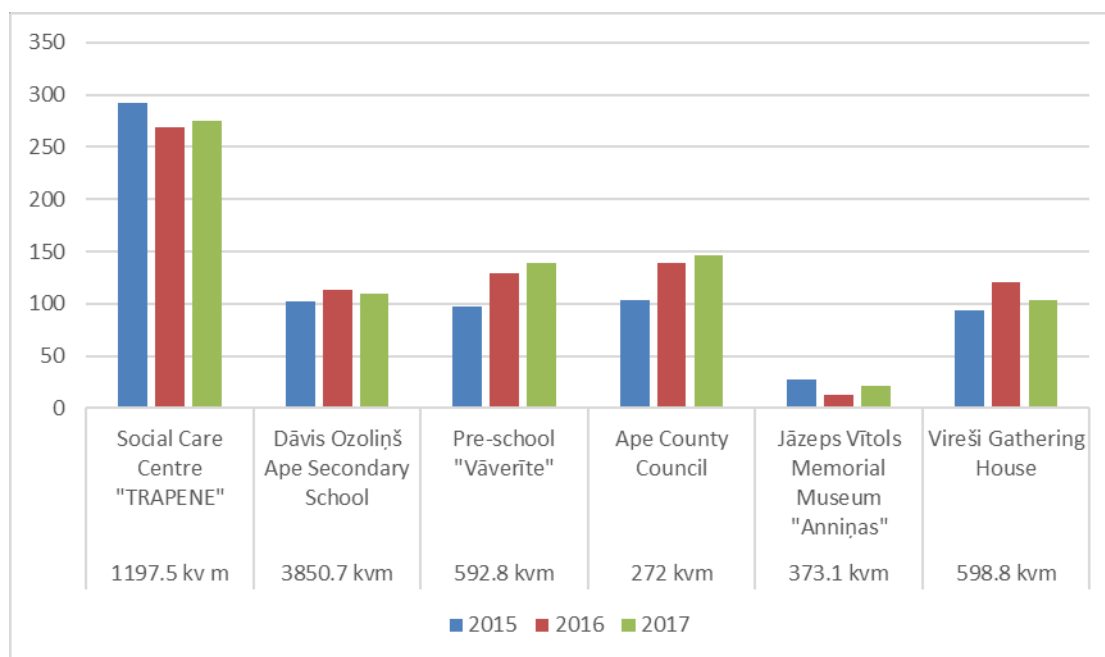


Figure 1.10. Specific heat consumption of different municipal buildings, kWh/m² per year

Table 1.2

Baselines for electricity, heat and water in SCC "Trapene"

Type of energy resource	Unit of measure	Baseline value
Electricity	MWh/per year	67.03
Heat	MWh/per year	348.74
Water	M ³ /per year	3935

The average consumption of 2015, 2016 and 2017 is determined as the baseline energy consumption. The margin of the energy management plan is determined within the boundaries of one municipal building. The main accounting and evaluation indicators are determined as follows:

- electricity consumption;
- firewood consumption;
- heating pellets consumption;
- water consumption.

The Ape County Energy Management Pilot Plan has been developed on the basis of the Manual on the Methodological Guidelines for the Implementation of an Energy Management System developed by the Ministry of Economics.

2 Implementation strategy

2.1 Main activities

The Action Plan provides for the assessment of the building's technical condition, estimates of the necessary funds, improvement of the building's technical condition and energy efficiency, raising awareness of clients and employees, as well as data collection and analysis activities.

To identify the main steps to be taken, the technical condition of the building of SCC "Trapene" was assessed. A visual assessment was carried out by a task force. A superficial inspection of the building revealed a number of necessary improvements, as listed below, but all of them cannot be realised within this planning period due to lack of funding and human resources, therefore the most urgent and most realistic works have been selected and included in the Action Plan.

The building of social care centre "Trapene" was built 40 years ago as a kindergarten. Unfortunately, it served only 15 years for its initial purpose. As the number of children decreased, its role declined until it was closed. For five years the building was uninhabited. Then a disaster struck the neighbouring county – the old manor building burnt down, where a nursing home was established. The renovation of the manor building required very large funds. A decision was made to look for other premises for the care centre. The choice fell on the kindergarten in Trapene, which was adapted to the needs of a care centre.

In order to better assess the technical condition of the building, its assessment has been modified in the form of a Table (2.1), indicating both positive and negative indicators.

Table 2.1

A summary of results of the simplified inspection of SCC "Trapene"

No.	Constructive element of the building, description, assessment	Improvements made	Improvements necessary
1.	Foundation - monolithic reinforced concrete 60 cm	Not made	Insulation of foundation needed
2.	Walls – brick 64 cm	Not made	Thermal conductivity measurements are required to assess the need for insulation measures
3.	Wooden windows in the stairways, plastic windows in	Old wooden windows have	Replacement of the remaining wooden windows necessary.

	other rooms	been replaced by plastic windows, improving heating indicators	It is necessary to insulate window gaps and assess the quality of the built-in windows, as freeze-through has been observed
4.	Doors	Separate doors have been replaced by plastic doors	Exterior doors need to be replaced to improve heat regime
5.	Roofing – the roof was designed as an interconnected structure	Roof covering has been renewed	Thermal conductivity measurements are required to assess the need for insulation measures
6.	Double-piped heating system, heating units – pipe-type convectors with the protective plate removed	Most radiators have been replaced by controllable convector radiators	It is necessary to complete the replacement of all radiators
7.	Boiler room, heating boilers. 1 pellet boiler with 100kW power used for boiling water and 100 kW wood boiler for heating have been installed. The boilers operated continuously, giving heat to the network, as there are no accumulation tanks	Restoration of pipework of boilers has been performed	It is necessary to install an accumulation tank for the accumulation of hot water
8.	Hot water supply system – iron double pipe, without heat insulation	None	Full system rebuild is required
9.	Lighting – daylight fixtures with 40W tubular bulbs	Replacing of old lighting fixtures with LED systems has been started	It is necessary to complete the replacement of the entire lighting system with a LED system
10.	Natural ventilation without recuperation, forced ventilation in the kitchen	None	Install recuperators as much as possible

Other problems identified:

- financial – no firewood reserves are created to ensure its drying for two summer seasons, insufficient capacity of the firewood shed to store firewood sufficient for two years;
- staffing – there is not always a cautious attitude towards the use of electricity and heat;
- clients – the balanced heating system is re-adjusted regularly.

2.2 Step by step description

Although much more needs to be done in the future, short-term measures that do not require large investments but allow for a gradual introduction of an energy management system in the County were selected for this plan.

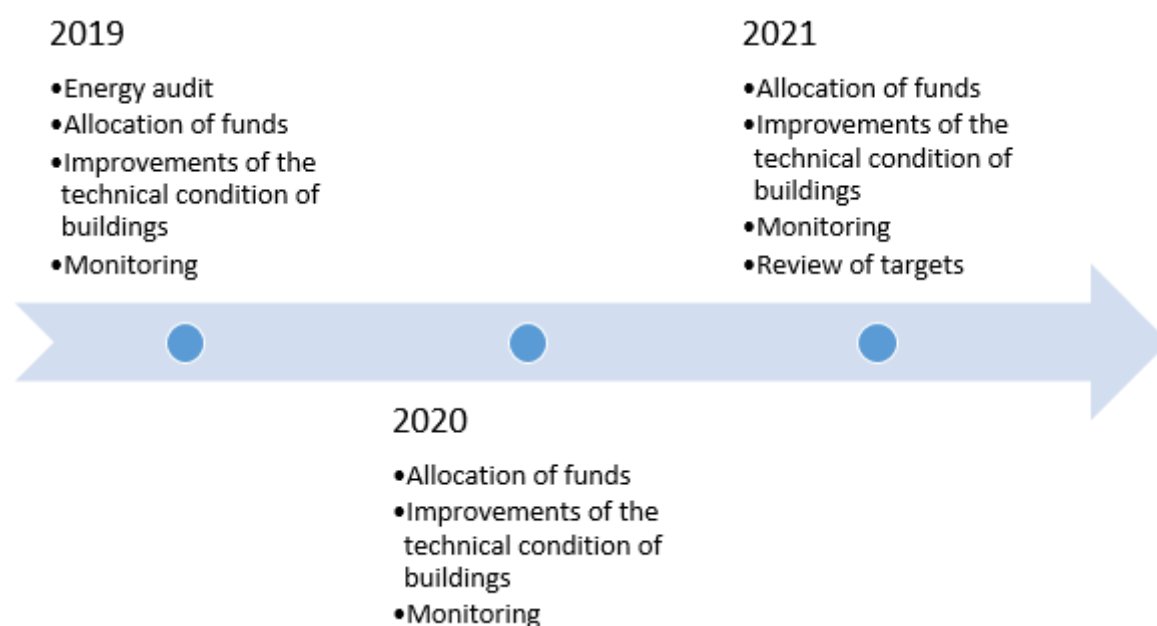
Table 2.2

Action plan

No.	Action	Results to be achieved	Timeline	Responsible employees
1.	To carry out complete technical inspection of the building, energy audit. To determine the amount of investment, the target effect, payback time	Information is obtained on the works to be performed, costs thereof and the results to be achieved. Allows to assess the resulting effect and to decide on the utility of investment	2019	Council management, Territorial Development Department
2.	Allocation of financial resources to improve the technical condition of the building	The technical condition of the building improves, expenses for maintenance of the building are reduced	Each year as possible	Council management, deputies
3.	Allocation of financial resources for the creation of firewood reserves	Consumption, costs for firewood are reduced	2019	Council management, deputies
4.	Improvement of the building's technical condition (construction works)	The technical condition of the building improves, expenses for maintenance of the building are reduced	Each year as possible	Management of the institution, technical staff

5.	Informative and interpretive work with the staff, employees and clients.	To encourage the staff, employees and clients to use energy resources more efficiently and carefully.	Each year	Council management, management of the institution, energy management task force
6.	Compilation of monitoring data once a month, preparation of information for the staff of the institution	To have a vision of actual consumption of energy resources and financial resources	Each month	Accounting staff
7.	Data analysis and preparation of proposals	To get an idea of the results of the measures takes, to make proposals for further action	To draw up a budget request for the next year once a year	Staff of the Territorial Development Department and management of the institution, energy management task force
8.	Determination and approval of indicators to be achieved in the next period	To determine indicators to be achieved in the next period, to allocate appropriate financial resources	To draw up a budget request for the next year once a year	Staff of the Territorial Development Department and management of the institution Council management, deputies, energy management task force

2.3 Time schedule



2.4 Budget and resources needed

In order to achieve the targets set out in the Action Plan, the main resources required are human resources due to the need to implement a data collection and analysis habit, and it is necessary to communicate with stakeholders on changing habits and smart use and management of buildings. The next step is to invest the resources saved from effective management into technological energy efficiency measures. At the moment the amount of savings is not clear. When the Plan is put into action and starts to operate, work with the management and reservation of the necessary funds and allocation to measures of the Action Plan and its future versions will begin.

3 Collaboration with stakeholders

There are separate records on energy efficiency in the current planning documents of Ape County “Ape County’s Sustainable Development Strategy for 2013-2030” and “Ape County’s Development Program for 2014-2020”, stating specific measures for the restoration of municipal buildings. The planning documents do not contain a separate section on energy policy, there are no targets for the efficient use of energy such as firewood, electricity and water. The energy management pilot plan to be developed will provide a concrete example for Ape County in the case that the implementation of an energy management system has a positive impact on the Municipality’s budget, and will promote the introduction of energy management throughout the County. Amending of the Municipality’s development program has begun. It will include a section on municipal energy targets.

The energy management plan is to be implemented as part of the Municipality’s development program. The development program is currently underway and will be supplemented with a section on energy management. When developing these amendments

to the program, the procedure for the introduction and operation of energy management will be defined. Consequently, this pilot plan sets out the main guidelines.

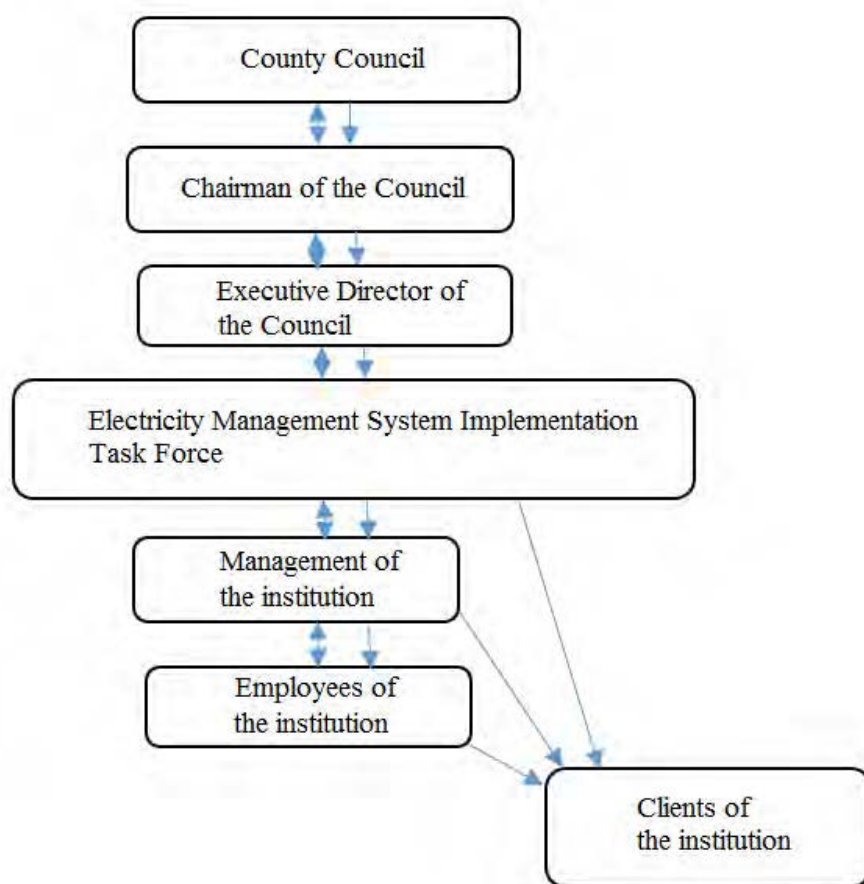


Figure 3.1. Communication with stakeholders

Ape County Municipality does not plan on engaging staff with special qualifications and competence requirements in the scope of implementing energy management measures. The staff of the Municipality to be engaged in energy management measures are properly qualified for their direct duties. Training workshops will be organised to specify the performance of work related to energy management. Development of an energy certificate, development of a building design and other work will be purchased as a service. Figures 3.1 and 3.2 show the scheme of the roles and responsibilities of the various participants of the implementation of the Action Plan.

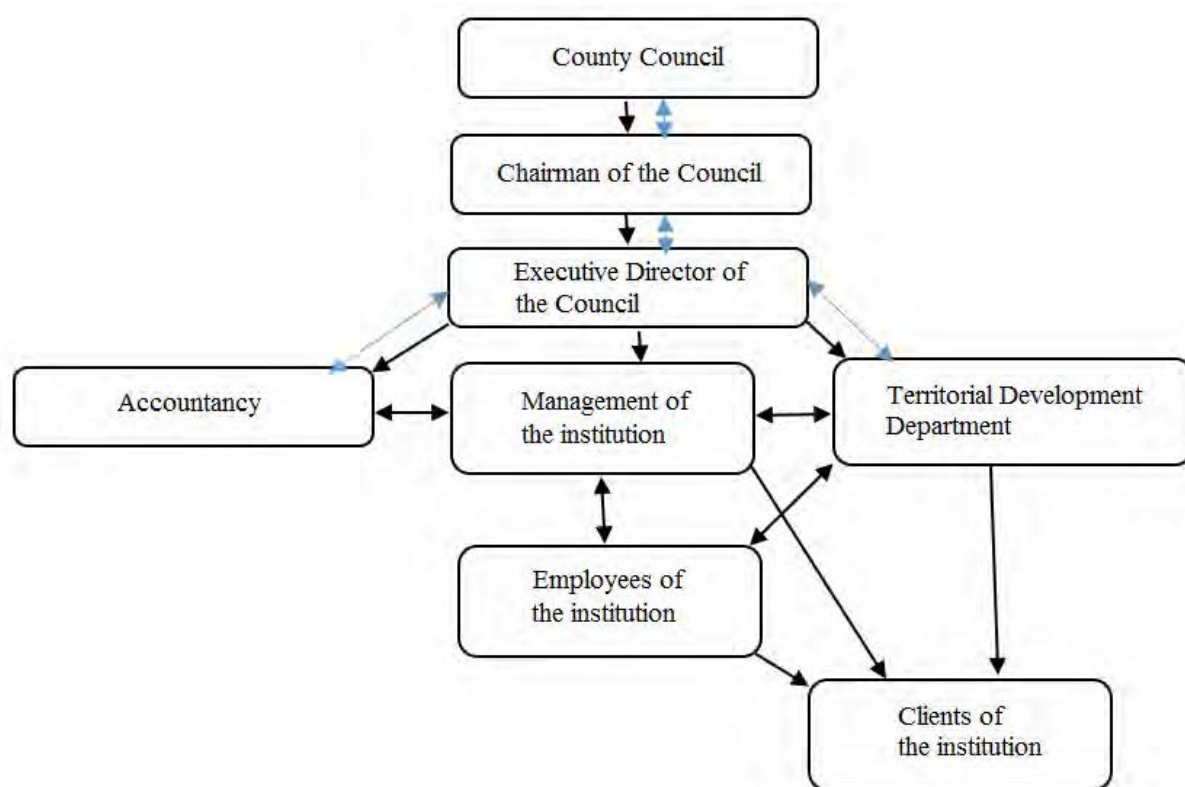


Figure 3.2 Management of Implementation

Stakeholders engaged in energy resources supply, management and use, their roles and responsibilities, as well as the impact assessment of these persons in each stage of supply, management and use are presented in Table 3.1 below.

Table 3.1

Stakeholders engaged in energy resources supply

Stakeholder	Type of impact on the supplied resource and use				
	Quality	Price	Frequency of supply	Resources management	Final consumption of resources
Relevant to all types of resources					
Decision-making power of the Municipality	Significant when setting requirements for employees	Medium impact when allocating funds	Insignificant	Significant when setting requirements for employees	Significant when setting requirements for employees

Municipality's Procurement Commission	Significant when setting requirements for procurements	Medium impact when setting requirements for procurements	Medium impact when drawing up contracts	None	None
Municipality's accountancy	None	Insignificant – timely payment of invoices, avoidance of penalties	Insignificant – timely payment of invoices to avoid creating doubts to the supplier	None	None
Technical staff	Significant, it must be ensured that resources are received and their quality is checked	None	Insignificant –	Significant – proper preparation, storage, use	Significant, proper consumption, accounting and control
Servicing staff	None	None	None	None	Significant
Clients – amount consumed	None	None	None	None	Significant
Supplier	Significant	Significant	Significant	Insignificant	None

4 Monitoring strategy

The energy management system must always be up to date. This means that the results obtained shall be assessed once a year after receiving the annual statement. The Action Plan shall be updated on the basis of this. In the course of updating, new, up-to-date actions can be added or ineffective actions can be excluded. When assessing the results, target values to be achieved within a year can be changed.

Each month, heating pellet consumption data, water consumption data, as well as electricity consumption data from the meter shall be collected and entered into the database. Employee and client habits will also be monitored regularly and it will be assessed, whether they observe the change of habits prescribed by the Plan. In case of unusually high or low consumption, an in-depth analysis of the situation shall be carried out to find the causes.

The executive director of the Municipality shall carry out the monitoring of the implementation and operation of the energy management system.

5 Risk management

Risk	Probability of realising	Mitigation measure
Lack of financial resources	High	The task force thoroughly evaluates the measures provided for in the Plan, their efficiency and payback time before allocating funds; careful budget planning
Lack of human resources	High	Prior to defining each sub-target and task, the task force appoints the responsible persons and evaluates their suitability and performance capacity; systematic planning of measures, ensuring more efficient use of human resources
Unreachable targets	Medium	The energy manager, with the support of the task force, thoroughly assesses the current situation in order to identify shortcomings and realistic targets
Weak communication, information about measures does not reach stakeholders	Medium	Carefully designed communication and information transfer procedures; active involvement of management by showing the stakeholders an example and creating the feeling that the implementation of the plan is important; to plan motivating and engaging activities to promote people's involvement and awareness raising
Monitoring measures are not carried out in the required quality	Medium	To develop precise procedures and steps for data reading and analysis, as well as to appoint specific persons to read, record and analyse data; to require regular reports from the task force and management.

Contact

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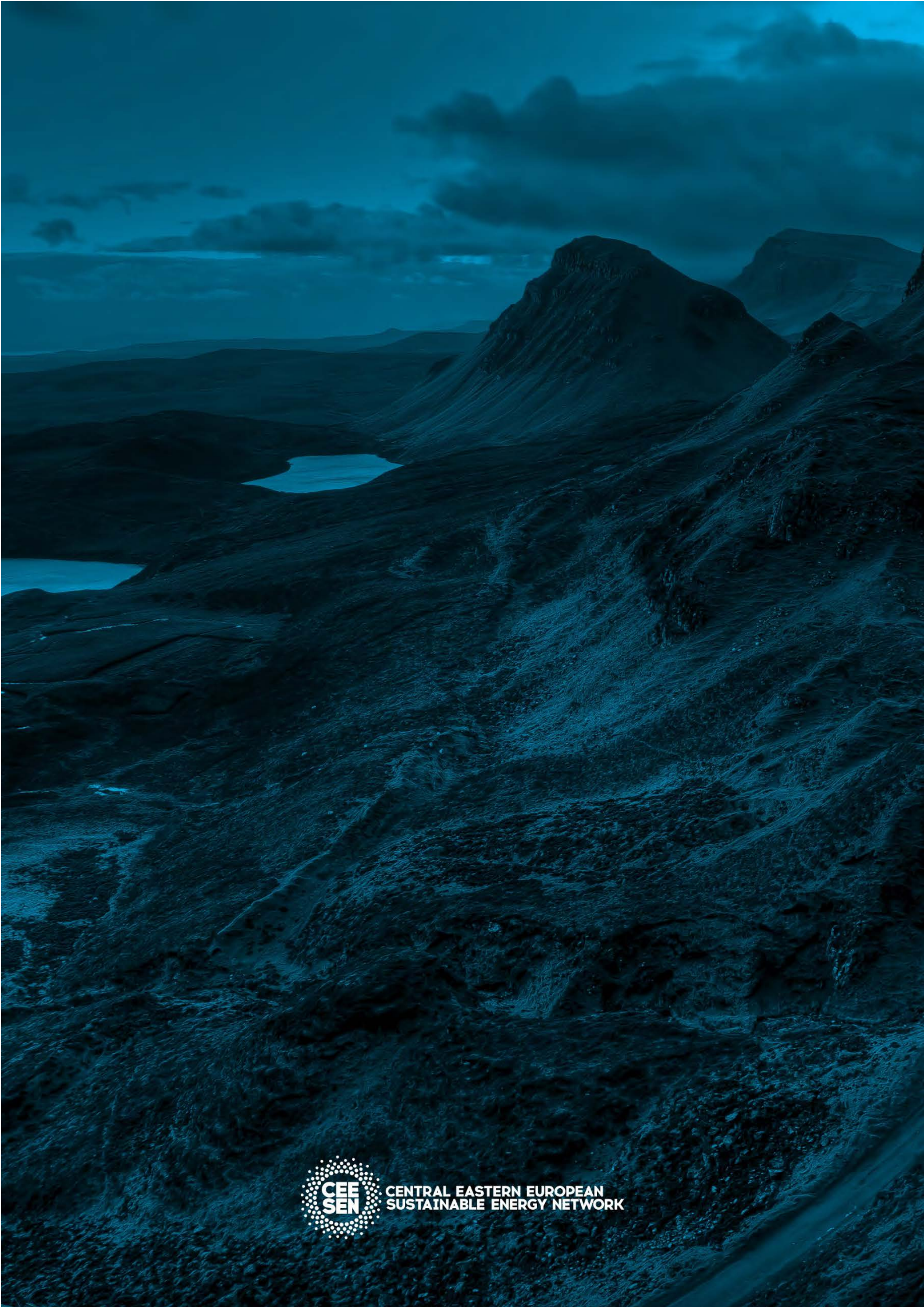
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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ENERGY ACTION PLAN

Cesvaine County Municipality

prepared by:

Cesvaine County Municipality

PANEL 2050 - Partnership for New Energy Leadership 2050

Deliverable 3.7

Date: August 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Introduction

On 19 March 2018 Order No. 11 "On the Development of an Energy Efficiency Plan for Cesvaine County" was issued. Composition of the energy efficiency plan task force:

- the responsible executive director of the Council of the top management of the development of the energy efficiency plan;
- the spatial planner of the maintainer of the energy efficiency plan (energy manager);
- Board member of SIA "Cesvaines siltums";
- head of the Technical Unit;
- Economist.

Municipal site included in the energy plan – **boarding school** at Augusta Saulieša Street 1, Cesvaine.

Municipal sites included in the energy report:

- Boarding school at Augusta Saulieša Street 1, Cesvaine;
- Cesvaine pre-school "Brīnumzeme" Celtnieku Street 1, Cesvaine;
- Cesvaine School of Music and Art at Celtnieku Street 1, Cesvaine;
- Cesvaine Social Service at Rīgas Street 4, Cesvaine;
- Sports Hall at Saules Street 2A, Cesvaine;
- Building at Augusta Saulieša Street 9, Cesvaine.

Every year, it would be necessary to submit an overview report on the execution of tasks and achieved results in the field of energy management. General energy targets of the Municipality:

- To reduce electricity and heat consumption in municipal buildings;
- To train employees in the field of energy management;
- To implement a common energy consumption accounting system;
- To introduce up-to-date and innovative solutions;
- To reduce the impact on climate change;
- To promote resident's involvement in dealing with energy management issues.

Vidzeme Planning Region

Action plan: Cesvaine County Energy Plan for 2018-2025

1 Objective

Short-time (1 year) objective: to reduce electricity and heat consumption in the boarding school by 3% by 1 September 2019.

Medium-term (5 years) objective: to implement a common energy consumption accounting system, to collect energy consumption data on a regular basis.

Long-term (2025) objective: to reduce the total energy consumption in Cesvaine County with the help of the implemented solutions.

1.1 Objective scope and targets values

1.1.1 Legal background

National legislation binding to Cesvaine County in the field of energy planning:

- Energy Efficiency Law effective as of 29 March 2016;
- Sustainable Development Strategy of Latvia until 2030;
- National Development Plan of Latvia for 2014-2020.

Cesvaine County Council has not issued binding regulations related to energy management in Cesvaine County. To promote residents' involvement in dealing with energy management issues, it would be necessary to find the opportunity to support the residents. Cesvaine County Council might issue binding regulations on the amount of co-financing of Cesvaine County Council and the procedure for allocating it for the implementation of energy efficiency measures for apartment buildings, which could motivate the residents to participate in energy management.

1.1.2 Description of the County's buildings

Cesvaine County is located in the northeastern part of the Republic of Latvia and eastern part of Vidzeme Upland. Its territory shares a border with Madona and Gulbene Counties. After the administrative territorial reform of 2009, the area of Cesvaine County (the total area of the County is 190.5 km²) includes Cesvaine Town and Cesvaine District. According to the Office of Citizenship and Migration Affairs, 2601 residents were registered in Cesvaine County as at 1 January 2018.

The Municipality owns 41 buildings in Cesvaine County, 7 of which have been renovated and rebuilt since 2007 (County Council's building, library, gathering house, social service, pre-school and music and arts school, secondary school, sports hall). Major repairs performed in municipal buildings: insulation of buildings, roof replacement, interior repairs, etc. They have mostly been co-financed by various projects.

1.1.3 Energy assessment (historical energy consumption)

In order to determine the strengths and weaknesses of buildings that would help to set realistic and relevant targets, it is important to understand the current situation. One of the most important stages for this analysis is the determination of the historic energy consumption.

The total energy consumption in all selected buildings is similar, but in 2016 it was slightly higher. In 2016, the average heating season temperature was lower (-0.7°C) than in 2015 (1.6°C) and in 2017 (0.3°C) (see Figure 1.1).

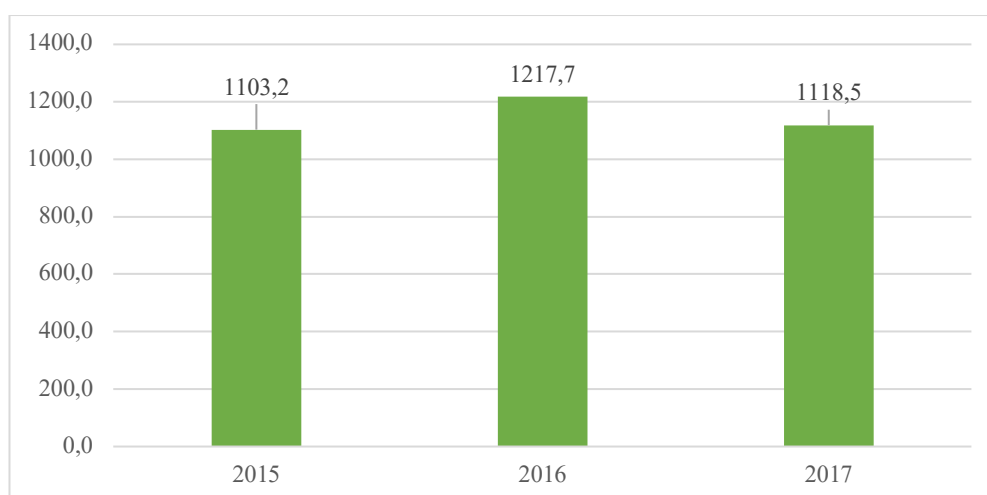


Figure 1.1. Total change in energy consumption (MWh) by year in all selected buildings together

The largest part (over 90%) of the total energy consumption in 2017 was distributed to the heating energy of buildings (see Figure 2.2).

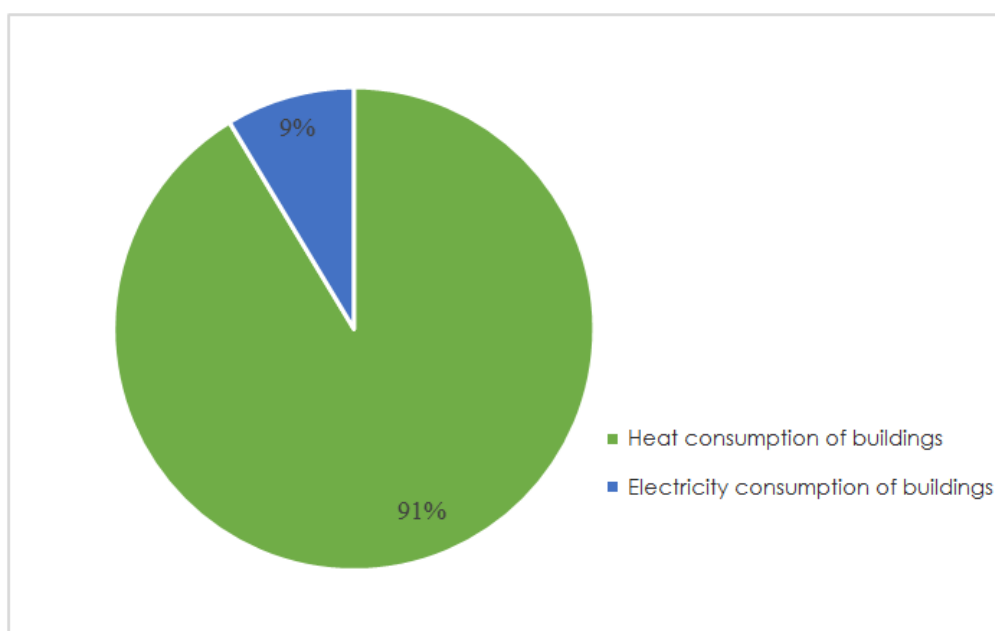


Figure 2.2. Breakdown of total energy consumption (%) by type of energy in 2017

In the period from 2015 to 2017 the sports hall had the highest average specific energy consumption (213.8 kWh/m²) (see Figure 3.3). The sports hall is old and has not been reconstructed, therefore it is not energy efficient. In the period from 2015 to 2017 Cesvaine Music and Arts School had the lowest average specific energy consumption (118.7 kWh/m²). Cesvaine Music and Arts School is located in the same building as the pre-school, which has been renovated.

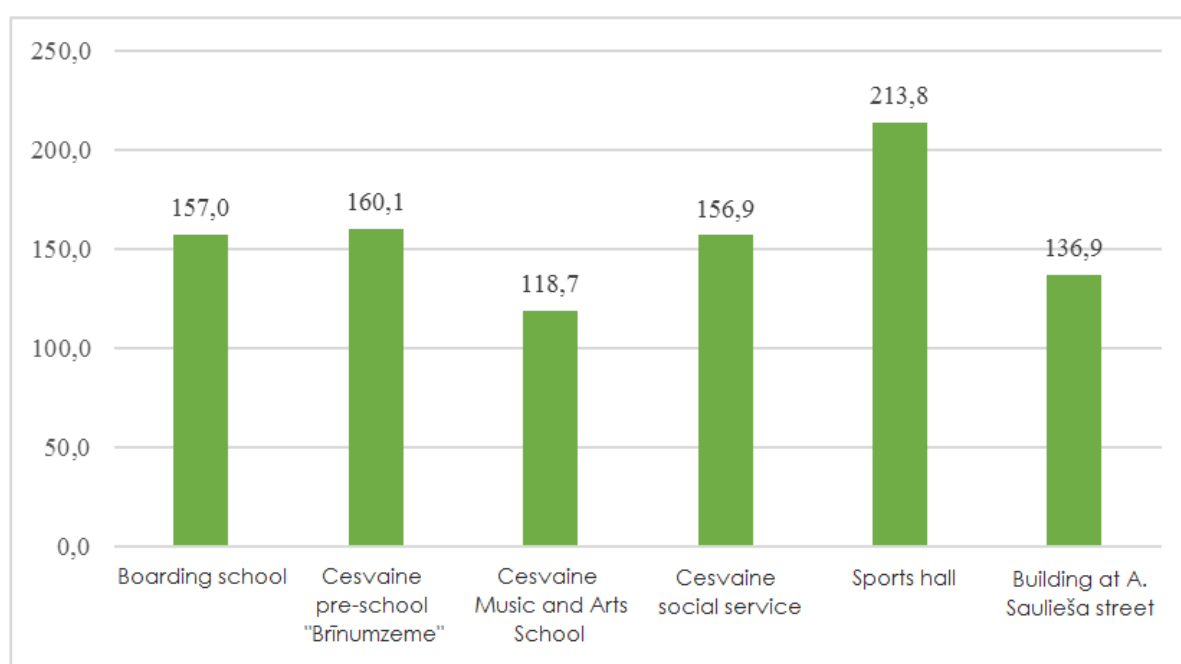


Figure 3.3. Average specific energy consumption in 2015-2017, kWh/m²

Having assessed 6 selected municipal buildings according to various criteria (see Tables 1.1 and 1.2), the energy plan mostly includes activities that will improve the overall state of the boarding school at Augusta Saulieša Street 1, Cesvaine. Although it would be

necessary to introduce changes in all municipal buildings, this must first be done in those buildings that need changes in order for them to be able to carry out their key functions.

Table 1.1

Building assessment per criteria (qualitative)

Name of building	Information on criteria				
	Availability of energy data and information of the building	Value of the specific energy consumption of the building	Building has been renovated/h as not been renovated	Building has been renovated within the scope of CCFI or another program and reaches/does not reach the specified savings	Is the building necessary to provide municipal functions?
Boarding school	No energy audit performed	164.3	Not renovated	None	Yes
Cesvaine pre-school "Brīnumzeme"	Energy audit performed	163.7	Renovated	Has been renovated, does not reach savings	Yes
Cesvaine Music and Arts School	Energy audit performed	131.2	Renovated	Has been renovated, reaches savings	Yes
Cesvaine social service	Energy audit performed	115.5	Renovated	Has been renovated, reaches savings	Yes
Sports hall	No energy audit performed	198.1	Not renovated	None	No
Building at A.Saulieša Street	Energy audit performed	139.1	Not renovated	None	Partially

Notes: Based on the information provided by the State Construction Control Bureau of Latvia, in Latvia as of 01.03.2018 the average specific heating consumption of office buildings was 115.63 kWh/m² per year and educational institutions – 154.13 kWh/m² per year.

The specific heating energy consumption of renovated buildings should be around 100 kWh/m² per year or lower.

Table 1.2.

Building assessment per criteria (quantitative)

Name of building	Criterion					Total score	Priority
	Availability of energy data and information of the building	Value of the specific energy consumption of the building	Building has been renovated/has not been renovated	Building has been renovated within the scope of CCFI or another program and reaches/does not reach the specified savings	Is the building necessary to provide municipal functions?		
Boarding school	3	3	3	3	3	15	I
Cesvaine pre-school "Brīnumzeme"	1	2	1	2	3	9	IV
Cesvaine Music and Arts School	1	2	1	2	3	9	IV
Cesvaine social service	1	1	1	1	3	7	VI
Sports hall	3	3	3	3	1	13	II
Building at A.Saulieša Street	1	3	3	3	2	12	III

Note: Assessment for each building from 1 to 3, where 1 – insignificant/not important; 2 – significant/important; 3 – very significant/very important

1.2 Target indicators

Energy performance indicators by which buildings were assessed and compared:

- kWh energy per m²;
- l water per person;

- average indoor and outdoor temperature.

Energy baseline was the average three year indicator (2015 – 2017) The consumption indicators for the following months and years will be compared to it. Casvaine County energy baseline (baseline energy consumption) for the boarding school is 157.0 kWh/m², for all other buildings – 157.2 kWh/m².

2 Implementation strategy

2.1 Main activities

The main activities aimed at achieving the short-term objective are collecting and analysing data on the boarding school, raising awareness of the users of the building, identifying primary measures and receiving management support for implementation of measures, as well as introducing these measures and assessing the result.

In order to achieve the medium-term objective, it is planned to establish a single data collection and processing system and to assess the achieved results and progress, as well as to notify the management about it.

In order to achieve the long-term objective, it is planned to hire an apartment building manager, to educate the public, to develop binding regulations of the Municipality, to identify energy efficiency measures to be taken and to install energy-efficient street lighting in Cesvaine Town.

2.2 Step by step description

In order to achieve the targets set by 2025, the designed Action Plan is shown in Table 2.1. The Plan is divided into three parts, according to three target categories: short-term, medium-term and long-term.

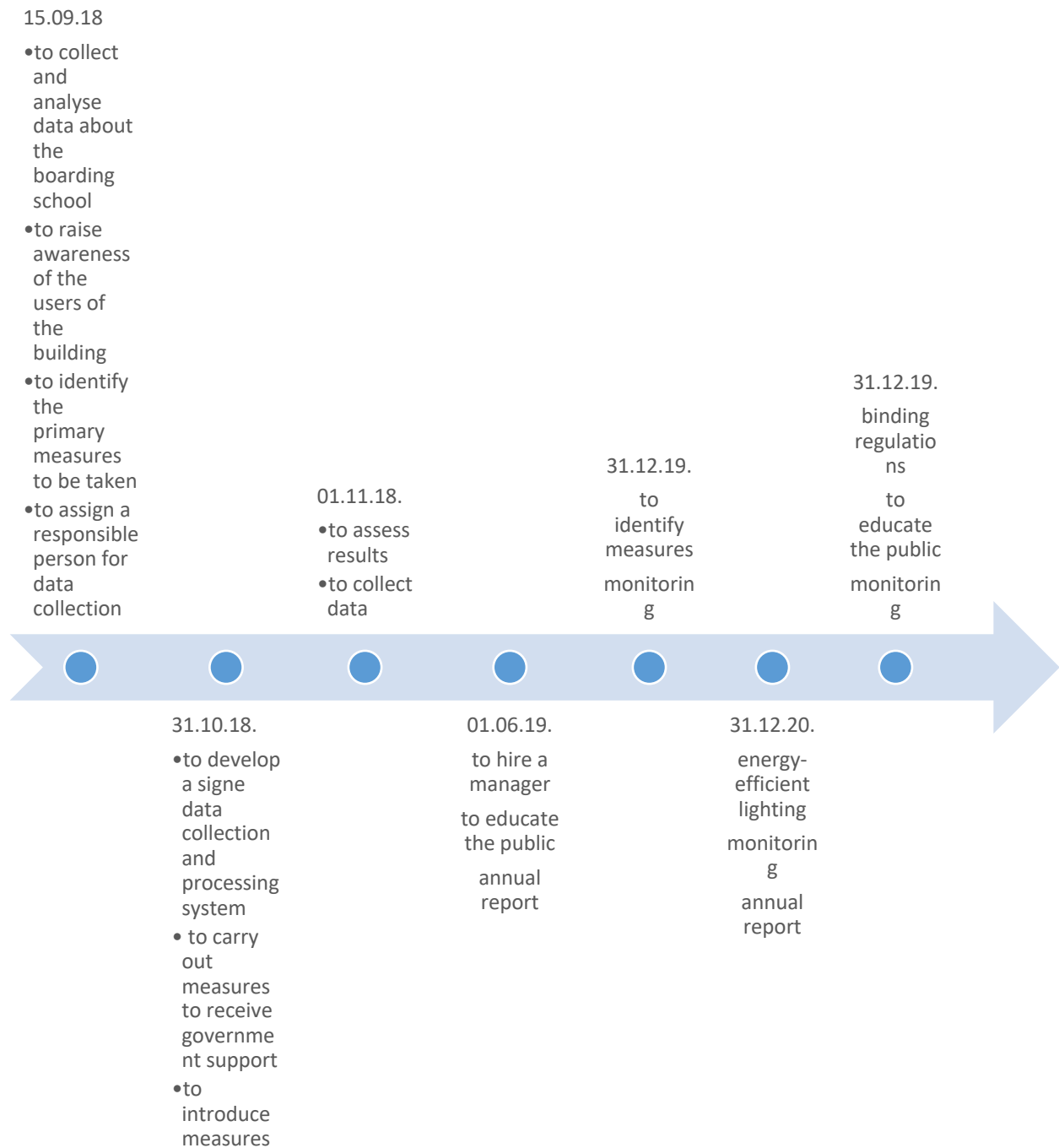
Table 2.1.

Action plan

Objective	No.	Action	Time schedule
Short-term (1 year) objective: to reduce electricity and heat consumption in the boarding school by 3% by 1	1.	To study all information available about the boarding school (for example, energy audits)	31 July 2018
	2.	To draw up an energy report for the boarding school	31 August 2018
	3.	To visit the boarding school and to talk with the responsible people about the habits practised in the building	10 September 2018

September 2019.	4.	To identify the first steps that could be taken in the boarding school without a lot of investment	15 September 2018
	5.	To notify the management and implement planned activities	31 October 2018
	6.	To assess the results achieved	1 November 2019
Medium-term (5 year) objective: to implement a common energy consumption accounting system, to collect energy consumption data on a regular basis.	7.	Identification of the responsible persons that will collect data	01 September 2018
	8.	Introduction of a single database	01 October 2018
	9.	Data collection	Each month
	10.	To submit an overview report on the execution of tasks and achieved results in the field of energy management	Each year
Long-term (2025) objective: to reduce the total energy consumption in Cesvaine County with the help of the implemented solutions	11.	Hiring of an apartment building manager	1 June 2020
	12.	Activities to educate the public	Regularly
	13.	Developing binding regulations	31 December 2021
	14.	Identification of measures that might be taken to improve energy efficiency indicators	31 December 2019
	15.	Installation of energy-efficient street lighting in Cesvaine Town.	31 December 2020

2.3 Time schedule



2.4 Budget and resources needed

In order to achieve the targets set out in the Action Plan, the main resources required are human resources due to the need to implement a data collection and analysis habit, and it is necessary to communicate with stakeholders on changing habits and smart use and management of buildings. The next step is to invest the resources saved from

effective management into technological energy efficiency measures. At the moment the amount of savings is not clear. When the Plan is put into action and starts to operate, work with the management and reservation of the necessary funds and allocation to measures of the Action Plan and its future versions will begin. Certain financial resources shall be provided for the installation of street lighting and the development of a database.

3 Collaboration with stakeholders

The actions outlined in the Action Plan will be carried out in cooperation with municipal authorities, as the energy management system affects the Municipality as a whole rather than individual persons. Achieving the objectives is the responsibility of the Municipality. If any of the actions cannot be taken within the specified time, it will be necessary to prescribe the action with the order of the Chairman of Cesvaine County Council.

The task force of the energy plan is responsible for the development and implementation of the plan. If discrepancies or exceedances are found according to the criteria, the leader of the task force shall be contacted who will provide further guidance. Each employee shall act in accordance with the requirements specified in the energy plan. Noticing that any of the colleagues does not observe the requirements of the energy plan, it is advisable to encourage them to observe the requirements, to give advice, etc.

Table 3.1.

Employee communication activities related to energy efficiency issues in Cesvaine County

Target group	Target message	Types of communication	Feedback
Top management (Council deputies)	Energy plan as a whole	meetings (presentations)	direct meetings
Administration staff	Energy plan as a whole	meetings (presentations), e-mail (internal system)	direct meetings, surveys
Technical staff (building managers, boiler house workers, etc.)	Actions to be taken to achieve the targets	meetings (presentations)	direct meetings, surveys
Residents, society as a whole, clients	Statistics, reports, finances spent/saved	meetings (presentations), disclosure of information (social networks, website, apps)	direct meetings, surveys, interviews

Cooperation organisations	Statistics, reports, finances spent/saved	disclosure of information (social networks, website, apps)	direct meetings, surveys
Municipal enterprises	Energy plan as a whole, actions to be taken to achieve the targets, finances spent/saved	meetings (presentations), e-mail (internal system)	direct meetings

Table 3.1 summarises communication measures that will help to engage building users, employees and other stakeholders. Table 3.2 shows horizontally the various systems of the boarding school that use electricity. The Table lists vertically the various users of the boarding school, which can affect the use of electricity in each of the systems with their actions.

Table 3.2.

Electricity systems of the boarding school and their users

USERS/ SYSTEMS	Indoor lighting	Office equipment	Kitchen appliances	Household appliances	Water boiling	Outdoor lighting
Employees of the building	Turns lights on/off	Uses a computer	Uses a kettle, fridge	Uses a washing machine	Use of water in bathrooms and showers	-
Pupils and visitors of the boarding school	Turns lights on/off	Uses a computer	Uses a kettle, fridge	-	Use of water in bathrooms and showers	-
Manager	Purchase and installation of lamps	Installation of equipment ; Setting up modes	Installation of equipment; Setting up modes	Installation of equipment; Setting up modes	Service and maintenance	-
SIA "Cesvaines komunālie pakalpojumi"	-	-	-	-	Water supply and heating, maintenance and service of equipment	-
Cesvaine County Council	-	Determines the requirements for the equipment	Determines the requirements for the equipment	Determines the requirements for the equipment	Determines the requirements for management	Managed

Note: There are no ventilation systems and cooling systems in the boarding school

The Table lists horizontally various systems of the boarding school that consume heat or affect the production of heat. The Table lists vertically the various users of the boarding

school, which can affect the consumption of heat in each of the systems with their actions.

Table 6

Heating systems of the boarding school and their users

USERS/SYSTEMS	Heating system	Purchase/preparation of firewood	Water boiling
Employees of the building	Can control heat supply in rooms with thermal heads	-	-
Pupils and visitors of the boarding school	-	-	-
Manager	Sets up the heating unit	-	-
SIA "Cesvaines siltums"	Service and emergency situations	Boiler settings, service and emergency situations, monitors the quality of firewood	-
SIA "Cesvaines komunālie pakalpojumi"	-	-	Water supply and heating, maintenance and service of equipment
Cesvaine County Council	Determines the requirements for the manager of the heating system	Determines purchase requirements for firewood and boiler management	Determines the requirements for the manager of the water supply system
Stokers	-	Preparation of firewood and inserting into the boiler	-

4 Monitoring strategy

The potential/desired process for monitoring heat and electricity consumption data:

1. Data accounting and analysis should be carried out **once a month**;
2. **Heat, water and lighting** consumption data should be accounted and analysed;
3. Variables – **temperature, number of visitors (length of stay)**;
4. Energy efficiency performance indicators will be controlled as follows: **kWh/m² per year**;

5. Data will be obtained from **the accountancies of SIA «Cesvaines siltums», SIA «Cesvaines komunālie pakalpojumi» and the registers of the managers of the Council and school;**
6. Significant deviations (+/-%) of energy consumption will be controlled – **3% each year.**

Changes (actions) that need to be carried out to improve the existing electricity and heat management processes in the boarding school.

- To install indoor thermostats;
- To install conditioners, to build a ventilation system;
- Water boiler using the heating system;
- Lighting replacement;
- Insulation of the building complex.

4.1 Heat supply

Data on heat supply is collected by SIA "Cesvaines siltums". Municipal buildings have heat meters installed, from which information about the supplied heat is read. Subsequently, the data collection officer enters this information every month in the database maintained by the Council. Additionally information about the average daily outdoor temperature should be collected.

4.2 Electricity supply

Data on electricity supply is collected by the manager of the Technical Unit. Data is available at the site of the supplier of electricity because smart meters are installed, from which information about electricity consumed is read automatically. Subsequently, the data collection officer enters this information every month in the database maintained by the Council.

4.3 Water supply

Data on water supply is collected by SIA "Cesvaines komunālie pakalpojumi". Water meters (both smart and standard) are installed in municipal buildings, from which information about cold and hot water consumption is read. Subsequently, the data collection officer enters this information every month in the database maintained by the Council.

Progress towards achieving the objectives of the Action Plan will be checked annually by analysing monthly energy consumption data. Since specific objectives with specific deadlines have been set, it will also help understand whether there is a positive approach towards the objectives.

All data obtained will be compared with energy baseline, which was calculated from data of 2015-2017. Here the average outside daily temperature shall be taken into account.

5 Risk management

Risk	Probability of realising	Mitigation measure
Lack of financial resources	High	The task force thoroughly evaluates the measures provided for in the Plan, their efficiency and payback time before allocating funds; careful budget planning
Lack of human resources	High	Prior to defining each sub-target and task, the task force appoints the responsible persons and evaluates their suitability and performance capacity; systematic planning of measures, ensuring more efficient use of human resources
Unreachable targets	Medium	The energy manager, with the support of the task force, thoroughly assesses the current situation in order to identify shortcomings and realistic targets
Weak communication, information about measures does not reach stakeholders	Medium	Carefully designed communication and information transfer procedures; active involvement of management by showing the stakeholders an example and creating the feeling that the implementation of the plan is important; to plan motivating and engaging activities to promote residents' involvement and awareness raising
Monitoring measures are not carried out in the required quality	Medium	To develop precise procedures and steps for data reading and analysis, as well as to appoint specific persons to read, record and analyse data; to require regular reports from the task force and management.

Annexes

Annex 1

Energy consumption data of various municipal buildings in 2015-2017

No.	Name of building	Address	Total energy consumption, (MWh/per year)			Specific energy consumption (kWh/m2)		
			2015	2016	2017	2015	2016	2017
1	Boarding school	Augusta Saulieša Street 1, Cesvaine	171.1	200.6	198.9	141.2	165.6	164.3
2	Cesvaine pre-school "Brīnumzeme"	Celtnieku Street 1, Cesvaine	195.3	221.4	233.7	161.3	155.2	163.7
3	Cesvaine Music and Arts School	Celtnieku Street 1, Cesvaine	109.8	124.3	121.7	90.7	134.1	131.2
4	Cesvaine social service	Rīgas Street 4, Cesvaine	273.3	305.0	272.2	225.6	129.5	115.5
5	Sports hall	Saules Street 2A, Cesvaine	232.4	226.2	178.3	191.9	251.3	198.1
6	Building at Augusta Saulieša Street	Augusta Saulieša Street 9, Cesvaine	121.2	140.2	113.7	100.1	171.5	139.1

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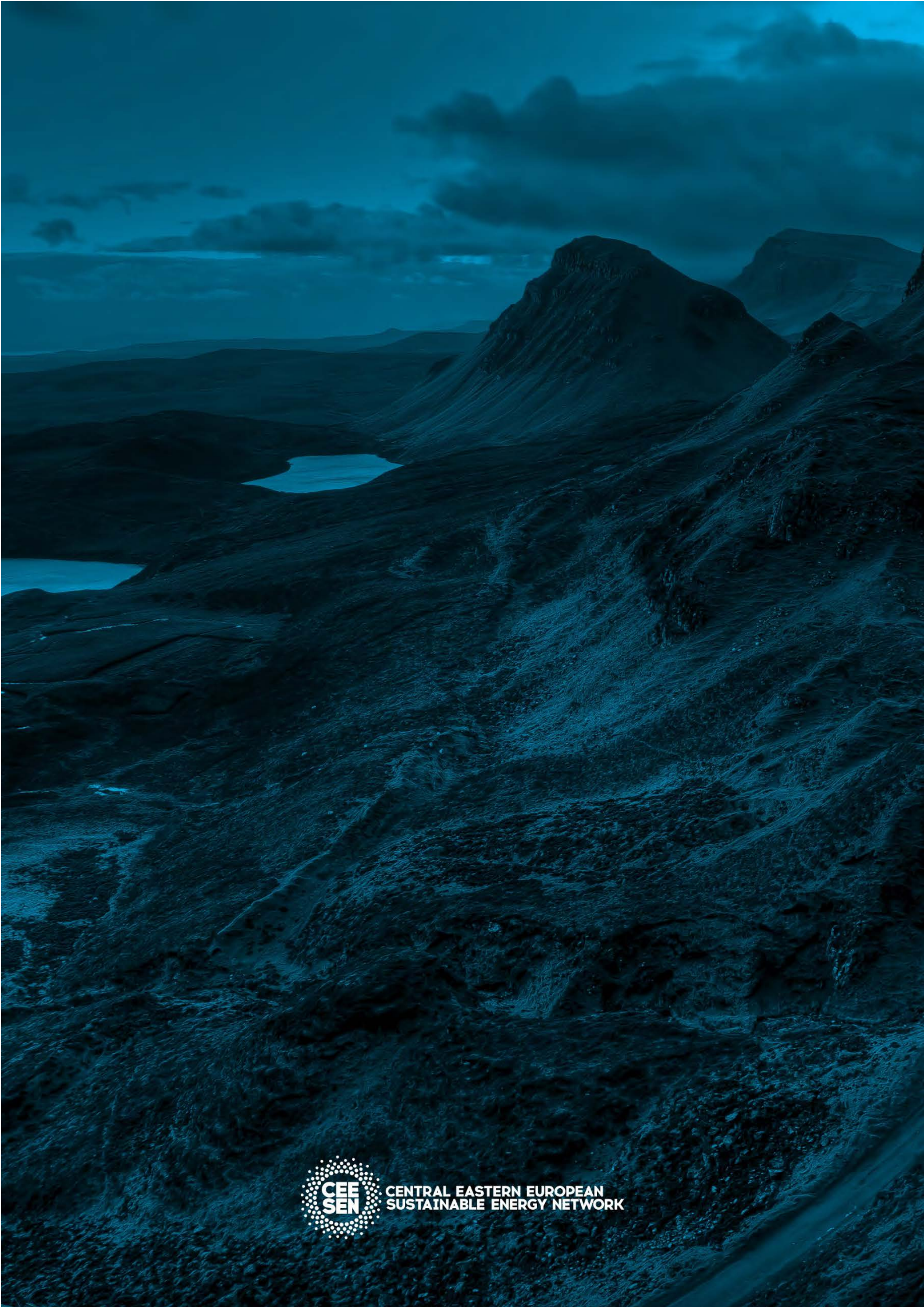
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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ENERGY ACTION PLAN

Gulbene County Municipality

prepared by:

Gulbene County Municipality

PANEL 2050 - Partnership for New Energy Leadership 2050

Deliverable 3.7

Date: August 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

Summary

Energy planning is an ongoing process. The development of energy systems is ongoing, therefore, it is necessary to improve and update planning documents on a regular basis. Sustainable energy planning in the Municipality is closely related to all processes and stages of the energy system.

Sustainable Energy Action Plan of Gulbene County Municipal Building for 2018-2020 (hereinafter **the Action Plan**) is a short-term development planning document of Gulbene County Municipality outlining the directions of action, tasks and activities to increase energy efficiency of a municipal building of Gulbene. The Action Plan is closely linked to the Gulbene County Sustainable Development Strategy for 2014-2030 (hereinafter – the Strategy), which is a long-term development planning document of the County.

Chapter 1 discusses the stakeholders of the process and their responsibilities. The objectives of the European Union and national policy are discussed in Chapter 2 of the Action Plan. Chapter 3 and Chapter 4 describe the current situation in Gulbene County and the implementation and operation of an energy management system. The control and monitoring of energy management, as well as the procedure for submitting an annual report on the results achieved, are described in Chapter 5 and Chapter 6, respectively.

The main **objective** of developing the Action Plan is to determine the short-term priorities, targets and tasks, actions and projects to be carried out for the sustainable and balanced operation of the building and the use of energy resources.

Information was obtained using municipal data, information prepared by specialists, data collected by institutions, resources of various Internet addresses, and available planning documents.

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Introduction

The Energy Efficiency Law¹ adopted in 2016 stipulates the right of local governments to develop and implement an energy efficiency plan that includes certain energy efficiency objectives and measures. An energy management system may be developed and introduced as part of implementation of this plan or separately (in accordance with ISO 50001).

Energy management is an effort to effectively achieve energy efficiency through the use of available resources. It is a systematic control of energy consumption with the aim of reducing it, which leads to the search for the most economically efficient solutions for the management of municipal sites by improving the level of energy efficiency and, in the long, term, reducing financial costs and CO₂ emissions. An Energy Management System (EMS) includes various tools, guidelines and procedures that enable the municipality:

- to make systematic recording and analysis of energy consumption data;
- to determine the necessity of energy efficiency measures at municipal sites, and prioritize them;
- to know the energy efficiency indicators of municipal sites in order to plan new measures and assess the performance of the implemented energy efficiency measures in them;
- to be able to manage municipal structures and other infrastructure included in the EMS in a rational manner, reducing energy costs and channelling savings for development.

The main principles of energy management are defined in LVS EN ISO 50001: 2017. It is a European standard, which has been adopted as a national standard without any modifications to its content. The standard defines and determines the areas that an organisation needs to take into account when designing an energy management system, including by identifying the responsibility of the organisation's management and other stakeholders, developing an energy policy, etc.

¹ Para II and III of Section 5 of the Energy Efficiency Law (effective as of 29.03.2016), published in "Latvijas Vēstnesis", 52 (5624), 15.03.2016

Vidzeme Planning Region

Action plan: Sustainable Energy Action Plan of Gulbene County Municipal Building for 2018-2020

1 Objective

Objective – to determine the short-term priorities, targets and tasks, actions and projects to be carried out for the sustainable and balanced operation of the building and the use of energy resources.

To achieve the set objective, two more objectives to be achieved by 2020 are set:

1. To ensure a 5% reduction in heat consumption compared to the heat baseline established by the EMS;
2. To ensure a 3% reduction in electricity consumption compared to the electricity baseline established by the EMS.

1.1 Objective scope and targets values

Introduction of an energy management system is a complex measure, in which not only the activities of stakeholders must be changed, but also their mindset. In order to implement energy management, it is necessary to analyse the existing system. It is necessary to further identify weak points and strengthen them with planned measures.

1.1.1 Legal background

In the long-term development document of the country "Sustainable Development Strategy of Latvia until 2030", the following measures to be taken in the field of renewable energy resources and energy efficiency have been defined:

- renovation of apartment houses and reduction of thermal energy consumption;
- increase in thermal energy production efficiency;
- investments in centralised heat supply systems;
- reduction of electricity transmission and distribution losses;
- improvement of energy efficiency of electrical transport and linking thereof with other types of transport;
- energy efficient street lighting in cities;
- the main criteria for success of energy efficiency measures is reduced heat and electricity consumption and more efficient use of energy resources both in private and public sector;

- energy efficiency and considerations of the life cycle analysis of products should be included in the criteria of state and local government procurement procedures.

The medium-term development planning document "National Development Plan of Latvia for 2014 – 2020" (NAP2020) specifies the direction of action - energy efficiency and energy production. In order to ensure sustainable use of the energy resources required by the national economy by promoting the availability of a market for the resources, a decrease of the energy intensity and emission intensity in certain sectors, and an increase of the proportion of renewable energy resources in the total consumption, while focusing on competitive energy prices, 7 goals have been set for this direction of action:

- Development of local government energy plans providing for complex measures to promote energy efficiency and transition to renewable energy resources;
- Energy efficiency programmes in the sector of state and local government public buildings;
- Support programmes for the energy efficiency of residential buildings and transition to renewable energy resources;
- Support to innovative energy sector and energy efficiency technology projects;
- Support programmes for transition to renewable energy resources in the transportation sector and provision of the required infrastructure through assistance only for those alternative energy resources that are economically advantageous, and by supporting innovation resulting in the promotion of the use of economically advantageous alternative energy resources;
- Use of renewable energy resources in energy production, reducing dependence on fossil fuels, and promotion of energy efficiency in centralised heat supply;
- Development of energy infrastructure grids.

On 21 April 2017 the informative report "On the Progress Towards an Indicative national Energy Efficiency Goal in 2017 – 2019 in Accordance with Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC", which sets out the indicative energy efficiency goals for 2020 both in the country and for end-use consumption, was presented to the European Commission. According to Energy Guidelines 2020, the following energy efficiency targets are set for the economy as a whole:

- national minimum accumulated final energy savings by 2020 – 9896 GWh (0,85Mtoe);
- 3% of the area of direct administration buildings renovated every year (expected maximum – total of 678,460 m² renovated);
- reduced average heat consumption for heating (with climate adjustment) by 50% compared to consumption of 2009 (202 kWh/m²), by 2020 the target of 150 kWh/m² must be achieved;
- energy intensity reduced from 372.9 kg of oil equivalent to 1,000 euros of GDP in 2010 to 280kg of oil equivalent to 1,000 euros of GDP in 2020.

The strategy states that in 2030 Gulbene County will be known with its renovated, energy-efficient municipal infrastructure buildings. Increasing the share of renewable resources and reducing energy consumption and losses by raising the quality of the environment. To ensure sustainable environmental quality of the County's villages, the following shall be dealt with:

- household waste sorting;
- street covering and traffic safety;
- centralized heat supply and energy efficiency of housing;
- public space and green areas.

The municipal medium-term planning document "Gulbene County Development Programme 2018 – 2024" (hereinafter – the Development Programme) sets a separate direction of action for energy management, which includes 3 main tasks:

- To improve utility services;
- To provide information and advice on energy efficiency;
- To promote the construction and management of energy-efficient infrastructure in the County.

Several activities have been identified to achieve the targets and tasks:

- to carry out energy efficiency improvement measures in the municipal infrastructure – where the expected results are the development of an energy plan for the entire Gulbene County and the development of an energy management system for at least 6 municipal buildings as well as the energy certification of public buildings and the purchase of monitoring equipment;
- to support energy efficiency measures in the household, apartment and business sector;
- introduction of energy efficiency requirements for construction projects and construction process;
- to provide advice and information on energy efficiency issues;
- to improve electrically technical infrastructure – where the expected results are a surveyed and assessed justification of power supply connection capacity and assessed technical condition of the power grids in municipal properties, surveyed and assessed technical condition and energy efficiency of lighting infrastructure.

1.1.2 Description of the selected territory and buildings

Gulbene County is located in the north-eastern part of Latvia. According to the area of the territory, the county ranks 5th in the country with 1,872 km². The County consists of 13 parishes and one administrative centre of Gulbene Town (see Figure 1.1). The total length of the County's roads – 1,640 km, of which 38.1% is covered with asphalt concrete. Gulbene Town is located about 100 km from Valmiera and 185 km from Riga. Ten municipalities share a border with the County: the municipalities of Alūksne, Ape, Balvi, Rugāji, Lubāna, Madona, Cesvaine, Jaunpiebalga, Rauna un Smiltene. Of the entire area

of the Gulbene County, 58% are used in agriculture, whereas woods occupy 38%. Gulbene County is located in the territory of two largest Latvian river junction areas - Gauja and Daugava.



Figure 1.1. Distribution of Gulbene County area by administrative territories

There are 48 rivers in the County with a length of more than 10 km, the longest of which are: Gauja, Pededze, Tirza, Liede, Krustalīce. There are about 50 lakes and other bodies of water in the Gulbene County.²

According to the data of the Office of Citizenship and Migration Affairs (OCMA), as at 1 January 2018, 22,066 inhabitants were declared in Gulbene County. Since 2012, the total population has decreased by 2,610 inhabitants (see Figure 1.2).

35.5% of the population lives in Gulbene Town. The largest of the 13 parishes by population in 2018 is Beļava Parish with 1529 inhabitants, and the smallest – Līgo Parish with 391 inhabitants. The distribution of population by administrative districts can be seen in Figure 1.3.

² Data from Gulbene County Development Strategy for 2018 – 2024.

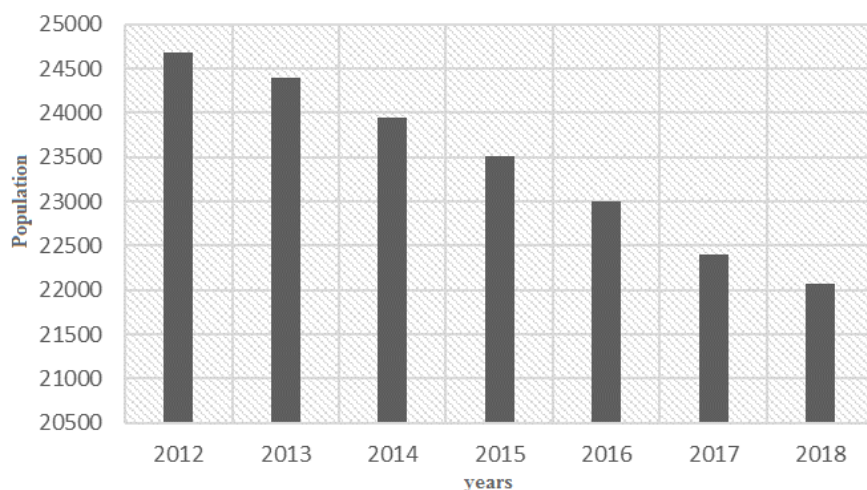


Figure 1.2. Population in Gulbene County by years

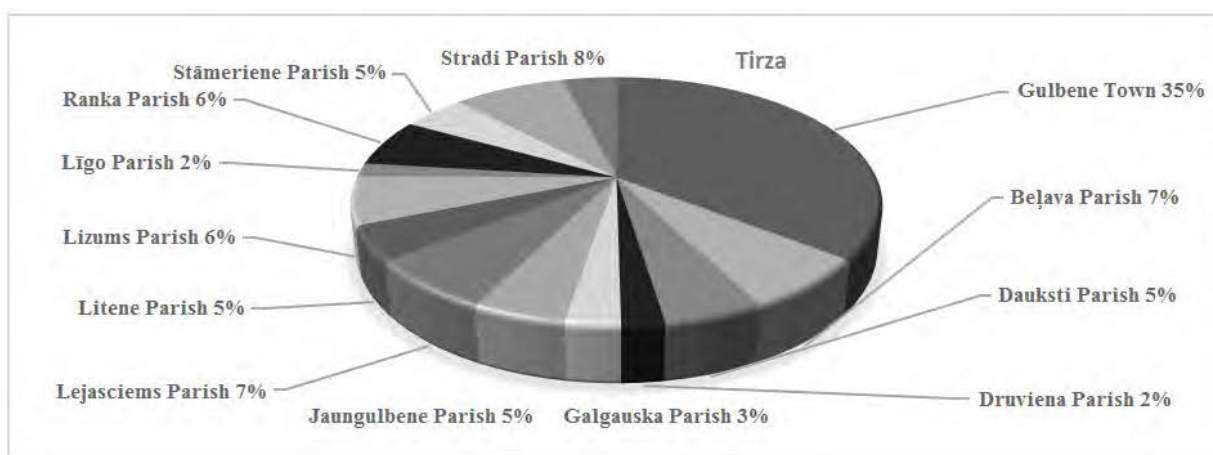


Figure 1.3. Distribution of population in administrative territories in 2018 in percentage

There are 15 manor estate complexes in the County, six of which are of national significance, and nine local manor houses. Castles have remained in eight manor complexes. General education schools are located in four manor castles¹.

As at 2018, the Municipality manages slightly more than 123 buildings. Of these, 25 are located in the Town, while the others – in the parishes. Most of them have a public function. 9 schools are located in the parishes and 3 – in the Town. Each parish has at least one culture house and a parish administration building. Most also have a library and pre-school.

Larger or smaller centralised heat supply systems have remained in the 10 parishes. In the Lizums Municipality, heat is supplied by a cogeneration plant operated by SIA "Eko NRG". Heat supply to the villages of Šķieneri and Stāķi is provided by a municipal enterprise SIA "Gulbenes nami". Other centralised heat supply systems are managed by the municipality.

Electricity supply is provided by AS "Sadales tīkls", while electricity is provided by AS "Latvenergo". According to the information provided by AS "Sadales tīkls", Gulbene County Municipality has 213 electricity connection points where electricity accounting is carried out. There are municipal buildings with a number of connections, the need of which shall be further determined.

The centralised heat supply system is managed by SIA "Vidzemes enerģija". Heat energy for Gulbene Town is provided by a cogeneration station managed by SIA "Bioeninvest" and a chip boiler house operated by "Vidzemes enerģija". In 2015, the total heat produced by the CHT of Gulbene Town was 27103 MWh³.

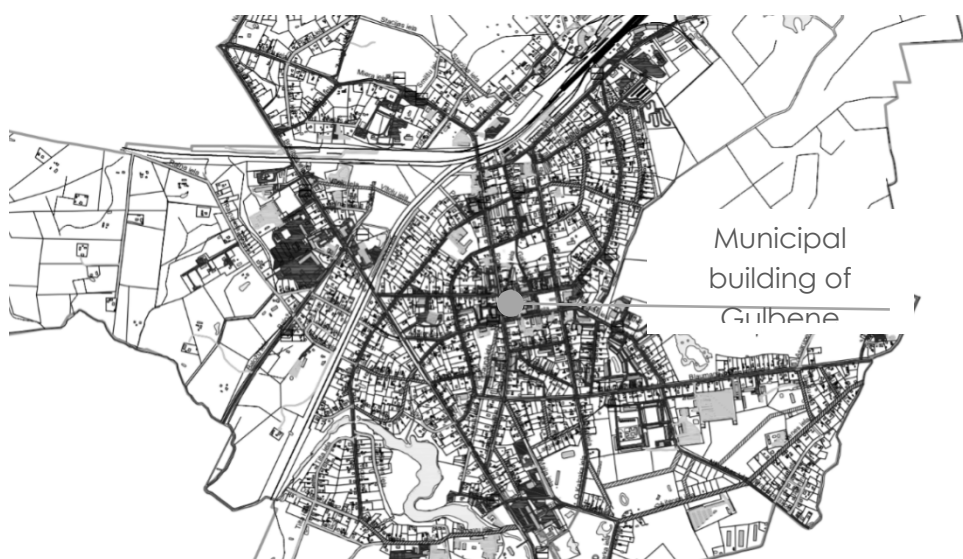


Figure 1.4. Location of the municipal building of Gulbene County

The municipal building of Gulbene County is located in the centre of Gulbene Town (see Figure 1.4.). In 2015, the facade and the roof of the three-storied building were insulated to reduce heat loss in winter. The double-packed plastic windows and doors of the building were replaced. This year, the single-storied roof was insulated. The administration of Gulbene County Municipality is located on the central part and on all three floors of the southern part of the building, as well as on the second and third floors of the northern part, except for the premises on the third floor, which is leased by the Land Registry Division of Vidzeme District Court. Rural Support Service is located on the 1st floor of the northern part of the building. The common system also includes a garage for which no energy efficiency measures have been taken.

There is no fixed plan in the management of the system. Improvements and energy efficiency solutions take place when they are proposed by someone, but this is not carried out in a planned way. For this reason, the annual budget does not stipulate any financial resources. In 2017, the management costs of the Gulbene municipal building amounted to almost EUR 50,000 (see Table 1.1).

Table 1.1

Management costs of the municipal building of Gulbene County

Cost item	Costs, EUR
Heating	16501.72
Water and sewerage	1777.14
Electricity	22556.65
Waste management	776.46

³ Development of a heat supply strategy for Gulbene Town

Repairs	1018.67
Security services and maintenance of carpets	3308.38
Internet and telecommunication services	3629.58
Total	49568.60

1.1.3 Energy assessment (historical energy consumption)

In order to determine the strengths and weaknesses of buildings that would help to set realistic and relevant targets, it is important to understand the current situation. One of the most important stages for this analysis is the determination of the historic energy consumption.

Within the framework of the Action Plan, the municipal building of Gulbene County will be further analysed. The municipal building of Gulbene County consumes heat, electricity and water (Fig.1.5):

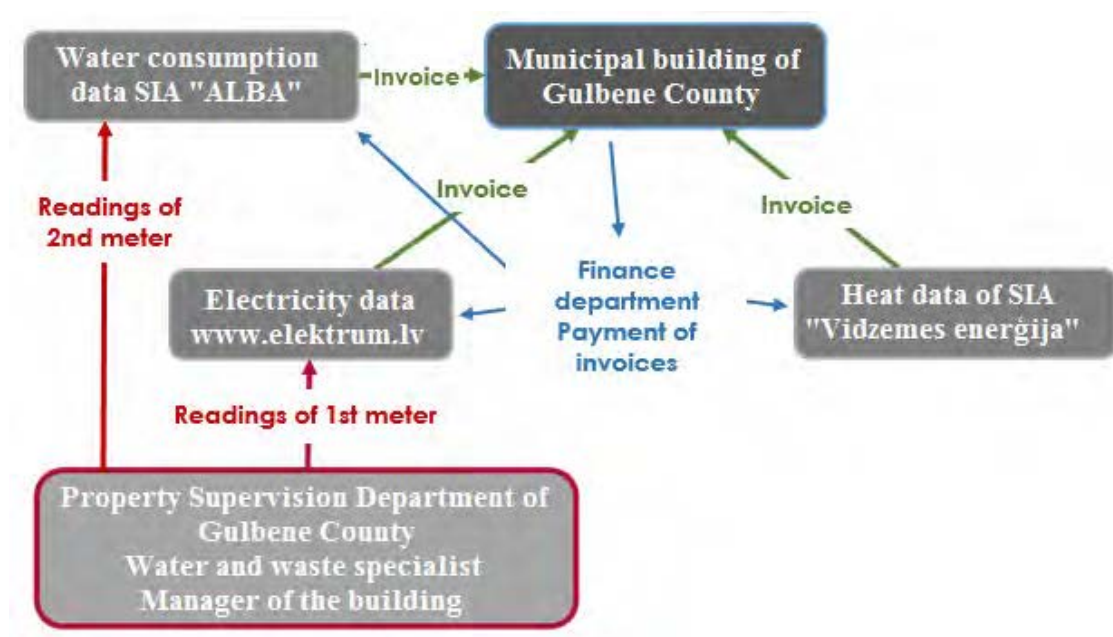


Figure 1.5. Circulation of consumption data and invoices of Gulbene County's municipal building

The garage consumes heat and electricity. The heat meter is read by the heat supplier, who issued invoices. The building has 3 electrical connection points, of which 1 meter has to be read by the manager of the building, who then has to submit the data to a water and waste specialist for registering with the supplier's system, while the other two are read by the company remotely. The manager of the building reads the two water meters and submits the data to a water and waste specialist for registering with the supplier's system and issuing of invoices. Figure 1.5 shows the circulation of data and documents for payment of consumed energy resources of the municipal building of Gulbene County.

The heating network is managed by the manager of the building. Changes in the automatic control system are carried out in co-operation with the energy manager, although, by the end of 2017, automatic control was not regulated in a planned way. It is not possible to regulate the garage heating system. The users of the building can adjust the circulation of the heating unit through the heater with a valve, thus maintaining a constant temperature in the room. The system's thermal energy consumption over the last three years is presented in Table 1.2. Total consumption of heat in 2015 was 279.34 MWh, in

2016 - 240.92 MWh and in 2017 - 236.69 MWh. The heat tariff in the city has been stable for a long time – 67.4035 EUR/MWh (VAT included).

Electricity to the Council building of Gulbene County and the garage is provided with 3 connections. The connection capacity for the two inputs is 3/60 A and for the one input – 3/40 A. Intermeters have been installed to record energy consumed by RSS. Since one of the meters does not have a remote energy reading and recording option, full electricity monitoring is not carried out. Monthly electricity consumed is shown in Table 1.3.

Table 1.2

Consumption of heat energy of Gulbene municipal building and garage, MWh

2015											
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
45.38	39.55	54.55	30.29	28.55	0	0	0	0	22.44	28.95	29.63
2016											
56.07	31.25	31.25	29.92	30.7	2.7	0	0	0	3.05	18.14	34.12
2017											
41.53	38.66	29.34	27.16	10.87	0	0	0	0	20.16	32.24	36.73

Table 1.3

Consumption of electricity of Gulbene municipal building and garage, kWh

2015											
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
11838	12689	10357	11566	9353	9524	10077	8870	10276	11172	11793	13983
2016											
8087	13820	13138	10235	10098	11292	9370	10918	11441	11917	13729	14009
2017											
15432	12740	12149	11196	10968	10947	10455	11607	11112	12526	13405	13218

The largest consumers of electricity are office equipment and servers, while in the summer, the offices in the southern part are air-conditioned. In the server room, the microclimate has a forced ventilation device with recuperation and air conditioning, which is regulated by the ITCC manager. Air conditioning devices are managed by the Property Supervision Department of Gulbene Municipality, attracting specialists if necessary. Mainly fluorescent bulbs are used in the building, although they are gradually being changed to LED lighting. Total consumption of electricity in 2015 was 131498 kWh, in 2016 - 138054 kWh and in 2017 - 145755 kWh. The electricity tariff has changed. In 2015 it was 149.3987 EUR/MWh, which in August 2016 changed to 144.3530 EUR/MWh. In April 2017, it changed to 136.7663 EUR/MWh. The cost does not include payment for connection power, as it depends on the situation.

Cold water is consumed in sanitary rooms and kitchens, designed for the needs of employees. Hot water is provided by heating it in electric boilers. Water consumption indicators for the last 3 years are summarised in Table 1.4. At the moment, consumption is not given much attention. Consumption is affected by both staff and visitors of the building. Since total water management costs form a relatively small part from the total costs, we do not plan for energy efficiency measures for the time being.

Table 1.4

Water consumption in the municipal building of Gulbene County, m³

2015											
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
48	49	48	48	41	43	47	36	49	46	50	51
2016											
57	60	34	42	45	45	34	46	48	47	50	48
2017											
57	50	48	46	46	48	44	48	47	53	52	48

As the municipal building was insulated in the summer of 2015, part of data from 2015 are not comparable. However, they are included in the total calculation to see the changes. The total energy consumption and the specific total energy consumption with correction can be seen in Figure 1.6.

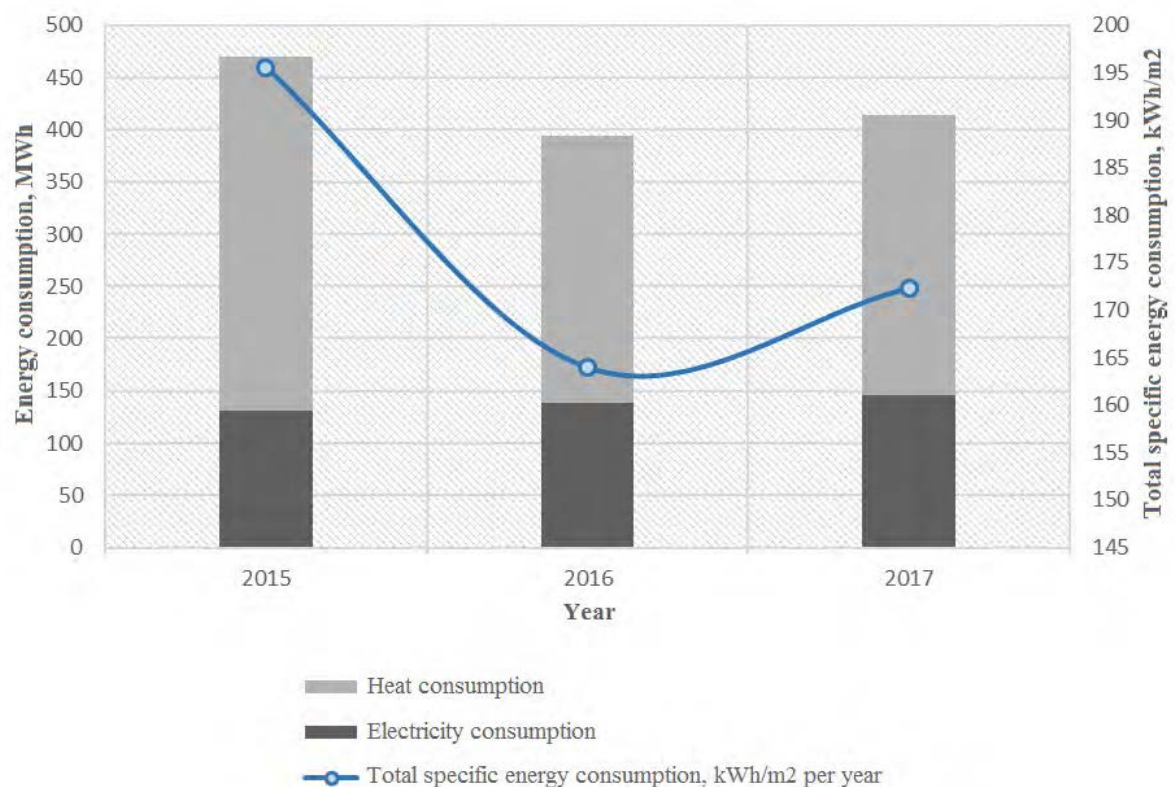


Figure 1.6. Total heat and electricity, as well as specific total energy consumed by Gulbene municipal building and garage

This energy consumption includes energy consumed by the garage. When looking at the situation in the nature, it is evident that the thermal stability of garage enclosures does not meet norms. The area of heated surfaces for this building is very large, therefore heat loss is significant. At the moment, the correct baseline for total energy consumed and total specific energy would be the average of 2016 and 2017.

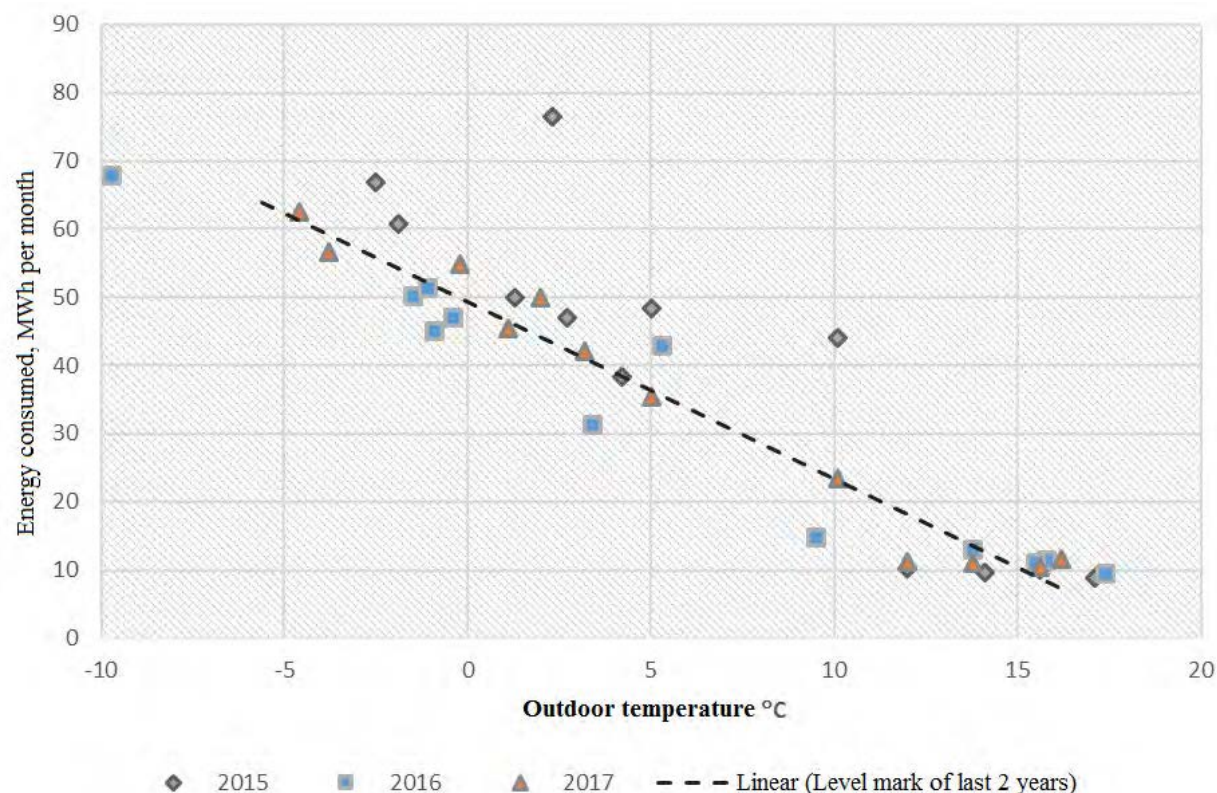


Figure 1.7. Energy consumption of Gulbene municipal building and garage depending on outdoor temperature

In order to compare the monthly indicators with each other, a linear mark for the last 2 years was created (see Figure 1.7). This chart shows months when energy consumption decreased or increased from the average depending on the outdoor temperature, and thus responding to changes. In 2017, buildings spent more energy than in 2016. The increase is in the consumption of electricity, which indicates the need for an in-depth analysis of the current situation and determine the possible causes.

The specific heat consumption of 2017 in the months of February and May was slightly higher than the average, as shown in Figure 1.7. However, in January, April and September, consumption was below average. This indicates that consumption is uneven and that more frequent monitoring of electricity consumption is needed in order to detect deviations.

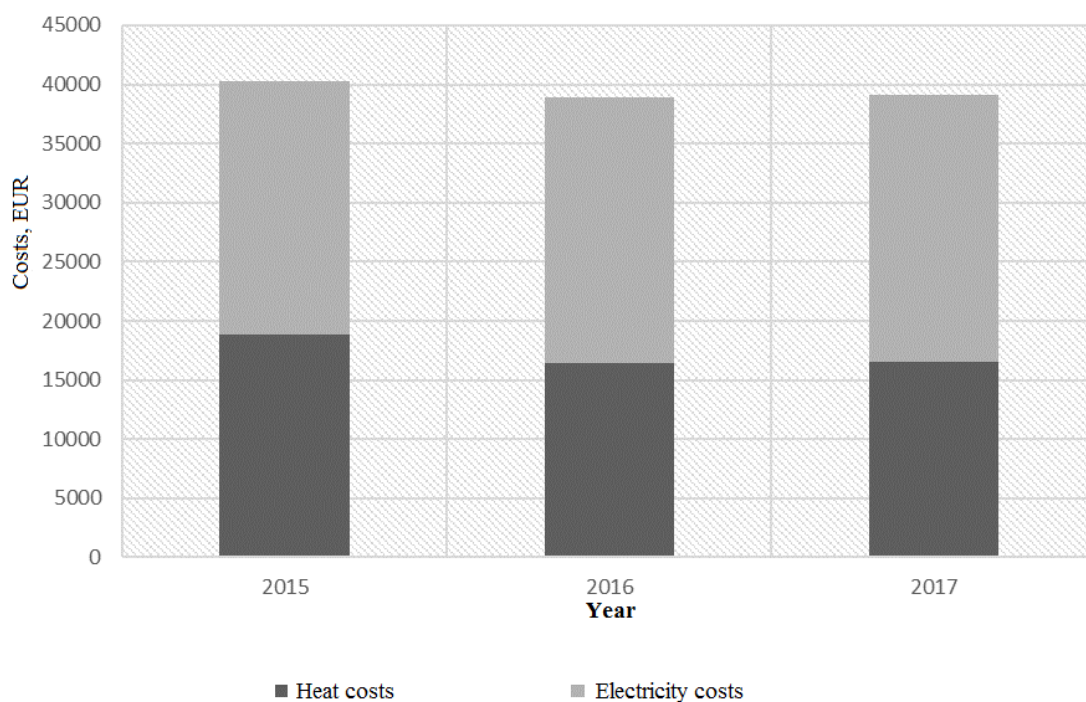


Figure 1.8. Comparison of the costs of Gulbene municipal building and garage over the years

A graphical analysis of energy costs reveals a negative trend – it is gradually increasing. Although, compared to 2015, in 2016 financial resources on heating were saved, in 2017 costs are rising again. The increase is mainly due to an increase in electricity consumption. In 2015, EUR 21485.5 was paid for electricity, then in 2017 it amounted to EUR 22556.65 (see Figure 1.8).

1.2 Energy performance indicators and baseline

In order to determine the strengths and weaknesses of buildings that would help to set realistic and relevant targets, it is important to understand the current situation. One of the most important stages for this analysis is the determination of the historic energy consumption. There are different energy performance indicators, however choosing the most suitable for a particular situation is not easy. Often, data compatibility is determined by various nuances that are difficult to include in the calculation.

One of the main indicators is **the specific heat consumption kWh/m² per year**. It shows the energy performance of the building and is one of the most understandable analysis data. When choosing a building, one of the criteria was this energy performance indicator (see Figure 1.9).

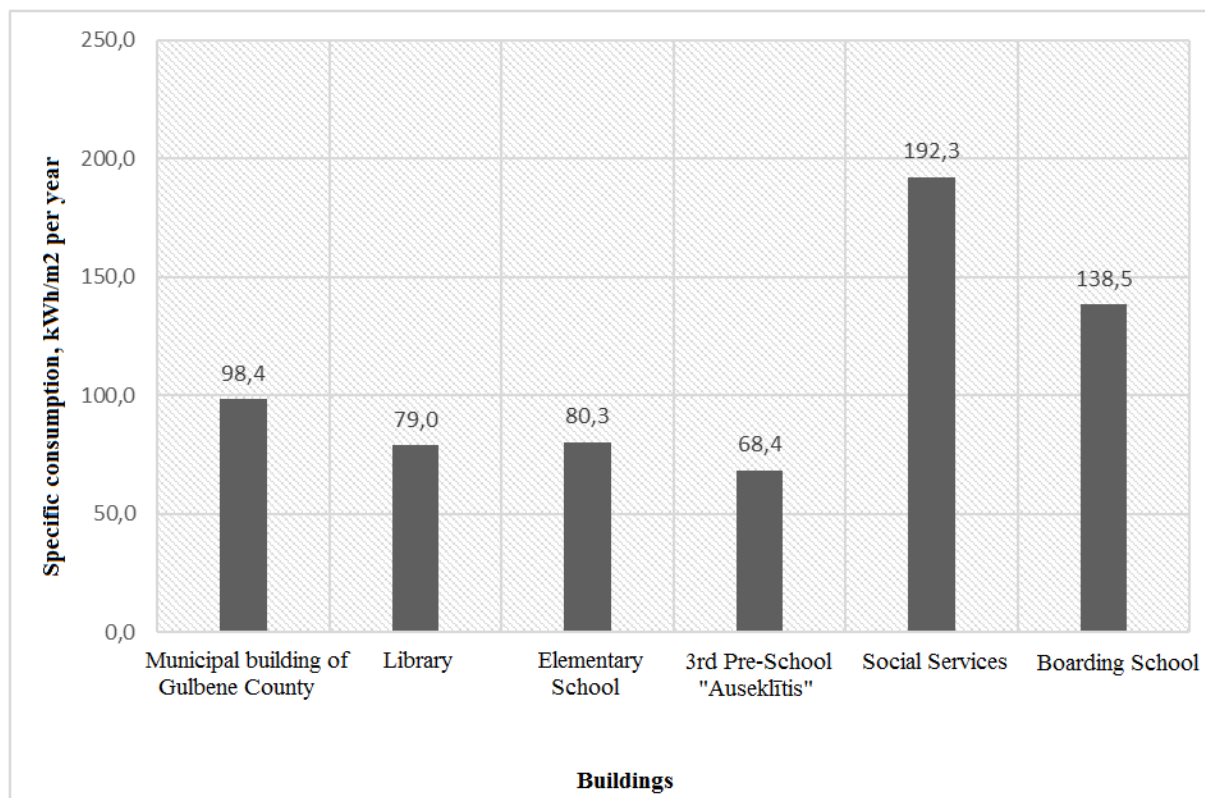


Figure 1.9. The specific heat consumption of various buildings of Gulbene Municipality in 2017

The current choice is justified because Gulbene municipal building has the largest specific heat consumption, i.e. 98.4 kWh/m² per year. In 2017, the Social Services and the boarding school were insulated and a ventilation system was installed. For this reason, the buildings have other indicators at this time.

Often buildings can be better compared with each other according to user behaviour. In this case, the best energy performance indicator is **kWh/per number of users**. In the office rooms, such a comparison would work efficiently. It is a little more complicated with public buildings with a lot of visitors. In such cases, accurate records of the number of visitors should be made. In this way, both electricity and heat consumption data can be compared.

At this point, only one municipality building has CO₂ sensors. Their function is to start forced ventilation when the CO₂ level in the room is elevated. In the future, a good energy performance indicator would be **the average, min and max ppm/per month**. It would provide an insight into the user's habits and operational quality of the ventilation systems. Currently it is not planned to acquire such a system, but in the future it could be done for monitoring purposes.

The specific heat consumption of 2017 in the months of February and May was slightly higher than the average, as shown in Figure 1.9. However, in January, April and September, consumption was below average. This indicates that consumption is uneven and that more frequent monitoring of electricity consumption is needed in order to detect deviations.

A graphical analysis of energy costs reveals a negative trend – it is gradually increasing. Although, compared to 2015, in 2016 financial resources on heating were saved, in 2017

costs are rising again. The increase is mainly due to an increase in electricity consumption. In 2015, EUR 21485.5 was paid for electricity, then in 2017 it amounted to EUR 22556.65 (see Figure 1.10).

When defining baselines, monitoring data and analysis of these data are taken into account. The following baselines are established for Gulbene municipal building and garage:

- **The specific total energy consumed is calculated and determined in Figure 1.10;**
- **Electricity consumption – 141904 kWh;**
- **Heat consumption – 263 MWh.**

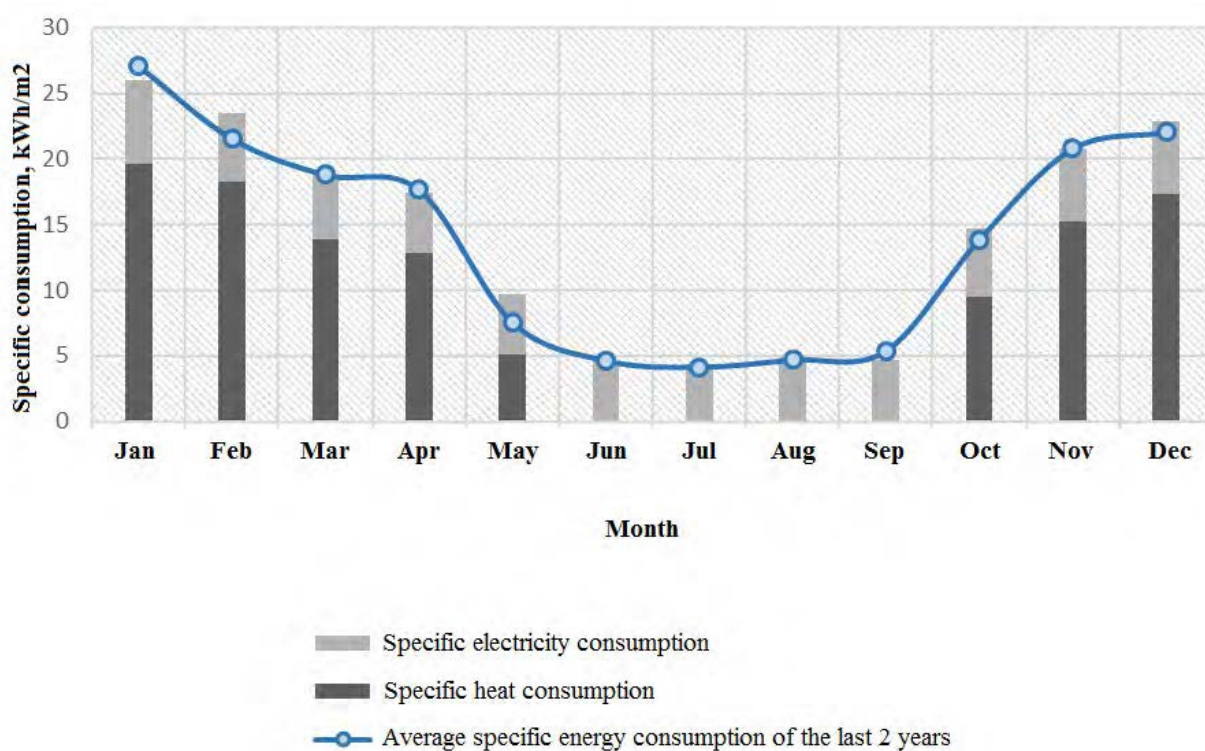


Figure 1.10. Monthly heat and power consumption of Gulbene municipal building and garage, and comparison with previous year's figures

2 Implementation strategy

2.1 Main activities

The main steps in the Action Plan are: raising awareness of users and developing instructions for use or regulations, preparing engineering communication schemes, auditing technological systems and achieving energy efficiency class D in the building.

2.2. Step by step description

In order to achieve the targets set in the Plan, it is necessary to determine the tasks to be performed (see Table 2.1). Five have been set, after the performance of which it is

planned to explore the system and to change energy consumption by changing the habits of the building users.

Table 2.1

Planned tasks and deadlines to achieve the objectives set in the Action Plan

Task	Deadline	Expected result
To install an additional shut-off valve in order to regulate heat consumption of the garage	2018	Heat consumption has decreased, as it will be possible to reduce the temperature in the garage separately.
To equip all rooms with thermometers	2018	Building users control the room temperature according to the monitoring equipment. Room temperature set to 21 – 22 °C.
Preparation of basic schemes for building engineering communications	2018	Completely surveyed building engineering communications. More successful inheritance and repair work planning.
Audit of ventilation, heating, lighting and cooling systems	2019	Current situation studied and schedule for planned works developed
To aim at a stable energy efficiency of class D (no more than 100 kWh/m ²)	2020	Stable energy consumption in the building as well as ease of budget planning.

A task force has been set up to develop and maintain the Action Plan. It consists of 7 people, the description of which is given in Table 2.2. The responsible person of the top management of the Action Plan is the executive director of the Council. The responsible person for development, implementation and maintenance thereof is the energy manager. 6 municipal employees are responsible for maintaining the Action Plan by further development and implementation. The energy management task force will monitor the fulfillment of the objectives and targets set. The task force will be responsible for smaller subtasks and performance thereof.

Table 2.2

Task force for the development, implementation and maintenance of the Action Plan

Job title	Role in the task force
Executive director of Gulbene County Municipality	Management of the planning process and execution of tasks. Delegation of responsibilities and monitoring of implementation for the development and implementation of energy plans.
Energy manager of the Development and Project Department of Gulbene County Municipality	Plans energy efficiency measures and compiles energy data for the development of statistics. Planned data monitoring to reduce the risk of unnecessary energy consumption and plan for system upgrades. To organise task force meetings and staff training on energy efficiency issues.
Head of the Development and Project Department of Gulbene County Municipality	Planning of attraction of financial resources in project-type events to implement energy efficiency measures by carrying out renovation or reconstruction. Monitoring the construction process and achieving the criteria set after implementation.
Financial economist of the Financial and Economic Department of Gulbene County Municipality	Linking the Energy Plan with financial resources. Financial investment planning and calculation of energy consumption tariffs. Developing statistics for the planning of financial resources.
Senior Personnel Specialist of the Administrative Legal Department of Gulbene County Municipality	Planning of a link with the introduction of an energy plan and informing employees. Keeping minutes of task force meetings. Engaging in energy efficiency awareness events.
Water and waste management specialist of the Property Supervision Department of Gulbene County Municipality	Collection of various energy resources from institutions and parishes and their submission to the supplier for the issuance of invoices. Communication with utility engineers in rural areas to obtain data and implement energy plans.
Utility engineer of Gulbene Town Administration	Provision of technical information in the energy plan development stages. Practical system surveying and monitoring of systems. Technical support through system surveys, action planning and system regulation.

The task force has a deadline of 31 August 2018. After this date, the effectiveness and decision-making of the task force will be assessed. If necessary, the composition will be changed and its operation restored.

Initially, the distribution of energy consumption by area and type of consumption should be determined. To determine the achievable targets by analysing the historical energy consumption. It is necessary to identify building users who have an impact on energy consumption and identify actions that users can and cannot affect. This existing situation needs to be analysed and corrective actions by stakeholders shall be carried out so that energy efficiency criteria are met at any stage. The current situation illustrates the

mechanisms for controlling and managing energy consumption, as well as the responsible actors.

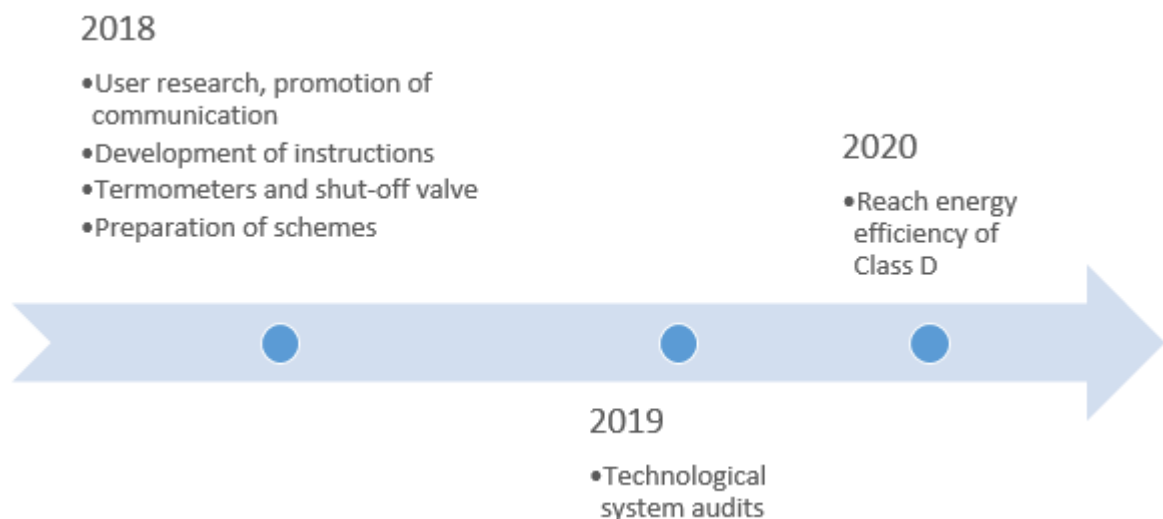
Currently energy consumption of the Gulbene municipal building and garage is monitored but not controlled, therefore an Action Plan needs to be developed that defines responsibilities, goals and tasks. The data collected should be analysed and provided to the users of the building so that they have a clear vision and targets to be achieved, and that the result would be seen in the future.

To determine the distribution of electricity consumption, calculations are required as the building does not have separate monitoring equipment per consumer. The energy manager carries out inspection and auditing of electrical equipment in the building in order to identify the largest consumers.

Definition of responsibilities and possible actions of the stakeholders in the instructions for use or internal rules of procedure. Also, defining the limits of responsibility, which allows to understand who is responsible for which stage.

At the moment, for the implementation of the plan and the commencement of operations, it is necessary to activate the work of the task force and to direct the planning processes in communication, in order to inform users and stakeholders about the necessary changes. The task force determines the priority in energy planning and the energy manager includes it in its informative reports and planned management activities, informing the owners and responsible persons of the building.

2.2 Time schedule



2.3 Budget and resources needed

In order to achieve the targets set out in the Action Plan, the main resources required are human resources due to the need to implement a data collection and analysis habit, and it is necessary to communicate with stakeholders on changing habits and smart use and management of buildings. The next step is to invest the resources saved from effective management into technological energy efficiency measures. At the moment, there are funds available for the first technological improvements – the installation of thermometers and the installation of a shut-off valve for regulating the heating of the garage. The energy manager and energy management task force have been appointed.

3 Collaboration with stakeholders

When planning communication with stakeholders, it is first necessary to identify target groups that need to be addressed. The Action Plan will be developed for the Gulbene municipal building and garage, therefore we identify the following target groups:

- Top management (Council deputies);
- Administration staff;
- Technical staff (manager of the building);
- Municipal enterprises.

Table 3.1

Communication activities related to energy efficiency issues

Target group	Target message	Types of communication	Feedback
Top management (Council deputies)	Energy efficiency indicators, possible changes	E-mailing information, Council meetings, Committee meetings	Decisions taken
Administration staff	Proper use of energy, results achieved	Presentations, informative e-mails, energy efficiency stall, resourceful signs in the building	Conversations, direct communication, advisory stall, quick e-mail polls.
Technical staff (manager of the building)	System management and regulation, results achieved	Training, newsletters in e-mail, surveys on pros and cons, direct communication	Direct communication, information reflected by monitoring equipment and energy consumption.
Municipal enterprises	Co-operation opportunities in energy efficiency issues, involvement in energy efficiency planning in municipal buildings and awareness of decisions made	Newsletters in e-mails, meetings, task force meetings.	Decisions taken, accountability for planning and management processes.

Currently, communication on energy management issues is insignificant. It consists mainly of direct communication, which does not contribute to planning and management. In order to better plan communication, there are certain target messages, communication types and checking mechanisms to verify the effectiveness of communication (see Table 3.1).

A lot of work is to be done to prepare materials for starting to build communication. Creating visually appealing informative materials and developing a concrete work plan are the first tasks to be done. After that work must be planned according to the elaborated Plan and the tasks specified therein.

ENERGY ACTION PLAN

Jaunpiebalga County Municipality

prepared by:
Jaunpiebalga County Municipality

PANEL 2050 - Partnership for New Energy Leadership 2050

Deliverable 3.7

Date: August 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Introduction

Jaunpiebalga County Council Energy Management Plan for 2018 - 2022 (hereinafter – Energy Management Plan) has been developed on the basis of the Energy Efficiency Law adopted in 2016, which stipulates the right of local governments to develop and implement an energy efficiency plan that includes certain energy efficiency objectives and measures. An energy management system may be developed and introduced as part of implementation of this plan or separately (in accordance with ISO 50001).

The aim of the Energy Management Plan is to assess the current situation in the territory of the County in order to ensure efficient use of energy resources in municipal buildings and infrastructure, promoting their effective management, as well as to research options for attracting funds to implement energy efficiency measures. It is necessary to develop a plan in order to find more effective solutions for the management of municipal sites by improving the level of energy efficiency and reducing the financial costs and CO₂ emissions in the long-term.

The Energy Efficiency Plan of the County consists of six parts: Part 1: Stakeholders and their responsibilities; Part 2: energy policy; Part 3: Determination of the current situation; Part 4: Implementation and operation of an energy management system; Part 5: Control and monitoring of energy management; Part 6: Annual report on the results achieved.

The developer of the Energy Management Plan is Jaunpiebalga County Council. Part 1 of the document *Stakeholders and responsibilities* states the persons responsible for municipal buildings and infrastructure; Part 2 of the document *Energy Policy* states the Municipality's targets and objectives for the future; Part 3 of the document *Determination of the current situation* describes the current situation as at the beginning of 2018. Its purpose is to describe the current situation of municipal buildings and infrastructure. The description of the current situation serves as a reference point on the basis of which the Energy Management Plan for the region is being developed. Part 4 of the document *Implementation and operation of an energy management system* states the County's goals for the future and how it plans to implement an energy management system; Part 5 of the document *Control and monitoring of energy management* describes the monitoring of the Plan after its implementation and how to achieve the planned results, how to carry out control of the implementation of the Energy Plan; Part 6 of the document *Annual report on the results achieved* is about collecting and assessing data obtained for the previous year for every year after the implementation of the Plan.

Vidzeme Planning Region

Action plan: Jaunpiebalga County Council Energy Management Plan for 2018 - 2022

1 Objective

Jaunpiebalga County Council is committed to ensuring the development of the County through application of sustainable and environmentally friendly principles. Jaunpiebalga County Council sets the following objectives for 2022:

1. To develop an energy management system in the Municipality, conforming to ISO 50001, by the end of 2018 and to implement it by 1 April 2019.
2. To reduce electricity consumption in municipal buildings by 10% compared to 2017.
3. To reduce electricity consumption in the field of street lighting by 5% compared to 2017.
4. To identify 7 municipal buildings with the highest specific energy consumption and determine the main energy consumers and habits of these buildings.
5. To summarise information collected.

1.1 Objective scope and targets values

1.1.1 Legal background

The Action Plan is being developed in accordance with Para 9 of Section 1 of the Energy Efficiency Law "Energy management system – a set of related processes, establishing an action plan and setting energy efficiency targets, as well as the procedures to achieve these targets".

1.1.2 Description of the County's buildings and responsibilities

a) Deputy Director of Jaunpiebalga Secondary School for Administrative and Management Activities

Material responsibility lies in the maintenance and management of three buildings:

- a) Jaunpiebalga Secondary School at Gaujas Street 41, Jaunpiebalga, Jaunpiebalga Parish, Jaunpiebalga County;

b) Jaunpiebalga Pre-school at Priežu Street 8, Jaunpiebalga, Jaunpiebalga Parish, Jaunpiebalga County;

c) Branch in Pēteris Primary School at Skolas Street 2, Melnbārži, Zosēni Parish, Jaunpiebalga County.

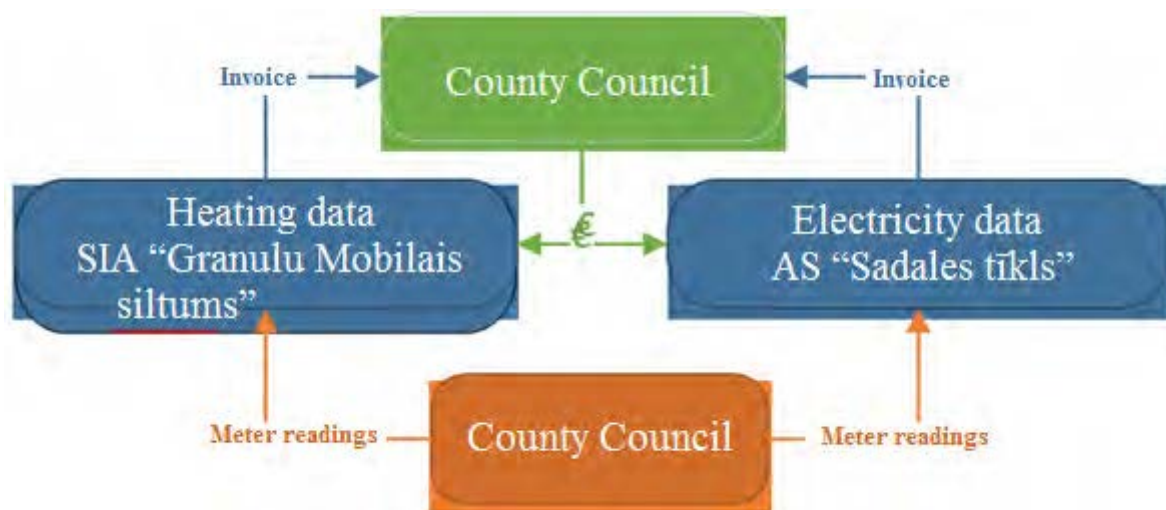
Deputy Director for Administrative and Management Activities in the School is responsible for:

- heating system management;
- changes in the heating network;
- heat consumption;
- lighting in buildings;
- forced ventilation system adjustment.

Heat supply to schools is provided by SIA "Granulu Mobilais siltums" – a Limited Liability Company. Heating system operators regulate heat consumption according to outdoor temperature; regulate settings of the heating network (on Saturdays, Sundays); regulate temperature in radiators.

All buildings have a forced ventilation system. The criteria for the purchase/replacement of lighting is determined by the Deputy Director for Administrative and Maintenance Activities.

The IT specialist is responsible for maintaining office and household appliances. The criteria for the purchase/replacement of equipment is determined by the Deputy Director for Administrative and Maintenance Activities.



b) Manager of Utilities

Material responsibility lies in the maintenance and management of several buildings, of which the largest ones are:

- a) The Council's building at Gaujas Street 4, Jaunpiebalga, Jaunpiebalga Parish, Jaunpiebalga County;
- b) Management building in Zosēni, Annas Street 4, Melnbārži, Zosēni Parish, Jaunpiebalga County;
- c) Boiler house at Gaujas Street 2 a, Jaunpiebalga, Jaunpiebalga Parish, Jaunpiebalga County.

The Manager of Utilities is responsible for:

- heating system management;
- changes in the heating network;
- heat consumption;
- lighting in buildings.

Heat supply to the management building of Zosēni Parish is provided by SIA "Granulu Mobilais siltums" – a Limited Liability Company. Heating system operators regulate heat consumption according to outdoor temperature; regulate settings of the heating network (on Saturdays, Sundays); regulate temperature in radiators.

Heat supply to the Council's building and Jaunpiebalga Culture House is provided by Jaunpiebalga County Council employing a heating equipment operator. Heating system operators regulate heat consumption according to outdoor temperature; regulate settings of the heating network (on Saturdays, Sundays); regulate temperature in radiators.

Criteria for the purchase/replacement of lighting is determined by the electrician of Jaunpiebalga County Council.

The IT specialist is responsible for maintaining office and household appliances. Criteria for the purchase/replacement of equipment is determined by the IT specialist.

c) Head of Jaunpiebalga Culture House

Material responsibility lies in the maintenance and management of the Culture House: Jaunpiebalga Culture House at Gaujas Street 2 a, Jaunpiebalga, Jaunpiebalga Parish, Jaunpiebalga County;

The Head of the Culture House, in cooperation with the electrician of Jaunpiebalga County Council, is responsible for:

- lighting in buildings;
- operation of ventilation system.

Criteria for the purchase/replacement of lighting is determined by the electrician of Jaunpiebalga County Council.

The IT specialist is responsible for maintaining office and household appliances. Criteria for the purchase/replacement of equipment is determined by the IT specialist.

d) Principal of Jaunpiebalga Music and Arts School

Material responsibility lies in the maintenance and management of one building: Jaunpiebalga Music and Arts School at Brāļu Kaudzīšu Street 10, Jaunpiebalga, Jaunpiebalga Parish, Jaunpiebalga County;

The Principal is responsible for:

- heating system management;
- changes;
- heat network;
- heat consumption;
- lighting in buildings;
- forced ventilation system adjustment.

Heat supply to Jaunpiebalga Music and Arts School is provided by Jaunpiebalga County Council employing a heating equipment operator. Heating system operators regulate heat consumption according to outdoor temperature; regulate settings of the heating network (on Saturdays, Sundays); regulate temperature in radiators.

Criteria for the purchase/replacement of lighting is determined by the Principal in cooperation with the electrician.

The IT specialist is responsible for maintaining office and household appliances. Criteria for the purchase/replacement of equipment is determined by the Principal.

1.1.3 Energy assessment (historical energy consumption) in 2007

No.	Public buildings owned or used by the Municipality	Building area		Electricity	Heat			
		Heated	Total	Electricity consumed kWh/per year	Supplied from the central system		Produced in the building's boiler room	
					Heat procured	Has the procured heat been paid for?	Type of material	Heat produced or transferred to the building
		m2	m2	kWh/per year	mWh/per year	EUR/per year		mWh/per year
1	2	3	4	5	6	7	8	9
1	Jaunpiebalga Music and Arts School	834	834	11800			wood pellets	134
2	Jaunpiebalga Culture House	1300	1300	28926			wood pellets	203
3	Management building in Melnbārži, Zosēni Parish	582	582	10552			wood pellets	131
4	Council's building in Jaunpiebalga, Gaujas Street 4	1274	1274	32556			wood pellets	222
	BASEMENT FLOOR			1213				
5	Secondary School at Gaujas 41	3298	3298	8914Eur - 68572	514	23213	wood chips	
6	Primary school at Priežu 8	1681	1681	6933Eur - 53334	370	18500	wood chips	
7	Pētera school	1296	1296	3961Eur - 30476	256	12764	wood pellets	
	Total for schools			1980Eur – 1523 82 kw	1140	54477		

Energy consumption of the Municipality is made up of two main energy consumers:

1. heat and electricity consumption in municipal buildings;
2. electricity consumption of street lighting.

1.2 Target indicators

The Table below shows the historical energy consumption by main groups. Data used in the energy baseline is described in annual reports.

Heat consumption data presented in Table 1.2 correspond to heat consumption in the respective year. Heat energy is used both for heating and water boiling, and currently there are no meters for precise separation of flows.

Table 1.2.

Reference values

Baseline	Designation	Unit of Measure	2017
Total heat consumption in all municipal buildings	ETref	MWh/per year	1830
Total electricity consumption in all municipal buildings	DHWref	MWh/per year	237.4
Average heat consumption per unit of area	EHTref	kWh/m ² per year	178.3

2 Implementation strategy

2.1 Main activities

The main activities aimed at achieving the objectives are to collect data on municipal buildings and to supplement the analysis model with particular emphasis on lightning auditing, as well as to organise training and identify buildings with the highest consumption and analyse the behaviour of their users, and to carry out procurement of heat supply.

2.2 Step by step description

In order to achieve the targets set by 2025, the designed Action Plan is shown in Table 2.1. The Plan is divided into three parts, according to three target categories: short-term, medium-term and long-term.

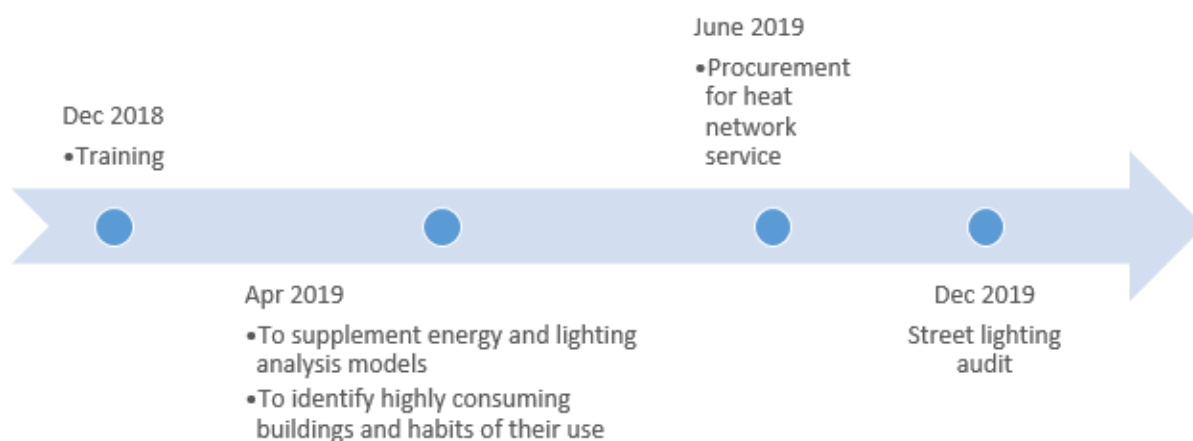
Table 2.1.

Action plan

No.	Action	Responsible person	Timeline
1	To organise training for participants involved in the development of the Energy Management Plan on opportunities to reduce energy consumption	Utilities management - electrician	December 2018
2	To use and continuously supplement the Building Energy Consumption Analysis Model of the Energy Management Plan	Utilities management - electrician	April 2019
3	To use and continuously supplement the analysis of public lighting.	Utilities management - electrician	April 2019
4	To identify 7 municipal buildings with the highest specific energy consumption and determine the main energy consumers and habits of these buildings.	Utilities management - electrician	April 2019

5	To collect detailed technical information about all stages of street lighting distribution and impact factors	Utilities management - electrician	December 2019
6	To organise procurement and conclude a contract for the servicing of the heating networks of residential apartment buildings	Procurement Commission	June 2019

2.3 Time schedule



2.4 Budget and resources needed

In order to achieve the targets set out in the Action Plan, the main resources required are human resources due to the need to implement a data collection and analysis habit, and it is necessary to communicate with stakeholders on changing habits and smart use and management of buildings. The next step is to invest the resources saved from effective management into technological energy efficiency measures. At the moment the amount of savings is not clear. When the Plan is put into action and starts to operate, work with the management and reservation of the necessary funds and allocation to measures of the Action Plan and its future versions will begin.

3 Collaboration with stakeholders

To assess the competence of persons involved in the development of the Energy Management Plan, copies of documents certifying education, training courses and other relevant documents are kept by Human Resources Department.

The Municipality will ensure that during the development and implementation of an energy management system all involved municipal employees (including external service providers) are informed at least once a year about the following:

- a) the municipal energy policy, its objectives, EMS procedures and conditions;

- b) the roles, responsibilities of employees, persons and authorities responsible for EMS implementation;
- c) benefits of developing and implementing an EMS in the Municipality, and the results;
- d) how employee behaviour can affect energy consumption and what can be done to reduce energy consumption.

3.1 Communication with stakeholders

The internal communication of the County Council on EMS implementation will be carried out in the following meetings:

- EMS task force;
- management consultations;
- planning meetings.

Executives of the Municipality (heads of structural units) are responsible for the issues discussed, decisions adopted in meetings and distribution of information to other employees of their unit.

3.2 Management of Implementation

To ensure and control the operation of EMS in the management of municipal buildings, the following activities will be performed:

- the responsible employee of each municipal building performs maintenance work as it has been done so far;
- the energy manager regularly supplements the energy consumption analysis model and analyses these data by comparing energy consumption with indicators of the previous period;
- if energy consumption of a given month is more than 10% above the average multi-annual consumption of the given month, the energy manager reviews energy efficiency indicators and makes notes. In the event that, as a result of the analysis of data, the energy manager verifies that the indicators are above the norm, he/she contacts the technical staff of the building in order to find out the reason for the change;
- if the cause can be explained and is credible, the energy manager shall agree with the technical employee about the action to be taken;
- if the technical employee does not have an explanation, the energy manager (if necessary, by calling representatives from other departments)

- visits the respective authority and assesses energy use and causes of the changes, and carries out corrective actions.

Records are made and kept on all actions.

Once every six months (if necessary, then more often) the energy manager notifies the Executive Director of discrepancies found in municipal buildings.

To ensure and control the operation of EMS in the management of public street lighting, the following activities will be performed:

- public street lighting is managed according to current practice;
- each month the energy manager collects electricity consumption data for each control distribution unit, these data are entered into the public lighting analysis model, and carries out analysis of these data by comparing energy consumption indicators with indicators of the previous period;
- If energy consumption of a given month is more than 10% above the average multi-annual consumption of the given month, the energy manager reviews energy efficiency indicators, makes notes and determines the cause.

3.3 Incorporation of energy efficiency criteria into procurement and design

The County's Municipality carries out public procurement on the basis of the Procurement Law.

The preferred criterion for procurement would be the most economically advantageous tender in order to purchase new electrical equipment, electricity consumption, lifetime and total lifetime costs of electrical equipment would be taken into account rather than assessing the submitted tender by choosing the lowest price offer.

4 Monitoring strategy

4.1 Monitoring, measurement and analysis

Currently, data on energy production and consumption in the County are, in most cases, available only individually and are not collected centrally. Implementation of an energy management system in the County will allow to address issues related to energy consumption data accounting and analysis, thus reducing energy consumption and saving the Municipality's funds.

Persons responsible for ensuring reduction of consumption:

- In municipal buildings – head of the respective structural unit/head of management department
- In the field of street lighting – municipal electrician.

- Energy management system in municipal buildings – the responsible municipal structural unit for the establishment of energy management and implementation in the County is the Municipal Administration. Monitoring of the implementation of the energy management system in the County will be provided by the EMS implementation task force.
- Monthly accounting of energy consumption of municipal institutions and street lighting will be organised using Excel programs.

4.2 Compliance assessment

Once a year up-to-date information on regulatory enactments governing and affecting energy consumption shall be collected to assess the current situation in the County. Responsible persons of structural units shall be notified on any changes in legislation and compliance with regulatory enactments related to energy consumption.

4.3 Annual report in the results achieved

Once a year the County Council will assess the established energy management system in order to ensure its continued suitability, adequacy and effectiveness.

Information to be included in the annual report:

- measures implemented in the Municipality since the last management report;
- overview of energy policy;
- overview of energy efficiency parameters and relevant indicators;
- results of conformity assessment related to regulatory enactments and their changes;
- summary of achievement of the targets set;
- EMS audit results;
- projected energy efficiency indicators for the following period;
- suggestions for improvements.

4.4 Results of the annual report

The annual report shall include information on:

- changes in energy efficiency indicators;
- changes in energy policy;
- changes in energy efficiency parameters;
- changes in targets and objectives set, which correspond to the Municipality's commitment to ensure continuous improvement;
- changes in resource provision.

5 Risk management

Risk	Probability of realising	Mitigation measure
Lack of financial resources	High	The task force thoroughly evaluates the measures provided for in the Plan, their efficiency and payback time before allocating funds; careful budget planning
Lack of human resources	High	Prior to defining each sub-target and task, the task force appoints the responsible persons and evaluates their suitability and performance capacity; systematic planning of measures, ensuring more efficient use of human resources
Unreachable targets	Medium	The energy manager, with the support of the task force, thoroughly assesses the current situation in order to identify shortcomings and realistic targets
Weak communication, information about measures does not reach stakeholders	Medium	Carefully designed communication and information transfer procedures; active involvement of management by showing the stakeholders an example and creating the feeling that the implementation of the plan is important; to plan motivating and engaging activities to promote people's involvement and awareness raising
Monitoring measures are not carried out in the required quality	Medium	To develop precise procedures and steps for data reading and analysis, as well as to appoint specific persons to read, record and analyse data; to require regular reports from the task force and management.

Contact

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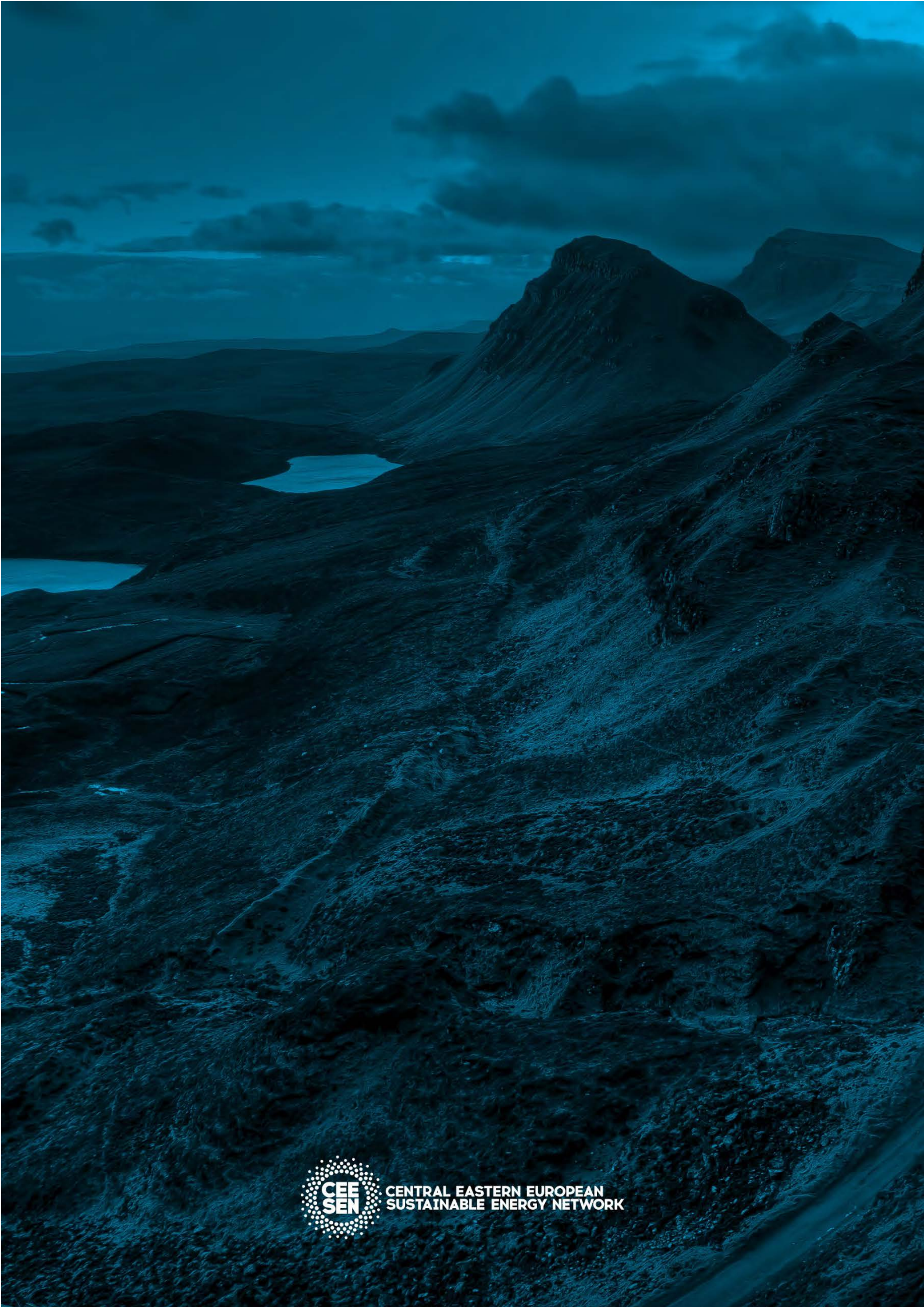
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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ENERGY ACTION PLAN

Lizums Secondary School

prepared by:

Lizums Secondary School lead by Juris
Ločmelis

PANEL 2050 - Partnership for New Energy Leadership 2050

Deliverable 3.7

Lizums, 2018



CENTRAL EASTERN EUROPEAN
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Introduction

2016. The Manor House was built in 1854 in Gothic style and in the middle of the 19th century it was rebuilt in Neo-Gothic style. The Manor House belonged to F. von Wolff. The masonry building has a semi-basement and two floors, a tower has been built in the northwest corner. The artistic arrangement of several rooms in the Manor House has been preserved. To this day, a barn and other Manor buildings have been preserved. Lizums Secondary School is currently in operation. In 1937, Lizums Four-Year Elementary School and Velēna II Grade Primary School are combined, establishing Lizums Six-Year Primary School, which begins to operate in the Castle in 2 October. In the barn of the Manor the school's gym is established. In 1957/1958 it is transformed into a secondary school.

Initially, firewood furnace was used for heating the building. Precise data have not been documented regarding changes in heating; however, at the beginning of the 20th century K. Pēkšēns established a central heating system installation company, which was the largest in Riga for a very long time. It can be assumed that around 1933 central heating is established in Lizums Castle by K. Pēkšēns's company. It heats all rooms, except the tower and auxiliary rooms. It was sufficiently warm as the thickness of the masonry walls exceeds 0.7 m and the windows do not have high heat losses. Such self-circulating heating system operated until mid-seventies.

The number of students grew rapidly and the School had to find a new spatial solution. It was decided to reconstruct the attic floor, terrace and balconies. These works were carried out in a hurry and there was a lack of construction materials characteristic to USSR. Today, there is a problem with these rooms to provide steady heat supply in the winter.

The School's energy targets may be driven in three directions:

- To find efficient use for heat, expecting a higher heat consumption,
- To use electricity economically, to promote habits for its efficient use,
- To find causes for CO₂ increase and to provide the School's management with recommendations on how to reduce its average annual consumption by at least 10%.

Teachers shall raise the awareness of all pupils about energy management issues, according to the pupils' background knowledge. To attract pupils' interest, competitions and drawing contests shall be organised. To offer topics on the use of energy for scientific research.

Vidzeme Planning Region

Action plan: Lizums Secondary School Energy Action Plan

1 Objective

The School's energy targets may be driven in three directions:

- To find efficient use for heat, expecting a higher heat consumption,
- To use electricity economically, to promote habits for its efficient use,
- To find causes for CO₂ increase and to provide the School's management with recommendations on how to reduce its average annual consumption by at least 10%.

1.1 Objective scope and targets values

1.1.1 Legal background

- Energy Efficiency Law effective as of 29 March 2016;
- Sustainable Development Strategy of Latvia until 2030;
- National Development Plan of Latvia for 2014-2020.
- Laws and regulations of the Republic of Latvia – Section 5 of the Energy Efficiency Law, which states that local governments have the right to: 1) develop and adopt an energy efficiency plan as a separate document or as a component of the spatial development programme of a local government, which includes energy efficiency targets and measures; 2) separately or as a component of the implementation of its energy efficiency plan put in place an energy management system;
- Cabinet Regulation of 09.07.2013 No. 383 "Regulations for Energy Certification of Buildings".

1.1.2 Description of the selected building

Lizums Secondary School (Figure 1) is located in Gulbene County. It has 243 pupils from grade 1 to 12. The staff consists of 31 teachers and 22 other employees. The school complex includes the following buildings: manor castle, manor barn and in 2017 the primary school was moved to the County's administration building. The Castle was built in 1854. The most important repairs done in the school building are the replacement of roofing and façade renovation.

The total area of the school is 2491 m², heated area ≈2200 m², the building is constructed of boulders and bricks, bearing structures of the roof are made of wood, the roof is covered with sheet metal. The building has 3 basement floors and 3 floors.

In the basement there is the school cafeteria, coat room, wood and metal technology rooms, bathrooms, utility rooms. On the first floor there is a spacious staircase, the Blue Hall and the Great Hall (renovated according to the historic heritage), classrooms. On the second floor there is a spacious hallway and classrooms. On the third floor there are classrooms and three utility rooms.



Figure 1.1. Building of Lizums Secondary School

1.1.3 Energy assessment (historical energy consumption)

- Heat

The building has one heating network. The building receives heat from the Parish's heating network. Figure 2 shows heat consumption over a three year period. The specific heat consumption in 2015 was 221 kWh/m², in 2016 – 218 kWh/m², but in 2017 – 231 kWh/m², which is considered a very high consumption, given that the current construction standard states that a low-consumption building is a building with a consumption of less than 100 kWh/m².

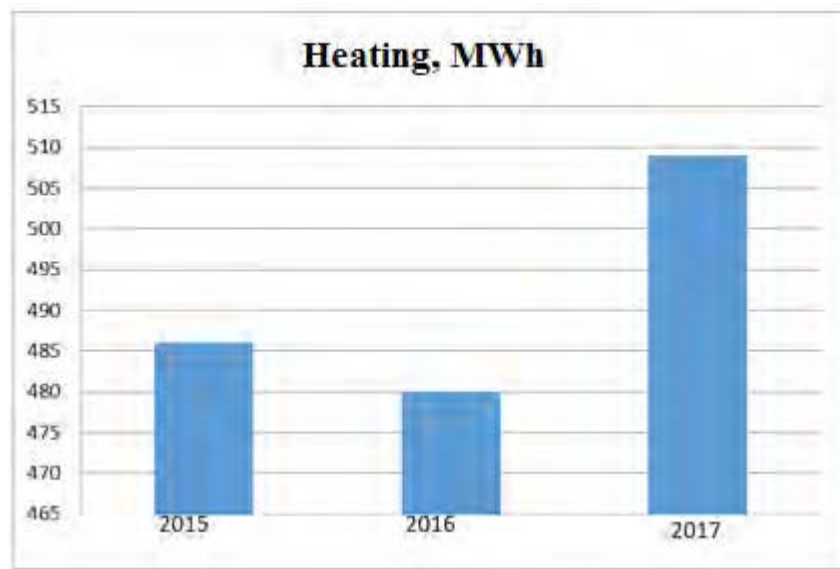


Figure 1.2. Heat consumption for heating, MWh

In order to determine the strengths and weaknesses of buildings that would help to set realistic and relevant targets, it is important to understand the current situation. One of the most important stages for this analysis is the determination of the historic energy consumption. The following steps were taken:

1. analysing the consumption of firewood, heating pellets, electricity and water for 2015, 2016 and 2017 after accounting data;
2. calculating the theoretical amount of energy consumed by heating after accounting data.

Energy consumption differences in Figure 1.2 are mostly related to different weather conditions. A heat regulator is installed in the Parish's boiler house, which regulates the total heat supply in the network, depending on the outdoor temperature.

The temperature in the school can be controlled partially, as some radiators have rusted regulators that cannot be mechanically moved. There is an issue with most rooms in the school that by the end of classes the temperature has risen significantly. Of course, this allows to ventilate the classrooms in breaks, as there is no need to worry about over-cooling of premises.

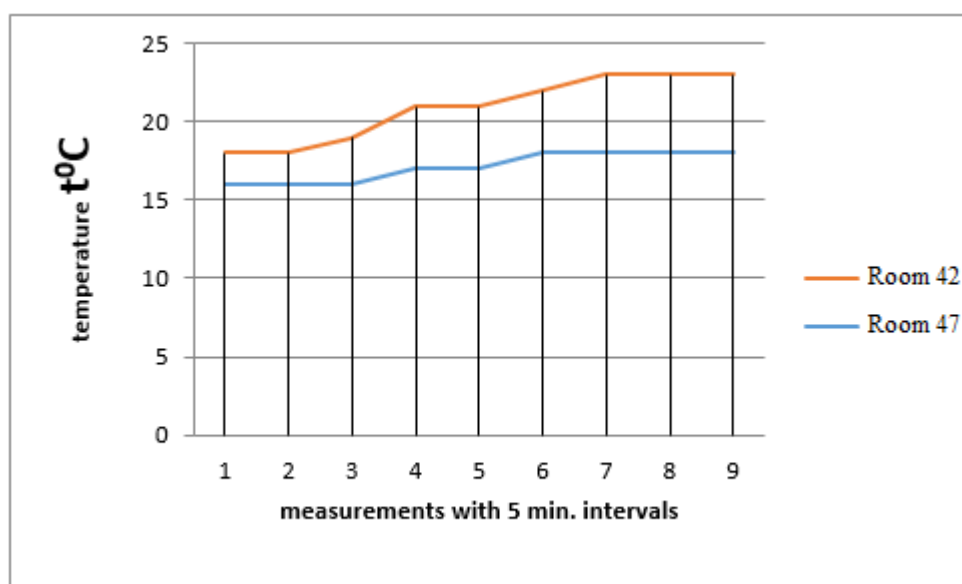


Figure 1.3. Increase of temperature in two classrooms over a 40 minute lesson

Figure 1.3 shows that, as per measurements, the temperature in room 47 is lower in general. Measurements were carried out simultaneously in both rooms and the question arose – is there an issue with heat supply or heat loss? Pupils performed measurements on heating radiators. Figures 1.4 and 1.5 show measurement results.

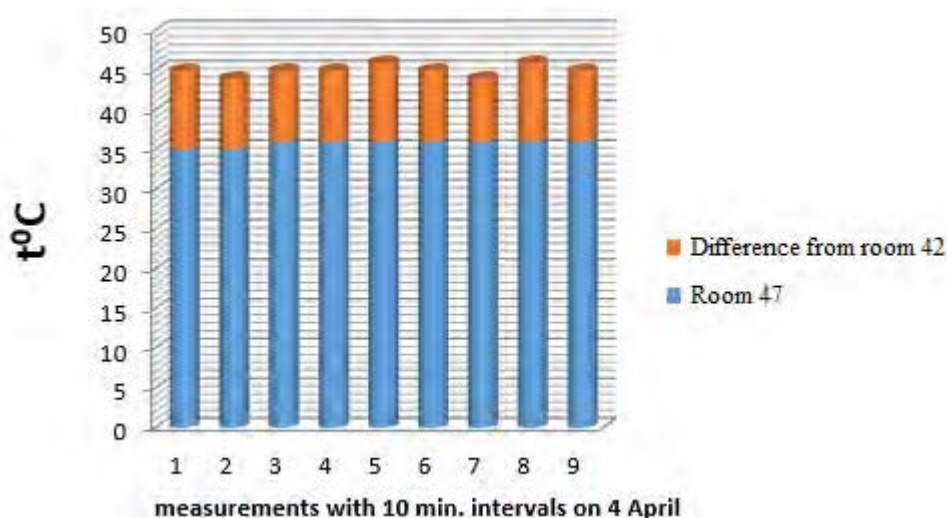


Figure 1.4. Figure 1.5. Heater temperatures in two classrooms on 4 April

We concluded that there is an issue with a certain circulation section, located behind the plasterboard wall. Since this issue is independent of the outdoor temperature, these are not losses of heat due to lack of insulation, but there may be circulation clogs or some other defects that block the flow of hot water.

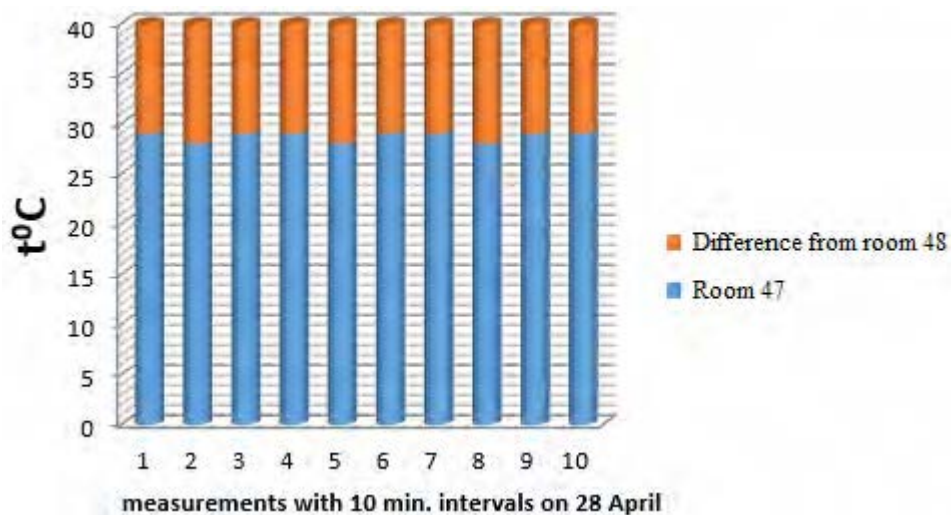


Figure 1.5. Heater temperatures in two classrooms on 28 April

One of the causes of the unbalanced heat in the school may be an ineffective change in technical utilities in the 1970s.

Taking into account that at the end of 2017 the heat supplier was replaced with larger capacities, the possibility to control each radiator flow separately would be topical. The issue here could be waste of heat.

- Electricity

The school receives electricity from two distribution stations of the distribution grid, which is actually very advantageous, because if there is an interruption in one line, then the school will not suffer from absolute darkness. The school uses electricity for:

- Lighting;
- Kitchen unit;
- Hot water;
- Technical learning aids.

Electricity consumption, kWh

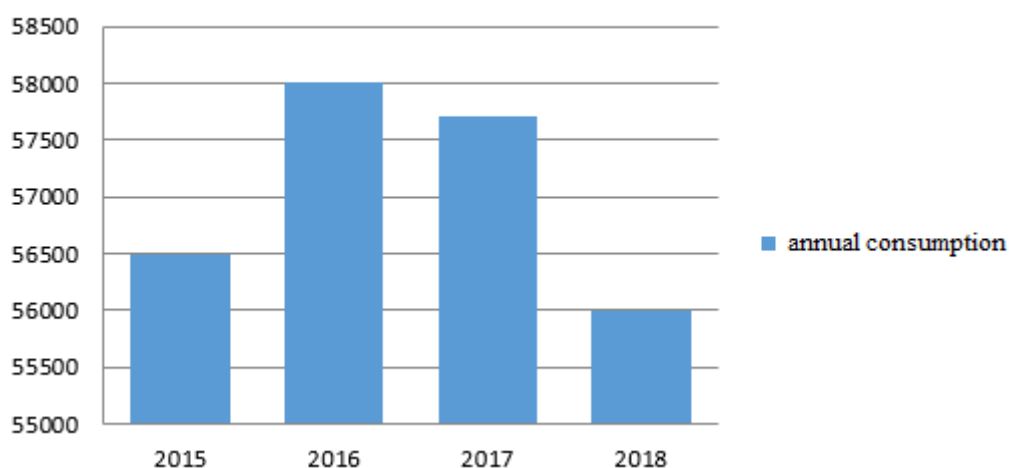


Figure 1.6. Total electricity consumption in 2015-2017 and in a part of 2018

Figure 1.6 shows electricity consumption in recent years. Such uneven energy consumption might be due to construction work, as auxiliary construction devices operated from the school's distribution unit in 2016-2017. It is promising that after replacing the school's lighting lamps to LED, there are significant energy savings. It is estimated that there will be 300 kWh less consumed than in the previous period. It is an estimation because the whole year is not over and we do not know the exact data.

The school's kitchen uses modern equipment with economic indicators; work is carried out to prevent heating elements from scale buildup.

One of the biggest electricity consumers is the computer room of the school. The cost-effectiveness of this room depends to a large extent on the capacities of computers. The extent to which the school is able to keep pace with technological developments depends on the school's financial capability. As far as possible, the school tries to replace old computers with more economical ones.

The school's staff tries to prevent waste of electricity:

- Technical staff turns off excess lighting in corridors;
- Projectors are kept in "sleep" mode if they are not used;
- Hot water taps are not left opened if they are not used.

- Water

Figure 1.7 shows total water consumption in the school in the last three years. As can be seen, it was the highest in 2015. Recalculating per person (assuming that on average 280 people are present at the school), consumption in 2015 was about 125 m³, in 2016 - about 104 m³, whereas in 2017 - about 107 m³, which is an extremely high consumption - in eight operation months of the school it amounts to 13 – 16 m³ per month per person.

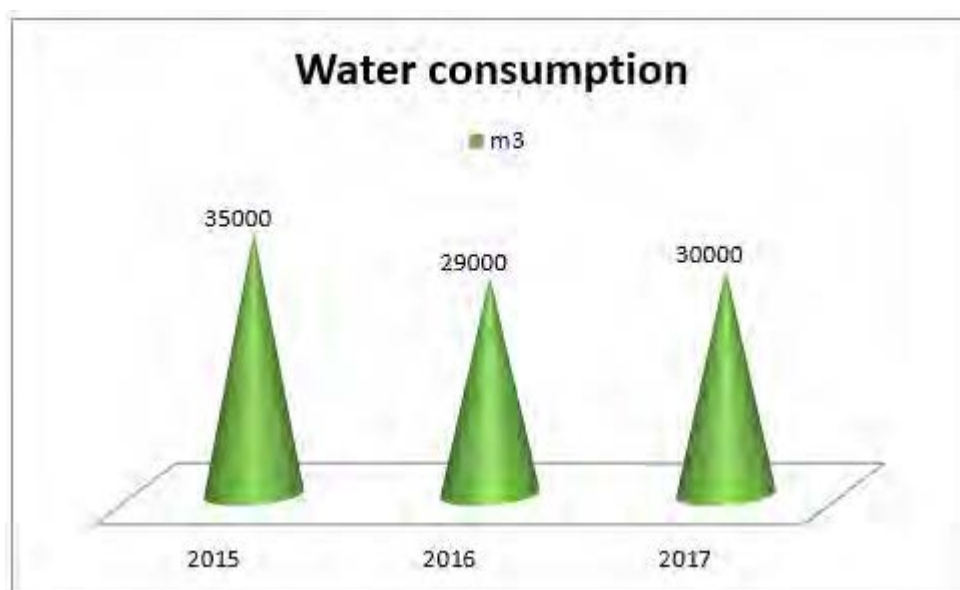


Figure 1.7. Water consumption in the school in 2015 – 2017

Water to the school is supplied from the Parish's water tower. The water is of good quality and can be used as drinking water. In 2015 the school had a water fountain that operated from the pressure difference of the height of the water tower. This meant that during the operation of the fountain water resources were irretrievably spent. In 2017 the fountain was reconstructed, and now it operates independently with resources from its pool. It can be seen that water consumption has decreased. In 2016 the fountain was not used.

All hot water resources in the school are obtained by electric heaters. It is mainly used for personal hygiene. Currently, there are no data to analyse hot water consumption. In any case, they are insignificant and, given the need for hot water throughout the year, this solution might even be the most advantageous.

1.2 Target indicators

Energy performance indicators reflect the specific energy consumption per square meter of the building or another unit.

The average consumption of 2015, 2016 and 2017 is determined as the baseline energy consumption. The margin of the energy management plan is determined within the boundaries of one municipal building. The main accounting and evaluation indicators are determined as follows:

- electricity consumption (kWh/per month; MWh/per year);
- heat consumption (kWh/m² per year; MWh/per year);
- water consumption (l/pers. per month and year; m³/per year);
- CO₂ level indoors (average, minimum and maximum).

2 Implementation strategy

2.1 Main activities

The Action Plan mainly focuses on raising environmental awareness of employees and pupils, creating a habit of collecting and analysing data, as well as teaching them to manage their building in a smart manner. Since the school has limited financial resources, only such energy efficiency measures that do not require much material investment and will place more emphasis on awareness raising and energy management will be introduced in the near future.

2.2 Step by step description

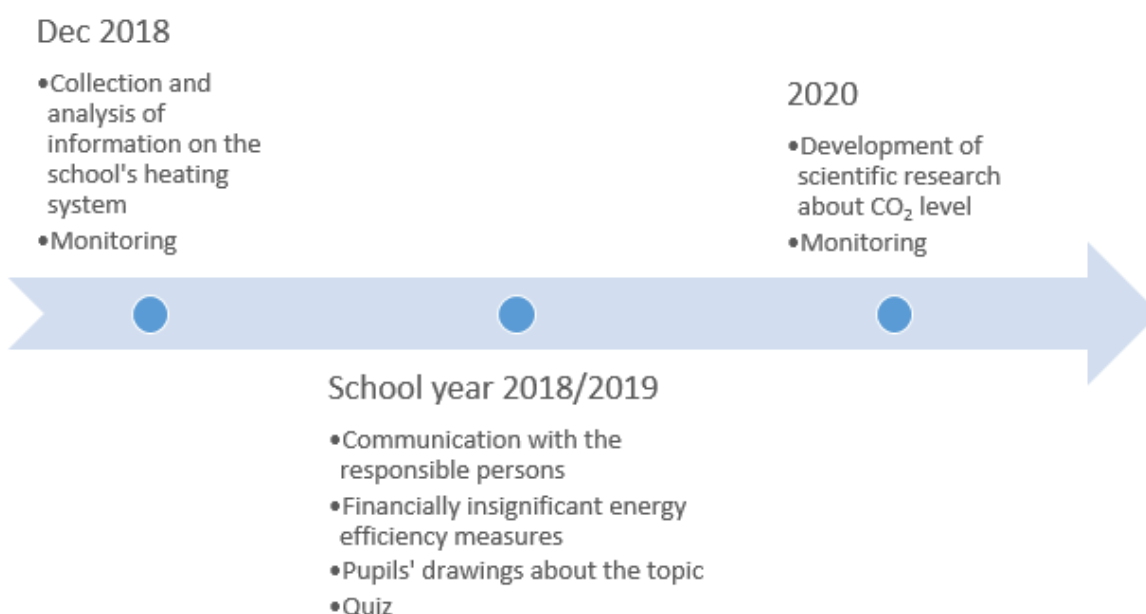
Although much more needs to be done in the future, short-term measures that do not require large investments but allow for a gradual introduction of an energy management system in the County were selected for this plan. In order to achieve the targets set, an Action Plan has been developed, which is shown in Table 2.1.

Table 2.1

Lizums Secondary School Energy Action Plan

Objective	No.	Action	Time schedule
To learn to use heat efficiently.	1.	To review available information about the school's heating	December 2018
	2.	To discuss with responsible persons the quality of actions	school year 2018/2019
	3.	To identify steps that could be taken in the school without a lot of investment	school year 2018/2019
Efficient use of electricity	1.	To draw drawings in the school about energy	school year 2018/2019
	2.	Quiz	April 2019
To analyse the school's CO ₂ level	1.	Development of scientific research papers on energy topics	2018-2020

2.3 Time schedule



2.4 Budget and resources needed

In order to achieve the targets set out in the Action Plan, the main resources required are human resources due to the need to implement a data collection and analysis habit, and it is necessary to communicate with stakeholders on changing habits and smart use and management of buildings. The main focus of the Plan currently is on raising awareness of pupils and employees through various measures.

3 Collaboration with stakeholders

It is not planned to recruit employees with special qualifications and competencies to introduce the measures of the Action Plan. Employees working at the school form a part of persons engaged in the performance of measures stipulated by the Plan. Collaboration between pupils and teachers will be achieved by integrating measures stipulated by the Action Plan and the ideas of environmental protection and energy management into the learning process and individual activities.

4 Monitoring strategy

Monitoring of energy management is one of the most important implementation sections of the Energy Action Plan. Regular data collection and analysis allows to better track progress and determine whether the targets are achieved in due time.

The head of the school's technical department could be responsible for monitoring. Monitoring data would be prepared and submitted to the manager of the Parish upon request. Data collection and analysis should be done at least once a week. It should be determined separately, which data shall be collected more often. These may be

electricity and heat consumption data so that changes can be analysed by months and seasons.

Measurements could be made by pupil task forces who know how to do measurements. Teachers of natural sciences could control measurement accuracy and non-compliances of pupil task forces.

1. Heating data accounting and analysis should be carried out once a month.
2. Electricity consumption data should be accounted and analysed once a week.
3. Energy efficiency performance will be controlled with the following indicators:
temperature outdoors, indoors, heating units; wattmeters; CO₂ sensors.
4. Data will be obtained from the school's meters, from the Parish's administration.

Electricity consumption can be determined from the school's common meter and using small portable meters. The small electricity meters may be used by pupils, but the central meter is accessible to the manager of the technical department.

When inconsistencies are detected, they shall be reported to the school's manager. Once a semester, a summary of performance is developed and compared with the Plan.

5 Risk management

Risk	Probability of realising	Mitigation measure
Lack of financial resources	High	The task force thoroughly evaluates the measures provided for in the Plan, their efficiency and payback time before allocating funds; careful budget planning
Lack of human resources	High	Prior to defining each sub-target and task, the task force appoints the responsible persons and evaluates their suitability and performance capacity; systematic planning of measures, ensuring more efficient use of human resources
Unreachable targets	Medium	The energy manager, with the support of the task force, thoroughly assesses the current situation in order to identify shortcomings and realistic targets
Weak communication, information about measures does not reach stakeholders	Medium	Carefully designed communication and information transfer procedures; active involvement of management by showing the stakeholders an example and creating the feeling that the implementation of the plan is important; to plan motivating and engaging activities to promote people's involvement and awareness raising
Monitoring measures are not carried out in the required quality	Medium	To develop precise procedures and steps for data reading and analysis, as well as to appoint specific persons to read, record and analyse data; to require regular reports from the task force and management.

Contact

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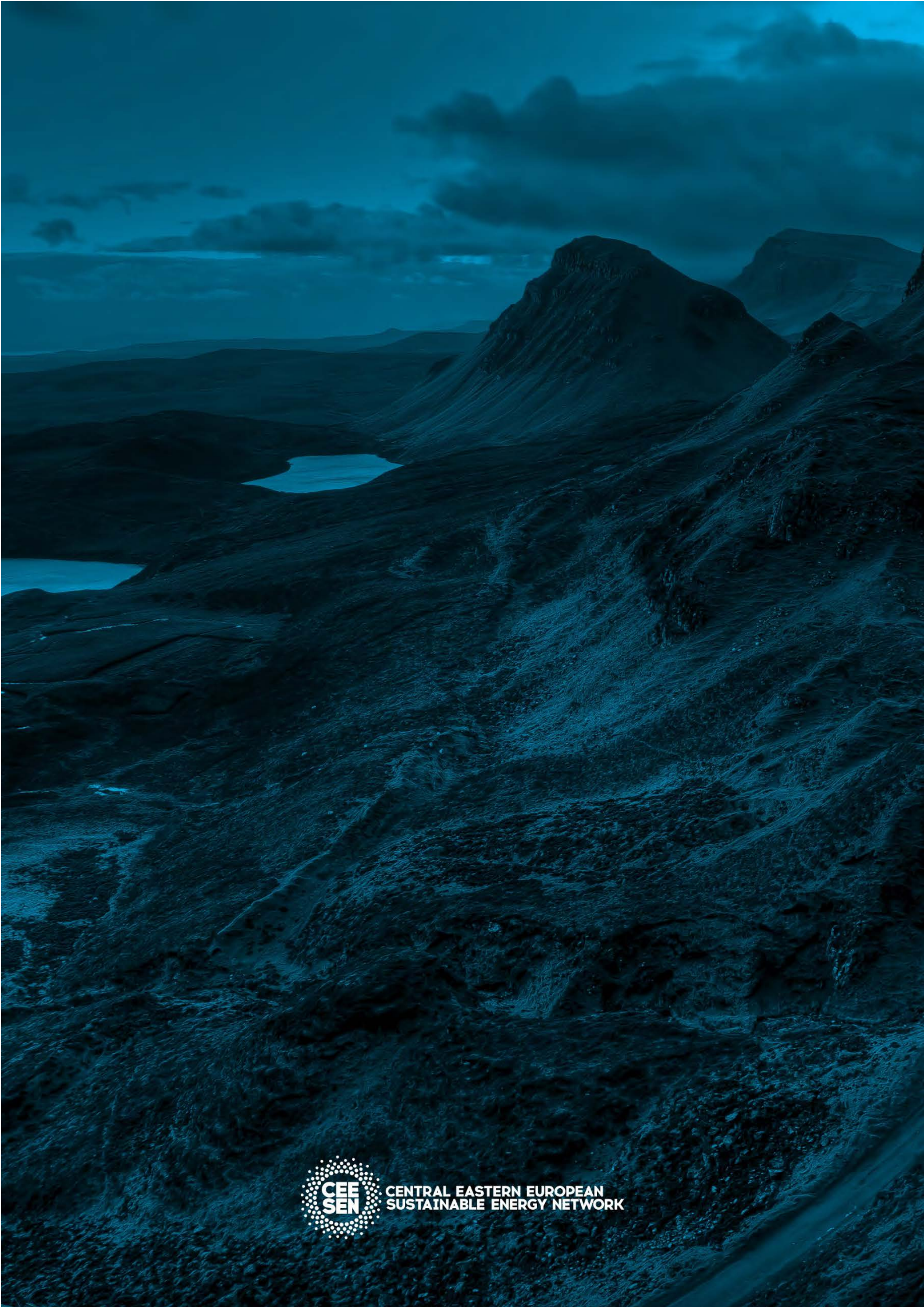
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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ENERGY ACTION PLAN

Lubāna County Municipality

prepared by:
Lubāna County Municipality

PANEL 2050 - Partnership for New Energy Leadership 2050

Deliverable 3.7

Date: August 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Vidzeme Planning Region

Action plan: Energy Plan for Lubāna Pre-School “Rūķīši”

1 Objective

Commitment: energy efficiency is one of the key criteria for moving towards sustainable development in order to save the financial resources of Lubāna residents.

By developing this Plan, we are committed to reducing the total energy consumption of the building and the annual maintenance costs.

We undertake to comply with the basic principles of an energy management system in accordance with the ISO 50001 standard. Employees of Lubāna County Municipality and the pre-school will be involved in the development, implementation and maintenance of an energy management system, and will tell others about it.

Long-term objective: to reduce significantly the total energy consumption of the building and thereby – management costs of the building by 2022. To reduce damage to building structures and networks. To improve the aesthetic look of the building.

Short-term objective: to reduce the building's energy consumption by 10% of the total baseline consumption by the end of 2019.

1.1 Objective scope and targets values

1.1.1 Legal background

- Energy Efficiency Law effective as of 29 March 2016;
- Sustainable Development Strategy of Latvia until 2030;
- National Development Plan of Latvia for 2014-2020.
- Lubāna County Integrated Development Programme for 2012–2018

1.1.2 Description of the selected building

The building is located in Lubāna County Municipality. The Municipality was established on 30 October 2007. The administrative centre of Lubāna County Municipality is Lubāna Town. According to the Population Register, as of 01.01.2018 there are 2464 residents in Lubāna County, 773 of which are registered in Indrāni Parish, while 1691 of which are registered in Lubāna Town.

The selected building of Pre-School “Rūķīši” (Figure 1.1) is located in Lubāna, Brīvības Street 17. On a daily basis there are around 80 pupils and 30 employees in the building. It is a two-story building with a total area of 3422 m²; currently the heated area is 2596 m². Foundation of the building is made of reinforced concrete, the walls – of lightweight concrete (cracked, in some parts there are openings through which rainwater gets into the building), slabs - of reinforced concrete. The building has a flat reinforced concrete slab roof, insulated with 100 mm hard rock wool, covered with roll roofing. Wooden windows installed during the construction of the building now have rotten frames, when it is raining, water gets into the building through the oakum sealing. PVC double-glazed windows have been replaced, most of which have been installed incorrectly (the windows are mounted in a single inner plane with internal walls, creating cold paths that reduce the energy efficiency of the building). The exterior door of the building has been partially replaced. The main entrance door has been planned, manufactured and installed poorly. Rainwater drainage system has been built inside the building. During winter months condensation forms on the pipes, additional humidity in the room occurs, the room temperature is lowered.



Figure 1.1. Pre-School “Rūķīši”

In the building 80% of the heating system has been replaced by a new system, pipes in the basement have been insulated with stone wool, convectors with thermoheads have been installed. Hot water is provided with water boilers. There are 7 water boilers and 1 flow heater (21 kW) installed in the building. The equipment has been adjusted to the manufacturer's established economic regime. Hot water is distributed through thermostat mixers.

1.1.3 Energy assessment (historical energy consumption)

Figures 1.2, 1.3 and 1.4 show a brief overview of energy consumption indicators of some buildings in Lubāna County Municipality.

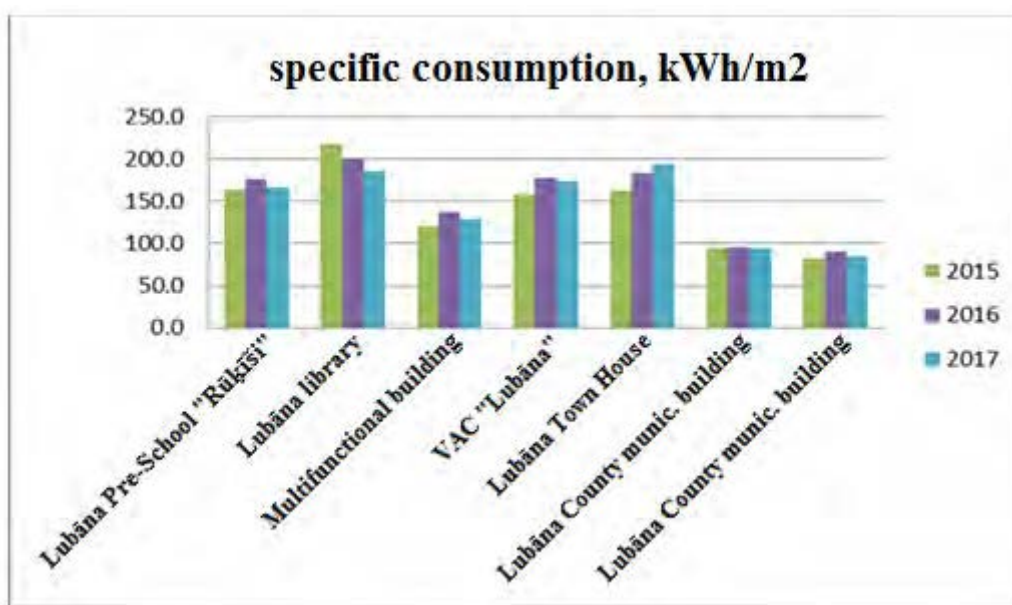


Figure 1.2. Average specific energy consumption in 2015-2017, kWh/m²

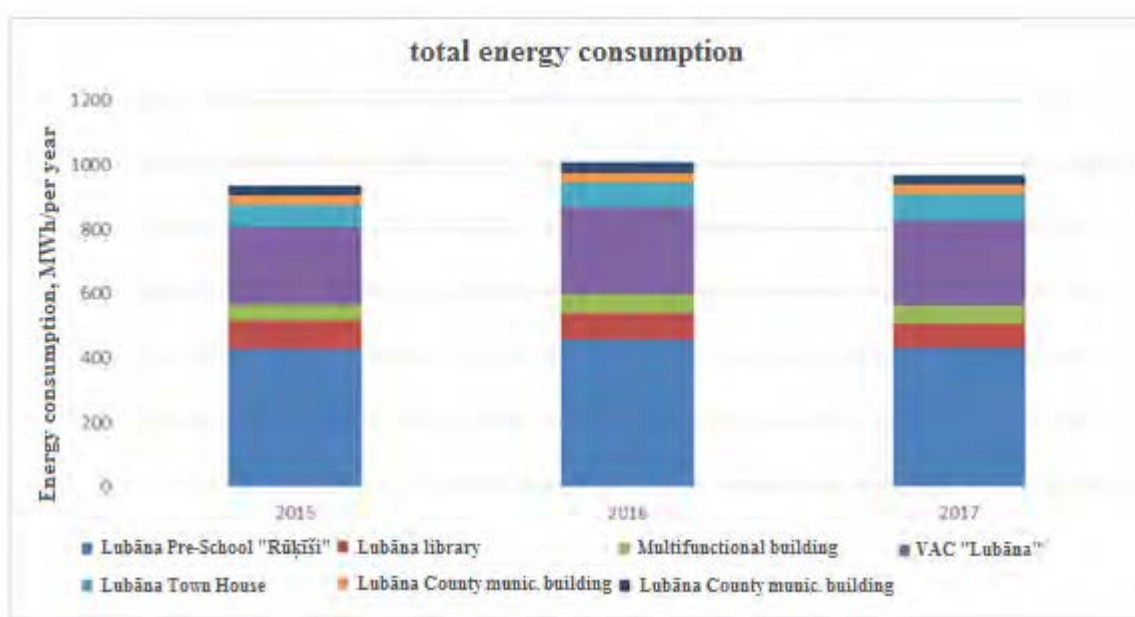


Figure 1.3. Total change in energy consumption (MWh) by year in the municipal buildings of Lubāna County

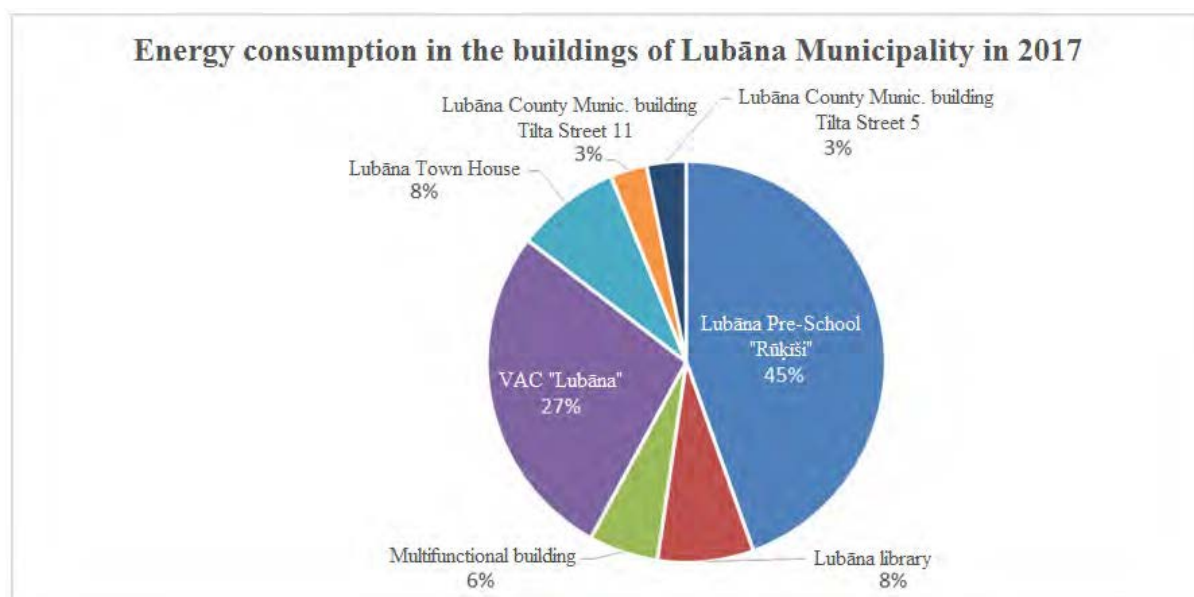


Figure 1.4. Breakdown of total energy consumption (%) by buildings in 2017

The charts (in Figures 1.2, 1.3 and 1.4) show that Lubāna Pre-School "Rūķīši" is one of the largest energy consumers (45%) among the County's authorities, but not with the largest specific consumption.

Before the heating season of 2016, an automatic heating unit was installed in Lubāna library, thus reducing the annual energy consumption.

There is an increase in energy consumption of Lubāna Town House, which can be attributed to the fact that an automatic heating unit has not been installed, therefore there is no option to control heating. The Town House's energy consumption was also affected by the fact that the outlet thermostat thermometer has been installed in the wrong place, thus, during the last two years, the maximum temperature of around 75 degrees Celsius was maintained in the heating network, which in turn is reflected in the Town House's energy consumption increase.

The total energy consumption of the populated part of Pre-School "Rūķīši" is 430 MWh per year. The specific consumption is 170 kWh/m² per year. Figure 1.5 shows that heat takes up most of the building's energy consumption.

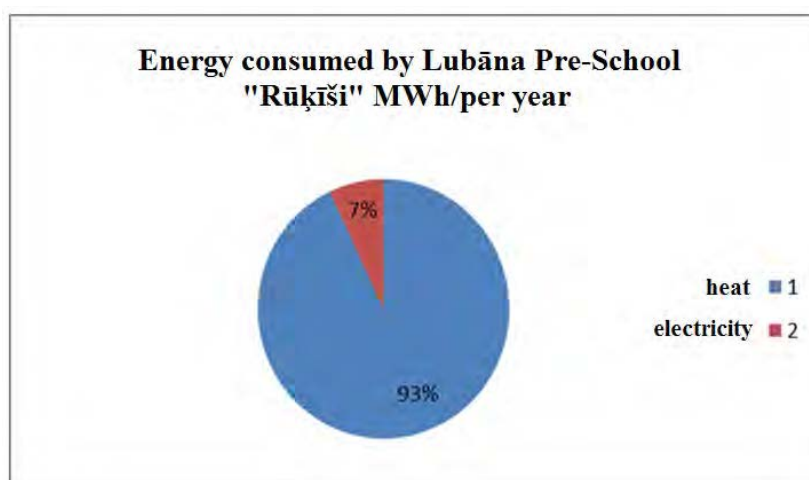


Figure 1.5. Breakdown of energy consumption in Pre-School "Rūķīši"

Pre-School "Rūķīši" receives **cold water** from the town's water pipe (a meter has been installed at the inlet). The charts (in Figures 1.6, 1.7) show water consumption changes with the number of pupils changing, as well as inaccurate readings of the meter (e.g. July 2017).

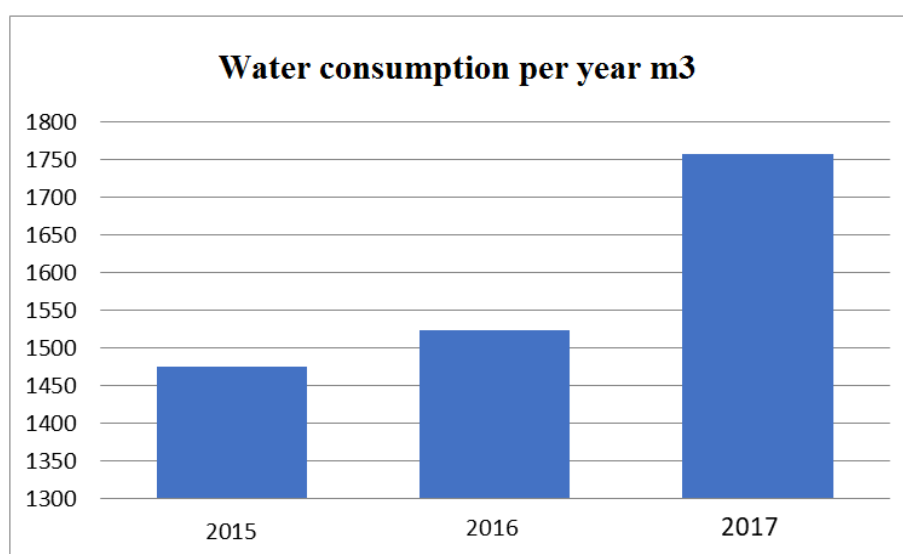


Figure 1.6. Water consumption by years, m³ per year

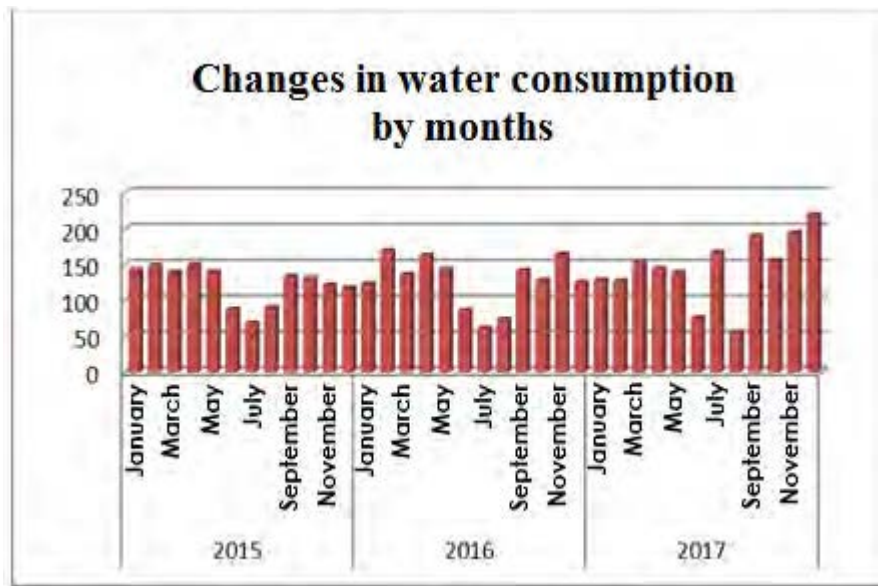


Figure 1.7. Water consumption by months, m³ per month

Heat is supplied to the building by municipal company SIA "Lubānas KP". Heat is produced by burning wooden chips. A heat meter has been installed at the inlet. The building is equipped with a split heat unit with a heat exchanger and a Danfoss ELC110 regulator (set by the building's technical officer). Summarising the temperature in rooms where children are present, the following was established:

- the group of the first floor of the north end + 22 C° / bedroom +18 C°
- the group of the second floor of the south end + 23 C° / bedroom 21 C°
- average room temperature +21 C°

Heat consumption charts (in Figures 1.9, 1.10 and 1.11) show that the amount of heat consumed increases or decreases, depending on the outdoor temperature (Figure 1.8).

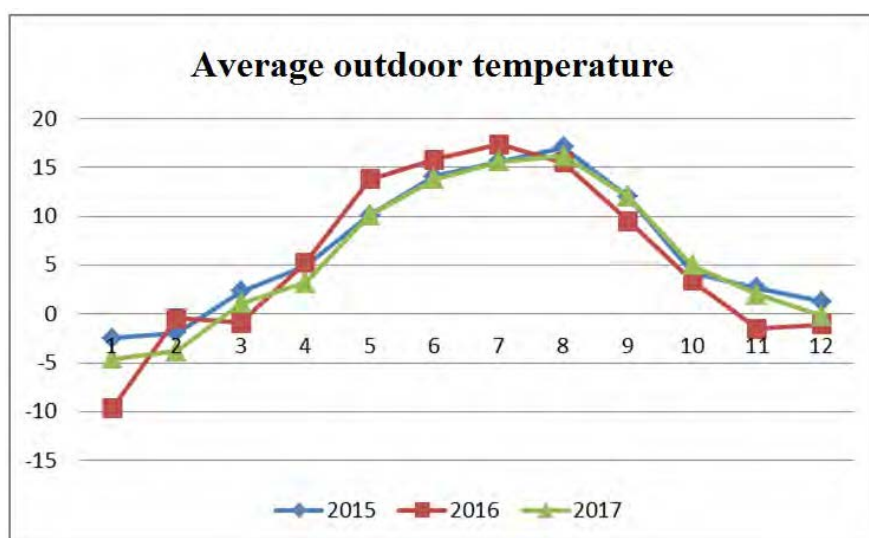


Figure 1.8. Average outdoor temperature per month by years

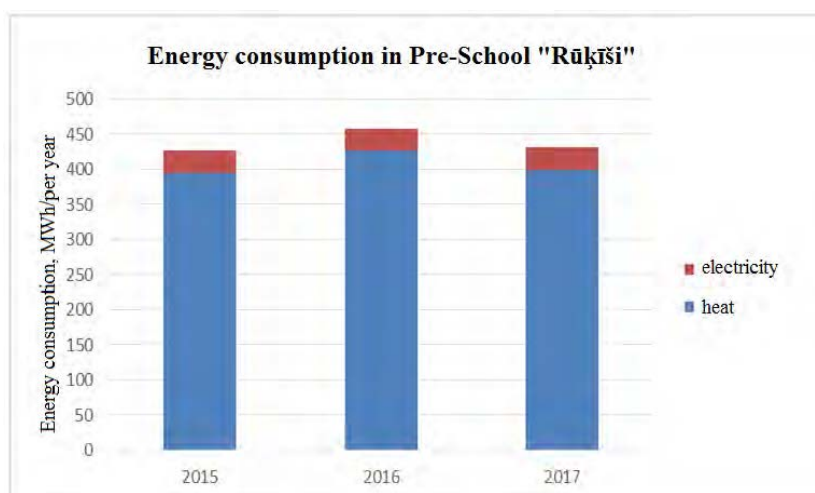


Figure 1.9. Energy consumption in Pre-School "Rūkīši" by years

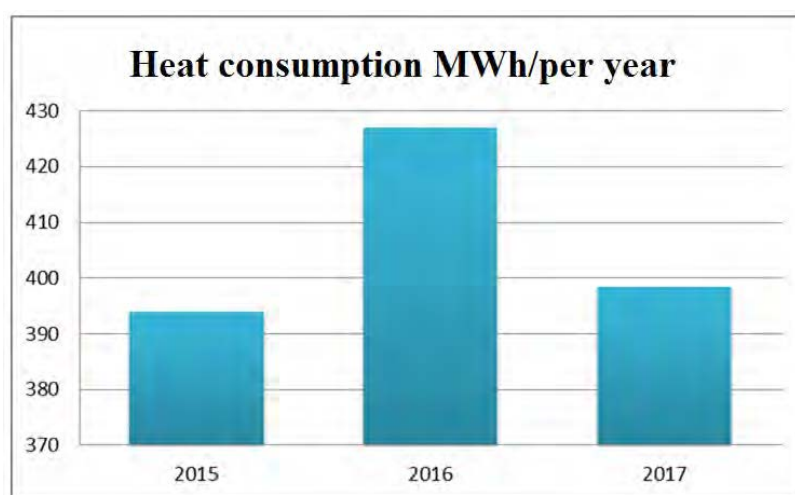


Figure 1.10. Heat consumption by years, MWh/per year

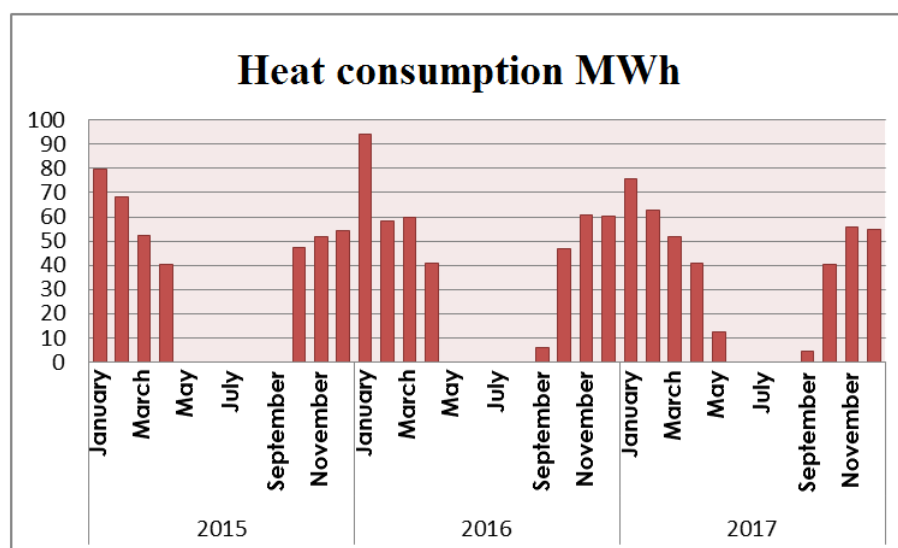


Figure 1.11. Heat consumption by months, MWh/per month

Table 1.1 horizontally lists various systems of the boarding school that consume heat or affect the production of heat. Table 1.1 vertically lists the various users of the building, which can affect the consumption of heat in each of the systems with their actions.

Table 1.1

Users of Pre-School "Rūķīši" and their potential impact on the heating system

IMPACT	Heating system
Employees, pupils	Can control heat supply in rooms with thermal heads
Technical staff	Sets up the heating unit
Lubānas KP	Service and emergency situations
County Municipality	Determines the requirements for the manager of the heating system

ELECTRICITY. Electricity connections 80A are established from both sides of the building (a smart meter has been installed at the inlet unit). Electricity is purchased in the scope of a procurement procedure. Fluorescent lamps are used for lighting, in some places these are replaced by LED lamps. Natural ventilation has been constructed in the whole building. There is a forced steam extractor in the kitchen, which can be adjusted by a reostat.

Electricity consumption charts (in Figures 1.12, 1.13) show how the amount of electricity consumed increases or decreases, depending on the attendance of children, the time of darkness of the day and the outdoor temperature.

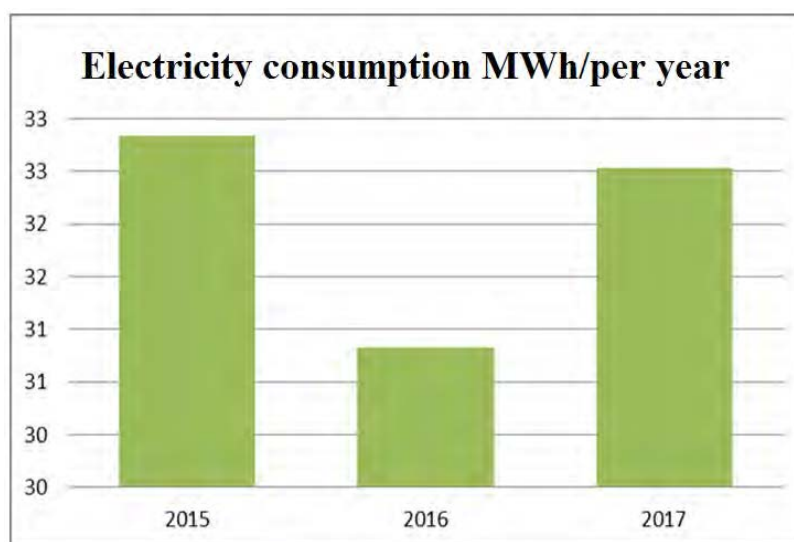


Figure 1.12. Electricity consumption, MWh/per year

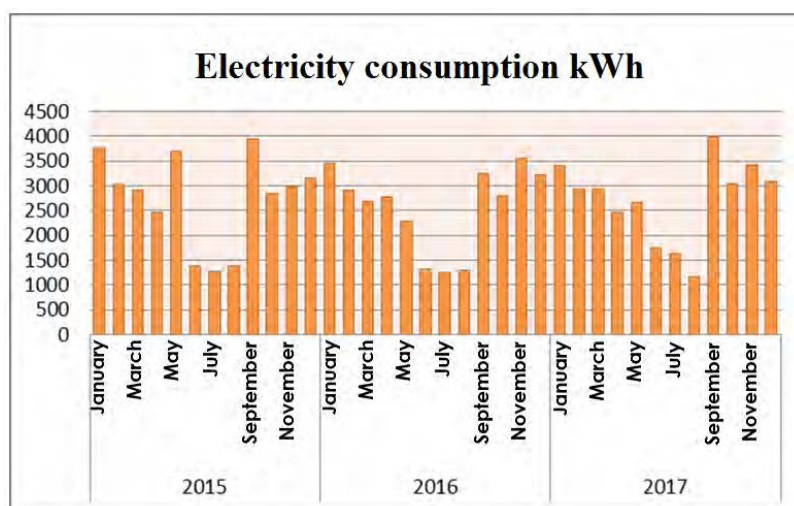


Figure 1.13. Electricity consumption by months, kWh/per month

Table 1.2 lists vertically various building systems that use electricity, while Table 2 lists horizontally various building systems that use electricity, which can influence the use of electricity in each of the systems with their actions.

Table 1.2

Users of Pre-School "Rūkšī" and their potential impact on electricity consumption

IMPACT/ SYSTEMS	Indoor lighting	Office equipment	Kitchen appliances	Househo ld applianc es	Water boiling	Outdoor lighting
Employees of the building	Turn lights on/off	Use a computer/projector etc.	Use a kettle, fridge, other professional kitchen equipment	Use a washing machine	Use of water in bathrooms and showers	-
Pupils	-	-	-	-	Use of water in bathrooms and showers	-
Technical staff	Purchase and installation of lamps	Equipment installation. Regime setting.	Equipment installation. Regime setting.	Equipment installation. Regime setting.	Service and maintenance	-

County Municipality	-	<i>Determines the requirements for the equipment</i>	<i>Determines the requirements for the equipment</i>	<i>Determines the requirements for the equipment</i>	<i>Determines the requirements for management</i>	<i>Turns on/off Determines the requirements</i>
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1.2 Target indicators

In order to assess the effectiveness of the energy management system after its implementation, it is necessary to determine a baseline. This will be the starting point, from which progress towards energy savings will be assessed.

Energy baseline was the average three year indicator (2015 – 2017) The consumption indicators for the following months and years will be compared to it. Energy base (baseline consumption) of Lubāna Pre-School "Rūķīši" is 168.8 kWh/m².

The margin of the energy management plan is determined within the boundaries of one municipal building. The main accounting and evaluation indicators are determined as follows:

- ✓ electricity consumption;
- ✓ heat consumption;
- ✓ water consumption.

2 Implementation strategy

2.1 Main activities

- Measures to be carried out to achieve the long-term objective (future vision in Figure 2.1):
- to replace the old wooden windows, incorrectly installed pvc (double-glazed) packet windows against double-chamber (triple-glazed) packet windows in accordance with the building standard of Latvia
- to insulate the outer walls, plinth, basement ceiling of the building in accordance with the building standard of Latvia
- to construct a forced ventilation system with a recuperator
- to install a windcatcher at the main entrance in accordance with the building standard of Latvia

- to replace the existing lighting fixtures with LED solutions.



Figure 2.1. Future vision of Pre-School “Rūķīši”

Measures to be taken to achieve the medium-term objective:

- to complete internal heating system replacement, approximate costs 25,000 EUR
- to replace the lighting of one room with LED fluorescent lamps every year - approximate costs 120 EUR/per room.
- to replace WC water boxes in sanitary rooms with a double mechanism. (It will be possible to teach children from the age of 3 to save water). Expected savings – 30% of the total consumption, approximate costs – 1,100 EUR.
- to insulate rainwater drainage pipes – 200 EUR.
- to install an automatic closing device for the kitchen door – 30 EUR.
- to discuss with kitchen workers the habits of using the electric stove and oven.
- to inform the employees of the operating principles of the convectors of heat exchangers and how the heating network works.
- to discuss with employees the habits of using electric lighting.
- to discuss with employees the strict compliance with the ventilation schedule.
- to discuss the use of the exterior door with parents in parent-teacher meetings.
- to organise educational workshops for employees (parents too, if there is a wish) regarding energy efficiency issues by inviting field experts.

2.2 Step by step description

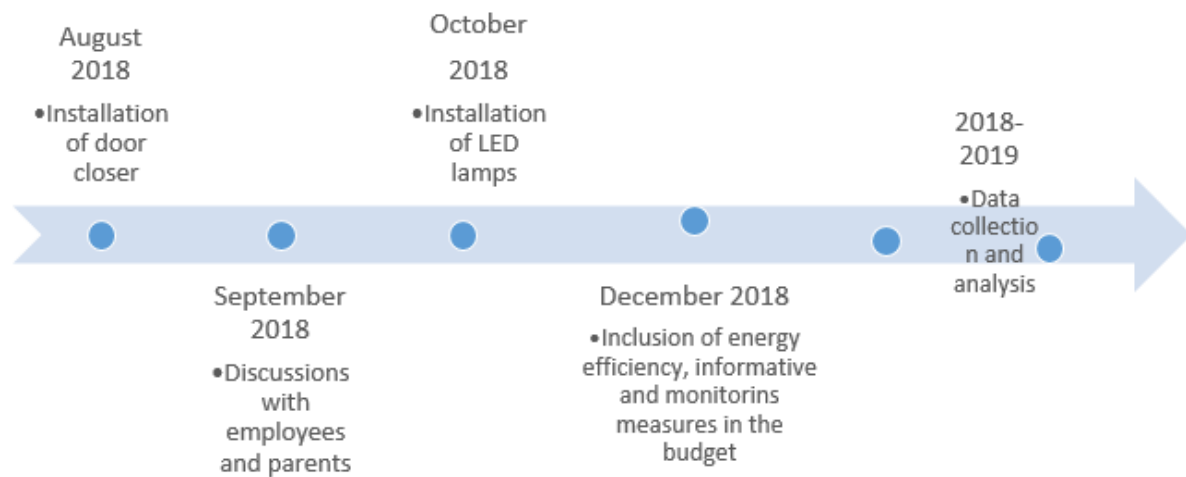
Although more needs to be done in the future, measures to achieve the short-term objective by 2019 were selected for this Plan (see Table 2.1).

Table 2.1

Action Plan for the end of 2018

No.	Action	Responsible person	Timeline
1.	To continue to collect and analyse data on used heat, electricity, water.	Manager of the building	2018/2019
2.	to install an automatic closing device for the kitchen door	Manager of the building	August 2018
3.	All kinds of discussions with employees, parents about energy efficiency measures.	Manager of the building	September 2018
4.	LED lamp replacement for "Kāpēcīši" group	Manager of the building	October 2018
5.	Inclusion of WC toilet replacement costs in the institution's budget.	Manager of the building	December 2018
6.	Inclusion of an education workshop on energy efficiency in the institution's budget of 2019.	Manager of the building	December 2018
7	Inclusion of data monitoring platform maintenance in the institution's budget of 2019.	Manager of the building	December 2018
8.	Inclusion of the costs of the finalisation of the heat system renovation in the institution's budget of 2019.	Manager of the building	December 2018

2.3 Time schedule



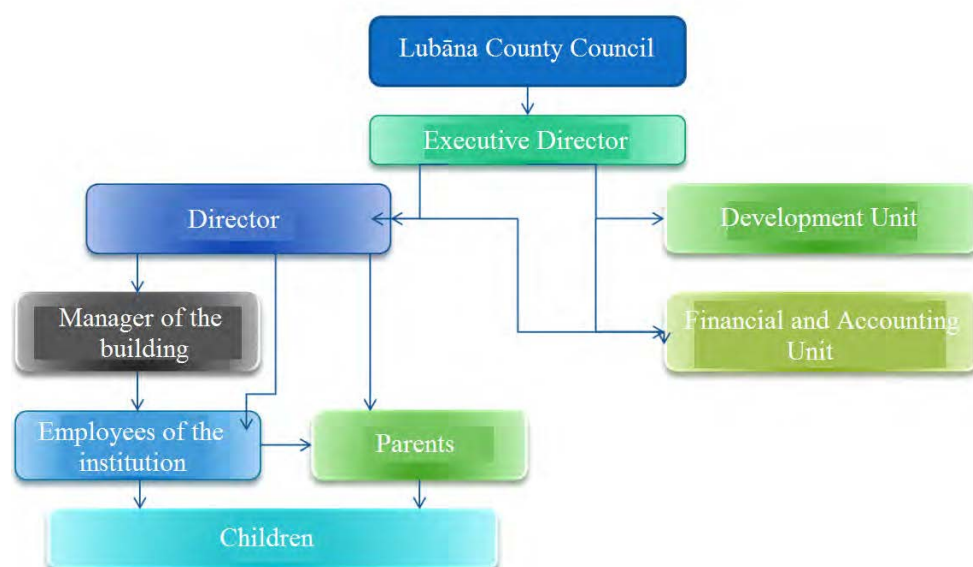
2.4 Budget and resources needed

In order to achieve targets set out in the Action Plan, the main resources required are human resources due to the need to implement a data collection and analysis habit, and it is necessary to communicate with stakeholders on changing habits and smart use and management of buildings.

Approximate building renovation cost 622,345.63 EUR. It is expected that the specific consumption for energy efficiency decreases to 85 kWh/m² per year. Approximate savings on electricity costs for lighting 30%.

The total cost of measures for reaching the short-term objective is 26,450 EUR, most of which (25,000 EUR) is for finalising the replacement of the heating system.

3 Collaboration with stakeholders



3.1. Employees involved in energy efficiency measures

Table 3.1

Employee communication activities related to energy efficiency issues in Lubāna County

Target group	Target message	Types of communication	Feedback
Top management (Council deputies)	Energy plan as a whole	meetings (presentations)	direct meetings
Administration staff	Energy plan as a whole	meetings (presentations), e-mail (internal system)	direct meetings, surveys
Technical staff (building managers, boiler house workers, etc.)	Actions to be taken to achieve the targets	meetings (presentations)	direct meetings, surveys
Residents, society as a whole, clients	Statistics, reports, finances spent/saved	meetings (presentations), disclosure of information (social networks, website, apps)	direct meetings, surveys, interviews
Cooperation organisations	Statistics, reports, finances spent/saved	disclosure of information (social networks, website, apps)	direct meetings, surveys
Municipal enterprises	Energy plan as a whole, actions to be taken to achieve the targets, finances spent/saved	meetings (presentations), e-mail (internal system)	direct meetings

Under Order No. LUB/2.02.18/2 of 16 March 2018 by the Executive Director of Lubāna County Municipality, a task force was established for the development and implementation of an Energy Efficiency Plan in Lubāna Pre-School "Rūķīši" at Brīvības Street 17, Lubāna. The task force consists of three people (see Table 3.2).

Table 3.2

Task force for the development and implementation of the Energy Efficiency Plan

Job title	Education	Work experience	Training/workshops in the field of energy or environment (name of topics)
Egils Rēvelis, head of the Development Unit	highest	Management of CCFI project "Carbon Dioxide Emission Reduction by Replacing Lighting Fixtures in Lubāna". Management of CCFI project "Reduction of Greenhouse Gas Emissions in the Lighting Infrastructure of Lubāna County Public Areas".	None
Jolanta Kočāne, accountant	highest	Financial management of CCFI project "Carbon Dioxide Emission Reduction by Replacing Lighting Fixtures in Lubāna". Financial management of CCFI project "Reduction of Greenhouse Gas Emissions in the Lighting Infrastructure of Lubāna County Public Areas".	None
Andris Stojers Manager of the building	Vocational school	Different types of building insulation works. Heating system renovation, insulation, adjustment.	VPR training "Energy Management in Vidzeme" – development, implementation, maintenance of an energy plan

Head of the Development Unit – promotion of the Energy Plan in the County Council.

Planning of attraction of financial resources in project-type events to implement energy efficiency measures by carrying out renovation or reconstruction. Monitoring of Energy Plan implementation.

Manager of the building – carries out execution of the Action Plan. Planned data monitoring to reduce the risk of unnecessary energy consumption and plan for system upgrades. Financial planning for achieving short-term targets.

Accountant - linking the Energy Plan with financial resources.

4 Monitoring strategy

In all buildings, heating accounts for the largest percentage of total energy consumption. In order to objectively determine energy consumption of the building itself, it would be necessary to install automatic heat exchangers (if there are none) or adjust the existing ones according to the manufacturer's recommendations. Place thermometers in the rooms and monitor them. By processing data obtained, it will be possible to assess and set priorities for the reduction of heat consumption more objectively.

The process for monitoring heat and electricity consumption data:

1. To carry out analysis of collected data once a month; when observing a significant deviation of, for example, 5%, in-depth analysis and elimination of the cause is carried out.
2. To account and analyse heat, water and lighting consumption data;
3. Variables - temperature, number of pupils;
4. Energy efficiency performance indicators are monitored by calculating the specific energy consumption - kWh/m² per year;
5. Data will be obtained from SIA «Lubānas KP», AS "Sadales tīkls";

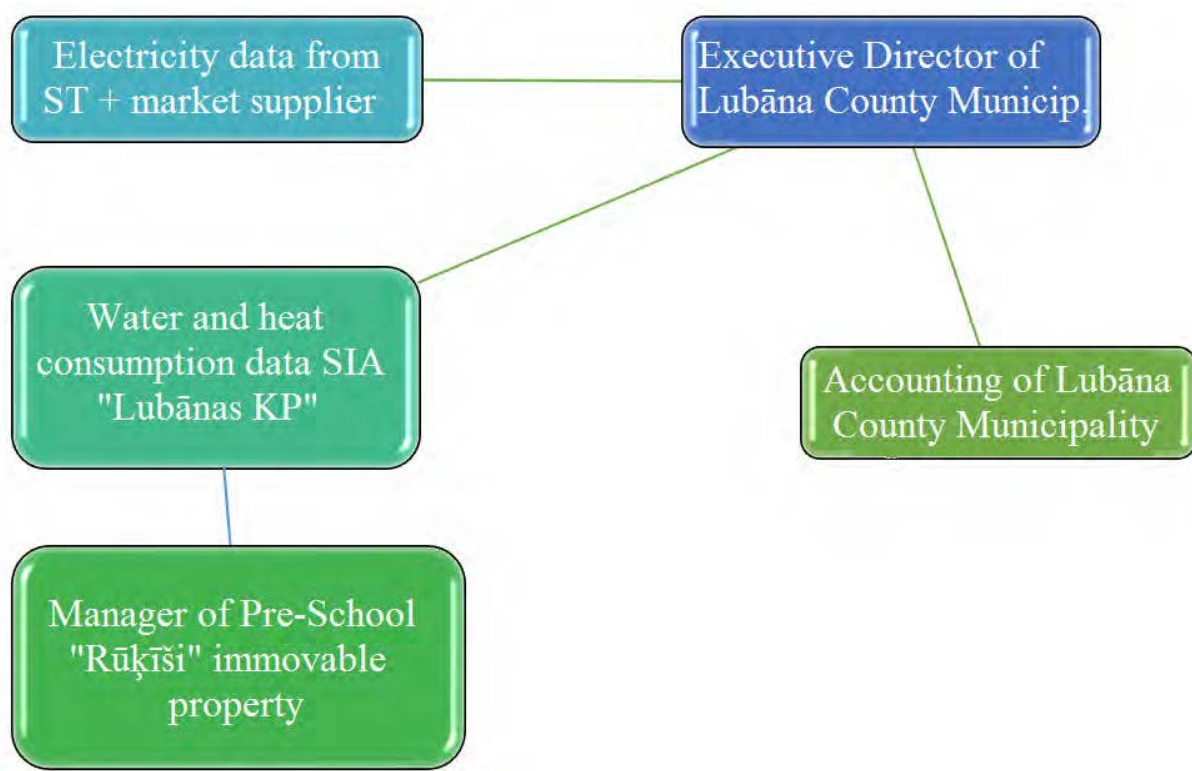


Figure 4.1. Circulation of consumption data and invoices of Lubāna Pre-School "Rūķīši"

Water and heating meters are read by a specialist of the building (see Figure 4.1), which are then reported to SIA "Lubānas KP". In turn, the company issues invoices to Lubāna County Municipality. Data on consumed electricity are read automatically. The invoice is issued to Lubāna County Municipality.

The desired monitoring model – implementation of an energy management monitoring system to any of the proposed platforms with access to all stakeholders. Implementation of an environmental monitoring system in the premises with notifications regarding deviances to smart devices, etc.

Once a year, summarising all data obtained, an annual report on accomplishments should be developed. Conclusions shall be drawn and proposals for progress towards the set objectives shall be developed.

5 Risk management

Risk	Probability of realising	Mitigation measure
Lack of financial resources	High	The task force thoroughly evaluates the measures provided for in the Plan, their efficiency and payback time before allocating funds; careful budget planning
Lack of human resources	High	Prior to defining each sub-target and task, the task force appoints the responsible persons and evaluates their suitability and performance capacity; systematic planning of measures, ensuring more efficient use of human resources
Unreachable targets	Medium	The energy manager, with the support of the task force, thoroughly assesses the current situation in order to identify shortcomings and realistic targets
Weak communication, information about measures does not reach stakeholders	Medium	Carefully designed communication and information transfer procedures; active involvement of management by showing the stakeholders an example and creating the feeling that the implementation of the plan is important; to plan motivating and engaging activities to promote people's involvement and awareness raising
Monitoring measures are not carried out in the required quality	Medium	To develop precise procedures and steps for data reading and analysis, as well as to appoint specific persons to read, record and analyse data; to require regular reports from the task force and management.

Contact

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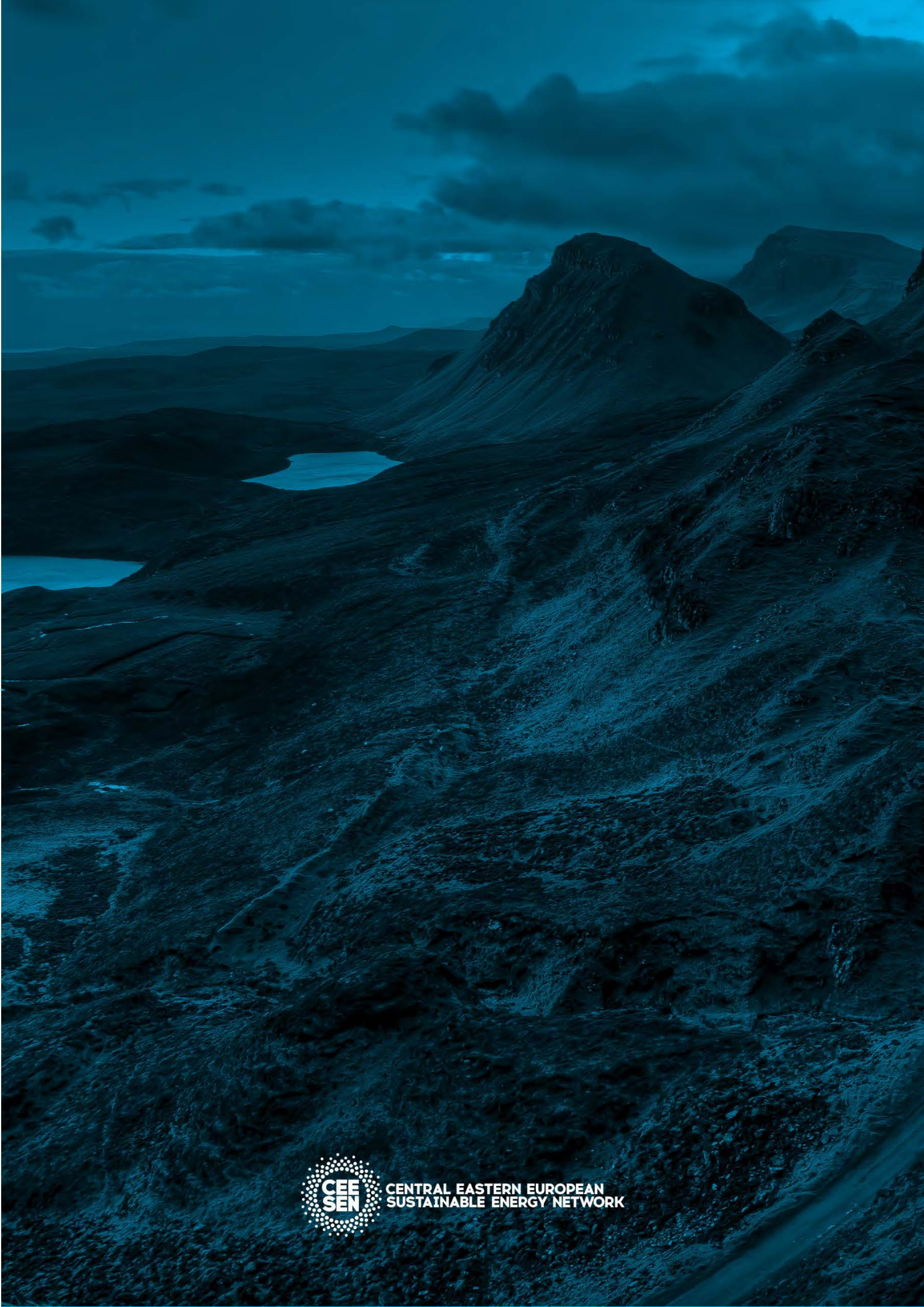
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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ENERGY ACTION PLAN

Pārgauja County Municipality

prepared by:
Pārgauja County Municipality

PANEL 2050 - Partnership for New Energy Leadership 2050

Deliverable 3.7

Date: August 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Introduction

The EU has set itself a long-term goal of reducing greenhouse gas emissions by 80-95%, when compared to 1990 levels, by 2050. This commitment is part of the joint effort of developed countries to establish a competitive low-carbon economy in all sectors. For EU to reach this ambition, public authorities at national and especially at local level have to develop locally adapted energy policies and plans with strong involvement from local stakeholders, including private energy industry and civil society actors focusing on the development of low carbon society. Activities of low carbon society are closely linked to vision of sustainable development and aim to improve and adapt its actions and economy towards non-dependence of activities raising carbon dioxide emissions.

According to available data, due to inappropriate technologies and generally accepted but obsolete behavioural patterns and habits, in Central and Eastern Europe (CEE) the growth of renewable energy generation lacks behind EU average, implicating that CEE countries have to increase their current efforts to attain energy efficiency objectives. Some of these challenges are: 1) low priority on sustainable development issues; 2) lack of transparent and well-organized energy management at local and regional level; and 3) a lack of cooperation to jointly address common challenges.

In the European Union (EU), one of the priorities is to reduce the impact on climate change, and therefore the EU and its Member States support various measures to promote energy efficiency, the use of local and renewable energy (RES), and environmental awareness. Such measures are not only to ensure the achievement of the EU's common objectives, sustainable development and economic growth, but also to enable local governments to develop in a thoughtful way and to provide a quality living environment for their citizens.

The EU's common objectives for 2020 are:

- 20% cut in CO₂ emissions (from 1990 levels);
- 20% improvement in energy efficiency;
- 20% increase in the share of RES in total final energy consumption.

Sustainable Energy Action Plan of Pārgauja County (SEAP) has been developed taking into account the regulatory documents defining national targets for energy efficiency, such as the Sustainable Development Strategy of Latvia until 2030, National Development Plan of Latvia for 2014-2020 (NDP2020).

Chapter 3 of the Sustainable Energy Action Plan of Pārgauja County describes the current situation and summarises the source data for municipal buildings. Chapter 2 defines the tasks and objectives of Pārgauja County that are based on the vision defined in the Pārgauja County Development Program for 2013-2019, and it also summarises ideas for a range of actions that should be followed in order to meet the challenges and achieve the objectives set. Chapter 4 provides an insight into the development of a functional organisational chart. At the moment, work is under way on the development of a new

development program, which will include this planning document and the objectives set therein.

The Sustainable Energy Action Plan of Pārgauja County is one of the Sustainable Energy Action Plans of Latvia, developed within the framework of the European Union Horizon 2020 project PANEL 2050. The aim of PANEL 2050 project is to create durable and replicable sustainable energy networks at local level, where relevant local stakeholders collaborate for the creation of local energy visions, strategies and action plans for the transition towards low carbon communities in 2050.

Vidzeme Planning Region

Action plan: Sustainable Energy Action Plan of Pārgauja County for 2018-2023

1 Objective

The objective of the Plan is to reduce energy consumption in municipal buildings by 15% by 2023.

1.1 Objective scope and targets values

Up till now, the role of energy policy in Pārgauja County has been small and only slightly reflected in planning documents. The plans set out in the Development Program for 2013-2019 indicate the improvement of energy efficiency in buildings, with a special emphasis on educational institutions. The Investment Plan, which is updated annually, includes measures to achieve better energy efficiency indicators — insulation and renovation of buildings, construction of heating networks. Although energy savings and reduction of heat loss are considered, the planning documents do not currently include specific targets in figures that would be desirable to achieve.

The most significant project for improving energy efficiency was the renovation of the facade and the replacement of internal engineering networks of Stalbe Secondary School, which was implemented with the financing of the Climate Change Financial Instrument (CCFI). Other significant projects include the construction of the Auciems boiler houses and two heating networks, a complete rebuilding of the heat pipe in Straupe, where heating units have been constructed for all sites, and also the reconstruction of Straupe gym's roof and restoration of the façade, which has been financed by the Municipality. Since the establishment of the County in 2009, much work has been done on the preparation of project applications, also for energy efficiency programs, but so far only the above-mentioned CCFI reconstruction project of Straupe Secondary School. The Municipality has also submitted applications for the reconstruction of Straupe gym, renovation and insulation of the building facade of the structural unit of Straupe Secondary School at Auciems (hereinafter - Auciems Pre-School), energy efficiency measures in Raiskums Boarding School, but the required score in order to fulfill the tasks has never been achieved, these works are performed from the budget funds. A project was also prepared in the framework of the project "Reducing Greenhouse Gas Emissions in the Infrastructure of Lighting of Public Areas of Villages" regarding change of lighting in Auciems and Straupe, which also did not receive support to obtain funding. Technical projects have been prepared and can be implemented in the near future if funding is received.

As energy policy in Pārgauja County is in the initial phase, utopian objectives are not currently set. Work on improvement, insulation of buildings and data recording and reading must be continued, all heat networks of the County must be in proper order to

avoid loss of heat, heat-regulating facilities in all municipal buildings must be provided. It is equally important to educate employees of the Municipality and encourage residents to live more energy efficiently. At present, we refrain from expressing a vision in figures, as precise data are only available for 2016 and 2017, and it is not yet possible to objectively assess the situation. We have taken a period of 3 years as the first point of reference for evaluating the indicators.

1.1.1 Legal background

The Energy Efficiency Law, which came into force on 29 March 2016, regulates planning and control of energy policy, stipulating the right of local governments to develop and implement an energy efficiency plan as a separate document or as an integral part of a development program of a local government territory that includes certain energy efficiency objectives and measures. Currently, development of such a plan is voluntary. Pārgauja County Municipality has not developed separate binding regulations or restrictions and energy efficiency requirements, therefore energy planning is carried out in accordance with national regulations.

1.1.2 Description of the territory and buildings

Pārgauja County is located in the central part of Vidzeme, about 80 km from Riga. The administrative territory of the municipality borders with the counties of Amata, Cēsis, Kocēni, Krimulda, Līgatne, Limbaži and Priekule. The area is 485.3 km². The County consists of 3 territorial units - Raiskums Parish, Stalbe Parish and Straupe Parish, the largest populated areas - Straupe, Stalbe, Auciems, Raiskums, Rozula, Plācis, Kūdums, Lenču, Daibe and Lielstraupe.

According to the data of the Office of Citizenship and Migration Affairs, as at 1 January 2018, 3946 inhabitants lived in Pārgauja County (in Raiskums Parish – 1506, in Stalbe Parish – 1116, Straupe Parish - 1324). Figure 1.1 shows the territory of Pārgauja County.

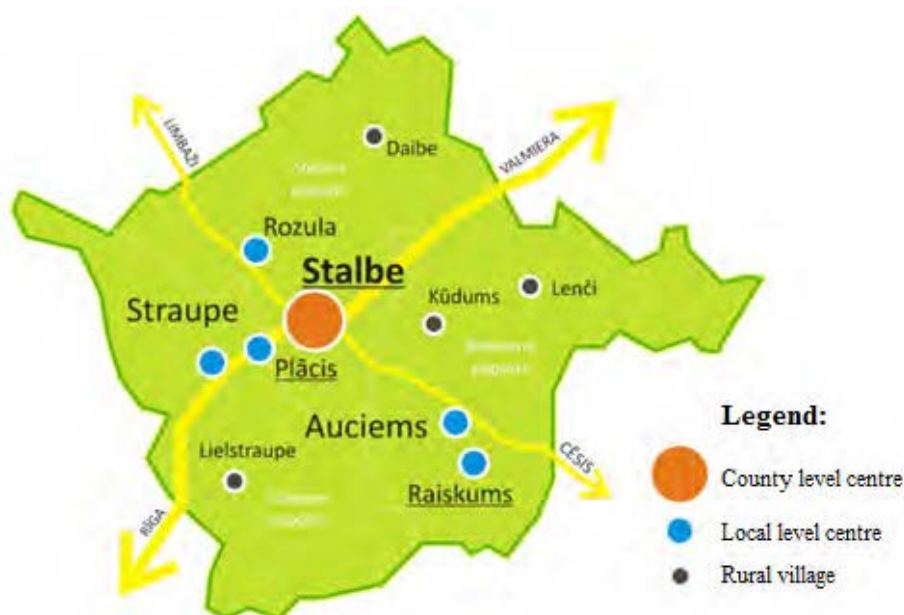


Figure 1.1. Territory of Pārgauja County (author: SIA "Reģionālie projekti")

The municipality has 19 buildings, some of which already have primary energy efficiency measures implemented. Stalbe Parish is home to Stalbe Secondary School, Gym, Administration building, that forms a complex, and a Gathering House; these sites receive heat from a boiler house that uses chips as fuel, but there are also two wood-burning boilers with lower capacity. Automation has been installed to save fuel resources. In total, 15 sites receive heat from this boiler house. Rozula Village has three buildings - a Gathering House with its own autonomous boiler house, which uses granules, Rozula School building, which has a boiler house for wood burning and Rozula Boarding School, which still uses wood-burning stoves for heating.

Raiskums Parish is home to the Parish's administration building, maintenance building that will be put into operation in June 2018, Raiskums Boarding School – rehabilitation centre, Auciems Pre-School, Gathering House (Auciems Manor) and cultural complex "Unguri Manor". The newly built maintenance building also has a boiler house, from which heat will be supplied to the Parish's administration building and library, which is scheduled to be moved shortly from the Parish's administration building and the nearby Raiskums manor building where the Municipality owns a part of the building. Raiskums Boarding School has an autonomous heating system, while Auciems Pre-School is heated from an adjacent boiler house. A residential building with 24 apartments in Auciems also receives heating from this boiler house. The heating system and the boiler house are operating in Auciems Manor and soon a heating system will also be built in Unguri Manor. The project of Unguri Manor heating system is financed by the European Union funds (project "Culture, History, Architecture of Gauja Heritage over Time", SAM 5.5.1), until now all the entire Unguri Manor complex has been heated using ovens and electric heaters. The construction of a heating system in the complex of the Manor is expected to result in significant energy savings.

Straupe Municipality manages Mazstraupe Castle (Straupe Elementary School), Gym and dog-keeper's house, the heating source of which is a boiler house that uses wood. From the same boiler house heat is supplied to a local entrepreneur's property, where premises are leased by the Municipality for the purposes of a library. In terms of use, Plācis Gathering House is a complex building, which houses administration rooms, Cultural House, apartments, a hairdressing salon, an emergency medical aid point and women's club "Dzirkstēlīte". The Gathering House has its own boiler house. There is a doctoral building nearby, which has a small firewood boiler, which is to be replaced with a pellet boiler in 2019.

1.1.3 Energy assessment (historical energy consumption)

In order to determine the strengths and weaknesses of buildings that would help to set realistic and relevant targets, it is important to understand the current situation. One of the most important stages for this analysis is the determination of the historic energy consumption.

Qualitative, complete and accessible data are currently compiled for 6 municipal buildings for 2016 and 2017 - Stalbe Secondary School (Stalbe Parish), Straupe Elementary School, Straupe Gym, Dog-Keeper's House (Straupe Parish), Auciems Pre-School and Raiskums Gathering House "Auciems Manor" (Raiskums Parish). Data for 2015 is incomplete, therefore not displayed in the total analysis.

Stalbe Secondary School (Figures 1.2 and 1.3) - The building was put into operation in 1988 and in 2014 large-scope energy efficiency works were carried out. The School's building has been insulated, its facade has been renovated, a heating unit and ventilation system have been installed, lighting of the hallways of the School's 1st and 2nd floors has been changed, and the building has been made visually appealing. Energy efficiency measures taken have reduced the amount of heat loss and the consumption of energy required for heating. The efficiency of heat consumption has improved, thus extending the life of the building. This project was implemented in the scope of Stage III of the Climate Change Financial Instrument (CCFI) project "Complex Solutions for Greenhouse Gas Emissions". The project was financed 85% by the CCFI and 15% by municipal co-financing.



Figure 1.2. Stalbe Secondary School during energy efficiency improvement works in 2014 (author unknown)



Figure 1.3. Stalbe Secondary School in 2018 (photo by: Iluta Beķere)

Straupe Elementary School (Figures 1.4 and 1.5) – the School is located in Mazstraupe castle, which was one of the manor complex buildings. It was built in the 13th-14th centuries as a fortress, with subsequent redevelopment and adaptation to the needs of the Manor and later – the School. The School has been in the building since 1930. Recent upgrades – foundation waterproofing, construction of a rainwater collection system in the yard that affected the sustainability of the building, as the building was damaged, facade restoration was performed in 2014. In 2016, reconstruction of the electrical networks of the building was carried out, which resulted in a positive impact on the consumption of electricity.



Figure 1.4. Mazstraupe Castle (Straupe Elementary School) during simplified reconstruction work in 2014 (photo from SIA "Wolf System")



Figure 1.5. Mazstraupe Castle (Straupe Elementary School) in 2008 (photo by: Iluta Beķere)

Straupe Gym (Figures 1.6 and 1.7) was built relatively recently – in 2006, but it was in poor technical condition, the roof leaked and the building was slowly crumbling, so in 2017 it was rebuilt by constructing a sloping roof, restoring the facade. During reconstruction the ventilation system was upgraded. A contract for the maintenance (servicing) of the ventilation system was concluded.



Figure 1.6. Straupe Gym during reconstruction in 2017 (photo by: Marta Martinsone – Kaša)



Figure 1.7. Straupe Gym in 2018 (photo by: Iluta Beķere)

Dog-keeper's house (Figures 1.8 and 1.9) – preserved from the times of Mazstraupe Manor, when hunting was a popular activity among the nobles, hence hunting dogs were

needed. The dog-keeper (manager of the hunting dogs) lived at one end of the building, while the hunting dogs lived at the other end. In the 1970s this was a stall for the only horse of Straupe School. In 2005 the house was renovated by Straupe Tourism Association, reinitiating the improvement of tourism infrastructure.



Figure 1.8. Dog-Keeper's House (photo from archive materials)



Figure 1.9. Dog-Keeper's House in 2018 (photo by: Iluta Beķere)

Auciems Primary School (Figure 1.10) – aerated concrete and perforated clay brick building with a joined roof and floor on a dirt road in the eighties. In 2010 windows were replaced and partial insulation of the N and W facade with a 50 mm insulation material was carried out. In 2018, it is planned to carry out waterproofing of the foundation, the facade and roof insulation.



Figure 1.10. Auciems Pre-School in 2018 (photo by: Iluta Beķere)

Raiskums Parish Gathering House (Figures 1.11 and 1.12) – built in the 19th century as a manor house, has undergone reconstructions during the centuries, the last one in 2009/2010, when both the facade and the interior were restored, by constructing a heating system with pellet boiler.



Figure 1.11. Auciems Manor before reconstruction (author unknown)



Figure 1.12. Auciems Manor in 2018 (photo by: Iluta Beķere)

The buildings in question are functionally different: 3 buildings are schools, 1 gym, 1 gathering house and 1 tourist information centre located in a separate, small building. 5 of the buildings have a central heating system and hot water is prepared with electric boilers, 1 building has an individual heating system (pellet boiler).

Table 1.1 summarises the information on the above-mentioned building – the area and the type of heat and hot water source.

Table 1.1

Characteristics of municipal buildings

No.	Name of institution	Address	Heated area of the building, m ²	Type of heating (CHS, individual, no heating)	Type of hot water boiling (CHS, electric boilers)
1	Stalbe Secondary-School	"Iktes", Stalbe, Stalbe Parish, Pārgauja County	3688.8	CHS	CHS and electric boilers
2	Auciems Pre-School	Alejas Street 2a, Auciems, Raiskuma Parish, Pārgauja County	1257.2	CHS	CHS and electric boilers
3	Straupe Elementary School	"Mazstraupe Castle", Straupe, Straupe Parish, Pārgauja County	1366.4	CHS	CHS and electric boilers
4	Straupe Gym	Braslas Street 3, Straupe, Straupe Parish, Pārgauja County	1028.8	CHS	CHS and electric boilers
5	Dok-keeper's house	Braslas Street 2, Straupe, Straupe Parish, Pārgauja County	40.7	CHS	CHS and electric boilers
6	Raiskums Parish Gathering House "Auciems Manor"	"Auciems Manor", Auciems, Raiskums Parish, Pārgauja County	916.3	individual	electric boilers

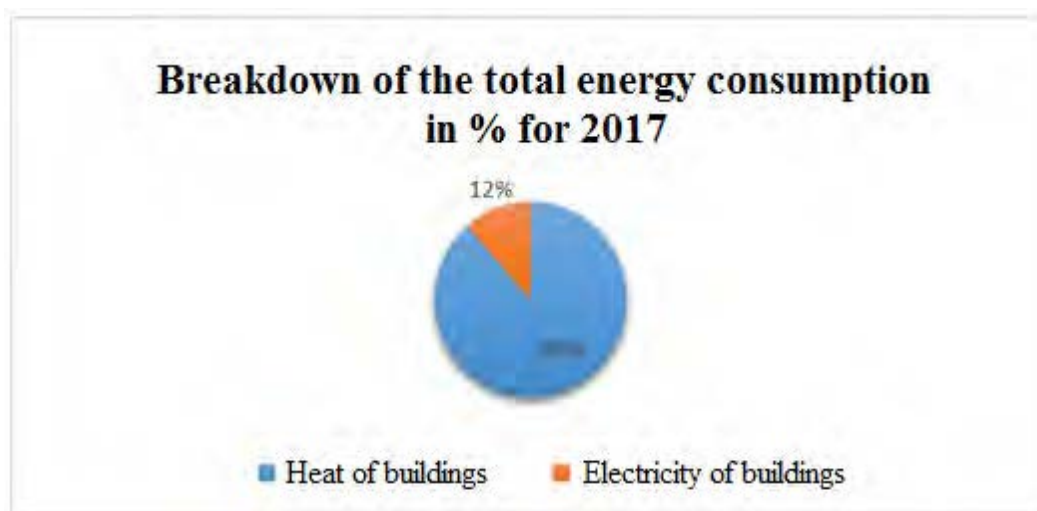


Figure 1.12. Breakdown of total energy consumption % in 2017

As seen in Fig. 1.12, the largest amount of energy consumed in 2017 was heat. It is expected that in 2018 this difference will increase, as a utility building with a new boiler house will be put into operation, which will heat premises previously heated by electric heaters. One of the targets in the coming years is to give up electricity-provided heating completely. However, the aggregate figures for 2018 may also be affected by an increase in data volumes (so far, 6 municipal buildings have been considered; is it planned to register meter readings of all municipal buildings). Electricity consumption will also be affected by contracts for routine maintenance of ventilation systems, which will allow the systems to operate economically, saving energy resources. Lamps are also being replaced in municipal buildings by choosing more energy efficient lighting fixtures.

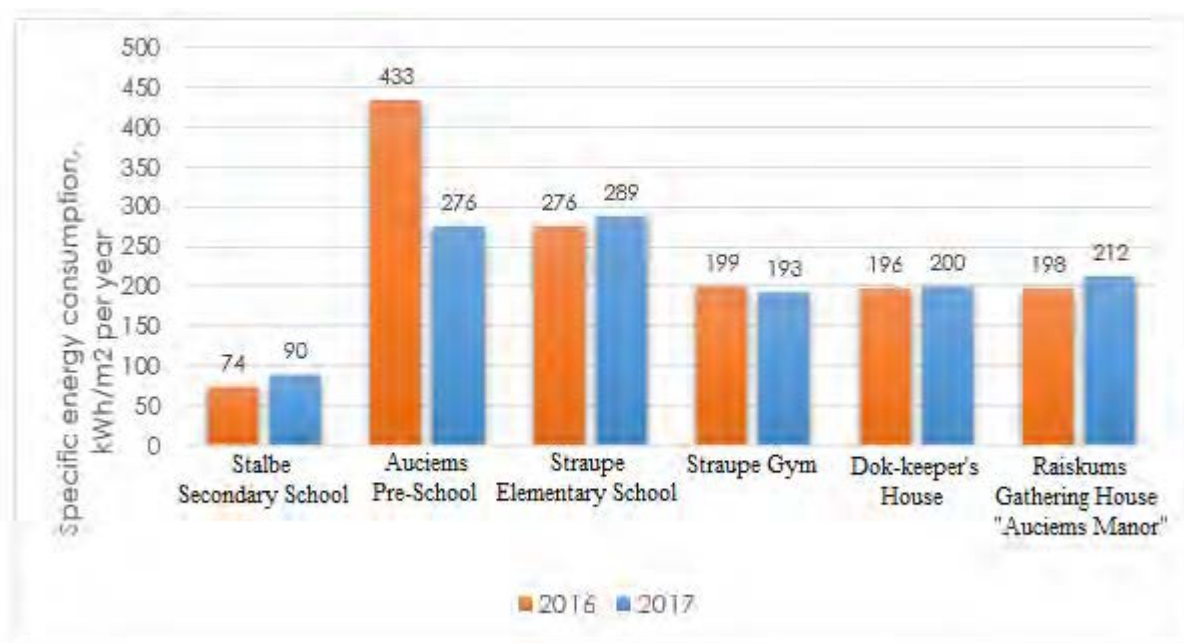


Figure 1.13. Specific energy consumption in municipal buildings in 2016 and 2017, kWh/m² per year

Specific energy consumption data (Figure 1.13) are based on total energy consumption and heated area. As seen in the graphs on the total and specific energy consumption in 2016 and 2017, fluctuations of meters have taken place, but it will be able to draw more accurate conclusions from carefully recorded data for a period of at least three years. No weather analysis has taken place. If the measured energy efficiency assessment is based on energy consumption data obtained in a period of less than five full years, a correction of the measured energy consumption due to climatic conditions is necessary to ensure that energy consumed during the measurement period is consistent with the average local climatic conditions. Similarly, data accuracy is influenced by the human factor when reading data and the technical improvements made only at the end of 2017 - after improvement, the heat supply can be regulated.

1.2 Target indicators

The energy efficiency indicators used for the assessment of municipal buildings are heat consumption, MWh/per month and year, calculated heat energy consumption in MWh/per month and year, specific heat consumption, kWh/m² per year, specific electricity consumption, kWh/m² per year. The main indicator that should be used for the characterisation of each municipal building in both decision-making and other cases is the specific energy consumption (kWh/m² per year), which is derived from the amount of heat energy consumption and annual consumption of the building in question and divided by the heated area of the building. Calculations must be made for each building individually. It would be necessary to identify other indicators, such as the amount of water consumed by people in the buildings and the average and actual air temperatures, to make climate adjustments.

The energy baseline is the quantitative reference needed to evaluate and compare energy performance. At the moment, the year 2016 is adopted as the base year because since 2016, there is complete and objective information on most of the buildings of Pārgauja Municipality – their electricity and heat energy consumption. The previous year of the current year will be selected as the base year, when setting new energy efficiency targets.

2 Implementation strategy

2.1 Main activities

Currently it is topical to implement measures that require low investment and whose pay back time is up to five years, while the Municipality accumulates experience and increases financial and institutional capacity.

The main activities planned include lighting reconstruction, solar energy analysis and installation, implementation of an energy management system in buildings and improvement of energy efficiency of the heating system, as well as simple measures such as the removal of heaters from the proximity of furniture and other objects that interfere with the heat exchange processes in the room. Also, another important aspect is raising

awareness of stakeholders, thus achieving energy savings from changes in behaviour and habits.

In order for energy management measures to be more effective, attention must be paid to the designer's work, it is important that the specialist cooperates with an energy auditor. Such a criterion already exists in projects involving the attraction of European Union funding. The design task includes indicators that are based on an energy audit.

2.2 Step by step description

Reducing energy consumption of buildings and saving money is possible if central monitoring of energy consumption of buildings in the Municipality is carried out daily, weekly, monthly or annually. It is not planned to introduce an energy management department or to employ an energy manager in the Municipality, but, with responsible management, the potential energy manager functions can be performed by existing employees by allocating responsibilities.

The implementation of energy efficiency measures with minimal costs and implementation of other measures, the payback period of which is less than five years, will be continued in Pārgauja County. In addition to the measures already implemented, the Municipality will be able to implement the following:

- reconstruction of indoor lighting with innovative and energy-efficient technologies;
- analysis of solar power options and installation of innovative solar and electrical equipment;
- installation of energy management systems for buildings;
- other measures to improve room heat exchange processes and to prevent heat loss from the external structures of the building.

Training should be organised for technical staff or other ways in which responsible staff acquire the latest knowledge of possible energy efficiency improvement measures to reduce energy consumption. It is also important to change the habits of administration staff, schools and kindergartens by using electrical appliances and controlling indoor temperature.

It is possible to carry out a series of energy efficiency measures at minimum cost in the County. The Municipality can implement immediately:

- repairing the external doors of all municipal buildings (door automatic closures must be installed);
- setting up of standby heating in municipal buildings on Saturdays and Sundays could bring energy savings of ~10-20%.
- obstacles to heating elements such as cabinets, desks and other furniture should be removed, and radiators and convectors should be exempted from special enclosures (design elements in the premises);

- other quick measures to improve room heat exchange processes and to prevent heat loss from the external structures of the building.

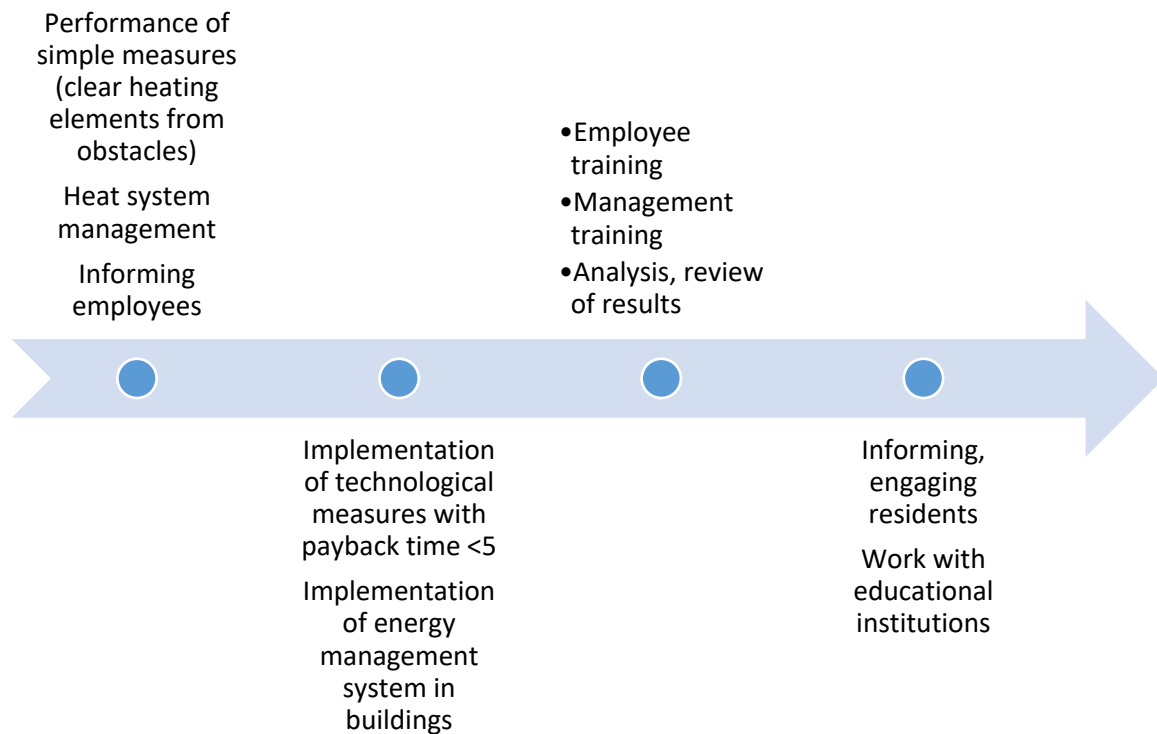
Informative events on possible energy efficiency improvement measures with simple techniques and reduction of energy consumption should be organised. The introduction of this set of measures could reduce the consumption of heat in municipal buildings by ~5%.

Mutual communication and information exchange are needed for energy efficiency measures to be more effective. In the Municipality, communication needs to be developed at different levels, starting from the top management, because it's possible that the cause of the problem lack of understanding. When informing the management (Council), support is provided to improve the situation.

The next step is to educate the employees of the administration (Municipality), because the employees are those who, with their activities, can influence the energy consumption of municipal buildings. It is also very important to educate and inform the technical staff (for example, maintenance managers, boiler house workers), it is necessary to train these staff members so that they understand and take responsibility for data recording and be able to process and analyse read data.

Thinking more and more in perspective, the awareness of the residents of the County should be raised, while calling for energy measures to be taken in their private homes and apartments. It is necessary to explain to the public tariff formation and influencing factors, possible energy efficiency measures in apartments and buildings in general. It is important for to get feedback from the residents, for example, by carrying out surveys, in order to get people's opinion, attitudes, knowledge about various energy efficiency issues. As far as possible, energy efficiency measures should be organised in pre-schools and schools, as human habits begin to form from early childhood. The target audience of children is best achieved through competitions, promotions, because it requires practical involvement and participation.

2.3. Time schedule



2.4. Budget and resources needed

In order to achieve the targets set out in the Action Plan, the main resources required are human resources due to the need to implement a data collection and analysis habit, and it is necessary to communicate with stakeholders on changing habits and smart use and management of buildings. The next step is to invest the resources saved from effective management into technological energy efficiency measures. At the moment the amount of savings is not clear. When the Plan is put into action and starts to operate, work with the management and reservation of the necessary funds and allocation to measures of the Action Plan and its future versions will begin. Certain financial resources should be provided for the technological improvements envisaged in the Plan. If the goals are achieved, the results will be good and experience will be accumulated, it will be possible to consider the potential for attracting external funds.

3. Collaboration with stakeholders

Currently the Municipality does not have a single department or any other body responsible for all energy issues. The Development Planning Department is responsible for issues related to the development (planning) of the County, the maintenance managers of parishes are responsible for buildings, roads, street lighting and energy consumption in municipal buildings, the Financial Department is responsible for payments for consumed energy. All parties involved are subordinate to the Executive Director, who in turn reports to Pārgauja County Council.

A task force has been set up for the development and implementation of an energy plan, whose composition will be supplemented. Initially, this task was carried out by the Executive Director, and a Project Manager was involved in the development of an energy plan, who, in cooperation with maintenance managers, collected data. In order to achieve the goals set, the task force will be composed of the Executive Director, Project Manager, maintenance managers (Raiskums Parish, Stalbe Parish and Straupe Parish) and the Chair of the Development and Economic Committee of the County Council.

The largest role in the implementation of the energy plan will be played by maintenance managers who are responsible for accurate and regular data reading, recording and analysis. Maintenance managers should keep track of the technical condition of buildings, informing management if improvements are needed.

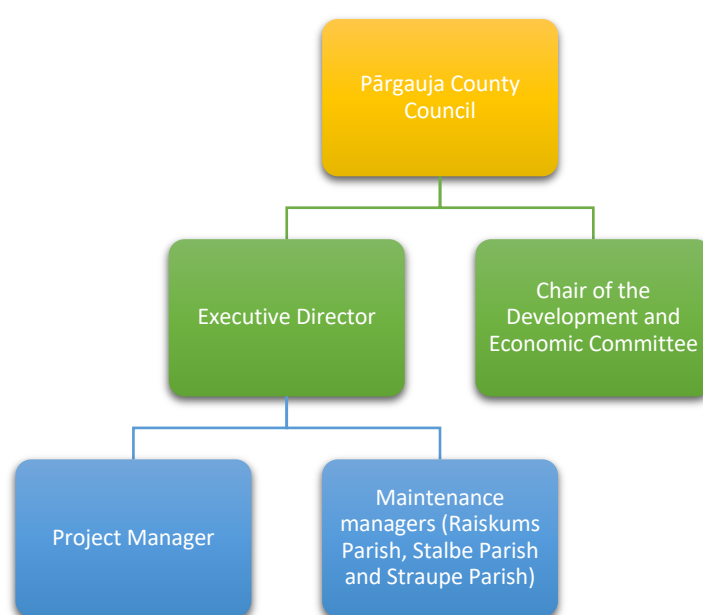


Figure 3.1. The task force of Pārgauja County Municipality for the development and implementation of an action plan

Control over execution of tasks will be carried out by the Executive Director, who has full information about all buildings owned by the Municipality, heating networks, water facilities, street lighting and transport. Figure 3.1 shows the task force of the energy action plan

Table 3.1

Communication plan with stakeholders

Target group	Target message	Types of communication	Feedback
Top management (Council deputies)	To present the current situation and inform about possible measures to improve the situation	Presentation at committee meetings / council meetings	Support and understanding of the situation by deputies
Administration staff	Transmission of information on the development of the energy plan, calling for resources to be dealt with responsibly	Planning meetings	Employee understanding of the tasks and objectives to be achieved to improve energy efficiency
Technical staff (building managers, boiler house workers, etc.)	Transmission of information on the development of the energy plan, calling for resources to be dealt with responsibly and an order to accurately and regularly record data for accounting/analysis	Planning meetings of maintenance managers	Accurate data entry/accounting
Residents/society as a whole/patients/clients	To inform about the development of the energy plan, emphasizing that the municipality already implements an energy policy and encourages the residents to do so as well.	Website of the Municipality, social networks, local newsletter	Understanding of citizens about energy efficiency improvement processes

Awareness of the plan and its necessity is very important, so communication and effective information transfer are indispensable for achieving the objectives. A communication plan for stakeholders has therefore been developed, summarized Table 3.1.

4. Monitoring strategy

Energy management is needed to enable responsible people in the area to assess the current situation in the County. At the same time, it allows for the creation of an optimal system for tracking data and provides data analysis. Currently, all data is not centrally collected in the County, but data about sectors is partly collected. All data have not been analysed so far, so one of the high priority measures is the accounting of energy produced and consumed by keeping inventories of electricity, heat and water consumed. It is necessary to install meters everywhere, where it has not been done to increase the accuracy of the data.

The four main steps of the simplified energy management are:

1) Creating a system

There are several options available on who and how to keep track of data. It is necessary to find the optimal solution that gives the result. The responsible person should set up a system that requires minimal investment and that would collect data for all sectors included in the plan.

2) Data collection

The responsible person must have a clear idea and understanding of the data that needs to be collected. Ensuring accounting of energy consumed in municipal buildings by installing heat meters, the actual consumption of each building (kWh/per month), chipwood/firewood/pellet consumption, boiler efficiency and other important issues will be collected, which will allow for the analysis of the complete data, draw conclusions and plan the necessary actions. It is necessary to install thermometers in the rooms and assign employees to read the temperature at certain times. Also, electricity consumption data must be requested from AS "Sadales tīkli" regularly and collected in a single system.

3) Data analysis

Analysis of existing data shows that heat consumption in different municipal buildings is different and, naturally, the renovated building (Stalbe Secondary School) shows the best results. Such data should be analysed on a regular basis and it must be ensured that the responsible person is informed of the current situation.

4) Making conclusions and changing of action

Depending on the analysis of the data, the responsible person or the action plan's task force can draw conclusions and plan the relevant action. Upon the establishment of a data accounting system, Pārgauja County Council will be able to identify the priority buildings where energy efficiency measures should be taken and at the same time keep track of the improvements and indications in the already renovated buildings. The task force has to decide on the best method for implementing and maintaining energy management.

The annual report on the results achieved will be developed for each calendar year, and, based on monitoring data, the objectives, targets and measures included in the

Sustainable Energy Action Plan of Pārgauja County will be reviewed each year, if necessary, by introducing changes.

5. Risk management

Risk	Probability of realising	Mitigation measure
Lack of financial resources	High	The task force thoroughly evaluates the measures provided for in the Plan, their efficiency and payback time before allocating funds; careful budget planning
Lack of human resources	High	Prior to defining each sub-target and task, the task force appoints the responsible persons and evaluates their suitability and performance capacity; systematic planning of measures, ensuring more efficient use of human resources
Unreachable targets	Medium	The energy manager, with the support of the task force, thoroughly assesses the current situation in order to identify shortcomings and realistic targets
Weak communication, information about measures does not reach stakeholders	Medium	Carefully designed communication and information transfer procedures; active involvement of management by showing the stakeholders an example and creating the feeling that the implementation of the plan is important; to plan motivating and engaging activities to promote people's involvement and awareness raising
Monitoring measures are not carried out in the required quality	Medium	To develop precise procedures and steps for data reading and analysis, as well as to appoint specific persons to read, record and analyse data; to require regular reports from the task force and management.

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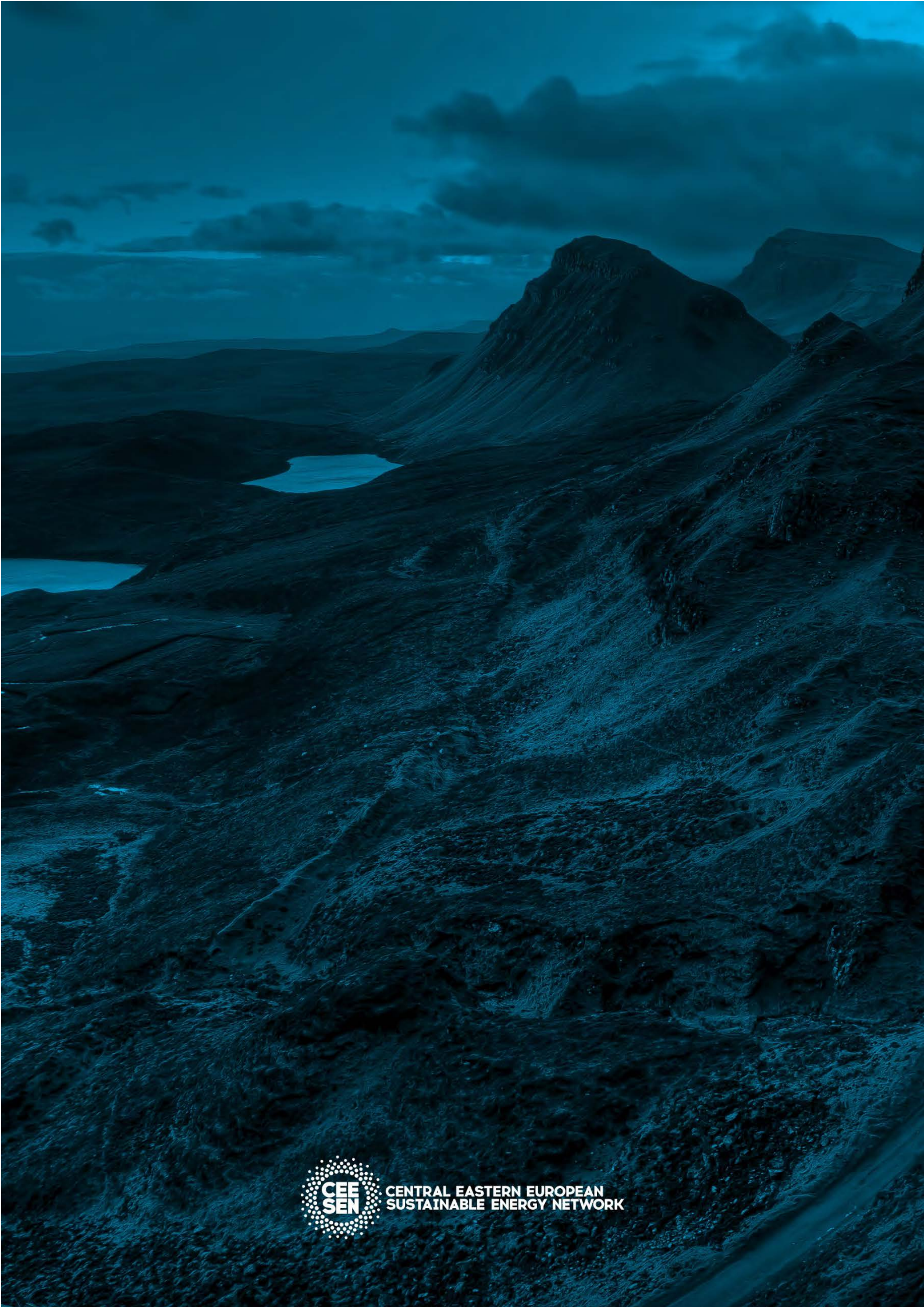
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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ENERGY ACTION PLAN

Priekuļi County Municipality

prepared by:

Priekuļi County Municipality

PANEL 2050 - Partnership for New Energy Leadership 2050

Deliverable 3.7

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Introduction

On 19 March 2018 Order No. 3-5/2018-3 "On the Development of an Energy Efficiency Plan for Priekule County" was issued.

Composition of the energy efficiency plan task force:

- the responsible deputy executive director of the Council of the top management of the development of the energy efficiency plan;
- the maintainer of the energy efficiency plan (energy manager) head of Liepa Parish Administration;

Municipal site included in the energy plan – public building at Rūpnīcas Street 8, Liepa, Liepa Parish, Priekule County.

Every year, it would be necessary to submit an overview report on the execution of tasks and achieved results in the field of energy management.

General energy targets of the Municipality:

- To reduce electricity and heat consumption in municipal buildings;
- To train employees in the field of energy management;
- To implement a common energy consumption accounting system;
- To introduce up-to-date and innovative solutions;
- To reduce the impact on climate change;
- To promote resident's involvement in dealing with energy management issues.

Vidzeme Planning Region

Action plan: Priekuļi County Energy Plan for Rūpnīcas Street 8, Liepa, Liepa Parish, Priekuļi County for 2018 – 2025

1 Objective

Short-term (1 year) objective: to reduce electricity and heat consumption at Rūpnīcas Street 8, Liepa by 3% by 1 September 2019.

Medium-term (5 years) objective: to implement a common energy consumption accounting system, to collect energy consumption data on a regular basis.

Long-term (2025) objective: to reduce the total energy consumption in Priekuļi County with the help of the implemented solutions.

1.1 Objective scope and targets values

1.1.1 Legal background

National legislation binding to Priekuļi County in the field of energy planning:

- Energy Efficiency Law effective as of 29 March 2016;
- Sustainable Development Strategy of Latvia until 2030;
- National Development Plan of Latvia for 2014-2020.

Priekuļi County Municipality has not issued binding regulations related to energy management in Priekuļi County. To promote resident's involvement in dealing with energy management issues, it would be necessary to find the opportunity to support the residents. Priekuļi County Council might issue binding regulations on the amount of co-financing of Priekuļi County Municipality and the procedure for allocating it for the implementation of energy efficiency measures for apartment buildings, which could motivate residents to participate in energy management.

1.1.2 Priekuļi County

Priekuļi County is a municipality in the central part of Vidzeme, on the left bank of Gauja, where four former parishes of Cēsis District were merged in 2009. It shares a border with the counties of Cēsis, Pārgauja, Kocēni, Beverīna, Smiltene, Rauna and Vecpiebalga. The centre of the County is Priekuļi. After the administrative territorial reform Priekuļi County includes Priekuļi Parish, Liepa Parish, Mārsēni Parish, Veselavas Parish (the total area of the County is 301.8 km²). According to the Office of Citizenship and Migration

Affairs, 8026 residents were registered in Priekule County as at 1 January 2018: In Liepa Parish – 2750, in Mārsēni Parish – 728, in Veselava Parish – 564, in Priekule Parish – 3984.

The Municipality owns 127 buildings in Priekule County, 7 of which are renovated (1 secondary school, 2 primary schools, 3 pre-schools, community centre). One buildings has been recently constructed – Mārsēni Parish pre-school. Major repairs performed in municipal buildings: insulation of buildings, roof replacement, interior repairs, etc. They have been made by the co-financing available to the Municipality and EU projects.

1.1.3 Energy assessment (historical energy consumption)

In the first stage of the Energy Plan one building is described in detail – the public building in Liepa, Rūpnīcas Street 8, which performs several functions. It has a library, police department, pharmacy, medical laboratory and R/O “Pestīšanas armija” (Salvation Army). The total heating area of the building is 624.1 m². Figure 2 shows the total heat consumption in this building by years. The total heat consumption in 2015 was 139 MWh, in 2016 – 158 MWh, whereas in 2017 – 169 MWh (see Figures 1.1 and 1.2).

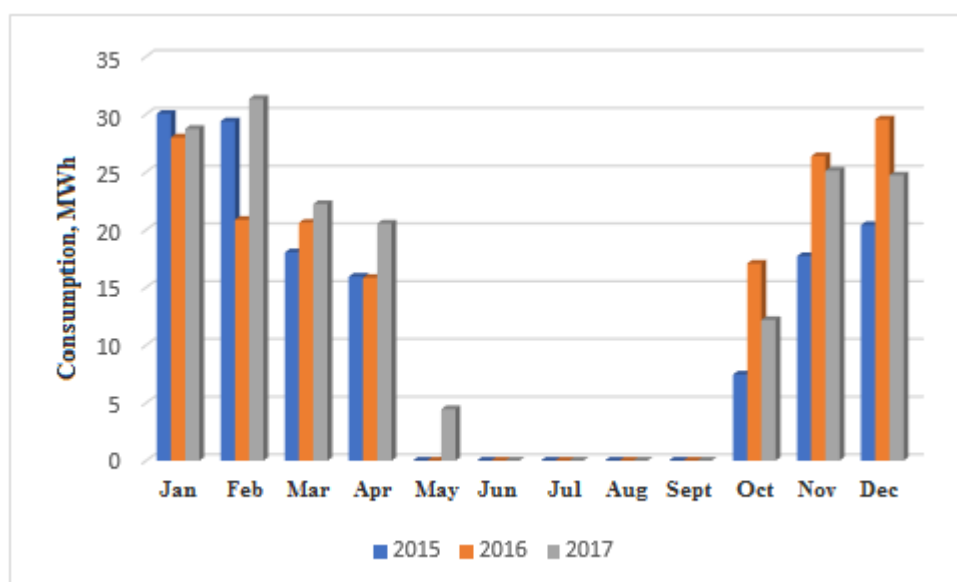


Figure 1.1. Heat consumption in the building by months, MWh

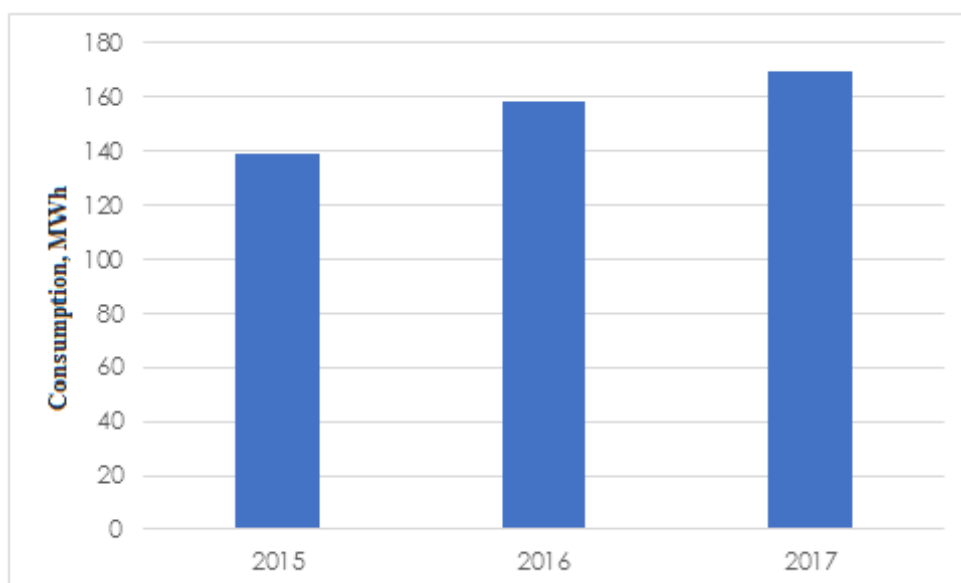


Figure 1.2. Total change in heat consumption of the building by years, MWh

There is an increase in consumption, but this can only partially be attributed to the change in outdoor temperature, given that the average temperature of the heating season in 2016 was slightly lower: 0.3 °C than in 2017 – 1.1 °C (see Figure 1.3).



Figure 1.3. Outdoor temperature in 2016 and 2017, °C

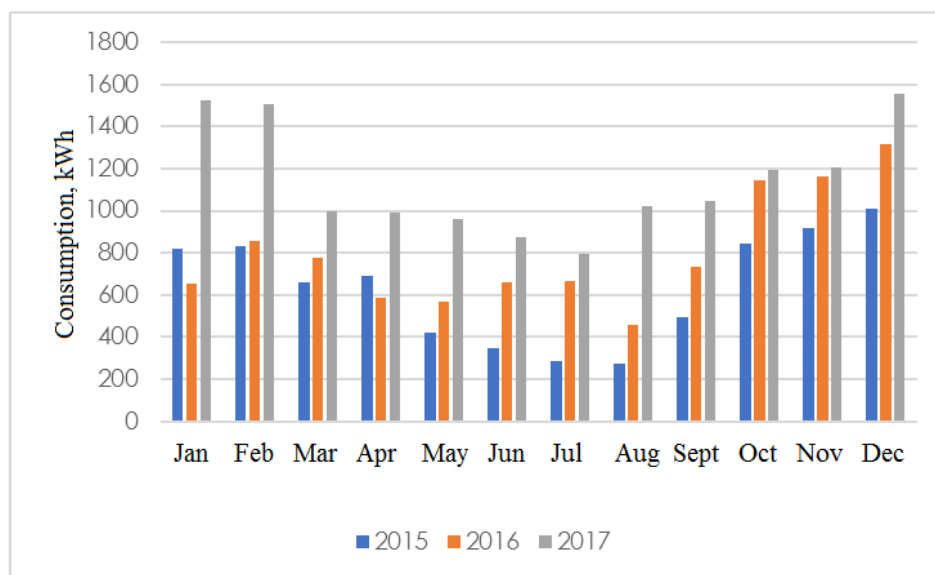


Figure 1.4. Changes in electricity consumption of the building by months, kWh

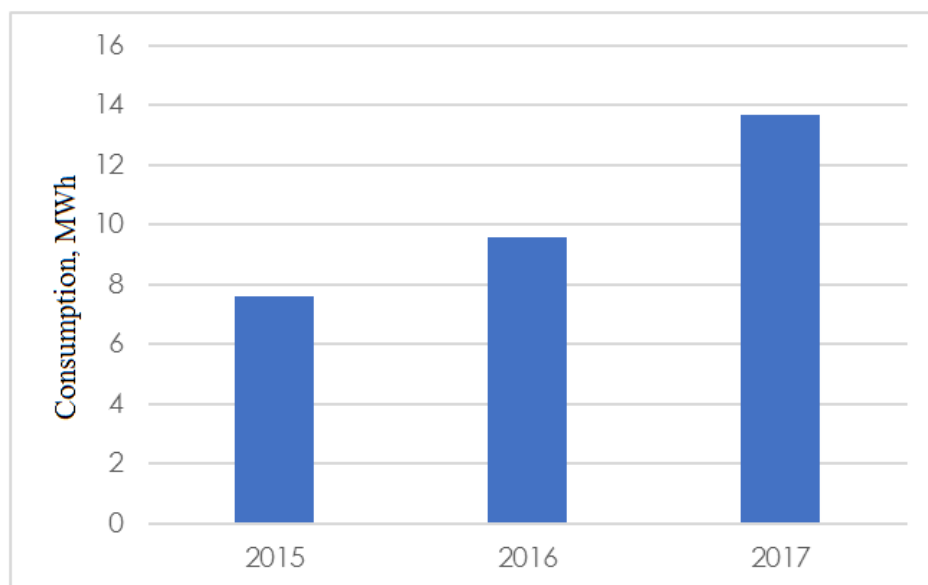


Figure 1.5. Electricity consumption of the building by years, MWh

The largest part (over 90%) of the total energy consumption was distributed to the heating energy of the building, electricity consumption is rather low, but with a tendency to increase (see Figures 4 and 5).

Figures 6 and 7 show water consumption in the building. Just like other indicators, water consumption tends to increase.

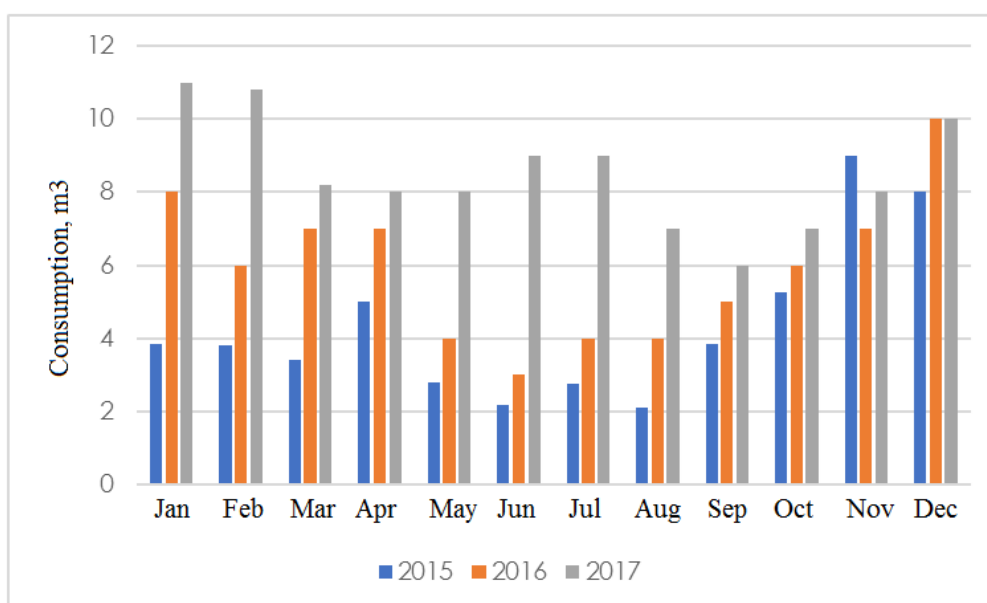


Figure 1.6. Water consumption in the building by months, m³

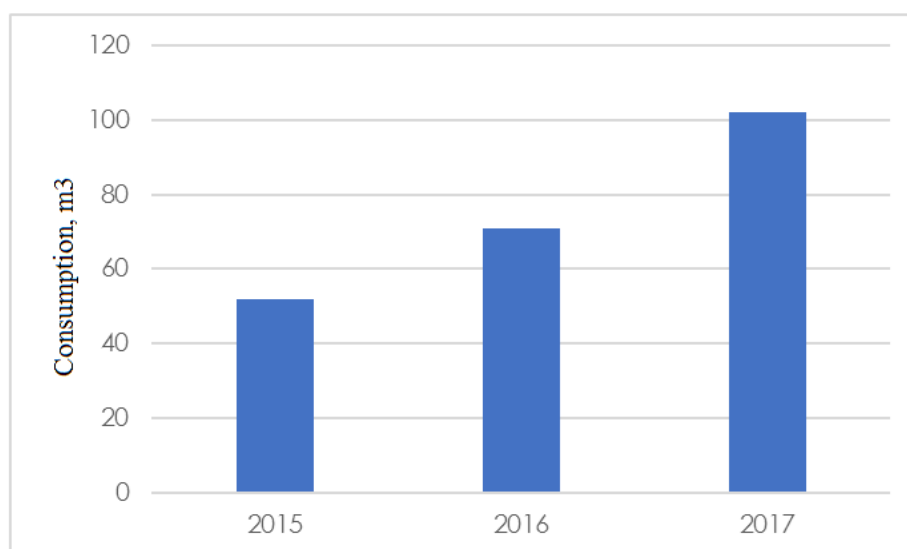


Figure 1.7. Water consumption in the building by years, m³

Having assessed the building according to various criteria (see Tables 1.1 and 1.2), the Energy Plan mostly includes activities that will improve the overall state of the building at Rūpnīcas Street 8, Liepa, Liepa Parish, Priekule County. Although it would be necessary to introduce changes in all municipal buildings, this must first be done in those buildings that need changes in order for them to be able to carry out their key functions.

Table 1.1

Building assessment per criteria (qualitative)

Name of building	Information on criteria				
	Availability of energy data and information of the building	The building's specific energy consumption, kWh/m ² per year	Building has been renovated/has not been renovated	Building has been renovated within the scope of CCFI or another program and reaches/does not reach the specified savings	Is the building necessary to provide municipal functions?
Rūpnīcas Street 8, Liepa	No energy audit performed	249	Not renovated	None	Yes

Notes: Based on the information provided by the State Construction Control Bureau of Latvia, in Latvia as of 01.03.2018 the average specific heating consumption of office buildings was 115.63 kWh/m² per year and educational institutions – 154.13 kWh/m² per year.

The specific heating energy consumption of renovated buildings should be around 100 kWh/m² per year or lower. It can be seen that this consumption is exceptionally high for the public building – 249 kWh/m² per year, indicating significant heat losses.

Table 1.2

Building assessment per criteria (quantitative)

Name of building	Criterion					Total score	Priority
	Availability of energy data and information of the building	Value of the specific energy consumption of the building	Building has been renovated/has not been renovated	Building has been renovated within the scope of CCFI or another program and reaches/does not reach the specified savings	Is the building necessary to provide municipal functions?		
Rūpnīcas Street 8, Liepa	3	3	3	3	3	15	I

Note: Assessment for each building from 1 to 3, where 1 – insignificant/not important; 2 – significant/important; 3 – very significant/very important

1.2 Target indicators

Energy performance indicators by which buildings were assessed and compared:

- kWh energy per m² and MWh energy per year;
- l water per m²;
- average indoor and outdoor temperature.

Energy baseline was the average three year indicator (2015 – 2017). The consumption indicators for the following months and years will be compared to it. Priekule County energy base (baseline energy consumption) of the building at Rūpnīcas Street 8, Liepa is 249.0 kWh/m². The average electricity consumption is 10 MWh/per year. The average water consumption is the specific water consumption 75 m³ per year or 120 l/m² per year.

2 Implementation strategy

2.1 Main activities

The main activities aimed at achieving the short-term objective are collecting and analysing data on the building, raising awareness of the users of the building, identifying primary measures and receiving management support for implementation of measures, as well as introducing these measures and assessing the result.

In order to achieve the medium-term objective, it is planned to establish a single data collection and processing system and to assess the achieved results and progress, as well as to notify the management about it.

In order to achieve the long-term objective, it is planned to hire an apartment building manager, to educate the public, to develop binding regulations of the Municipality and to identify energy efficiency measures to be taken.

2.2 Step by step description

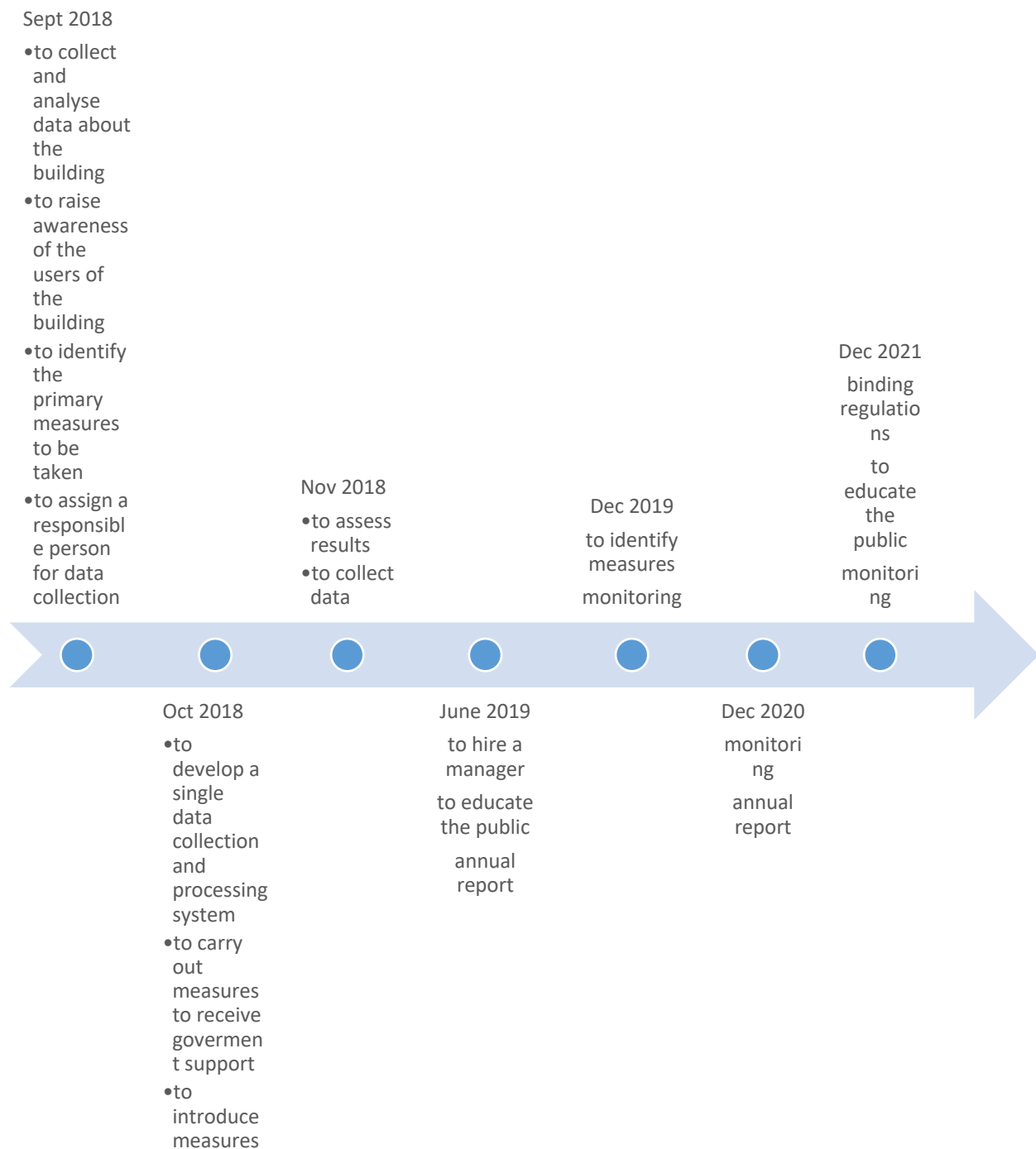
In order to achieve the targets set by 2025, the designed Action Plan is shown in Table 2.1. The Plan is divided into three parts, according to three target categories: short-term, medium-term and long-term.

Table 2.1

Action plan

Objective	No.	Action	Time schedule
Short-term (1 year) objective: to reduce electricity and heat consumption at Rūpnīcas Street 8, Liepa by 3% by 1 September 2019.	1.	To review all information available of the building at Rūpnīcas Street 8, Liepa (for example, energy audits)	31 July 2018
	2.	To draw up an energy review about the building at Rūpnīcas Street 8, Liepa	31 August 2018
	3.	To visit the building at Rūpnīcas Street 8, Liepa, and to talk to the persons responsible for the habits in the building	10 September 2018
	4.	To identify the first steps that could be taken in the building at Rūpnīcas Street 8, Liepa without a lot of investment	15 September 2018
	5.	To notify the management and implement planned activities	31 October 2018
Medium-term (5 years) objective: to implement a common energy consumption accounting system, to collect energy consumption data on a regular basis	6.	To assess the results achieved	1 November 2019
	7.	Identification of the responsible persons that will collect data	1 September 2018
	8.	Introduction of a single database	1 October 2018
	9.	Data collection	Each month
Long-term (2025) objective: to reduce the total energy consumption in Priekule County with the help of the implemented solutions	10.	To submit an overview report on the execution of tasks and achieved results in the field of energy management	Each year
	11.	Hiring of an apartment building manager	1 June 2020
	12.	Activities to educate residents	Regularly
	13.	Developing binding regulations	31 December 2021
	14.	Identification of measures that might be taken to improve energy efficiency indicators	31 December 2019

2.3 Time schedule



2.4 Budget and resources needed

In order to achieve the targets set out in the Action Plan, the main resources required are human resources due to the need to implement a data collection and analysis habit, and it is necessary to communicate with stakeholders on changing habits and smart use and management of buildings. The next step is to invest the resources saved from effective management into technological energy efficiency measures. At the moment the amount of savings is not clear. When the Plan is put into action and starts to operate,

work with the management and reservation of the necessary funds and allocation to measures of the Action Plan and its future versions will begin. Certain amount of funds shall be allocated for the development of a database.

3 Collaboration with stakeholders

The actions outlined in the Action Plan will be carried out in cooperation with municipal authorities, as the energy management system affects the Municipality as a whole rather than individual persons. Achieving the objectives is the responsibility of the Municipality. If any of the actions cannot be taken within the specified time, it will be necessary to prescribe the action with the order of the Chairman of Priekuļi County Council.

The task force of the energy plan is responsible for the development and implementation of the plan. If discrepancies or exceedances are found according to the criteria, the leader of the task force shall be contacted who will provide further guidance. Each employee shall act in accordance with the requirements specified in the Energy Plan. Noticing that any of the colleagues does not observe the requirements of the Energy Plan, it is advisable to encourage them to observe the requirements, to give advice (see Table 4.1).

Table 4.1

Employee communication activities related to energy efficiency issues in Priekuļi County

Target group	Target message	Types of communication	Feedback
Top management (Council deputies)	Energy plan as a whole	meetings (presentations)	direct meetings
Administration staff	Energy plan as a whole	meetings (presentations), e-mail (internal system)	direct meetings, surveys
Technical staff (building managers, boiler house workers, etc.)	Actions to be taken to achieve the targets	meetings (presentations)	direct meetings, surveys
Residents, society as a whole, clients	Statistics, reports, finances spent/saved	meetings (presentations), disclosure of information (social networks, website, apps)	direct meetings, surveys, interviews
Cooperation organisations	Statistics, reports, finances spent/saved	disclosure of information (social networks, website, apps)	direct meetings, surveys
Top management (Council deputies)	Energy plan as a whole	meetings (presentations)	direct meetings

Table 4.2 shows horizontally the various systems of the building at Rūpnīcas Street 8, Liepa that use electricity. The Table lists vertically the various users of the building, which can affect the use of electricity in each of the systems with their actions.

Table 4.2

Electricity systems at Rūpnīcas iela 8, Liepa and their users

USERS/ SYSTEMS	Indoor lighting	Office equipment	Kitchen appliances	Household appliances	Water boiling	Outdoor lighting
Employees of the building	Turn lights on/off	Use a computer	Use a kettle, fridge		Use of water in bathrooms	-
Tenants	Turn lights on/off	Use a computer	Use a kettle, fridge, electric stove	Use a washing machine	Use of water in bathrooms and showers	-
Visitors	Turn lights on/off	Use a computer	Use a kettle, fridge	-	Use of water in bathrooms	-
Technical staff	Purchase and installation of lamps	Installation of equipment; Setting up modes	Installation of equipment; Setting up modes	Installation of equipment; Setting up modes	Service and maintenance	-
Utility management of Priekule County municipal apartments	-	-	-	-	Water supply, boiling, maintenance and service of equipment	-

Note: There are no ventilation systems and cooling systems in the building at Rūpnīcas iela 8, Liepa

Table 4.3 shows horizontally the various systems of the building at Rūpnīcas Street 8, Liepa that use heat and affect production of heat. The Table lists vertically the various users of the building, which can affect the consumption of heat in each of the systems with their actions.

Table 4.3

Heating systems at Rūpnīcas iela 8, Liepa and their users

USERS/SYSTEMS	Heating system	Purchase/preparation of firewood	Water boiling
Employees of the building	Can partially control heat supply in rooms with thermal heads	-	-
Tenants	Can partially control heat supply in rooms with thermal heads	-	-
Visitors	-	-	-
Technical staff	Service and emergency situations	-	-
Utility management of Priekule County municipal apartments	-	-	Water supply, maintenance and service of equipment
Priekule County Council	Determines requirements for the heating system	Determines procurement requirements for firewood	Determines requirements for the water supply system
Employees of the building	Can partially control heat supply in rooms with thermal heads	-	-

4 Monitoring strategy

The potential/desired process for monitoring heat and electricity consumption data:

1. Data accounting and analysis should be carried out once a month;
2. Heat, water and lighting consumption data should be accounted and analysed;
3. Variables – temperature, number of visitors (length of stay);
4. Energy efficiency performance indicators will be controlled as follows: kWh/m² per year;
5. Data will be obtained from the structural units, as well as accountancy and Council, boiler house registers of Priekule County;

6. Significant deviations (+/-%) of energy consumption will be controlled – 3% each year.

Changes (actions) that need to be carried out to improve the existing electricity and heat management processes in the building at Rūpnīcas Street 8, Liepa:

- To install indoor thermostats;
- To install conditioners, to build a ventilation system;
- Lighting replacement;
- Insulation of the building complex.

a. Heat supply

Data on heat supply is collected by the powerman of the heat supply of Liepa Central Boiler House of Priekulji County Municipality. The municipal building has heat meters installed, from which information about the supplied heat is read. Subsequently, the data collection officer enters this information every month in the database maintained by the Council. Additionally information about the average daily outdoor temperature should be collected.

b. Electricity supply

Data on electricity is collected by an electrician. Data is available at the site of the supplier of electricity because smart meters are installed, from which information about electricity consumed is read automatically. Subsequently, the data collection officer enters this information every month in the database maintained by the Council.

c. Water supply

Data on water supply is collected by the utilities manager of Priekulji County municipal apartments. Water meters (both smart and standard) are installed in municipal buildings, from which information about cold and hot water consumption is read. Subsequently, the data collection officer enters this information every month in the database maintained by the Council.

Progress towards achieving the objectives of the Action Plan will be checked annually by analysing monthly energy consumption data. Since specific objectives with specific deadlines have been set, it will also help understand whether there is a positive approach towards the objectives.

All data obtained will be compared with energy baseline, which was calculated from data of 2015-2017. Here the average outside daily temperature shall be taken into account.

5 Risk management

Risk	Probability of realising	Mitigation measure
Lack of financial resources	High	The task force thoroughly evaluates the measures provided for in the Plan, their efficiency and payback time before allocating funds; careful budget planning
Lack of human resources	High	Prior to defining each sub-target and task, the task force appoints the responsible persons and evaluates their suitability and performance capacity; systematic planning of measures, ensuring more efficient use of human resources
Unreachable targets	Medium	The energy manager, with the support of the task force, thoroughly assesses the current situation in order to identify shortcomings and realistic targets
Weak communication, information about measures does not reach stakeholders	Medium	Carefully designed communication and information transfer procedures; active involvement of management by showing the stakeholders an example and creating the feeling that the implementation of the plan is important; to plan motivating and engaging activities to promote people's involvement and awareness raising
Monitoring measures are not carried out in the required quality	Medium	To develop precise procedures and steps for data reading and analysis, as well as to appoint specific persons to read, record and analyse data; to require regular reports from the task force and management.

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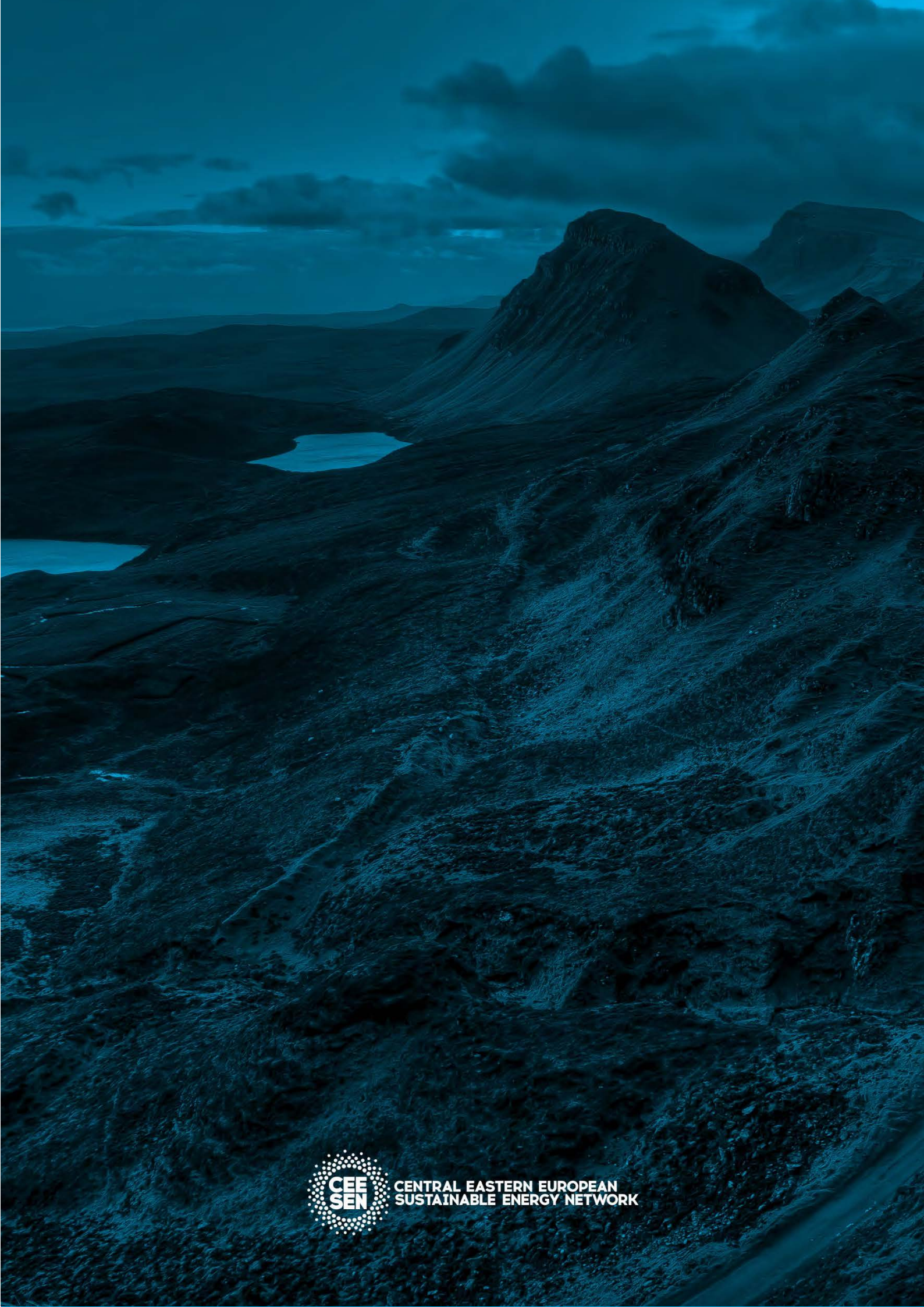
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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ENERGY ACTION PLAN

VIDZEME HOSPITAL

English version

prepared by:

Vidzeme Hospital

PANEL 2050 - Partnership for New Energy Leadership 2050

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Introduction

Energy Efficiency Law (hereinafter – the Law), by which Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC was introduced in Latvia, came into force on 29 March 2016. Section 10 stipulates that merchants, whose annual electricity consumption of which exceeds 500 MWh, shall carry out regular energy audits or implement a certified energy management system or certified environmental management system that ensures continuous control and reduction of energy control.

Energy management is an effort to effectively achieve energy efficiency through the use of available resources. It is a systematic control of energy consumption with the aim of reducing it, which leads to the search for the most economically efficient solutions for the management of municipal sites by improving the level of energy efficiency and, in the long, term, reducing financial costs.

The requirements of Latvian standard LVS LV ISO 50001: 2017 "Energy management systems. Requirements and Instructions for Use" were taken into account in the development of an energy management plan (hereinafter – Energy Plan) of Limited Liability Company "Vidzemes slimnīca" (hereinafter – Vidzeme Hospital), which stipulate the conditions for the development, introduction and maintenance of an energy management system. The Plan identifies the stakeholders and their responsibilities (Chapter 1), addresses the objectives of the European Union and national policies (Chapter 2), assesses the current situation in Vidzeme Hospital regarding energy consumption and costs (Chapter 3), identifies the competencies of the stakeholders and organizational management (Chapter 4), and defines the procedure for monitoring the energy management system (Chapter 5) and management reporting (Chapter 6).

In order to ensure the development and implementation of a high-quality energy management system of Vidzeme Hospital, on 21 March 2018 a Task Force was set up, whose main task was to develop an Energy Plan, as well as to establish a procedure for the implementation and maintenance of the planned measures, including for data reading, analysis, and other measures that will ensure the sustainability of the Energy Plan.

Vidzeme Planning Region

Action plan: Energy Management Plan of Vidzeme Hospital

1 Objective

The vision of Vidzeme Hospital's Energy Plan is to provide a systematic approach to continuous improvement of energy performance, including energy efficiency in terms of energy use and consumption. Taking into account the targets of the state and municipal energy sector, Vidzeme Hospital sets the following targets for the sustainable development of the company to be achieved by 2025:

- To reduce heat consumption of heating by 29% compared to the baseline (average indicators for the period from 2015 to 2017);
- To reduce electricity consumption of buildings by 5 % compared to the baseline (average indicators for the period from 2015 to 2017);

1.1 Objective scope and targets values

The measures included in the Action Plan will produce the following results by the end of 2018:

- Heat consumption will decrease by 2.5% (13.3 MWh) compared to the base year for Block C and for all buildings by 0.5% (22 MWh);
- Electricity consumption will decrease by 2 % (6 MWh) compared to the base year for Block C and for all buildings by 0.5% (9 MWh);
- An energy management system will be developed and implemented.

1.1.1 Legal background

On 23-24 October 2014, the European Council adopted a resolution on climate and energy targets for the period from 2020 to 2030 in order for the European Union to achieve the objective of the framework by 2050 – reduce GHG emissions by 80-95%. The EU's targets for 2030 are:

1. a 40% cut in greenhouse gas emissions compared to 1990 levels.
2. The Member States of the European Union must jointly achieve the above objective in a more cost-effective way, providing that, compared to 2005, by 2030 the following reductions will be achieved:
3. 43% in the sectors covered by the Emissions Trading Scheme (ETS) and 30% in non-ETS sectors.

The basic principles, objectives and directions of the government policy of Latvia in the field of energy for the period from 2016 to 2020 are set out in the Energy Development Guidelines for 2016-2020 (hereinafter – the Guidelines), which serve as a policy planning document. They aim to define a strategy for a competitive, secure and sustainable

energy policy, while highlighting the long-term trends in the industry in all areas of the energy sector.

On 28 May 2013 the Cabinet of Ministers took note of the informative report "Long-Term Energy Strategy of Latvia 2030 -Competitive Energy for the Society" (hereinafter – Energy Strategy 2030), instructing the Ministry of Economics to develop and submit to the Cabinet of Ministers guidelines for energy policy for the period up to 2020.

The Strategy 2030 was developed with a view to offer a new energy policy scenario which looks not only at the development of the energy sector, but also views it in the context of climate policy - the framework binding on the EU for cutting greenhouse gas (hereinafter – GHG) emissions. The main objective of the Strategy 2030 is to establish a competitive economy, by developing a well-balanced, effective, market-principle based energy policy, which ensures the further development of the Latvian economy, while one of the sub-objectives of the Energy Strategy 2030 is sustainable energy by improving energy efficiency and promoting efficient use of renewable energy technologies. The Strategy sets the following objectives and indicators for 2030:

- to ensure a 50% proportion of RES energy in gross final energy consumption (non-binding objective)
- to reduce energy and energy resource import from current third country suppliers by 50%
- to reduce the average consumption of thermal energy for heating by 50% against the current indicator, which together with the climate change adjustment amounts to about 200 kWh/m² per annum.

Valmiera City Municipality, on the basis of national policy objectives, elaborated a planning document "Valmiera City Sustainable Development Strategy for 2015-2030", in which one of the strategic objectives is "a functional, aesthetic and natural value inclusive environment". On 29 January 2015 the Environmental Declaration of Valmiera City was approved, in which the Municipality expressed its will and commitment to work and develop the city in a sustainable manner. It demonstrates the responsibility of the Municipality for preserving and shaping the environment, preserving natural values and reducing the harmful effects on the environment, promoting nature and human-friendly lifestyles and, in general, contributing to the sustainable development of the city, balancing economic, social, cultural and natural interests. Vidzeme Hospital has signed a certificate of support for the Environmental Declaration of Valmiera City, thus confirming that the environmental protection principles stated in the document are also an integral part of the Hospital's daily work and activities, plans and projects. The objectives set in the Energy Plan are closely linked to the objectives of the European Union and the state as well as the municipality in the field of sustainable energy.

In order to ensure the application of the regulatory enactments related to the energy, the responsible authority for the implementation of the energy management system (hereinafter - the Energy Manager), in cooperation with the EMS Task Force, shall develop a register of regulatory enactments in the field of EMS.

Laws and regulations currently applicable to the areas of the energy management system:

- Building Energy Efficiency Law;
- Energy Efficiency Law;
- Cabinet of Ministers Regulation No 60 on the Minimum Requirements for Medical Institutions and Their Structural Units;
- Cabinet of Ministers Regulation No 311 on the Latvian Construction Standard LBN 208-15 "Public Buildings";
- Cabinet of Ministers Regulation No 310 on the Latvian Construction Standard LBN 231-15 "Heating and Ventilation of Residential and Public Buildings";
- Cabinet Regulation No.500 General Construction Regulations.

1.1.2 Description of building complex

Limited Liability Company "Vidzemes slimnīca" is a multidisciplinary medical institution that provides round-the-clock emergency and planned ambulatory care, as well as various diagnostic examinations. In the Land Register certificate, the property consists of 8 buildings – hospital building, two ancillary buildings - a laundry house and a pathologoanatomical centre, garages and hangars (see Fig.1.1).



Fig. 1.1. Layout of Vidzeme Hospital buildings

A part of the buildings – garages, hangars, a part of the pathologoanatomical centre, as well as other premises are leased to other companies (SIA "Trimo tīrs", SIA "Valdeko" kiosks, SIA "Vizuālā diagnostika", medical practices, etc.). The heated areas of the buildings are shown in Table 1.1, totalling up to 24 099.2 m².

Table 1.1

Heated area of buildings

	Block A	Block B	Block C	Kitchen unit	Gym	Laundry house	Pathological-anatomical centre	TOTAL
Heated area, m ²	8296.4	6486.7	5791.4	783.7	1496.8	923.5	320.7	24099.2

The building of the Hospital consists of several combined Blocks – A, B and C. There is a gym attached to the left wing of Block A, which is used for occasional events or training, and a kitchen unit is attached to the right wing, which is used for cooking food for patients and cafe's customers. Block A has a 24-hour in-patient unit and administration room, Block B has a reception, department of diagnostics, surgery rooms and rehabilitation centre, while Block C mostly has visitation rooms and a surgery room. In the laundry house the entire laundry process takes place - reception, washing and drying.

So far, the following energy efficiency improvement measures have been carried out in Vidzeme Hospital:

1. 2005 – Replacement of main heat pipelines with new type energy efficient pipelines;
2. 2007 – Replacement of old wooden windows of all Blocks with energy efficient PVC frame double-glazed windows;
3. 2008 – Renovation of the laundry house and kitchen unit;
4. 2010 – Insulated attic cover for a part of Block A;
5. 2010 – Ventilation recuperation system installed;
6. 2014 – Replacement of old cast iron radiators in Block C with new steel-panel radiators;
7. 2014 – Replacement of lighting in Block C with LED type lamps and installed motion sensors, time relays in common areas;
8. 2014 – Insulation of exterior walls, roof covering, plinth of the building of Block C
9. 2014 – New ventilation equipment with recuperation options and intake air heaters installed in Block C;
10. 2016 – Block C is equipped with Automatic Control System (ACS) for the heating network and ventilation equipment, providing for the division of heating of the building in Z and D facades, control of the ventilation equipment according to the amount of CO₂ in the room.

Vidzeme Hospital is managed and represented by a Board appointed by the members of Valmiera City Municipality and the members of Valka County Council in a meeting

under a decision, and its responsibilities, rights and responsibilities are determined by the regulations of the Board. The internal organisational structure consists of a number of administrative and medical departments (see Annex 13), whose functions, tasks, competence and organisation of work are determined by the regulations of the relevant department.

The buildings belonging to the company are managed by the Maintenance Provision Department whose main task is to monitor and control Vidzeme Hospital's buildings and engineering systems in them, to maintain them in a safe manner, ensuring fire safety, electrical safety, labour protection and sanitary hygiene standards. According to the regulations of the Development and Marketing Department, its main task is to develop a company development program, organising its implementation and performance assessment, and ensure the attraction, coordination and implementation of investment projects. The Information Technology Department is responsible for the continuous operation, maintenance and development of new information systems.

1.1.3 Energy assessment (historical energy consumption)

The main historic indicator that will be used to characterise the buildings, both in decision making and in other cases, will be related to the quadrature of the building. But, in addition, the consumption of electricity and water to the number of people being cared for will be analysed, which is reflected for the period of 2015-2017 in Figure 1.2.

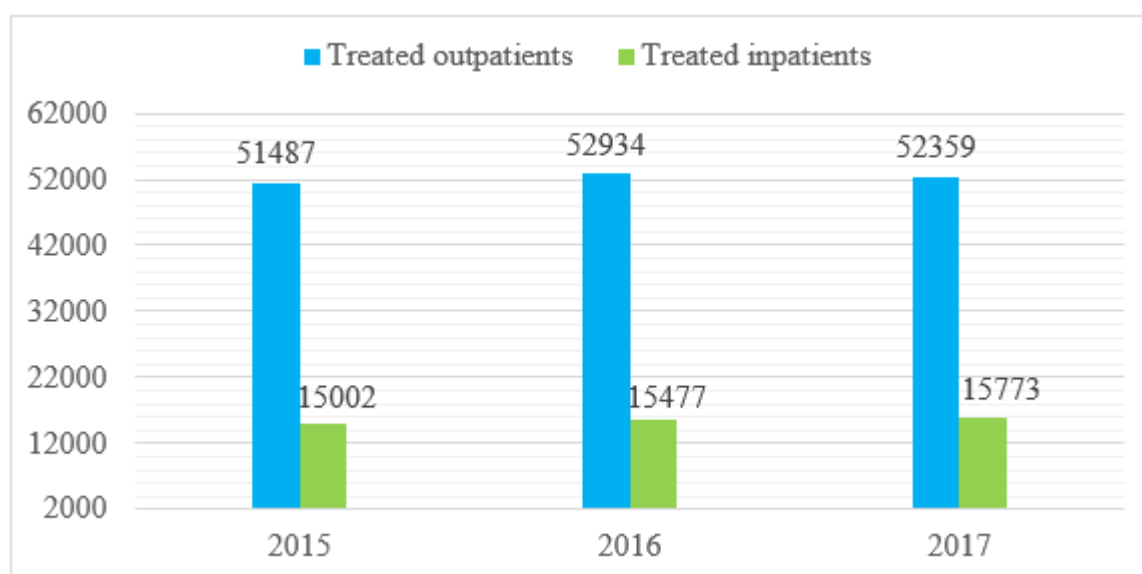


Fig. 1.2. Number of patients from 2015 to 2017

The central heating system is used to provide heating and hot water in the buildings. Distribution of heat energy occurs in several heat units by automatically compensating for the outdoor air temperature with the help of a three-way valve. Block C has a separate heating unit, where the heat supply is controlled remotely by the building's control system (ACS) according to the division of the building in north and south façades, as well as separate meters for heating and hot water have been installed. In other

heating networks, the temperature is controlled manually and the consumption of hot water is not considered separately.

Since 2013, the total heat consumption of buildings, which includes the amount of heat consumed for both heating and hot water, has decreased by about 10% (see Figure 1.3), as in 2014 the insulation of the outer walls, roofing and foundation plinth of Block C was started and completed in 2015. Heat consumption data shown in Figure 1.3 are given both in terms of heat consumption in a given year and corrected by climate adjustment, taking into account the number of days of the year in question and the temperature of the outdoor air (climate).

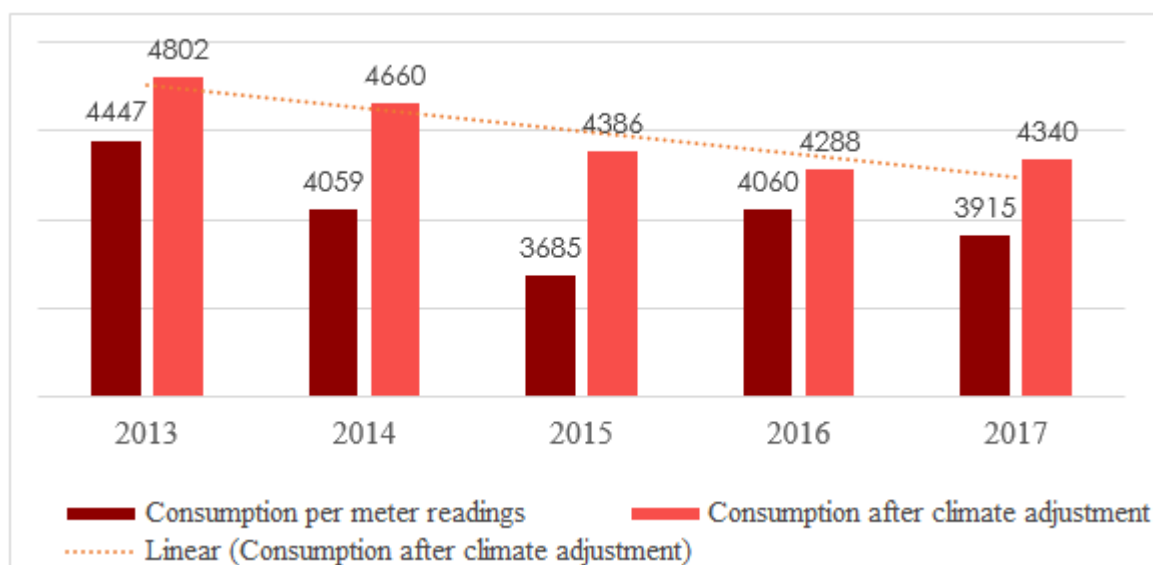


Fig. 1.3. Total heat consumption, MWh/per year

Figure 1.4 shows distribution of hot water consumption between buildings – a meter was installed in Block C in 2015, therefore precise consumption data are available, while for other buildings, consumption data are derived from the average heat energy consumption of the summer months.

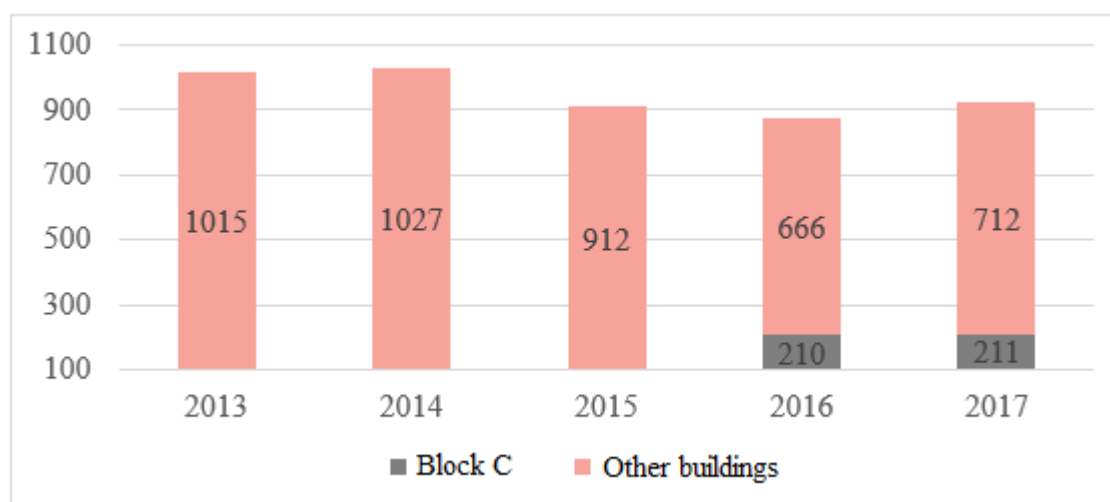


Fig. 1.4. Total hot water consumption, MWh/per year

Electric energy for the Hospital is provided by two independent electrical inputs with an input protection of 800 A (each). Consumption is accounted in total, separately dividing Block C, rehabilitation centre, laundry house, kitchen unit and tenants with separate meters. Electricity is used for mechanical ventilation, lighting and various powerful electrical equipment (see Annexes 2, 3, 4). Figure 1.5 shows that electricity consumption has decreased in the last 3 years as the ventilation equipment was changed for a more energy efficient one as part of a CCFI project, and the lighting was replaced with LED-type lamps. In 2016, consumption increased, as compared to other years, the average heating temperature was significantly lower and the heating of the colorifers was used.

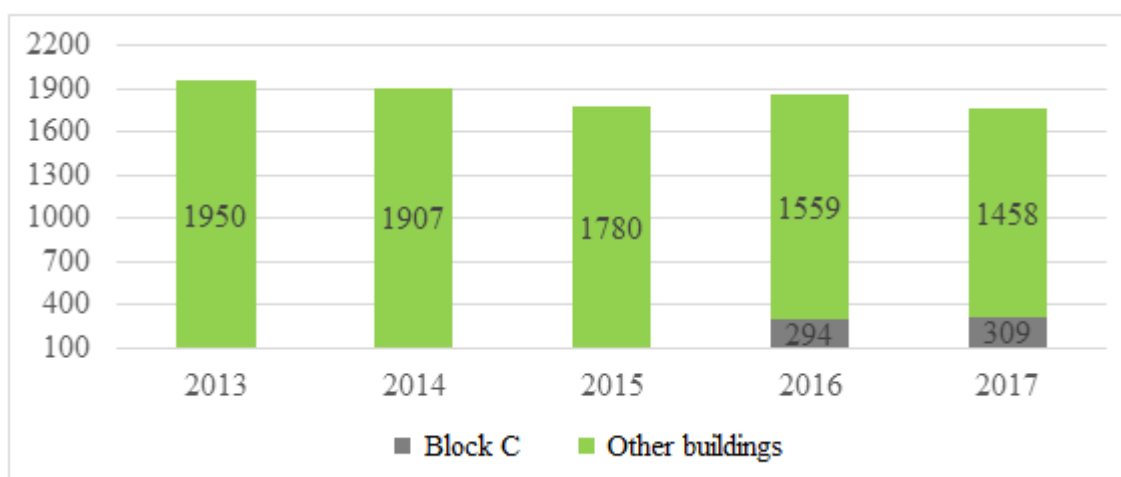


Fig. 1.5. Total electricity consumption, MWh/per year

Cold water supply and sewerage consumption is determined for all buildings together (see Fig. 1.6). Separate consumption is accounted for the kitchen unit, rehabilitation centre and tenants. In 2017, the increase in consumption was due to the incorrect reading of the data and the breakdown of the main water pipe in June 2017.

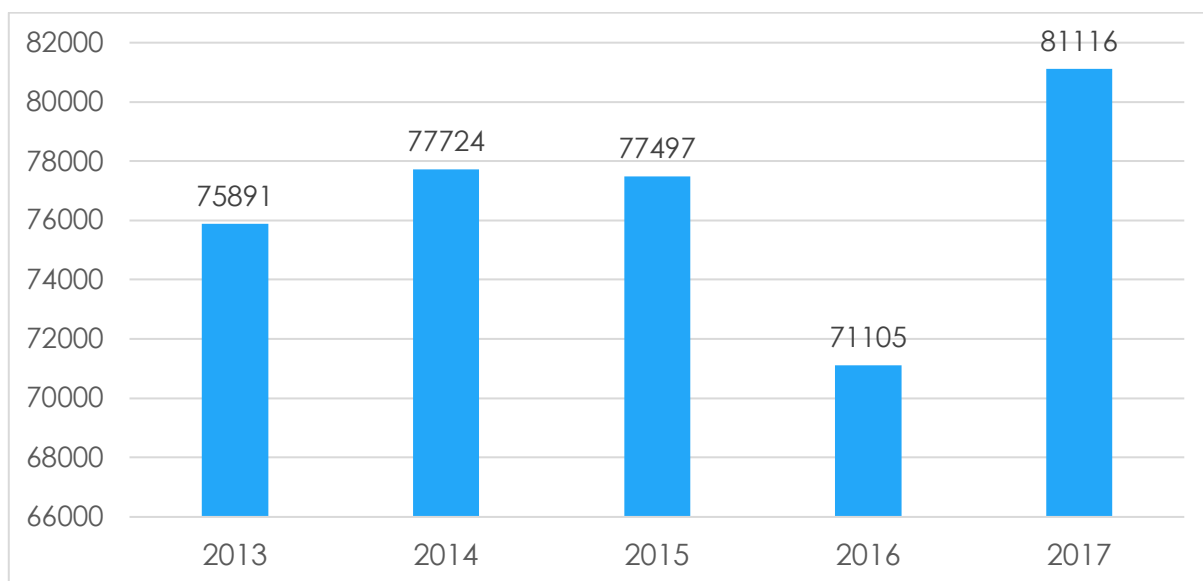


Fig. 1.6. Total water consumption, m³/per year

Energy consumption breakdown can be seen in Table 1.2. The largest consumers of heat are Blocks A and B, which also have the largest heated space. Hot water supply also uses a large part of the total heat consumption. In turn, according to the specific consumption data (kWh/m² per year), the most heat is consumed for the heating of the pathologanatomical centre and the kitchen unit. The largest electricity consumption is for Block A, which has a 24-hour in-patient unit and Block B with a diagnostic unit.

Table 1.2

Energy efficiency assessment after 2015 energy audit data

Name of item	Area, m ²	Short description	Energy type	Estimated amount of energy consumed			
				MWh per year	kWh /m ²	% of total	
Block A of the main building	8296.4	Heat and power consumption for heating, ventilation, cooling, lighting, and other energy-consuming equipment	heat	1255	151	19.7	
			electricity	532	64	8.4	
Block B of the main building	6486.7		heat	1040	160	16.3	
			electricity	414	64	6.5	
Block C of the main building	5791.4		heat	463	80	7.3	
			electricity	319	55	5.0	
The gym of Block	1496.8		heat	126	84	2.0	

A of the main building			electricity	5	3	0.1
The kitchen unit of Block A of the main building	783.7		heat	136	174	2.1
			electricity	261	333	4.1
Laundry house	923.5		heat	131	142	2.1
			electricity	229	248	3.6
Pathologanatomical centre	320.7		heat	56	175	0.9
			electricity	38	118	0.6
Other structures within the territory	-		heat	8	-	0.1
			electricity	112	-	1.8
Hot water supply	-	Heat consumption from the CHS system	heat	1031	-	16.2
Heat loss in the heating network	-		heat	55	-	0.9
Vehicles	-		Petrol, DF	150	-	2.4
TOTAL:	24099.2			6361	-	100.0

The average annual cost of maintenance of the buildings included in the Energy Plan for the period from 2015-2017 is 188 thousand EUR without VAT for heat, 215 thousand EUR without VAT for electricity, and 63 thousand EUR without VAT for water supply and sewerage. The tariff for heat energy in 2018 has increased by about 23%, while electricity has decreased by 6%, while water supply has remained unchanged.

Block C will be analysed in more detail in the Energy Plan, as separate heat meters and electricity meters are installed in this part of the building.

Block C was commissioned in 1984, it has eight above-ground floors and one underground floor. This Block has a reception, visitation rooms, eye surgery rooms, as well as a department for neurology, hemodialysis and therapy. In 2014, the project "Complex Solutions for Greenhouse Gas Emission Reduction", funded by the Climate Change Financial Instrument (CCFI), was launched, which resulted in the insulation of external walls, roofing and foundation plinth, replacement of ventilation equipment with a more energy efficient air exchange equipment with recuperation, as well as replacement of the incandescent lighting in the building with LED type light bulbs. At the end of 2016, an Automatic Control System for the heating network and air circulation equipment was implemented, providing for the division of heating of the building in Z and D facades and

control of the ventilation equipment according to the amount of CO₂ in the room. The total electricity consumption and the energy used for mechanical ventilation is accounted for Block C. Remote accounting with ACS is carried out for heat consumption for heating and hot water supply.

As shown in Figure 1.7, about half of the total energy consumption is used to provide heating.



Fig.

1.7. Breakdown of energy consumption in Block C

1.2 Target indicators

The main indicator used for the characterization of buildings both in decision making and in other cases will be the specific annual energy consumption per square meter of heated space (kWh/m²), which is derived from the corrected heat consumption and annual electricity consumption of the building in question and divided by the building's heated space.

Energy efficiency indicators used to measure energy consumption:

- Heat consumption, MWh/per month and/or year with climate adjustment;
- Heat consumption, MWh/per year depending on the temperature of the indoor air;
- Heat consumption, MWh/per year depending on the temperature of the outdoor air;
- Specific heat consumption, kWh/m² per year with climate adjustment;
- Heat energy necessary for water boiling, MWh/per month and/or year;
- Electricity consumption, MWh/per month and/or year;
- Specific electricity consumption, kWh/m² per year;
- Specific electricity consumption, kWh/number of patients per month;
- Specific electricity consumption, kWh/number of patients per month.

The historical consumption of Vidzeme Hospital and the baseline for all buildings (for heat, electricity and cold water) and Block C (for heating, hot water and electricity) are given in Table 1.3. The average energy consumption over the last 3 years has been adopted as the energy baseline/year (heat energy data is indicated with climate adjustment). Hereafter, the previous year is selected as the base year.

Table 1.3

Baseline for all buildings together and Block C MWh/per year

	2015	2016	2017	Baseline
For all buildings together				
Heat (Mwh/per year)	4605	4269	4335	4403
Electricity (Mwh/per year)	1780	1853	1767	1800
Cold water (m ³ /per year)	32677	29982	34203	32287
For Block C				
Energy used for heating (Mwh/per year)	-	498	565	532
Water boiling, MWh/per year	-	210	211	211
Electricity (Mwh/per year)	-	294	309	302

2 Implementation strategy

2.1 Main activities

The main measures provided for in the Action Plan are the implementation and supplementation of the Energy Action Plan, also setting medium-term and long-term objectives, studying users' habits in Block C, developing leaflets for equipment use, and internal audit of the energy management system and preparing a management report.

By introducing an Energy Plan, Vidzeme Hospital undertakes:

- To develop, implement and monitor an energy policy;
- To provide the necessary resources (human resources, funds, etc.) to ensure the sustainability of the Energy Plan, which will lead to the achievement of certain energy indicators;
- To take energy efficiency indicators into account in the long-term planning process.
- To involve the company's employees in maintenance and improvement of the energy management system;
- To promote the purchase of energy-efficient products and services, and apply sustainability criteria in infrastructure design;

- To continuously improve energy efficiency by setting objectives and targets for moving towards an efficient use of energy;
- To raise awareness of all employees and other stakeholders about the energy policy of Vidzeme Hospital and its importance.

2.2 Step by step description

In order to achieve the set objectives, the Action Plan for the end of 2018 is shown in Table 2.1.

Table 2.1

Action plan

No.	Action	Responsible person	Timeline
1.	To prepare an Energy Plan and procedures.	Project Assistant of the Development and Marketing Department	31.08.2018.
2.	To develop, continuously use and supplement the Monitoring Plan.	EMS Task Force	31.08.2018.
3.	To carry out research on energy user behaviour of the buildings of Block C.	EMS Task Force	31.08.2018.
4.	To develop a medium-term, long-term action plan to meet the objectives of the Energy Plan.	Energy manager	31.08.2018.
5.	To develop energy-efficient user instructions for cooling, ventilation, heating systems and operating instructions for individual equipment, making them accessible to room users.	EMS Task Force	October 2018
6.	To perform monitoring of the internal microclimate of the building in order to find out the existing parameters (room temp., CO2 concentration, humidity)	EMS Task Force	Continuously
7.	To perform internal audit of the EMS.	Energy manager	Annually
8.	To prepare the first Management Report.	Energy manager	Annually

It is also intended to integrate energy efficiency criteria into procurement and design. Those design tasks that involve the limits of the scope of the EMS, are coordinated with the Energy Manager and the EMS Task Force. The Energy Manager and the EMS Task Force must provide optimal options for long-term energy savings.

In procurement the company applies the green public procurement requirements of the Cabinet of Ministers Regulation No. 354, thus taking into account long-term environmental aspects. Its use allows to choose the most economically advantageous offer. In order to evaluate and compare the bids submitted, criteria such as delivery or contract performance dates, running costs, etc., as well as the quality of works, goods or services are taken into account. Green procurement is applied to the following product groups:

1. Office paper.
2. Printing equipment.
3. Computer hardware and information and communication technology (ICT) infrastructure.
4. Food and catering services.
5. Cleaning products and services.
6. Indoor lighting.
7. Street lighting.

2.3 Time schedule



2.4 Budget and resources needed

In order to achieve the objectives set out in the Action Plan, the main resources required are human resources. The Hospital already has the position Energy Manager. A copy of the documents certifying education, training courses and other relevant documents necessary for the assessment of competence is kept of all stakeholders and stored with the HR Department.

Table 2.2 defines the qualification and training requirements for staff involved in the establishment, implementation, monitoring and improvement of the EMS.

Table 2.2

Competence of stakeholders

Energy Manager	Participants of the EMS Task Force
Higher education	Appropriate education for the intended responsibilities in relation to the energy management system
Training on energy management completed	Training on energy management completed

3 Collaboration with stakeholders

Until now, monthly information on heat and power consumption was compiled by the Maintenance Provision Department, while the financial analyst prepared an annual report on utilities expenses. Consumed energy data is attributed to cost centers - structural units. Figure 3.1 shows a schematic figure of energy flow.

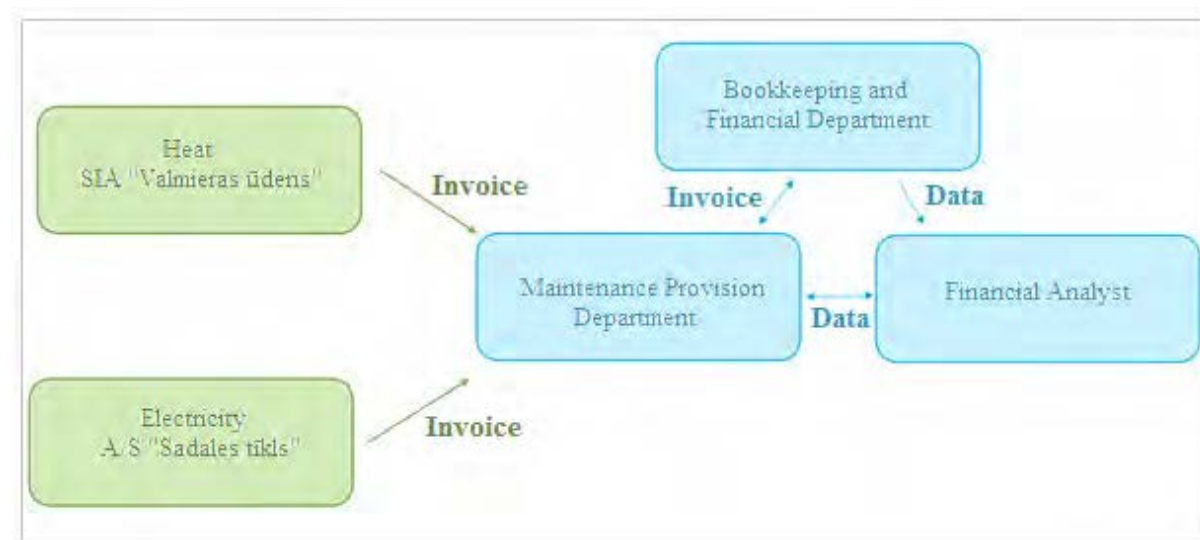


Fig. 3.1. Current energy consumption data management flow

To ensure efficient monitoring of energy consumption, On 21 March 2018 a decision was taken "On the Elaboration of an Energy Efficiency Plan", and a Task Force aimed at developing the Energy Plan, ensuring its introduction, maintenance, implementation of measures and sustainability, was established. Execution control was assigned to the Project Assistant of the Development and Marketing Department.

On 06.07.2018 a decision on the implementation of an energy management system (EMS) was taken (order No. 1-18-89), by designating a Task Force (hereinafter – the EMS Task Force) tasked with ensuring the implementation of the measures provided for in the Energy Plan, monitoring the results in accordance with the established procedures, as well as setting new targets and continuous improvement of the Energy Plan. The person responsible for the implementation of the system in the company is the Energy Manager, while the Chairperson of the Board has the responsibility to control, at management level, how the energy management system is implemented, maintained and continuously improved in accordance with the requirements of Vidzeme Hospital and the Energy Plan. The organisational structure and responsibilities of the EMS Task Force are shown in Fig. 3.2.

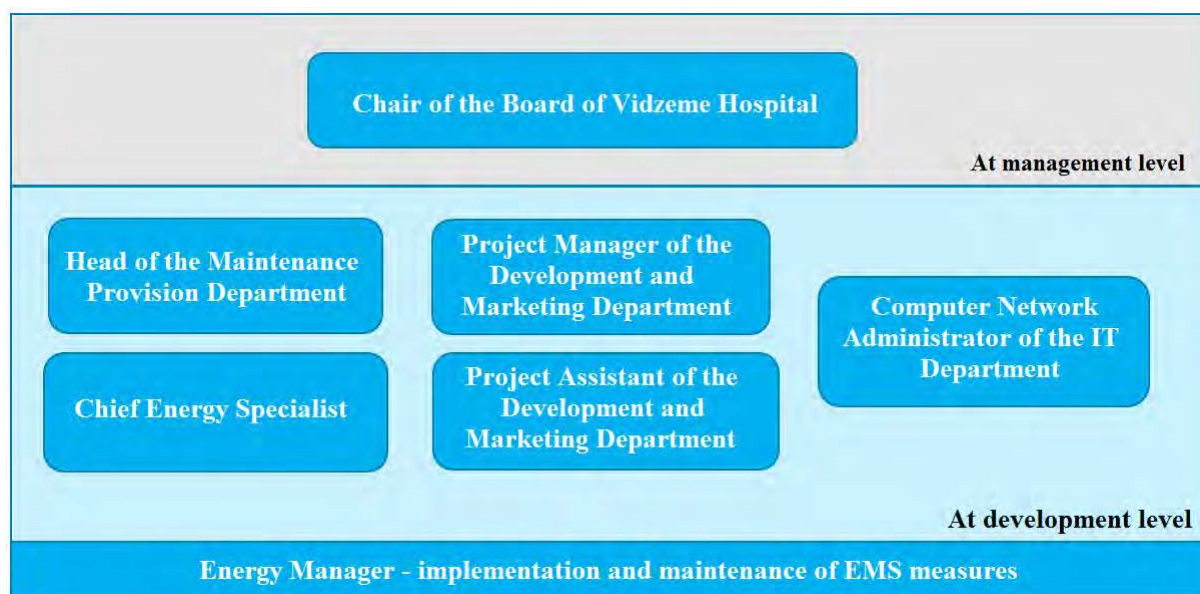


Fig. 3.2. Organisational structure of the Task Force

Vidzeme Hospital will ensure that during the development and implementation of an energy management system all involved employees are informed at least once a year about the following:

- The energy policy of the company, its objectives, EMS procedures and conditions;
- The roles, responsibilities of employees and persons responsible for EMS implementation;
- Benefits of developing and implementing an EMS in the company, and the results;

- How employee behaviour can affect energy consumption and what can be done to reduce it.

The rest of the procedure and the requirements to be met in terms of competence, training and awareness are defined in Procedure_02 (Annex 5).

The internal communication of the implementation of the energy management system of Vidzeme Hospital is provided in the five-minute administration meetings and in the meetings of the EMS Task Force, which are recorded in Minutes_01 (Annex 11). Heads of structural units are responsible for the issues discussed, decisions adopted and distribution of information to other employees of their unit. In addition, the Energy Manager informs all employees by e-mail and intranet.

The Energy Manager, in cooperation with the EMS Task Force, organizes, at least once a year, a report/training for the heads of structural units, informing them about:

- Efficiency of the energy management system and its trends;
- Main problems and non-compliances;
- Achievements (benefits) of the energy management system;
- Internal audit results;
- The outcome of the EMS Task Force meetings and decisions taken, the objectives set;
- etc.

Any employee of the company can get acquainted with the Energy Plan on the Intranet and may submit his/her recommendations and comments to improve the energy management system using Form-01 "Recommendations for improvements in the field of energy management" (Annex 9) on the Intranet or by submitting it in writing to the Energy Managers.

In order to inform the public about the improvements made in the field of energy management and the company's activities related to sustainable energy use, the Energy Manager prepares an overview of the current developments of the energy management system and submits it for publication on the website and/or Intranet. The procedure for internal and external communication is defined in Procedure_03.

4 Monitoring strategy

A successful energy management system is based on a regular evaluation of processes to effectively assess how energy consumption changes and to identify the necessary improvements.

Implementation of an energy management system in the company will allow to address issues related to energy consumption data accounting and analysis, thus reducing energy consumption. The Maintenance Provision Department is responsible for the reduction of consumption.

Monitoring and data flow on energy consumption will be provided according to the scheme in Figure 4.1.

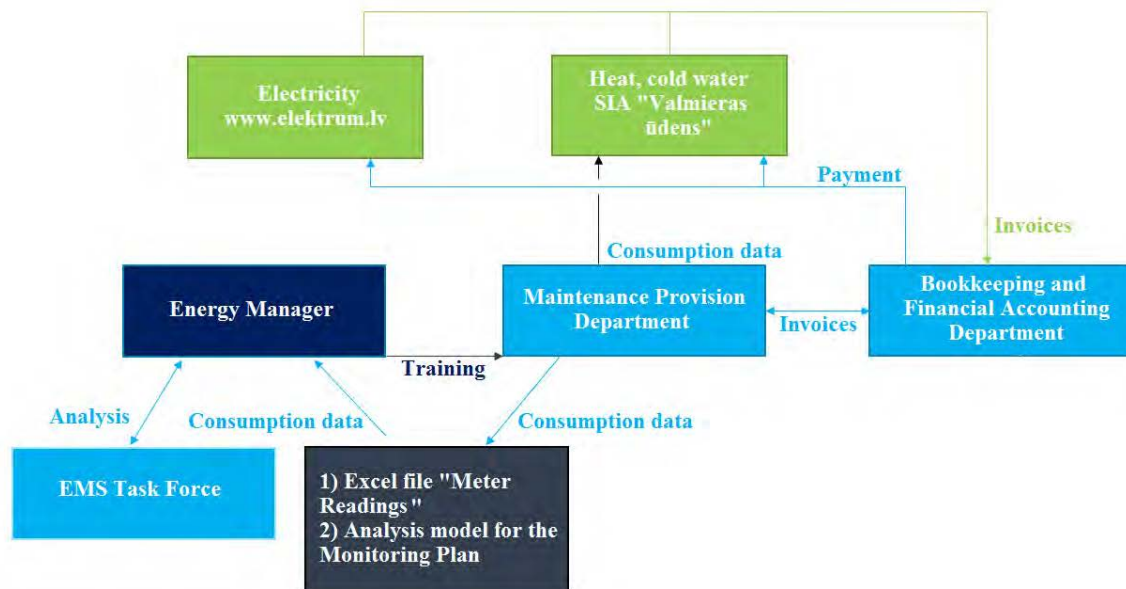


Fig. 4.1. Monitoring and schematic representation of data flow

To ensure and control the operation of EMS in the management of the company's buildings, the following activities will be performed:

1. The Maintenance Provision Department carries out the management of buildings in accordance with Regulations of the Maintenance Provision Department;
2. The energy specialist reads the meters (of heat, electricity and cold water), and enters the data into a shared excel file "Meter readings";
3. The Energy Manager summarises energy data analysis once a month (more often if necessary) and reviews the results together with the EMS Task Force;
4. The Energy Manager collects monthly data on the average outdoor air temperature and enters it into the monitoring plan analysis module;
5. The Energy Manager regularly supplements the energy consumption analysis model and analyses these data by comparing energy consumption with indicators of the previous period;
6. The Energy Manager enters monthly tariffs for heat energy, electricity and cold water supply and sewage into the module of the energy monitoring plan analysis module.

The implementation and further maintenance of the energy management system will be ensured by the EMS Task Force. The monthly accounting of energy consumption in the company will be organised in the excel file "Meter readings". The energy specialist will collect the following monthly data about:

- Heat consumption for heating, recording the start and end date of the heating season;
- Electricity consumption;
- Cold water consumption;
- Hot water consumption.

Data on heat, electricity and water consumption will be obtained by reading them from the ACS and/or reading the mechanical meter on the first day of each month.

The energy consumption accounting is performed in accordance with the structure of the Monitoring Plan, which the Energy Manager develops and proposes for the implementation of the EMS Task Force. The Monitoring Plan includes the following points:

1. Types of energy to be monitored;
2. Parameters that characterise energy consumption and affect it;
3. Functions of responsible stakeholders involved in data collection;
4. Data collection form, in which other components of the EMS are collected;
5. Frequency of data accounting;
6. Accounting system measuring instruments that ensure the reliability and availability of consumer data;
7. Indicators.

If the energy consumption deviation of a given month is observed by 10% compared to the same month of the base year, the Energy Manager reviews energy performance indicators, measurements of outdoor air temperature and makes notes. If, as a result of the analysis of the data, the Energetic Manager verifies that the indicators are above the norm, he/she asks the energy specialist to clarify the reason for the change, if it is explainable and reliable, the energy specialist, together with the Head of the Maintenance Provision Department and the Energy Manager agree on further action, but if the energy specialist does not have an explanation, the Energy Manager, by inviting the relevant specialists or representatives from other departments, carries out an assessment of the possible causes of the changes, and organises corrective actions. For all activities, records are made and saved using Form_02 "Identification, causes and elimination of non-compliances" (Annex 10). At the EMS Task Force meeting (more often if necessary), the Energy Manager informs the members of the Task Force about the non-compliances found in the buildings.

Based on the information available in the public space, the Energy Manager summarises current information on regulatory enactments regulating and influencing the consumption of energy within the scope of the EMS every six months, and, if necessary, supplements and/or amends the register of regulatory enactments. And he/she informs the head of the unit to which it applies. Procedure_01 (Annex 7) defines the procedure for organising follow-up to changes in regulatory enactments.

The Energy Manager, together with the EMS Task Force, conducts an internal audit of the energy management system once a year to assess:

- Compliance with planned energy management measures;
- Compliance with the objectives set;
- Changes in energy efficiency indicators (positive/negative trend);
- The functioning of the EPS system and its effectiveness.

Once a year, the EMS Task Force will assess EMS activities to ensure its continued effectiveness and suitability. All entries made will be stored with the EMS documentation. The following information should be taken into account in the report:

- Measures taken within the framework of the Action Plan;
- Overview of energy policy;
- Overview of energy efficiency parameters and relevant indicators;
- Results of compliance assessment;
- Assessment of the level of implementation of the objectives set;
- Internal audit results;
- Projected energy efficiency indicators for the following period;
- Recommendations for improving the EMS.

The documentation of the entire energy management system (both in paper and electronic form) that is approved is stored in the Management Department. Other materials and documents related to the energy management system are kept by the Energy Management.

5 Risk management

Risk	Probability of realising	Mitigation measure
Lack of financial resources	High	The Task Force thoroughly evaluates the measures provided for in the Plan, their efficiency and payback time before allocating funds; careful budget planning
Lack of human resources	High	Prior to defining each sub-target and task, the Task Force appoints the responsible persons and evaluates their suitability and performance capacity; systematic planning of measures, ensuring more efficient use of human resources
Unreachable targets	Medium	The energy manager, with the support of the Task Force, thoroughly assesses the current situation in order to identify shortcomings and realistic targets
Weak communication, information about measures does not reach stakeholders	Medium	Carefully designed communication and information transfer procedures; active involvement of management by showing the stakeholders an example and creating the feeling that the implementation of the plan is important; to plan motivating and engaging activities to promote people's involvement and awareness raising
Monitoring measures are not carried out in the required quality	Medium	To develop precise procedures and steps for data reading and analysis, as well as to appoint specific persons to read, record and analyse data; to require regular reports from the Task Force and management.

Annexes

Annex 1. Order on the development of an energy efficiency plan



Sabiedrība ar ierobežotu atbildību „VIDZEMES SLIMNĪCA”

Reģistrācijas Nr. 40003258333, Jūmaras iela 195, Valmiera, LV - 4201
Tālrunis 64202600, fakss 64202596, e-pasts: birojs@vidzemesslimnica.lv, www.vidzemesslimnica.lv

RĪKOJUMS Valmierā

M. B. 2018.

Nr. *118-60*

Par energoefektivitātes plāna izstrādi

Pamatojoties uz 30.06.2015. valdes lēmumu Nr.3. "Par enerģijas patēriņa monitoringa plāna izstrādi", kā arī ņemot vērā Energoefektivitātes likuma 10. un 12. pantu, Sabiedrība ar ierobežotu atbildību "Vidzemes slimnīca" (turpmāk – Vidzemes slimnīca), lai varētu nodrošināt sistemātisku pieeju nepārtrauktam enerģijas rādītāju uzlabojumam, ieskaitot energoefektivitāti, enerģijas lietojumu un patēriņu, **uzdodu:**

1. Izstrādāt energoefektivitātes plānu (turpmāk – EP).
2. Par EP izstrādi, pasākumu īstenošanu un uzturēšanu noteikt atbildīgo personu- Attīstības un mārketinga nodaļas projektu asistenti Aritu Leitlandi.
3. Izveidot EP izstrādes darba grupu šādā sastāvā:
 - 3.1. Vidzemes slimnīcas valdes priekšsēdētājs Uģis Muskovs,
 - 3.2. Saimnieciskā nodrošinājuma nodaļas vadītājs Jānis Štefenbergs,
 - 3.3. Attīstības un mārketinga nodaļas projektu vadītāja Elita Staune,
 - 3.4. Galvenais enerģētiķis Ints Dālbergs,
 - 3.5. Informācijas tehnoloģiju nodaļas datortīklu administrators Lauris Konošonoks,
 - 3.6. Attīstības un mārketinga nodaļas projektu asistente Arita Leitlande.
4. EP paredzēt kārtību EP pasākumu īstenošanai un uzturēšanai, t.sk., datu nolasīšanai, analizēšanai u.c. pasākumiem, kas nodrošinās EP ilgtspēju.
5. EP iekļaut šādas ēkas: slimnīcas ēku ar tās piebūvēm, veļas māju, patologanatomisko centru un angārus.
6. EP izstrādes darba grupai, ne retāk kā 1x mēnesī organizēt sanāksmes, kuras protokolē atbildīgās personas par EP izstrādi.
7. Darba grupai, ja EP izstrādei nepieciešams, sanāksmēs pieaicināt arī ekspertus.
8. EP izstrādāt un līdz 31.08.2018. apstiprināt Vidzemes slimnīcas valdes sēdē.
9. Rīkojuma izpildi nodrošināt Attīstības un mārketinga nodaļas projektu asistenti Aritai Leitlandei.

Valdes priekšsēdētājs

U.Muskovs

A.Leitlande 29699088

epazīnos:

Elita Staune 22.03.2018.
Lauris Konošonoks 22.03.2018.
Ints Dālbergs 15.03.2018.
Arita Leitlande 23.03.2018.
Jānis Štefenbergs 16.04.2018.

Annex 2. Medical Equipment Capacity and Load

MEDICAL EQUIPMENT			
Unit	Name	Capacity, kW	Load
Laboratory			
Immunological analyser	Cobas e411	1	in operation 24 h a day
Immunochemical analyser	Immolute 2000 XPi	1.5	in operation 24 h a day
Bacteriological analyser	Bactec 9050	1	in operation 24 h a day
Autoclave	Webeco A-2	1.5	in operation 2 h a day
Autoclave	HS-9041	2	in operation 2 h a day
Dry sterilizer	ED 53	1.2	in operation 2 h a day
Department of Diagnostic Radiology			
Computer tomograph	Ingenuity CT	80	in operation 24 h/a day, 120 sec of which for exposure
Mammography equipment	Mammo Diagnost	5	in operation 8 h/a week, 50 sec of which for exposure
Stationary equipment X-ray	Bucky Diagnost CS	50	in operation 24 h/a day, 70 sec of which for exposure
Stationary equipment X-ray	Bucky Diagnost FS	50	in operation 8 h/a day, 45 sec of which for exposure
Stationary equipment X-ray	Duo Diagnost	50	in operation 1 h a month
Stationary equipment (Rūjiena) X-ray	Cosmos BS	50	in operation 29 h/a week, 120 sec of which for exposure
Stationary equipment (Valka) X-ray	Cosmos BS	50	in operation 22 h/a week, 115 sec of which for exposure

Portable X-ray equipment	Practix 160	16	20 sec/month for exposure
Hemodialysis Department			
Hemodialysis machine	Dialog, PL 6488	2.5	in operation 10 h a day
Hemodialysis machine	Dialog, PL 6999	2.5	in operation 8 h a day
Hemodialysis machine	Dialog, PL 7000	2.5	in operation 8 h a day
Hemodialysis machine	Dialog, PL 7001	2.5	in operation 8 h a day
Hemodialysis machine	Dialog + Online, PL 8125	2.5	in operation 10 h a day
Hemodialysis machine	Dialog + Online, PL 8126	2.5	in operation 10 h a day
Hemodialysis machine	Dialog + Online, PL 8127	2.5	in operation 8 h a day
Hemodialysis machine	Dialog + Online, PL N149	2.5	in operation 10 h a day
Hemodialysis machine	Dialog + Online, PL N150	2.5	in operation 8 h a day
Hemodialysis machine	Dialog + Online, PL 7959	2.5	in operation 10 h a day
Hemodialysis machine	Dialog + Online, PL 7960	2.5	in operation 10 h a day
Hemodialysis machine	4008H, PL 8069	2.35	in operation 10 h a day
Hemodialysis machine	4008H, PL 8068	2.35	in operation 10 h a day
Hemodialysis machine	5008S, PL N235	2.35	in operation 10 h a day
Surgery Department			
Surgical X-ray equipment	BV Libra	3	in operation 2 h/a day, 2 min of which for exposure

Annex 3. Capacity and operating time of air humidifiers and coolers

CAPACITY AND OPERATING TIME OF AIR HUMIDIFIERS AND COOLERS				
Ventilation system to be connected to (name of equipment)	Ventilated rooms	Capacity , kwh	Operating time h/day	Notes
BLOCK A				
PN1A (Hygro Matik)	Block A (except for 1st floor, basement and children's department)	32	0	Not used
PN2A (Hygro Matik)		26	0	Not used
PN3A (Hygro Matik)		26	0	Not used
PN4A (Hygro Matik)		32	0	Not used
PN5A (Hygro Matik)		26	0	Not used
BLOCK B				
PN1B (HYDROMATIC C10-C)	Surgery room 5	7.5	0	Not used
PN2B (HYDROMATIC C10-C)	Surgery room 1	7.5	0	Not used
PN3B (HYDROMATIC C10-C)	Surgery room 2	7.5	0	Not used
PN4B (HYDROMATIC C10-C)	Surgery room 3	7.5	0	Not used
PN5B (HYDROMATIC C10-C)	Surgery room 4	7.5	0	Not used
	TOTAL:	179.5		
CAPACITY AND OPERATING TIME OF COOLERS				
Connected equipment (name of cooler)	Cooled rooms	Capacity , kwh	Operating time h/day	Notes
BLOCK A				
CH1A (Cooler CARRIER 30R)	Block A (except for 1st floor, basement and children's department)	196	0	Not operated
CH (Cooler Samsung)	Meeting room	1.5	-	Manually, as necessary*
BLOCK B				
PN1B-CH (Cooler York)	Surgery room 5	4.87	-	Manually, as necessary**
PN2B-CH (Cooler York)	Surgery room 1	4.87	-	Manually, as necessary**
PN3B-CH(Cooler York)	Surgery room 2	4.87	-	Manually, as necessary**
PN4B-CH (Cooler York)	Surgery room 3	4.87	-	Manually, as necessary**
PN5B-CH (Cooler York)	Surgery room 4	4.87	-	Manually, as necessary**
PN8B-CH (Chillers AirBlue)	Admission department	7.5	-	Manually, as necessary*
PN11B-CH (Carrier 30RBS-140A0022-PE-NGA)	Sterilisation, observation	64.7	0	Not operated
CH (Cooler LG FM 41 AH)	4th floor	4	9	Manually**

	radiology			and during office hours from 8 a.m. to 5 p.m.
CH (Cooler LG FM 41 AH)	4th floor radiology	4	9	Manually** and during office hours from 8 a.m. to 5 p.m.
CH (Cooler ARTEL clima)	4th floor radiology	6.2	9	Manually** and during office hours from 8 a.m. to 5 p.m.
CH (York MOC36N36BD)	4th floor radiology	3.2	9	Manually** and during office hours from 8 a.m. to 5 p.m.
CH (DAIKIN LUROPE NV R45GZ1V11)	4th floor radiology	2.1	9	Manually** and during office hours from 8 a.m. to 5 p.m.
CH (Cooler AEG)	3rd floor laboratory	1.3	9	Manually** and during office hours from 8 a.m. to 5 p.m.
CH (Cooler LG)	Blood transfusion, 5th floor	3.45	9	Manually** and during office hours from 8 a.m. to 5 p.m.
CH (Cooler LG FM 41 AH)	3rd floor laboratory	3.45	9	Manually** and during office hours from 8 a.m. to 5 p.m.
CH (Cooler LG FM 37 AH)	3rd floor laboratory	4	9	Manually** and during office hours from 8 a.m. to 5 p.m.
CH (Cooler LEKTROLUX)	3rd floor laboratory	1.4	9	Manually** and during office hours from 8 a.m. to 5 p.m.
CH (CARROR 380LS02869)	Reanimation department	3.45	9	??

CH1B (Cooler SAMSUNG AHN 121 VEOK)	Distribution room, UPS	1.2	24	
CH2B (EMERSON)	Server room	4	24	
BLOCK C				
PN1C-CH (Cooler York)	Eye surgery room			
PN2C-CH (Cooler York)	Eye surgery room			
CH1C (Cooler Toshiba RAV-SP804AT-E)	Distribution room on the 0th floor, UPS	4.84	24	
CH2C (Cooler Toshiba RAV-SP804AT-E)	Distribution room on the 0th floor, UPS	4.84	24	
CH (Cooler ACV ASE - 12HRN2)	LIDC on 7th floor	1.35	-	Manually, as necessary*
CH (Cooler ACV ASE - 12HRN2)	LIDC on 7th floor	1.35	-	Manually, as necessary*
KITCHEN				
CH1V (SAMSUNG)	Kitchen waste room	0.9	24	

* Turned on in summer

** Turned on as needed throughout the year


Annex 4. Capacity and operating time of ventilation equipment

CAPACITY AND OPERATING TIME OF VENTILATION EQUIPMENT				
Ventilation system (name of equipment)	Ventilated rooms	Capacity, kwh	Operating time h/day	Notes
BLOCK A				
PN1A (VTS ventus VS-55-R-GH/VS-75-R-G)	Block A (except for 1st floor, basement and children's department)	5.2	24	
PN2A (VTS ventus VS-40-R-GH/VS-55-R-G)		4.4	24	
PN3A (VTS ventus VS-75-R-RC/VS-75-R-RC)		6.6	24	
PN4A (VTS ventus VS-55-R-GH/VS-75-R-G)		5.2	24	
PN5A (VTS ventus VS-40-R-GH/VS-55-R-G)		4.2	24	
PN6A (VTS ventus VS-21-R-PH/VS-21-R-PH)	Basement, dressing rooms of Block A	1.5	24	
PN7A (VTS ventus VS-21-R-GH/VS-55-R-G)	Basement, pharmacy of Block A	1.5	24	
PN8A (AHU)	Bathroom	1	24	
PN9A (AHU)	Bathroom	1	24	
BLOCK B				
PN1B (Flakt EUWA 21-160)	Surgery room 5	2	-	Manually*, as necessary
PN2B (Flakt EUWA 21-160)	Surgery room 1	2	-	Manually*, as necessary
PN3B (Flakt EUWA 21-150)	Surgery room 2	1.5	-	Manually*, as necessary
PN4B (Flakt EUWA 20-150)	Surgery room 3	1.5	-	Manually*, as necessary
PN5B (Flakt EUWA 21-160)	Surgery room 4	1.5	-	Manually*, as necessary
PN6B (Flakt EUGA 30-200)	Surgery block, common system	7	-	Manually*, as necessary
PN7B (Gold AHU 7 h)	Endoscopy on the 3rd floor	4	-	Not used due to human factors
PN8B (VTS Clima)	Admission department (planned to be disassembled)	57	-	Not used due to human factors
PN10B (Envistar Flexomix)	Rehabil. centre	3	11	During office hours

EMMA 300-30 V/FR)	on the 1st floor			of the rehabil. centre from 7 a.m. to 6 p.m.
PN11B (Salda RISS11000)	Sterilisation	3	13	During office hours of the steril. depart. from 7 a.m. to 6 p.m.
PN12B (Salda RISS3000)	Observation	3	-	Not used due to human factors
PN12B (Gold AHU 4 h)	4th floor radiology	2	9	Manually, as necessary and during office hours from 8 a.m. to 5 p.m.
BLOCK C				
PN1C (FlaktWoods)	Eye surgery room	2	-	Manually*, as necessary
PN2C (FlaktWoods)	Eye surgery room	2	-	Manually*, as necessary
PN3C (FlaktWoods)	Eye surgery room	2	-	Manually*, as necessary
PN1C (Flakt Woods eQ-014)	Block C (excl. the surgery room)	3.05	16	Not used from 11 p.m. to 7 a.m.
PN1C (Flakt Woods eQ-014)	Block C (excl. the surgery room)	3.05	16	Not used from 11 p.m. to 7 a.m.
PN2C (Flakt Woods eQ-014)	Block C (excl. the surgery room)	3.05	16	Not used from 11 p.m. to 7 a.m.
PN2C (Flakt Woods eQ-014)	Block C (excl. the surgery room)	3.05	16	Not used from 11 p.m. to 7 a.m.
PN3C (Flakt Woods eQ-008)	Block C (excl. the surgery room)	1	16	Not used from 11 p.m. to 7 a.m.
PN3C (Flakt Woods eQ-008)	Block C (excl. the surgery room)	1	16	Not used from 11 p.m. to 7 a.m.
PN4C (Flakt Woods eQ-008)	Block C (excl. the surgery room)	1	16	Not used from 11 p.m. to 7 a.m.
PN4C (Flakt Woods eQ-008)	Block C (excl. the surgery room)	3.05	16	Not used from 11 p.m. to 7 a.m.
PN5C (Flakt Woods eQ-008)	Block C (excl. the surgery room)	1	16	Not used from 11 p.m. to 7 a.m.
PN5C (Flakt Woods eQ-008)	Block C (excl. the surgery room)	1	16	Not used from 11 p.m. to 7 a.m.

PN6C (Flakt Woods eQ-011)	Block C (excl. the surgery room)	1.68	16	Not used from 11 p.m. to 7 a.m.
PN6C (Flakt Woods eQ-011)	Block C (excl. the surgery room)	1.68	16	Not used from 11 p.m. to 7 a.m.
PN7C (DVCompact 10)	Block C (excl. the surgery room)	2.2	16	Not used from 11 p.m. to 7 a.m.
KITCHEN				
PN1V (Menerga Adsolair 561901)	Kitchen unit of Block A	3.2	14	During office hours from 5 a.m. to 7 p.m.

* Operated when it necessary to maintain the climate in the room during surgeries

	ENERGY MANAGEMENT SYSTEM	PROCEDURE 01
	Procedure for defining the statutory conditions and other requirements	Revision 01

1. Objective and application

The purpose of the procedure is to define a methodology for identifying requirements and conditions for energy consumption in regulatory enactments and other documents.

2. Responsibilities

The following is a list of responsible persons and tasks:

Responsible person	Task
Energy manager	To prepare, supplement and update the register with the requirements of regulatory and other acts related to energy management fields.
EMS Task Force	To disseminate information on the relationship between new legislation and energy aspects and their application

3. Methodology

3.1. Establishment and maintenance of a regulatory enactment register.


In order to ensure the application of the regulatory enactments related to the energy, the Energy Manager, in cooperation with the EMS Task Force, shall develop a register of regulatory enactments in the field of EMS. The register of regulatory enactments indicates the date when the last changes were made.

The following documents are understood to be regulatory enactments and documents:

- EU directives and decisions;
- Laws and regulations of the Cabinet of Ministers;
- Municipal regulations;
- Contracts or agreements.
- The register of regulatory enactments shall include the following information:
- Structural unit(s) to which this applies;
- Name of the regulatory enactment;
- Sections to follow;
- Deadlines specified in the regulatory enactments, which the company shall comply with.

3.2.Procedure for updating the register.

Based on the information available in the public space, the Energy Manager summarises current information on regulatory enactments regulating and influencing the consumption of energy within the scope of the EMS every six months, and, if necessary, supplements and/or amends the register of regulatory enactments. And he/she informs the head of the unit to which it applies.

	ENERGY MANAGEMENT SYSTEM	PROCEDURE 02
	Procedure and requirements for ensuring competence, training and awareness	Revision 01

1. Objective and application

The procedure defines the criteria and responsible persons to be used to:

- Identify the needs of employees for energy training;
- Ensure the competence of stakeholders;
- Create an understanding of the energy management system for all employees.

2. Responsibilities

Table 2.1 describes the areas of the EMS that the staff concerned must be aware of, while those involved in the EMS and the management staff shall complete training.

Table 2.1

Employees	Filed of EMS	Frequency
Those involved in the energy management system, medical, administrative and management staff	Energy policy, targets and objectives, responsibilities	Once at the beginning of employment
Those involved in the energy management system	Legislation and other requirements, document management, communication, operational management, non-compliance	As necessary
Medical, administrative and management staff	Training of employees on the efficient use of energy and equipment	Once a year

3. Methodology

The Energy Manager, in cooperation with the EMS Task Force, evaluates and defines the training needs of the staff involved in energy and environmental issues once a year.

The company must ensure that its staff and all those working for it are aware of:

- The role of EMS and the company's energy policy and procedures;
- Their role, responsibility and influence in implementing and maintaining the EMS;

- Benefits of energy management;
- The set targets, as well as how each employee's behaviour can contribute to their achievement.

Once a year, the Energy Manager informs all employees about current affairs in the field of EMS (sending out informative e-mails or otherwise). Upon entering into an employment relationship, the employee is informed about the introduction of the EMS upon signing the contract, providing an informative description.

Table 2.2 defines the qualification and training requirements for staff involved in the implementation, monitoring and improvement of the EMS.

Table 2.2

Energy Manager	Members of the EMS Task Force
Higher education	Higher education
Training on energy management completed	Training on energy management completed

Planning and implementation of training

The Energy Manager, together with the EMS Task Force, establishes a training plan that includes at least the following sections:

- Training activities;
- Training staff;
- Form and type of training;
- Staff involved.

After each training, the Energy Manager completes Minutes_02 of the energy management system with the following information: subject, venue and date, duration of training, training agenda. The minutes are stored electronically.

Binding documents

Minutes_02 "Training minutes".

	ENERGY MANAGEMENT SYSTEM	PROCEDURE 03
	Procedure for internal and external communication	Revision 01

1. Objective and application

The purpose of the document is to establish procedures for how the above parties can make their comments or recommendations for improving the energy management system.

2. Responsibilities

The Energy Manager is responsible for communication and exchange of information in the field of energy management system.

3. Methodology

3.1. Internal communication

The internal communication of the energy management system implementation is carried out in the following meetings:

- EMS Task Force meetings;
- short administration meetings.

Heads of structural units are responsible for the issues discussed, decisions adopted and distribution of information to other employees of their unit.

The Energy Manager, in cooperation with the EMS Task Force, organizes, at least once a year, a report/training for the heads of structural units, informing them about:

- Efficiency of the energy management system and its trends;
- Main problems and non-compliances;
- Achievements (benefits) of the energy management system;
- Internal audit results;
- The outcome of the EMS Task Force meetings and decisions taken, the objectives set;
- etc.

Employees are informed about topical issues and news in the field of energy management in the form of a short administrative meeting and informational letters (e-mails). Each employee can submit his/her recommendations and/or comments to improve the energy management system using Form 01 on the intranet or by submitting it in writing. In the meeting, the EMS Task Force considers all recommendations, discusses them and takes appropriate decisions by registering everything in Minutes_01 of the meeting of the EMS Task Force.


3.2. External communication

In order to inform the partners and the general public about the improvements made in the field of energy management and the company's activities related to sustainable energy use, the Energy Manager prepares an overview of the current developments of the energy management system and submits it for publication on the website and

intranet. The EMS Task Force decides on the publication of information on the website/intranet.

4. Binding documents

- Form_01 “Recommendations for improvements in the field of energy management”
- Minutes_01 “Minutes of EMS Task Force meeting”

	ENERGY MANAGEMENT SYSTEM	PROCEDURE 04
	Monitoring of energy consumption	Revision 01

1. Objective and application

The purpose of the procedure is to determine the criteria and responsibilities for introducing energy consumption accounting and identifying aspects that affect the energy consumption of buildings. In addition, this procedure defines the methods for developing a monitoring plan and which energy efficiency indicators to use.

2. Responsibilities

The following table lists the main tasks and responsibilities.

Responsible person	Task
EMS Task Force	To continuously use and supplement the energy analysis model for buildings.
Energy Manager	To determine which buildings will be included in the Monitoring Plan, the structure of the Monitoring Plan, the variables affecting energy consumption, and the energy efficiency indicators that will be used.

3. Methodology

3.1. Development of the structure of the monitoring plan for energy consumption and energy efficiency indicators

The Energy Manager provides the EMS Task Force with a structure for the Monitoring Plan with the following information:

- Buildings to be included in the monitoring system, the types of energy they use, the variables that affect energy consumption;
- Departments involved in data obtaining;
- Frequency of data collection and updating;
- Accounting tools to be used for determining energy consumption and variables;
- Energy efficiency indicators and the value to be used (if necessary) - minimum, maximum or average.

The EMS Task Force evaluates the Monitoring Plan submitted by the Energy Manager, assessing the tasks and their relationship with the departments concerned in order to achieve the objectives of the Monitoring Plan.

If the EMS Task Force gives a positive assessment, it is included in the Energy Plan.

3.2. Monitoring

Each department involved in the implementation of the Monitoring Plan, based on its competence, collects data, records them and provides them with access to the

Monitoring Plan. The Energy Manager is responsible for coordinating the data collection process.

4. Binding documents

- “Structure of the Monitoring Plan”



**Limited Liability Company
VIDZEMES SLIMNĪCA**

Valmiera

Registration No. 40003258333, Jumaras Street 195, Valmiera, LV - 4201
Phone 64202600, fax 64202596, e-mail: birojs@vidzemesslimnica.lv, www.vidzemesslimnica.lv

Recommendations for improvements in the field of energy management

Name, surname:

Position:

Issues in the field of energy management:

Recommendations for improvements in the field of energy management:



Annex 10. Form_02.

**Limited Liability Company
VIDZEMES SLIMNĪCA**

Valmiera
APPROVED

Registration No. 40003258333, Jumaras Street 195, Valmiera, LV - 4201
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under the decision of the Board of Limited Liability Company SIA "Vidzemes slimnīca"
adopted _____ 2018

(Article No. ____ of Minutes No. ____ of the meeting of the Board)

Identification, causes and elimination of non-compliances

Date: __/__/__

Time: __:__

Invited experts:

- | | |
|----------|-----------|
| 1) _____ | 6) _____ |
| 2) _____ | 7) _____ |
| 3) _____ | 8) _____ |
| 4) _____ | 9) _____ |
| 5) _____ | 10) _____ |

Non-compliance detected:

Causes:

Corrective actions:

6		ENERGY MANAGEMENT SYSTEM TASK FORCE MINUTES OF MEETING_01
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Date: __/__/__

Time: __:__

1. Participants:

Name and surname	Designation	Phone No.	Information
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2. Issues to be considered and decisions taken.

No.	Issue	Decisions taken	Responsible person	Deadline

Deadline signature, name and surname, date

7 VIDZEMES SLIMNĪCA 	ENERGY MANAGEMENT SYSTEM TRAINING MINUTES_02
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Date: __/__/__

Time: __:__

Location: _____

1. Training organiser:
2. Aim:
3. Participants:

4. Agenda topics:

No.	Training topic	Name of presenter	Time

Participants: signature, name and surname

Contact

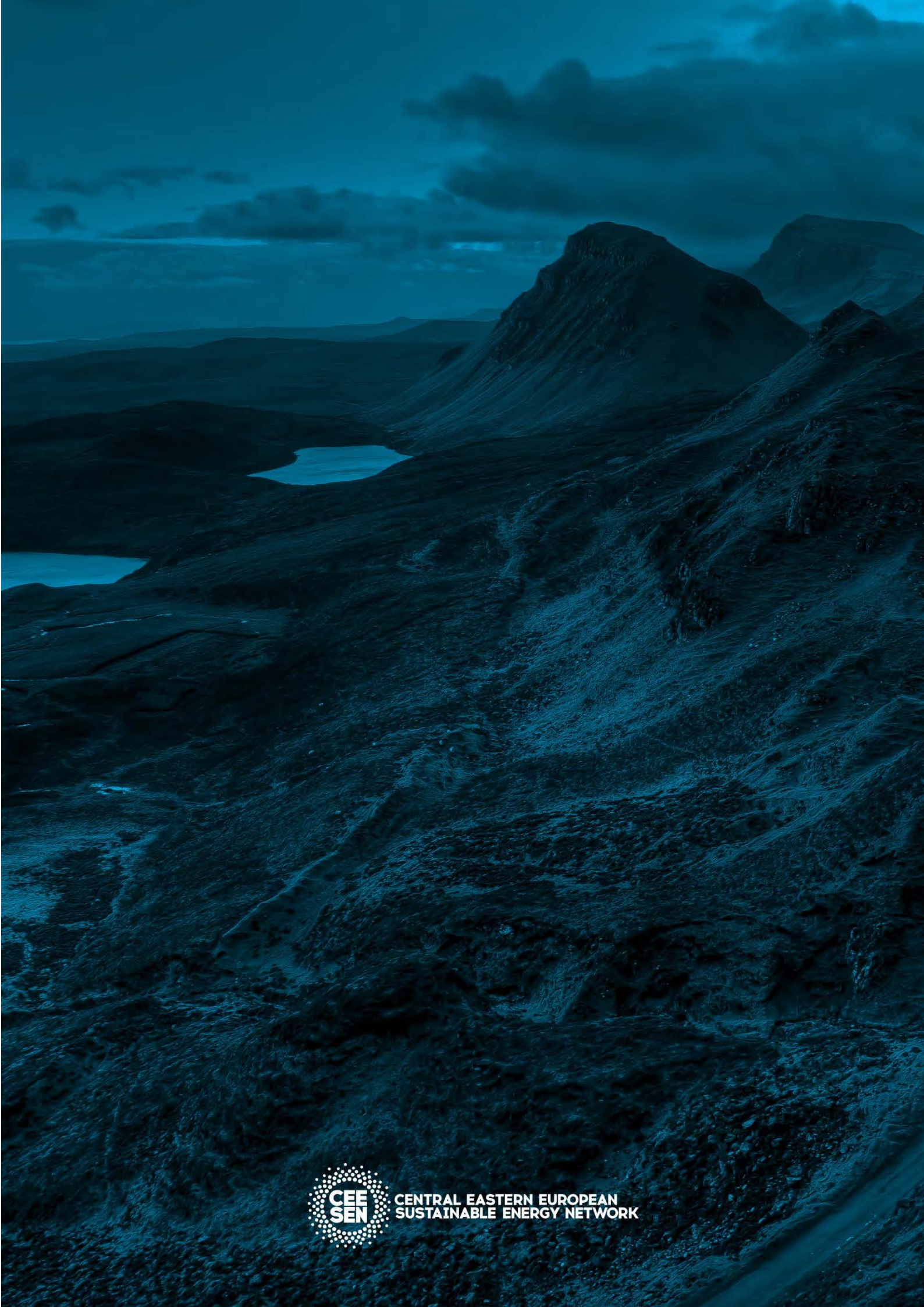
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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ENERGY ACTION PLAN

Alūksne County Municipality

prepared by:

Alūksne County Municipality

PANEL 2050 - Partnership for New Energy Leadership 2050

Deliverable 3.7

Date: August 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

Summary

When interviewing stakeholders, it was found that the problem of energy efficiency is often communication and the difference in the level of knowledge about how energy resources can be used more efficiently. In order to solve this problem, it is important to change the mindset of building users first and foremost, and building users need to continuously broaden their knowledge about the effective use of technical solutions, while an independent expert needs to analyse the problem by finding a solution and helping the building manager implement this system.

For complete data analysis, building energy audits must be carried out to obtain a detailed summary of historical data, and to be able to receive practical recommendations on improvements to be made and their costs. It is necessary to identify building users who have an impact on energy consumption and identify actions that users can and cannot affect. This existing situation needs to be analysed and corrective actions by stakeholders shall be carried out so that energy efficiency criteria are met at any stage. The current situation illustrates the mechanisms for controlling and managing energy consumption, as well as the responsible actors.

In the analysed institutions, data analysis and monitoring are performed partially, so building users cannot fully analyse the consumption of their building. The biggest problem is the lack of technical staff, since the institutions do not employ highly qualified technical staff.

Definition of responsibilities and possible actions of the stakeholders in the instructions for use or internal rules of procedure. Also, defining the limits of responsibility, which allows to understand who is responsible for which stage.

At the moment, for the implementation of the plan and the commencement of operations, it is necessary to activate the work of the task force and to direct the planning processes in communication, in order to inform users and stakeholders about the necessary changes. The task force determines the priority in energy planning and the energy manager includes it in its informative reports and planned management activities, informing the owners and responsible persons of the building.

In order to check the effectiveness of the Action Plan and compare the achieved energy consumption indicators, it is necessary to plan the possibilities of the verification mechanisms and the actions to be taken to monitor energy management. Energy performance indicators and definition of frequency and regularity of their comparison, in order to establish a unified system and regular access to information for stakeholders.

The frequency with which it is intended to monitor and analyse data depends on the purpose. The timetable is planned as follows:

Once a week – the manager of the building's maintenance department using remote monitoring equipment capabilities (to detect deviations of the system's operation);

Once a month – the person responsible for increasing energy efficiency, using available invoices from energy suppliers and monitoring equipment (building users, technical staff and general data analysis);

- Once a year – all stakeholders, using invoices from energy suppliers and monitoring equipment (to analyse and compare all the energy consumption and experience of the County, to collect data for various reports and statistical documents, to analyse the achievement of the targets set in the Action Plan).

To achieve energy efficiency, it is essential to promote understanding of the processes, because reduction of energy consumption can be achieved by working towards a common goal!

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Introduction

The Energy Efficiency Law¹ adopted in 2016 stipulates the right of local governments to develop and implement an energy efficiency plan that includes certain energy efficiency objectives and measures. An energy management system may be developed and introduced as part of implementation of this plan or separately (in accordance with ISO 50001).

Energy management is an effort to effectively achieve energy efficiency through the use of available resources. It is a systematic control of energy consumption with the aim of reducing it, which leads to the search for the most economically efficient solutions for the management of municipal sites by improving the level of energy efficiency and, in the long, term, reducing financial costs and CO₂ emissions. An Energy Management System (EMS) includes various tools, guidelines and procedures that enable the municipality:

- to make systematic recording and analysis of energy consumption data;
- to determine the necessity of energy efficiency measures at municipal sites, and prioritize them;
- to know the energy efficiency indicators of municipal sites in order to plan new measures and assess the performance of the implemented energy efficiency measures in them;
- to be able to manage municipal structures and other infrastructure included in the EMS in a rational manner, reducing energy costs and channelling savings for development.

The main principles of energy management are defined in LVS EN ISO 50001: 2017. It is a European standard, which has been adopted as a national standard without any modifications to its content. The standard defines and determines the areas that an organisation needs to take into account when designing an energy management system, including by identifying the responsibility of the organisation's management and other stakeholders, developing an energy policy, etc.

The content of the Energy Management Plan has been developed taking into account the main guidelines and recommendations of the energy management standard but simplified for the training needs of interested local governments and other organizations in the Vidzeme Region.

Based on the initiative of the Municipality of Alūksne County, as well as the Strategy for the Sustainable Development of Alūksne County for 2012-2030, it was decided to take the first step towards energy management by developing such plan for the educational institutions of Alūksne Town with centralized heat supply.

¹ Para II and III of Section 5 of the Energy Efficiency Law (effective as of 29.03.2016), published in "Latvijas Vēstnesis", 52 (5624), 15.03.2016

Vidzeme Planning Region

Action plan: Alūksne County Energy Action Plan

1 Objective

To reduce total energy consumption every year (kWh/m², EUR/per year) by 3-5% from the average consumption of the previous periods until 2021.

1.1 Objective scope and targets values

1.1.1 Legal background

Based on the Strategy for the Sustainable Development of Alūksne County for 2012-2030, the Municipality is aware that the production and use of alternative energy has a prospective and untapped potential. The Municipality has also put forward the strategic objective of [...] *promotion of renewable energy sources through pilot projects in the field of alternative energy use*. [...], as well as facilitation of the creation of renewable energy production plants.

Taking into account that there is a global decline in energy resources, as well as environmental concerns, it is necessary to use energy sources and solutions that primarily reduce total energy consumption (kWh/m²) and reduce the amount of CO₂ emissions in the atmosphere.

Promoting energy efficiency is one of the key criteria for moving towards sustainable development, which will enable individual institutions and the city to save on financial resources for its functionality (electricity, heat, water). The development of an energy plan for educational institutions will be the first step towards achieving the objectives, involving building representatives in the design, implementation and maintenance of the system.

1.1.2 Description of the County's buildings

It is planned to develop the Alūksne Energy Plan in the objects listed in Table 1.1. Table 1.1 shows all of the above-mentioned buildings.

Table 1.1

List of buildings considered in the Energy Plan

Name	Address	Heated area
Pre-School "Sprīdītis"	Raiņa Boulevard 5	1852.40
Pre-School "Piemenīte"	Helēnas Street 32	1017.30

Alūksne Town Pre-School	Lielā ezera Street 26	2028.80
Building for Grades 7-9 of Ernsts Gliks Alūksne State Gymnasium	E.Glika Street 10-2	6534
Building for Grades 10-12 of Ernsts Gliks Alūksne State Gymnasium	E.Glika Street 10-2	1869
Boarding School of Ernsts Gliks Alūksne State Gymnasium	E.Glika Street 13	1477.20
Gym of Ernsts Gliks Alūksne State Gymnasium	E.Glika Street 10-3	1563





Figure 1.1. Pictures of buildings considered in the Energy Plan

1.1.3 Energy assessment (historical energy consumption)

Heat source for educational institutions considered in the Energy Plan – centralised heating networks. Heat energy supplier of Alūksne Town – AS “Simone”, the tariff for the consumed heat is 55.05 Eur/MWh. When analysing data, it is possible to define objects that have the highest consumption of heat and electricity during the year, as a result of which it is possible to determine, whether it is necessary to implement energy efficiency measures in this object.

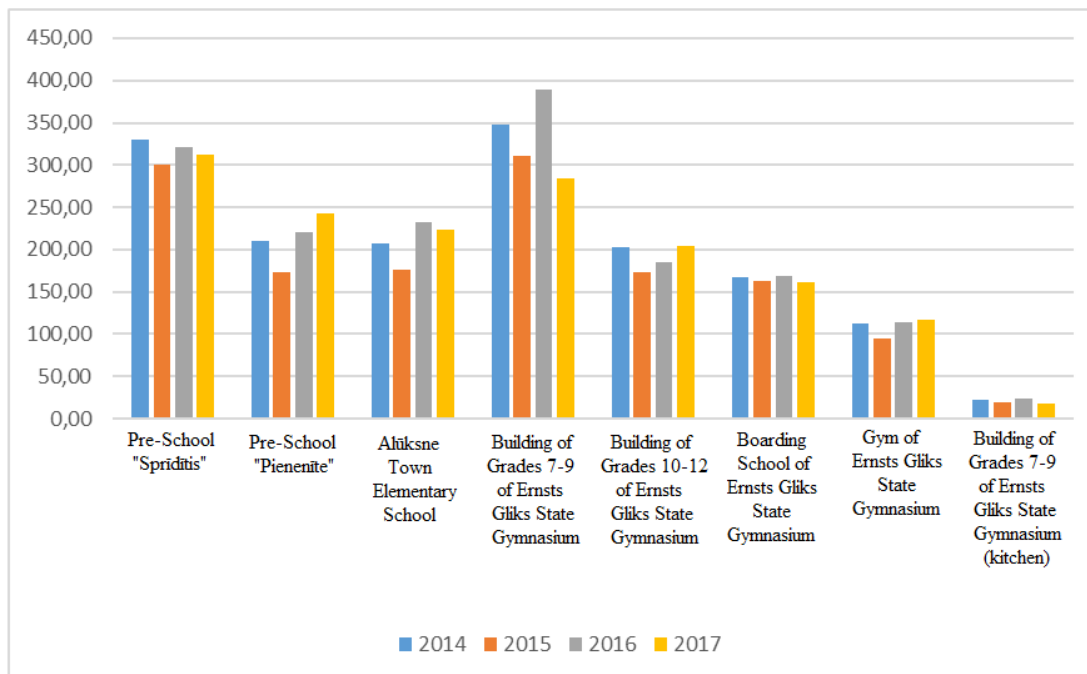


Figure 1.2. Heat consumption of various buildings, MWh/per year

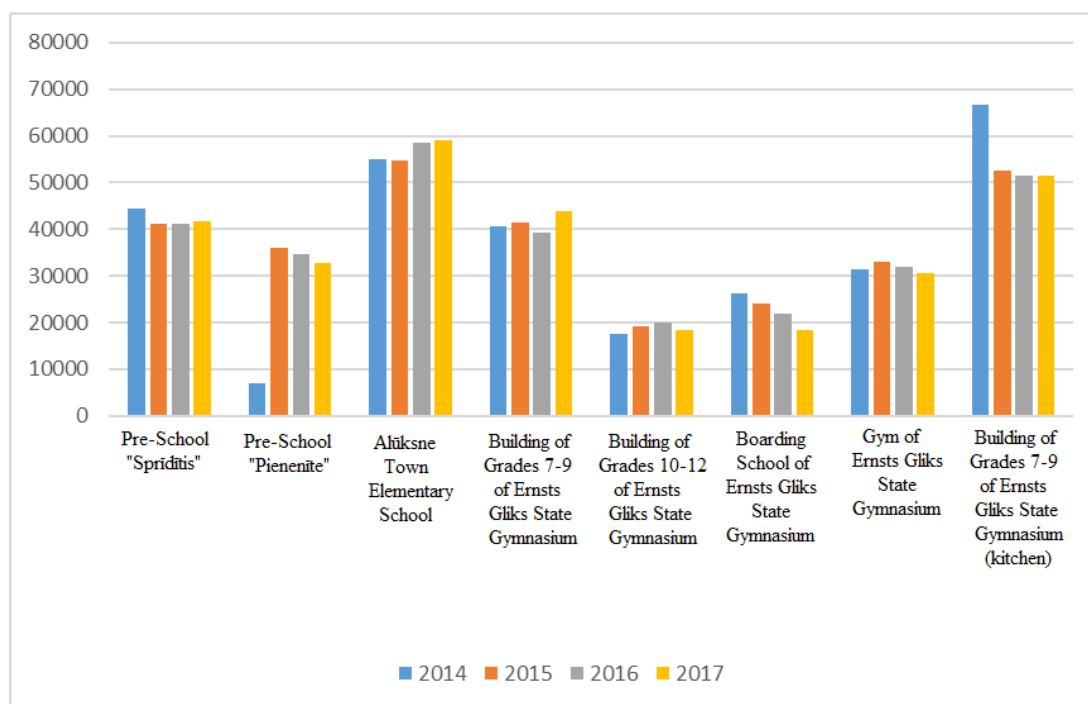


Figure 1.3. Electricity consumption of various buildings, kWh/per year

Looking at data obtained on heat (Figure 1.2), it can be determined which of the municipal institutions are energy-intensive; however, to make an objective comparison of consumption between buildings, the total heat consumption during the reference period should be divided with the quadrature of the building's heated space (kWh/m^2), which is discussed further in the Energy Plan.

Electricity is mainly used for lighting and electrical equipment. The Table below shows electricity consumption in the considered objects in a four-year period.

Looking at Figure 1.3, it can be concluded that there has been a decrease in electricity consumption over the years. This trend is due to the installation of LED lights and the purchase of electrical equipment with a higher energy efficiency class as well as change of consumer habits. In some educational institutions there has been an increase in electricity consumption over the years, which first of all indicates the need to consider replacing existing halogen lamps with LED type lamps or to reconsider electricity usage habits.

Cold water is mainly used in bathrooms and kitchens for cooking. It should be noted that Figure 1.4 also shows water used to prepare hot water.

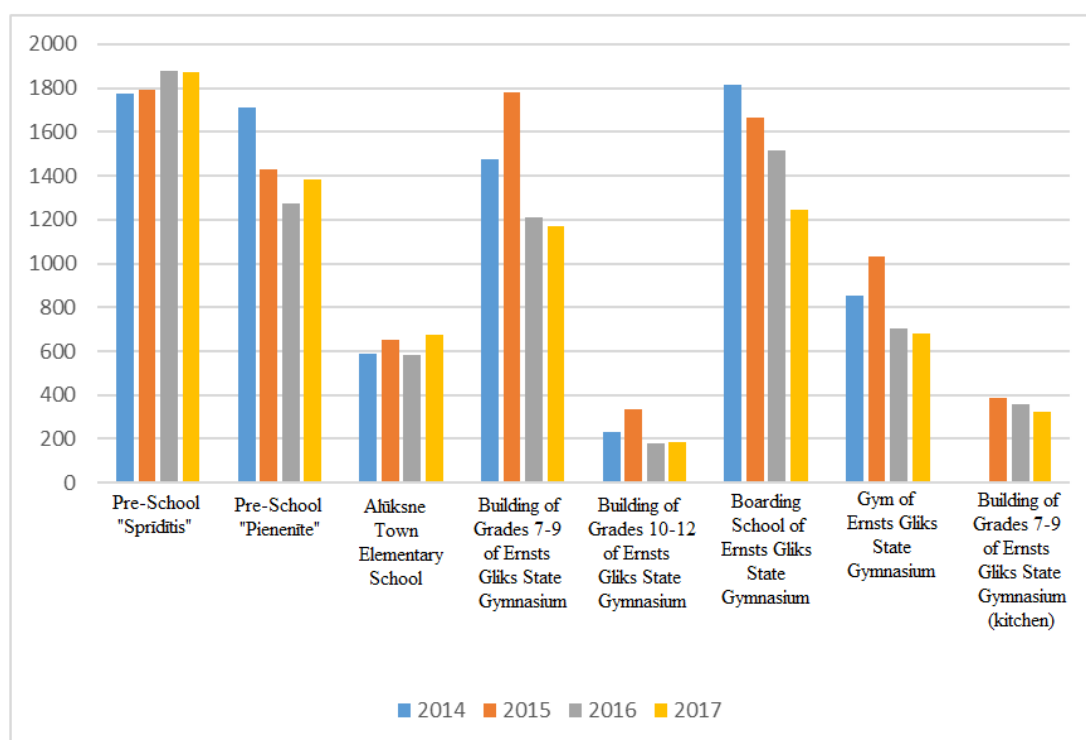


Figure 1.4. Cold water consumption of various buildings, m³ per year

A rather interesting analysis must be carried out for consumption data of the kitchen unit of E. Gliks Alūksne State Gymnasium. The significant electricity consumption is due to the technological process - electric cookers, ovens, kitchen equipment, etc., whereas heat consumption, which is calculated in proportion to the area heated, is very low, which can be explained by heat generated by the technological process.

Also, based on the results obtained, an in-depth analysis should be carried out between the building for Grades 7-9 of Ernsts Gliks Alūksne State Gymnasium and the building for Grades 10-12 of Ernsts Gliks Alūksne State Gymnasium. There is a significant difference in water consumption of almost 80%, but the buildings are used for the same purpose.

Cold water consumption includes the amount of water boiled and used as hot water.

ACTION PLAN

of the Municipality of Kumanovo

Energy Efficient Public Sector

English version

Prepared by
Municipality of Kumanovo
Center for Development of NEPR and
Balkan Development Solutions Ltd

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7
Date: December 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Energy Efficiency

Title: Energy Efficient Public Sector

1 Objective

The Energy Efficiency Plan of the Municipality of Kumanovo contains the basic contents required by the Law on Energy¹, paying particular attention to the measures envisaged in the National Action Plan for Energy Efficiency (NEEAP), referring to the measures and policies that are from the scope of responsibility of the municipality.

The Energy Efficiency Team of the Municipality of Kumanovo in 2015 paid great attention to providing accurate and detailed data on the level of energy consumption in all buildings that are owned by the Municipality of Kumanovo, public lighting in the competence of the municipality, and vehicles owned by local self-government (Municipality, Public Enterprises - Public Institutions, Public Institutions - PI).

Within the activities:

- accurate insight into the condition of each facility,
- condition of the shell / facade of the facilities,
- condition of the roof construction,
- conditions of the windows,
- condition of the heating installation,
- condition of the level of lighting,
- determining the actual energy consumption,
- defining the necessary measures for increasing the energy efficiency,
- control of the need and techno-economic feasibility of systems for utilization of renewable energy sources

The survey of buildings includes 61 facilities at the municipal level for which data are obtained and covers: heating surface of administrative municipal buildings, primary and high schools, public institutions and enterprises; street lighting on the territory of the Municipality of Kumanovo; and vehicles owned by the local self-government (Municipality, PE, PI) of about 80,815 m². The annual total energy consumption of all municipal buildings (municipal administrative buildings, primary and high schools, public institutions and enterprises), street lighting and vehicles owned by local self-government in the territory of the Municipality of Kumanovo for 2014 is 23.916MWh, while the total costs for energy is about 97,000,000 denars. These data represent an initial level in relation to which the improvement of the EE will be measured and will be the starting point for the municipality's road to becoming an energy efficient municipality.

The energy consumption in the education sector accounts for the largest part in the energy balance of the Municipality of Kumanovo (43%) and it can expect the greatest

¹ Law on Energy Official Gazette of RM 96/18, Article 242

increase in the energy demand in the future, and consequently the greatest potential for energy savings.

The summary review of energy costs (electricity and heat), annually, for municipal property is shown in the following table:

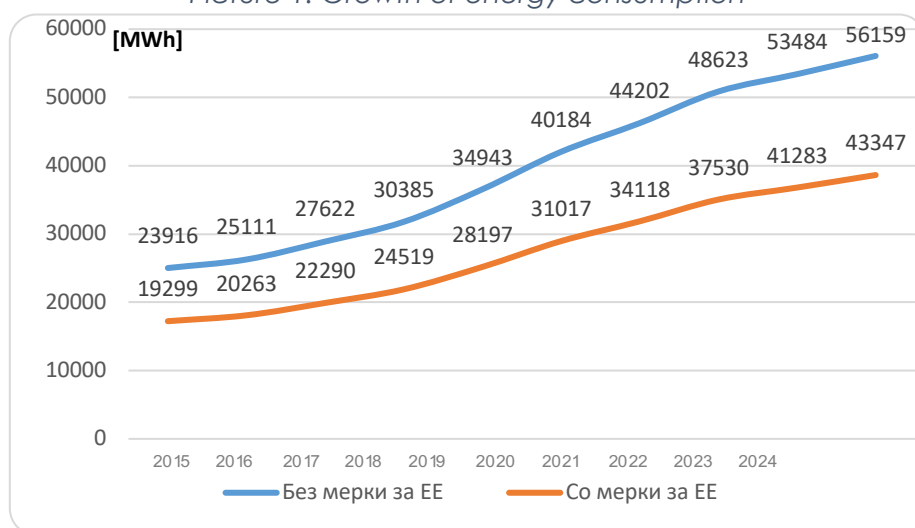
Table 1: A summary overview of energy performance in the Education sector

No.	Sector	No. of buildings	Heating surface (m ²)	Annual energy consumption MWh/yr	Average energy consumption kWh/m ²
1.	Administration	4	1.180	400,00	338,99
2.	Education	45	65.339	10.395,27	159,09
	Primary Schools	40	47.204	7.868,41	166,68
	High Schools	5	18.135	2.526,86	139,33
3.	Public enterprises and institutions	12	14.296	2.613,60	167,57
4.	Street lighting	/	/	7.625,89	/
5.	Traffic	97	/	288,00	/
	TOTAL	61	80.815	23.916,76	165,92

The data show that most of the annual energy consumption is in the education sector 43%, and the smallest part of the annual energy consumption is in the administration sector of 2%. Also, a large percentage of energy consumption occurs in public lighting 30%.

With the constant increase of energy prices on the local and regional market as well as the expected increase in the population, the energy consumption in the coming period in comparison with the current level is expected to grow at a rate of 5% -15% per annum.

Picture 1: Growth of energy consumption



The realization of the activities for energy efficiency will contribute to reducing the energy losses, and thus reducing the costs for heating and electricity from the municipal budget, improving the comfort in the school buildings, thus improving the atmosphere for work and education and more effective results in children's education will be achieved.

The potential for energy savings by applying all identified measures is shown in Table 2: Potential for energy savings.

Table 2: Potential for energy savings

Before the measures			
	MWh/yr	day/yr	† CO2/yr
Buildings	13.408,87	55.687.037,00	3.089,60
Public lighting	7.625,89	31.436.159,00	6.977,68
Traffic	2.882,00	17.394.194,00	76.661,00
Total	23.916,76	104.517.390,00	10.833,89
After the measures			
Buildings	11.768,97	47.882.072,00	188.760,00
Public lighting	4.906,89	23.542.349,00	4.616,17
Traffic	2.624,00	15.828.971,00	743,73
Total	19.299,86	87.253.392,00	7.247,50
Savings			
Buildings	1.639,60	7.804.965,00	1.202,00
Public lighting	2.719,00	7.893.810,00	2.361,51
Traffic	258,00	1.565.225,00	22,88
Total	4.616,60	17.264.000,00	3.586,39

The main objective of the AP is to reduce the energy costs in the municipality, primarily in the part of public buildings, street lighting and vehicles owned by the local self-government (Municipality, Public Enterprise, Public Utility Company).

1.1 Scope of measures and target values:

- Capacity building of the EE Team and awareness raising for EE and RES
- Renewal of data in the base and Energy audits for facilities under the authority of the Municipality of Kumanovo (61 facilities)
- Reconstruction of buildings (Thermal insulation of external walls; Reconstruction of external and internal carpentry; Reconstruction of roof construction together with roof covering, exterior carpentry and thermal insulation of external walls; installation of central heating systems; replacement of lights)
- Installation of solar collector system (for hot water / electricity) on roofs
- Restoration of part of the street lighting
- Recovery of the road vehicle fleet
- Gasification of public buildings under the jurisdiction of the Municipality of Kumanovo and use of natural gas as a source of energy²
- Construction and arrangement of bicycle paths
- Establishment of a regional waste management system
- Construction and arrangement of new green areas (parks, green belt around the city, ground arrangement of the same)
- Construction of a biomass power plant

² Although natural gas does not fall into the RES group, the delayed gasification of the Republic of Macedonia makes energy, which in the next 20-30 years will play a significant role in energy consumption. For the needs of the gasification of the municipality, the Public Enterprise "Kumanovo Gas" was established <http://kumanovogas.com.mk/>

The potential for energy efficiency by type of energy consumption projected for 2014 (base year) is given in MWh / year. The results of the survey show that the total annual energy consumption can be reduced from 23,916 to 19,299 MWh, which is a 23% reduction, if the planned measures for protection of energy consumption are implemented (Table 3: A summary overview of energy consumption).

Table 3: A summary overview of energy consumption

Sector	Before the measures	After the measures
	MWh/yr	MWh/yr
Buildings	13.408,87	11.768,97
Public lighting	7.625,89	4.906,89
Traffic	2.882,00	2.624,00
Total	23.916,76	19.299,86

By applying the proposed measures in the facilities (gasification, partial and complete renovation of the PS and replacement of energy efficient light bulbs), street lighting (replacement of part of the lights with EE lights) and traffic (introduction of a car-free day, repair of old and damaged vehicles as well as the purchase of new vehicles), a reduction in the emission of CO₂ emissions into the atmosphere will be achieved. The greatest reduction in CO₂ emissions will be by applying the EE measures in the sector of buildings under the jurisdiction of the Municipality of Kumanovo, while the smallest emission of CO₂ emissions will be after the application of the EE measures in traffic.

The long-term goals that the municipality wants to achieve are:

- Reduction of the share of energy in municipal investments
- Improvement of the internal conditions to the standard level of comfort in the primary schools and kindergartens within the competence of the municipality,
- Replacing the full public lighting in the municipality with new lights
- Reducing the level of CO₂ emissions in the atmosphere
- Reduced number of health problems related to the internal climate in school buildings and kindergartens,
- Rapid identification and renewal of problematic systems in primary schools and kindergartens with high energy consumption in primary schools and kindergartens.
- Usage of RES
- Gasification of public buildings

The municipality's strategy is that the above target values will be achieved through:

- Further operation and operation of the energy efficiency team in maintaining the database
- Establishment of a fund for financing and realization of projects for increasing energy efficiency in schools and public lighting
- Identification and finding of new donors
- Identification and use of new energy sources

At the same time, in order to achieve the above long-term goals, the municipality aims to promote and work on:

- Creating awareness through the dissemination of good practices

- Promote social awareness about the need to create sustainable development

1.2 Target indicators

Indicators and their target values that relate to the identified objectives are shown in Table 4: Objectives and Indicators.

Table 4: Objectives and Indicators

Objective	Indicator and target value of the indicator	Method of measurement and validation
Reduction of the share of energy in municipal investments	By 2025 it should be reduced by 25% in relation to current investments	Financial reports
Reduction of annual energy consumption	By 2025, the annual energy consumption will be reduced by 23% compared to the current one	Reports of consumption measurements
Improving the internal comfort conditions in primary and high schools	Achieving the standard level of comfort of the internal conditions in 80% of primary and secondary schools	Reports on the achieved levels of standards
Replacing public lighting	By 2025 the complete public lighting in the municipality with new lights was replaced. Reduce consumption by 50% of the current one	Consumer Reports
Reducing the level of CO2 emissions in the atmosphere	Reducing the level of CO2 emissions in the atmosphere by 30% compared to the current level	Reports from analyzes and measurements
To reduce the number of health problems related to the internal climate in school buildings	Reducing the number of sick students by 100% per year compared to the previous year	Reports of student absenteeism
Rapid identification and renewal of problematic systems in primary schools with high energy consumption.	The identification time is no longer than 7 days Recovery time not longer than 30 days	Reports from the record of identified problems and implemented interventions
Usage of RES	By 2030 all public buildings have sun roofs By 2040 a central heating system with a biogas plant was built 100% share of RES in energy consumption in 2050	Reports on: implemented projects for RES use; and energy consumption
Gasificatio* of the municipality	Gasification of public buildings by 2030	Reports on: Gasification projects implemented

2 Implementation Strategy

2.1 Step by step

Step 1 – Training, equipping and support of the EE Team in the municipality

The success of the Program is entirely dependent on the commitment, participation and engagement of the Head and members of the Energy Efficiency Team (TEE). The members of the Energy Efficiency Team are from different departments of the municipality and are able to work closely with external advisers to carry out tasks, to set tasks and control the results.

One of the key activities of the TEE at this stage are: database management, data collection and storage (building types of buildings, technical systems, energy systems, energy sources and devices, as well as the basic principles relating to administration in buildings); and identifying the necessary financial resources and modalities for implementation of the activities.

Step 2 – Organizing and implementing AP projects

Prioritization, organization and implementation of AP projects including: technical documentation, investments, schedules, cost plans, participants and program implementers, program modalities (subcontractors and consultants).

Key at this stage are the activities to increase access to capital related to investments (access to sources and allocation of funds).

Step 3 – Using Renewable Energy

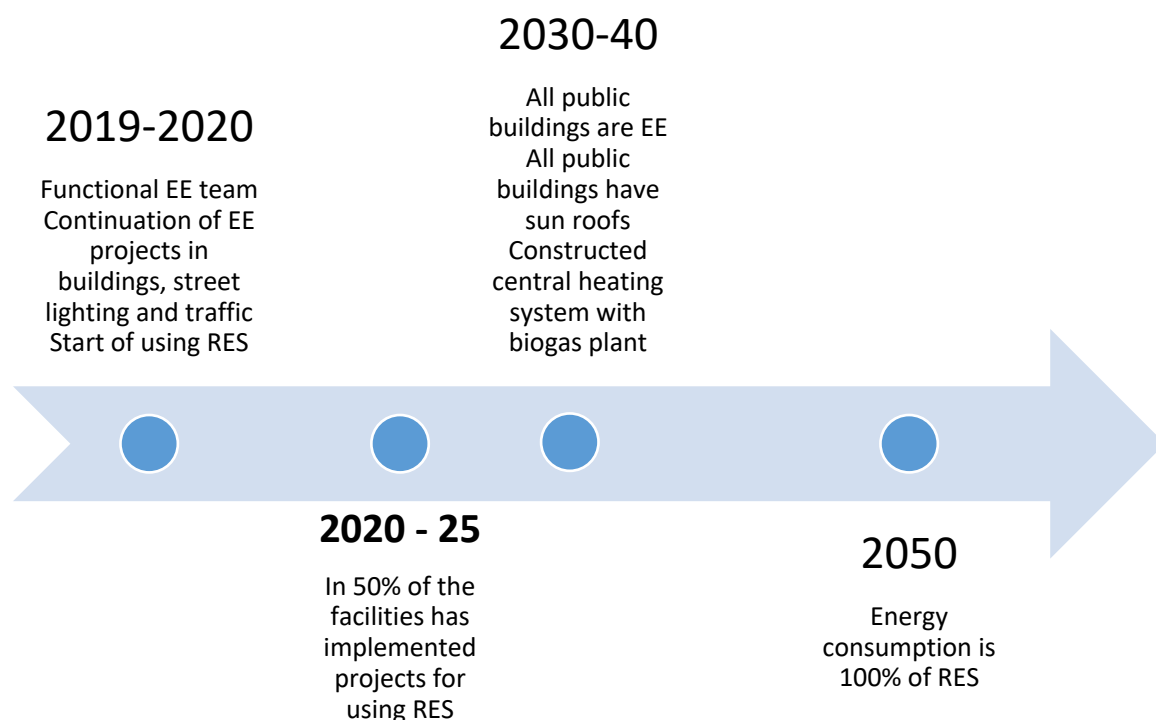
This step is especially separate in order to intensify the analysis, identify the possibilities for greater use of RES, the preparation of technical and project documentation, sources of financial resources and implementation models. First of all, emphasis is placed on the already undertaken activities for placing solar panels on the facilities within the competence of the municipality.

Step 4 – Identification and transfer of best practices

The Municipality, in cooperation with ZELS, the Ministry of Local Self-Government and the Ministry of Education, as well as non-governmental organizations and foreign donor institutions, to identify and increase the awareness of the population for more efficient use of energy systems and sources through presentation of positive examples and local initiatives. This initiative can be implemented by organizing a campaign for energy efficiency and using RES, which would include the preparation and distribution of leaflets and the organization of energy efficiency programs in the municipalities.

Partnership and involvement of the NGO sector in the process of education of the population and the business sector for renewable energy sources is needed.

2.2 Time frame



2.3 Budget and necessary resources

The necessary resources for implementation of the Action Plan are planned to be provided from different sources. One part of the funds will be provided in the budgets of the Municipality of Kumanovo, and the respective ministries. An important part of the funds are planned to be provided by applying to the EU Programs: EU IPA grants for rural infrastructure, EU IPA cross-border cooperation and other donor organizations present in the country that support education sector activities, as well as PPPs with the business sector.

The indicative budget for the implementation of measures and activities for EE in the public sector and the use of RES in the municipality is about 65 million euros.

3 Cooperation with the Stakeholders

The main stakeholders involved in this activity are:

- Municipality of Kumanovo (including PE and PI)
- Citizens and NGOs
- The business sector in the municipality of Kumanovo and wider

The roles and responsibilities of the various stakeholders in the implementation of the Action Plan are presented in Table 5.

Table 5: Stakeholders

Stakeholders	Role and Responsibility of the Stakeholders	How it is involved and how it will communicate with the stakeholder
Mayor of the Municipality of Kumanovo	Implementing the AP and responsible for the establishment of the EE Team	Directly through the EE Team Communication will take place through: <ul style="list-style-type: none"> • meetings • written communication • reports
Council of the Municipality of Kumanovo	Adopts action plans, makes decisions for implementation.	Directly Communication will take place through: <ul style="list-style-type: none"> • meetings • written communication • reports
Municipal administration	Issues construction permits and performs urban planning. Provides funding from the Budget.	Directly Communication will take place through: <ul style="list-style-type: none"> • meetings • written communication • reports
Citizens and the NGO sector	Awareness raising on the use of EE and RES measures	Indirectly Communication will take place through: <ul style="list-style-type: none"> • gatherings • media
Business sector	Participating directly in the realization of construction activities. Establishing of PPP	Directly Communication will take place through: <ul style="list-style-type: none"> • meetings • written communication • reports

4 Monitoring strategy

In order to monitor the results of the implemented energy efficiency measures, measurements are planned at different time intervals and comparing the results with the calculators. The main indicators that are measured and compared are the following:

- Energy consumption (thermal and electrical)
- Comparison of the conditions in the objects (temperature differences, degree of lighting and humidity)
- Saving funds that are separated for energy

The measurements will be carried out with determined dynamics throughout the year.

In order to achieve uniqueness in the data, it is necessary to measure and collect them in kWh for both electrical and thermal energy. In case other measures (eg J or that) are used, it is necessary to convert the units in kWh using appropriate conversion factors.

In order to obtain relevant data, the municipality plans to use the following sources of information:

- Bills from the distribution center of EVN Kumanovo for electricity
- Bills from suppliers of oil and firewood
- Data on energy consumption from equipment manufacturers
- Measurement methods such as data loggers, flow meters, electricity meters and the like

The monitoring of energy efficiency activities in the municipality by the Energy Efficiency Team will be carried out in accordance with the legal requirements and is shown in Table 6

Table 6: Schedule for monitoring activities

Report	Delivery time
Action Plan for Energy Efficiency	Annual delivery at the end of the first quarter.
Annual report	Annual delivery within three months after the end of the year
Energy Efficiency Project Report	Regular report every month for the duration of the project, and a final report at the end of the project
Reports on the monitoring of the energy efficiency measures for the implemented projects	Quarterly, within 15 days from the end of the specific quarter

5 Risk Management

The risks, the probability of their occurrence and the way of dealing with the risks are given in Table 7.

Table 7: Risk Management

Risk	Probability of risk	Measures for risk management
Non-functional EE team in the municipality	Medium	Training and increasing the EE Team's resources
Little interest in key stakeholders	Low	There is a strong partnership between key stakeholders Integration of activities across multiple sectors
Lack of financing	Medium	Initiation of projects funded through public grants / subsidies schemes, increased cooperation with the private sector
Insufficient potentials and resources for the implementation of the Projects in the NEPR	High	Promotion of projects at the national level and creation of partnerships

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

of the Municipality of Kratovo

Energy Efficient Public Sector

English version

Prepared by
Municipality of Kratovo
Center for Development of NEPR and
Balkan Development Solutions Ltd

PANEL 2050 – Partnership for New Energy Leadership 2050

Deliverable 3.7

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CENTRAL EASTERN EUROPEAN
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Priority area: Energy Efficiency

Title: Energy Efficient Public Sector

1 Objective

The aim of the Action Plan for Energy Efficiency of the Municipality of Kratovo is to reduce the budget expenditures for energy. Equally important is the environmental aspect ie reducing the emission of harmful gases into the atmosphere.

The Program for Energy Efficiency of the Municipality of Kratovo contains the basic contents required by the Law on Energy¹, paying special attention to the measures envisaged in the National Action Plan for Energy Efficiency (NEEAP), and referring to the measures and policies that are from the scope of responsibility of the municipality.

The initial level in relation to which the improvement of the EE will be measured and will be the starting point of the municipality's road to becoming an energy efficient municipality.

The inspection of buildings under the municipal administration includes 20 facilities, with a total heating area of 14132 m². The total annual energy consumption of all municipal facilities and including street lighting on the territory of the municipality is 2706 MWh / year.

The potentials for saving the Municipality of Kratovo by sectors by implementing the envisaged EE measures in the Program are presented in Table 1: Potential for annual heat energy savings by sectors and Table 2: Potential for annual savings in electricity by sector

Table 1: Potential for annual heat energy savings by sectors

No.	Sector	Number of buildings	Heating surface	Annual energy consumption	Predicted annual energy consumption	Annual energy savings	Average specific energy consumption	Predicted average specific energy consumption
			m ²	KWh/yr	KWh/yr	KWh/yr	KWh/m ² yr	KWh/m ² yr
1	Administration	1	1.932	145.437	103.071	42.366	75,28	53,35
2	Social worries	2	2.287	271.740	177.967	93.773	118,82	41,00
3	Culture	2	585	45.092	38.779	6.313	77,08	10,79
4	Education							
	Primary Schools	4	3.864	539.815	178.587	361.228	139,70	93,49
	High Schools	1	3.881	396.108	77.958	318.150	102,06	81,98
	Total	10	12.549	1.398.192	576.362	821.830	111,42	65,49

The data show that the greatest potential for annual heat energy savings is in the primary schools sectors 43.95% and secondary schools 38.71%.

¹ Law on Energy Official Gazette of RM 96/18, Article 242

Table 2: Potential for annual savings in electricity by sector

No.	Sector	Number of buildings	Annual energy consumption	Predicted annual energy consumption	Annual energy savings
			KWh/yr	KWh/yr	KWh/yr
1	Administration	1	7.475	2.925	4.550
2	Social worries	2	27.752	7.676	20.076
3	Culture	2	7.307	2.365	4.942
4	Education				
	Primary Schools	4	49.746	14.395	35.351
	High Schools	1	28.190	10.887	17.303
5	Street lighting	/	871.080	518.980	352.100
	Total	10	991.550	557.228	434.322

From the data it is noted that the greatest potential for annual energy savings is in the street lighting sectors 81,07%.

The potential for energy saving after the implementation of the envisaged measures is 1256 MWh / year, ie 10,048,209 den / year, of which 65% comes from savings of heat, and the remaining 35% of electricity savings from lighting.

Considering that the implementation of energy efficiency measures also affects the environment, Table 3: Reduced emission of harmful gases from energy savings presents the reduced emissions of harmful gas annually from saved fuel and electricity.

Table 3: Reduced emission of harmful gases from energy savings

No.	Sector	Number of buildings	Annual saving of heat energy	Annual saving of electricity	Annual energy savings	Annual CO2 saving
			KWh / yr	KWh / yr	KWh / yr	CO2e (t)
1	Administration	1	42.366	4.550	46.916	21
2	Social worries	2	93.773	20.076	113.849	58
3	Culture	2	6.313	4.942	11.255	8
4	Education					
	Primary Schools	4	361.228	35.351	396.579	174
	High Schools	1	318.150	17.303	335.453	136
5	Street lighting	/		352.100	352.100	420
	Total	10	821.830	434.322	1.256.152	818

1.1 Scope of measures and target values

The scope of the EE measures provides:

- Capacity building of the EE Team and awareness raising for EE and RES
- Renewal of data in the base and Energy audits for buildings under the authority of the municipality of Kratovo (10 facilities)
- Reconstruction of buildings (Thermal insulation of external walls; Reconstruction of external and internal carpentry; Reconstruction of roof construction together with roof covering, exterior carpentry and thermal insulation of external walls, installation of central heating systems, replacement of lights)
- Installation of solar collector system (for hot water / electricity) on the roofs of municipal buildings
- Restoration of part of the street lighting
- Gasification of public buildings under the authority of the municipality of Kratovo and use of natural gas as a source of energy²

Long-term goals ie expected results from the measures for energy efficiency of the municipality are:

- Reduction of average power consumption (kWh / m²)
- Reduction of CO₂ emissions in the atmosphere
- Reconstruction of existing energy systems
- Reconstruction of existing municipal facilities
- Improvement of the internal comfort in kindergartens, primary and secondary schools
- Timely detection of high energy consumption systems and their reconstruction
- Application of natural gas for heating
- Using renewable energy sources

Activities that the municipality should undertake to achieve these goals are:

- Maintain the database
- Measurement and monitoring of energy consumption
- Monitoring and applying the best practices in the field of energy efficiency
- Preparation of technical and project documentation
- Finding financial resources for the realization of projects
- Creating campaigns whose ultimate goal is raising awareness among the population for EE and RES

² Although natural gas does not fall into the RES group, the delayed gasification of the Republic of Macedonia makes energy, which in the next 20-30 years will play a significant role in energy consumption.

1.2 Target indicators

Indicators and their target values that relate to the identified objectives are shown in Table 4.

Table 4: Indicators and target values

Objective	Indicator and target value of the indicator	Method of measurement and validation
Reduction of annual energy consumption	By 2025, the annual energy consumption will be reduced by 25% compared to the current one	Reports of consumption measurements
Replacing public lighting	By 2025 the complete public lighting in the municipality with new lights was replaced. Reduce consumption by 50% of the current one	Consumer Reports
Reducing the level of CO2 emissions in the atmosphere	Reducing the level of CO2 emissions in the atmosphere by 30% compared to the current level.	Reports from analyzes and measurements
Usage of RES	By 2025, 50% of all public buildings have implemented projects for the use of RES 100% share of RES in energy consumption in 2050	Reports on: implemented projects for RES use; and energy consumption
Gasification * of the municipality	Gasification of public buildings by 2030	Reports on: Gasification projects implemented

2 Implementation Strategy

2.1 Step by step

Step 1 – Training, equipping and support of the EE Team in the municipality

The success of the Program is completely dependent on commitment: participation and engagement of the Head and members of the Energy Efficiency Team (TEE). The members of the Energy Efficiency Team are from different departments of the municipality and are able to work closely with external advisors to carry out tasks: to set tasks and control the results.

One of the key TEE activities at this stage are: managing the database, collecting and storing data (types of building structures, technical systems, energy systems, energy sources and devices, as well as the basic principles pertaining to the administration in the buildings); and identifying the necessary financial resources and modalities for implementation of the activities.

Step 3 – Organizing and implementing AP projects

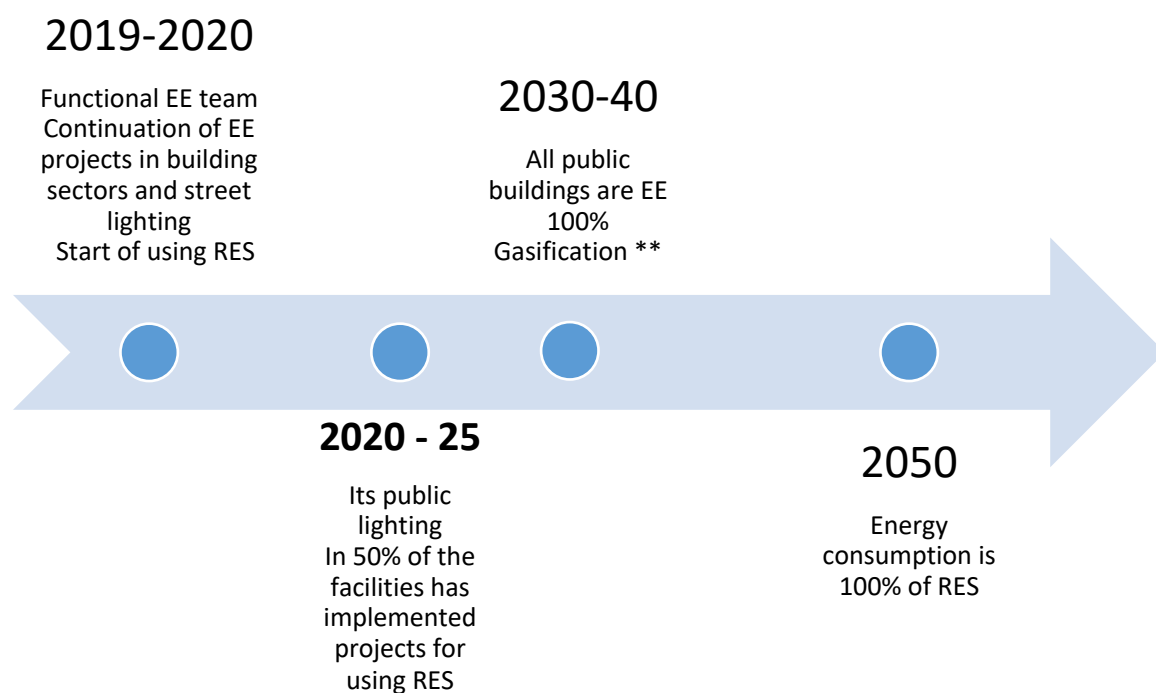
Prioritization, organizing and implementing AP projects including: technical documentation, investment, deploy, cost plans, participants and program implementers, modalities for the program's performance (subcontractors and advisors).

Also key in this phase are the activities for increasing access to capital related to investments (access to sources and allocation of funds)

Step 4 – Using Renewable Energy

This step is specifically singled out in order to intensify the analysis: identifying opportunities for greater use of RES, preparation of technical and project documentation: sources of financial resources and implementation models.

2.2 Time frame



2.3 Budget and necessary resources

The necessary resources for implementation of the Action Plan are planned to be provided from different sources. A part of the funds will be provided in the budgets of the Municipality of Kratovo and the respective ministries. An important part of the funds are planned to be provided by applying to the EU Programs: EU IPA grants for rural infrastructure, EU IPA cross-border cooperation and other donor organizations present in the country, as well as PPPs with the business sector

3 Cooperation with the Stakeholders

The main stakeholders involved in this activity are:

- Municipality of Kratovo;
- Local public institutions
- The business sector in the municipality of Kratovo and wider
- Households

The roles and responsibilities of the various stakeholders in the implementation of the Action Plan are presented in Table 5.

Table 5: Stakeholders

Stakeholder	Role and Responsibility of the Stakeholders	How it is involved and how it will communicate with the stakeholder
Municipality of Kratovo	<ul style="list-style-type: none"> - establishing and developing cooperation with other stakeholders. in order to promote the benefits of energy efficiency. - organizing campaigns, workshops and info sessions. - creation of a database for implementation of the action plan and its maintenance. - good budget planning for the implementation of the EE Action Plan. - providing financial support for the implementation of the measures. ie projects of public-private partnership. - providing access to favorable credit lines and donors for assistance. - to monitor the implementation of the action plan. 	As a direct participant in the creation of the Action Plan. There will be the biggest involvement in the implementation of the Action Plan.
Local public institutions	<ul style="list-style-type: none"> - a parcel with the Municipality and coordination of its own activities. ie work programs and budget within the EE Action Plan. - Preparation of reports for implementation of EE measures and their submission to the Municipality. - active participation in campaigns for EE campaigns. 	This stakeholder is an active participant in the implementation of the Action Plan and involved in almost all foreseen measures. Communication will take place in precisely determined time periods. especially due to the submission of reports due to updating the EE database.
Business Sector	-cooperation with the municipality	This stakeholder will be involved mostly in the part

	<ul style="list-style-type: none"> - exchange of views and experiences with stakeholders related to EE. - active participation in campaigns for EE campaigns. 	for elaboration of the feasibility study, as well as exchange of knowledge and experiences. Due to the changing moment of this side in the long run. This site will be communicated regularly through official correspondence and requests, ie notifications for active participation in the implementation of the Action Plan.
Household	<ul style="list-style-type: none"> - Active participation in campaigns for EE campaigns. - monitoring and active reporting for the use of government measures to subsidize households in the field of EE. 	This is the most comprehensive stakeholder and the same communication will be done through public calls for participation in campaigns and government measures.

4 Monitoring strategy

In order to monitor the results of the implemented energy efficiency measures: measurements are planned at different time periods and comparing the results with the calculators. The main indicators that are measured and compared are the following:

- Energy consumption (thermal and electrical).
- Comparison of the conditions in the objects (temperature differences, degree of brightness and humidity).
- Saving funds that are separated for energy.

The measurements will be carried out with determined dynamics throughout the year.

In order to achieve uniqueness in the data, it is necessary to measure and collect them in kWh, both for electrical and thermal energy. In case other measures (eg J or this) are used, it is necessary to convert the units in kWh using appropriate conversion factors.

To obtain relevant data: the municipality plans to use the following sources of information:

- Bills from the distribution center of EVN Kumanovo for electricity
- Bills from suppliers of oil and firewood
- Data on energy consumption from equipment manufacturers
- Methods for measuring energy such as data loggers, flow meters, counted on electricity and the like

Monitoring of the energy efficiency activities in the municipality by the Energy Efficiency Team will be conducted in accordance with the legal requirements and is shown in Table 6.

Table 6: Schedule for monitoring activities

Report	Delivery time
Action Plan for Energy Efficiency	Annual delivery at the end of the first quarter.
Annual report	Annual delivery within three months after the end of the year
Energy Efficiency Project Report	Regular report every month for the duration of the project, and a final report at the end of the project
Reports on the monitoring of the energy efficiency measures for the implemented projects	Quarterly, within 15 days from the end of the specific quarter

5 Risk Management

The risks, the probability of their occurrence and the way of dealing with the risks are given in Table 7.

Table 7: Risk Management

Risk	Probability of risk	Measures for risk management
Non-functional EE team in the municipality. Employees in the municipality have insufficient time / financial resources to fully devote themselves to the implementation of energy efficiency	Medium	Training and increasing the EE Team's resources
Lack of financing	Medium	Within the municipal budget, allocate funds that will be allocated for the implementation of the EE measures. Initiation of projects funded through public grant schemes / subsidies. increased cooperation with the private sector

Insufficient promotion for the development and implementation of energy efficiency projects and RES	Low	Creating a campaign in order to raise the awareness of the population in terms of EE and RES
Insufficient potentials and resources for the implementation of the Projects in the NEPR	High	Promotion of projects at the national level and creation of partnerships

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Priority area: Energy Efficiency

Title: Energy Efficient Public Sector

1 Objective

The purpose of this Action Plan is to give direction on how to achieve an energy efficient public sector in the municipality of Kriva Palanka in order to reduce the budgetary costs for energy.

In 2012, the Municipality of Kriva Palanka adopted a Program for Energy Efficiency of the Municipality in the period 2012-2014, which contains the basic contents required by the Law on Energy¹, paying particular attention to the measures envisaged in the National Action Plan for Energy Efficiency (NEEAP), referring to measures and policies that are within the scope of responsibility of the municipality.

This program is an initial level in relation to which the improvement of the EE will be measured and is the starting point on the road to the achievement of an energy efficient public sector in the municipality.

The main objective of this Energy Efficiency Program (OPEE) in the Municipality of Kriva Palanka is to reduce the energy consumption in the facilities under the municipal administration and the street lighting in the municipality. The EEAP's final results were envisioned to provide a reduction of the municipal energy expenditures by about 12.3% in 2014, ie 28.7% cumulatively in the period 2012-2014.

The program emphasizes that this can be achieved by implementing energy efficiency projects that will simultaneously help **raise awareness among citizens about the benefits of creating a local energy policy.**

The need for the preparation of this Action Plan is in the fact that today the municipality does not have a current EE Program, while at the same time the bulk of the set long-term objectives as well as the identified EE measures are still equally current and will continue to be in the future.

Kriva Palanka is considered a successful municipality in the utilization of funds from the European Programs, primarily in the framework of the implementation of projects from the IPA Cross-Border Program.

The Municipality of Kriva Palanka manages 25 municipal public buildings located in 4 sectors: administration, education, social care and culture, and appropriate target groups within the sectors. These objects with their data are entered in the energy efficiency database.

The overview of the buildings in the EMO includes 25 public facilities at the municipal level for which data were obtained. All facilities cover a heated area of 18,125 m². The total

¹ Law on Energy Official Gazette of RM 96/18, Article 242

annual energy consumption of all municipal public buildings in the four sectors and street lighting in the territory of the whole municipality in 2011 was about 4.086 MWh and total energy costs of 17.974.000 denars².

The Municipality of Kriva Palanka has the potential for energy efficiency. Improvements in energy utilization create a realistic opportunity to reduce the energy demand by an average of 60-120 MWh per year in the next ten years.

Much of the analysis of energy efficiency initiatives in the short term should focus on the possibilities for energy savings (electricity and heat) in all sectors that are under the authority of the municipality. Education sectors (primary and secondary schools) and street lighting account for the bulk of the municipality's energy balance and can expect the greatest increase in the energy demand in the future, and consequently the greatest potential for savings.

The municipality's strategy is to achieve the above objectives through:

- Further operation and operation of the energy efficiency team in maintaining the database
- Establishment of a fund for financing and realization of projects for increasing energy efficiency in schools and public lighting
- Identify and find new donors
- Identification and use of new energy sources

At the same time, in order to achieve the above long-term goals, the municipality aims to promote and work on:

- Creating awareness through the dissemination of good practices
- Promote social awareness about the need to create sustainable development
- Building partnerships involving the public sector, consumers and energy firms

1.1 Scope of measures and target values

The scope of measures for achieving an energy efficient public sector in the municipality of Kriva Palanka contains the following measures:

- Capacity building of the EE Team and awareness raising on EE and RES
- Maintain the database
- Measurement and monitoring of energy consumption
- Preparation of an Operational Program for EE for the period 2020-2023 and appropriate Action Plans Implementation of the identified and developed EE and RES projects (2019)
- Reconstruction of the buildings (Thermal insulation of the external walls; Reconstruction of the external and internal carpentry; Reconstruction of the roof construction together with the roof covering, exterior carpentry and thermal insulation on the external walls, installation of central heating systems, replacement of lights)

² 1 EYP = 61,5 MKD

- Installation of solar collector system (for hot water / electricity) on the roofs of municipal buildings
- Reconstruction of part of the street lighting
- Gasification of public buildings under the jurisdiction of the municipality of Kriva Palanka and use of natural gas as a source of energy³
- Creating campaigns whose ultimate goal is raising awareness among the population for EE and RES
- Visiting the coverage of the EE measures by 2050

1.2 Target indicators

Indicators and their target values that refer to the identified measures are shown in Table 1.

Table 1: Indicators and target values

Objective	Indicator and target value of the indicator	Method of measurement and validation
Functional EE team	Effective and efficient EE Team	Reports from the EE Team
Functional EE Database	Annual data recovery	Available data
Measurement and monitoring of energy consumption	Reducing the level of CO ₂ emissions in the atmosphere by 30% compared to the current level.	Reports of measurements and consumption analyzes
Developed OPEE 2020-2023	Developed Action Plans	Developed Project Fixes for implementation of the AP
Implementation of the identified and developed EE and RES projects	By 2025, the annual energy consumption will be reduced by 25% compared to the current one Gasification of public buildings by 2030 By 2025 the complete public lighting in the municipality with new lamps was replaced. Reduce consumption by 50% of the current one By 2025, 50% of all public buildings have implemented projects for the use of RES	Reports on: implemented EE projects, using RES; and energy consumption
Creating campaigns whose ultimate goal is raising awareness among the population for EE and RES	Organized annual event for promotion of EE and RES	Number of EE and RES projects implemented by households and businesses
Visioning of the coverage of the EE measures by 2050	100% share of RES in energy consumption in 2050	Reports on: implemented projects

³ Although natural gas does not fall into the RES group, the delayed gasification of the Republic of Macedonia makes energy, which in the next 20-30 years will play a significant role in energy consumption.

2 Implementation Strategy

2.1 Step by step

Step 1 – Training: equipping and supporting the EE Team in the municipality

The success of the Program is completely dependent on commitment, participation and engagement of the Head and members of the Energy Efficiency Team (TEE). The members of the Energy Efficiency Team are from different departments of the municipality and are able to work closely with external advisers to carry out tasks, to set tasks and control the results.

One of the key TEE activities at this stage are: database management, collecting and storing data (types of building structures, technical systems, energy systems, energy sources and devices, as well as basic principles relating to administration in buildings); and the preparation of relevant analyzes and reports.

Given that the municipality has experience with the work of the EE team, it needs to be upgraded based on the current status.

Step 2 - Making the OPEE 2020 - 2023

In this step, the focus should be on identifying and mobilizing stakeholders and implementing active communication with them. Special attention should be paid to the horizontal and vertical creation of synergies between stakeholders.

Step 3 - Implementation of the identified EE and RES projects

At this stage, the municipality and the EE Team should focus on the implementation of identified and developed projects through prioritization, organization and implementation of AP projects including: technical documentation, investments, schedules, cost plans, participants and program implementers, modalities for performance of the program (subcontractors and advisers).

Also key in this phase are the activities for increasing access to capital related to investments (access to resources and allocation of funds).

The list of projects that started in 2018 or are planned, and for which project documents are available in the field of energy efficiency and energy transition are given in Table 2.

Table 2: Projects ready to be implemented

Project	Short description of the Project (what is the purpose of the project and what activities should be realized)	Time frame	Budget
Construction of a primary gasification network ⁴		3 years	1.000.000 EUR
Placing photovoltaic public buildings owned or used by the municipality	The project envisages the construction of the primary gasification network and connection to the existing pipeline. The project envisages the reconstruction of the installation of complete equipment from photovoltaics for the production of	3 years	600.000 EUR

	electricity on the roofs of the primary schools, Joakim Krchoski and Ilinden, the LU City Museum, the municipal self-government building, the Gjorce Petrov gym, the OUD Boro Menkov and the objects of the kindergarten Detelinka		
Reconstruction of OUDG Detelinka	Replacement of carpentry and facade improvement	1 year	200.000 EUR
Reconstruction of OUD Boro Menkov	Replacement of carpentry and facade improvement	1 year	300.000 MKD
Education of local people	Organizing a campaign, preparing promotional materials and activities	3 years	50.000 MKD
Improving the facades of public institutions	Building activities for improving energy efficiency	5 years	500.000 MKD
Subsidies for collective housing buildings	Providing funds for building activities through the so-called. Communities of tenants or house councils	10 years	500.000 MKD
Subsidies for installation of solar panels	Provision of means for installation and installation of solar panels on private buildings	5 years	50.000 MKD

Step 4 - Organizing Events for Promotion of EE and RES

Creating campaigns whose ultimate goal is raising awareness among the population for EE and RES. These activities should involve the citizen sector and the media.

Step 5 - Visioning of the scope of EE measures and the use of RES until 2050

An overview of the identified, measures, timeframe and assessment of the required financial resources is given in the Table 3.

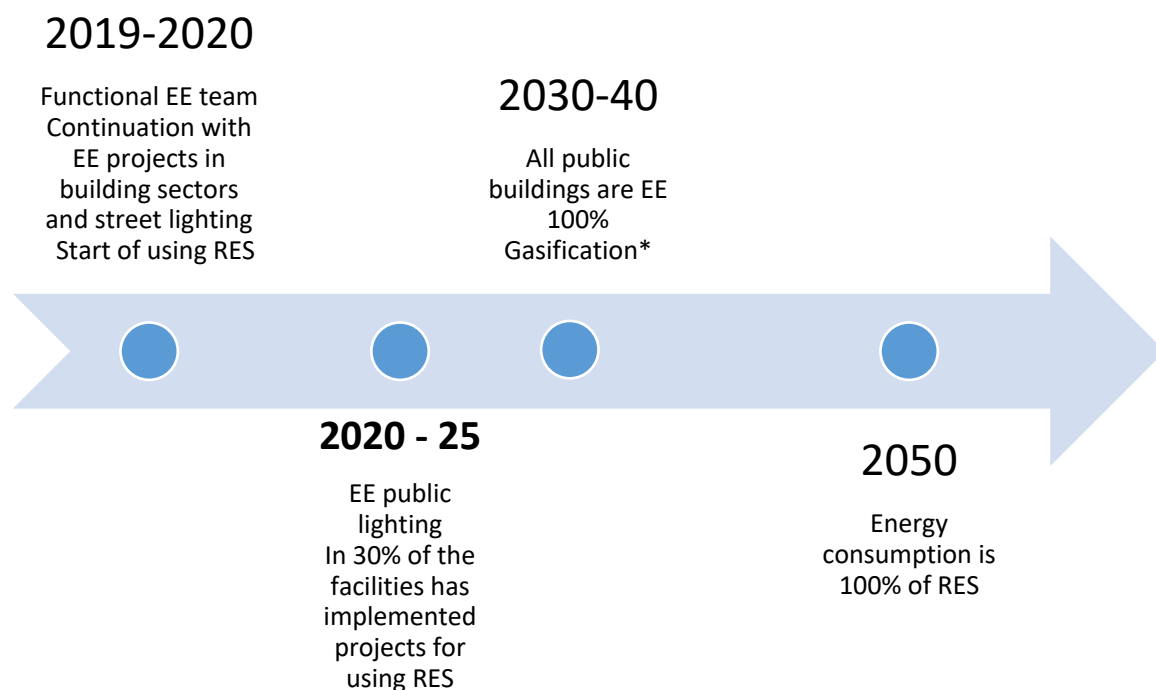
Table 3: Visioning of the energy transition

Objective	Measures and activities for energy efficiency and energy transition in the public sector, households and the business sector					Estimation of the necessary funds for realization in EUR
	2018	2020	2030	2040	2050	
Saving energy in the public sector (households or the business sector)	/	Improving the facade of public institutions - 2020-25			Energy consumption is 100% of RES	500.000
	/	Introducing gas as energy fuel 2020-30				500.000
	/		Subsidy of collective accommodation facilities to improve the insulation of the facade 2030-40			100.000
	/	Reconstruction of the building and heating system in OUD Boro Menkov				300.000
Reducing CO ₂ emissions		Installation and installation of photovoltaic roofs of public buildings - 2020-25			Energy consumption is 100% of RES	300.000
			Installing and installing windmills at multiple locations 2030-35			500.000

		Installation and installation of photovoltaics on certain public exposed in sunshine surfaces				50.000
			Construction and installation of bio-gas generators in public buildings			100.000
			Subsidies for placing photovoltaics on private buildings			100.000
			Subsidizing business entities for the installation of bio-generators and conserving renewable energy sources			50.000
		Projects and activities for protection of forests and reduction of use of fossil fuels				50.000
Reduction of energy poverty		Measures for subsidizing energy consumption for socially vulnerable groups			Energy consumption is 100% of RES	
		Measures for subsidizing the installation and installation of solar collectors for hot water 2020-22				50.000
			Measures for subsidizing the installation and installation of alternative energy sources			50.000
			Campaigns on the importance of energy poverty and the importance of implementing energy efficiency measures as a way to tackle energy poverty at national and local level			50.000
Production of heat (or electricity) from renewable energy sources	/	Gasification of public buildings and facilities for collective housing and business premises 2020-25			Energy consumption is 100% of RES	200.000
		Gasification of private accommodation facilities 2020-25				300.000
Education of the population and the business sector	/	Campaign for using renewable energy sources 2020-25			Energy consumption is 100% of RES	10.000
		Campaign for the use of renewable				10.000

for renewable energy sources		energy sources 2020-25				
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2.2 Time frame



2.3 Budget and necessary resources

The necessary resources for the realization of the Action Plan are planned to be provided from different sources. One part of the funds will be provided in the budgets of the Municipality of Kriva Palanka and the respective ministries. A significant part of the funds are planned to be provided by applying to the EU Programs: EU IPA grants for rural infrastructure, EU IPA cross-border cooperation and other donor organizations present in the country, as well as PPPs with the business sector.

3 Cooperation of the Stakeholders

The main stakeholders involved in this activity are:

- Municipality of Kriva Palanka
- Local public institutions
- The business sector in the municipality of Kratovo and wider
- Households

The roles and responsibilities of the various stakeholders in the implementation of the Action Plan are presented in Table 4.

Table 4: Stakeholders

Stakeholders	Role and Responsibility of the Stakeholders	How it is involved and how it will communicate with the stakeholder
Municipality of Kriva Palanka	Implementator of activities Forms the EE Team Prepares, adopts, implements and monitors the EE Program and the corresponding AP Establishes a communication system with other stakeholders project management	Preparation of technical documentation, implementation of procedures, concluding potential PPP contracts, institutional support (permits, decisions by competent institutions, etc.)
Local educational institutions	User	Direct participation in the projects and providing a balanced participation Communication will take place through: <ul style="list-style-type: none"> • meetings • written communication • reports
Business sector in the municipality of Kratovo and wider	Carrier of the construction process: supplier of materials, building Potential for PPP	Directly and indirectly Communication will take place through: <ul style="list-style-type: none"> • meetings • written communication • reports
Non governmental organizations	Promoter of the process of environmental protection	Collaborative development of projects and activities - campaign for environmental protection

4 Monitoring strategy

In order to monitor the results of the implemented measures for achieving an energy efficient public sector, it is necessary to establish a functional system for monitoring the implementation of the measures.

The monitoring of the EE activities and the use of RES in the municipality by the Energy Efficiency Team will be carried out in accordance with the legal requirements and is shown in Table 5.

Table 5: Schedule for monitoring the activities

Report	Delivery time
Action Plan for Energy Efficiency	Annual delivery at the end of the first quarter.
Annual report	Annual delivery within three months after the end of the year
Energy Efficiency Project Report	Regular report every month for the duration of the project, and a final report at the end of the project
Monitoring reports on energy measures	Quarterly, within 15 days from the end of the specific quarter

5 Risk Management

The risks, the likelihood of their occurrence and the manner of risk management are given in Table 6.

Table 6: Risk management

Risk	Probability of risk	Measures for risk management
Non-functional EE team in the municipality	Medium	Training and increasing the EE Team's resources
Lack of financing	Medium	Budget funds that will be earmarked for implementation of the EE measures Initiation of projects funded through public grants / subsidies schemes, increased cooperation with the private sector
Insufficient promotion for the development and implementation of energy efficiency projects and RES	Low	Creating a campaign in order to raise the awareness of the population in terms of EE and RES
Insufficient potentials and resources for the implementation of the Projects in the NEPR	High	Promotion of projects at the national level and creation of partnerships

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

of the Municipality of Rankovce

Energy Efficient Public Sector

English version

Prepared by
Municipality of Rankovce
Center for Development of NEPR and
Balkan Development Solutions Ltd

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7
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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Energy Efficiency

Title: Energy Efficient Public Sector

1 Objective

The main goal of the Action Plan is to reduce the energy costs in the municipality, both in the area of public buildings and street lighting

The Program for Energy Efficiency of the Municipality of Rankovce contains the basic contents required by the Law on Energy¹, paying special attention to the measures envisaged in the National Action Plan for Energy Efficiency (NEEAP), referring to the measures and policies that are from the scope of responsibility of the municipality.

The municipality of Rankovce manages 8 municipal public buildings located in the following sectors: administration, education, fire protection, as well as street lighting as a separate part of the municipal services that the municipality performs. These objects with their data are entered in the energy efficiency database.

In the municipality of Rankovce, there is a potential for increasing the energy efficiency in the facilities under municipal administration and street lighting. The total energy consumption of the municipality of Rankovce amounts to 670.63 MWh per year. For this level of consumption, the municipality allocates from its budget 1.747.077 denars, which represents 3.5% of the total budget of the municipality in 2015 (base year).

In order to reduce energy consumption and, therefore, energy costs and at the same time to improve the internal conditions of facilities owned by the municipality on the one hand and street lighting on the other, it is necessary to apply different energy efficiency measures.

Much of the analysis of energy efficiency initiatives in the short term should focus on the possibilities for energy savings (electricity and heat) in all sectors that are under the authority of the municipality. The education sector (primary schools) accounts for the largest part of the municipality's energy balance in the consumption of heat energy.

Based on the analyzes in Table 1, the following are given: facilities by location, heating volume and heating surface, as well as energy consumption in public municipal facilities before the measures for energy efficiency; the required financial resources and the specific consumption of thermal energy.

¹ Law on Energy Official Gazette of RM 96/18, Article 242

Table 1 Overview of energy consumption in buildings

No.	Type/Name of the facility	Location	Heating surface	Energy consumption before EE measures			Financies for energy	Specific consumption of heat energy
Objects owned by the municipality		Venue	m ²	Електрична kWh/yr	Топлинска kWh/yr	Вкупно kWh/yr	МКД/yr	kWh/m ²
	Administrative facilities							
1)	Municipality building	Rankovce	260	35.074	95.825	130.899	343.500	369
2)	PCE	Rankovce	40	250	5.750	6.000	7.750	144
	TOTAL		300	35.324	101.575	136.899	351.250	339
	Education							
3)	Primary School „Hristijan T. Karposh,,	Rankovce	936	18.068	177.327	195.395	1.037.066	189
4)	Elementary School „Hristijan T. Karposh,,	v. German	150	450	37.046	37.496	56.370	247
5)	Elementary School „Hristijan T. Karposh,,	v. Psacha	469	3.019	114.990	118.009	211.557	245
6)	Elementary School „Hristijan T. Karposh,,	v. Odreno	55	250	16.482	16.482	25.559	300
7)	Elementary School „Hristijan T. Karposh,,	v. Radibush	80	250	37.046	37.046	26.109	463
	TOTAL		1.690	22.038	382.891	404.428	1.356.660	227
	Municipal Services							
8)	Firefighting home	Rankovce	222	1.580	28.748	30.328	30.000	129
9)	Street lighting	Rankovce		98.477		98.477	571.167	
TOTAL ALL SECTORS			2212	157.419	513.214	670.132	2.309.077	

A significant difference was found in the specific energy consumption per m² - for the different types of facilities, under the municipal administration. It ranges from 463 kWh / m² to some rural schools that are not used at full capacity during the year or are not sufficiently warmed to around 129 kWh / m² in the fire brigade.

In addition to the education sector, the public street lighting sector is one of the most important communal activities of the local self-government. The street lighting system is owned by the municipality and is responsible for its operation, maintenance and improvement.

Table 2 presents an overview of possible energy savings in the facilities owned by the municipality as well as in street lighting.

Table 2: An overview of possible energy savings in buildings

No.	Measure to improve energy efficiency	Investment	SAVINGS			Return period of investment
Objects owned by the municipality		MKD [den]	kWh/yr.	den./yr	%	year
Administrative facilities						
1)	Municipality building	1.699.105	27.128	208.899	28,3	8,1
2)	Old residential building	41.820	839	6.464	15	6
Education						
3)	Primary School „Hristijan T. Karposh,,	2.568.325	80.351	618.710	41	4
4)	Elementary School „Hristijan T. Karposh,, v. German	454.362	7.846	60.412	21	8
5)	Elementary School „Hristijan T. Karposh,, v. Psacha	878.110	19.670	151.458	17	6

6)	Elementary School „Hristijan T. Karposh „ v. Odreno	929.265	4.165	32.070	25	29
7)	Elementary School „Hristijan T. Karposh„ v. Radibush	929.265	4.165	32.070	25	29
Municipal Services						
8)	Street lighting	161.730	53.392	394.674	54	0,4

The total potential for saving the municipality of Rankovce by implementing energy efficiency measures is 30% or 197 MWh per year.

1.1 Scope of measures and target values

The scope of the energy efficiency measures envisage:

- Capacity building of the EE Team and awareness raising for EE and RES
- Renewal of data in the base and energy inspections for facilities under the authority of the municipality of Rankovce (8 objects)
- Reconstruction of the buildings (Thermal insulation of the external walls; Reconstruction of the external and internal carpentry; Reconstruction of the roof construction together with the roof covering; exterior carpentry and thermal insulation of the external walls; installation of central heating systems; replacement of the lights) (Table 3)
- Installation of solar collector / photovoltaic systems (for hot water / electricity) on the roofs of municipal buildings
- Restoration of part of the street lighting
- Gasification of public buildings under the jurisdiction of the municipality of Rankovce and use of natural gas as a source of energy²

Long-term goals ie expected results from the measures for energy efficiency of the municipality are:

- By 2023 reduce the average energy consumption (kWh / m²) by 50% compared to the current one;
- By 2023 reduce the share of energy costs in the municipality by 40%;
- Improvement of the internal conditions to the standard level of comfort in 100% of the primary schools;
- Introduce measures for energy efficiency and energy management of public lighting, which will reduce the consumption by 70% of the current;
- To reduce the level of CO₂ emissions in the atmosphere by 50% compared to the current level;
- Rapid identification and renewal of problematic systems in primary schools with high energy consumption.

Table 3 presents the scope of EE measures in the building sector and street lighting.

² Although natural gas does not fall into the RES group, the delayed gasification of the Republic of Macedonia makes energy, which in the next 20-30 years will play a significant role in energy consumption.

Table 3: Scope of EE measures in the building sector and street lighting

No.	Measure to improve energy efficiency	Investment	SAVINGS			Simple return period
	Objects owned by the municipality	MKD [den]	kWh/yr	ден./yr	%	year
Administrative facilities						
1)	Municipal building					
	- Thermal insulation of external walls	836.200	11.032	84.951	11,5	9,8
	- Replacement of windows and doors	471.705	7.406	57.030	7,7	8,3
	- Thermal insulation of the roof	172.200	3.150	24.262	3,3	7,1
	- Installation of central heating of pellets (40kW)	219.000	5.540	42.656	5,8	5,1
	Total of all EE measures	1.699.105	27.128	208.899	28,3	8,1
2)	Public Communal Enterprise					
	- Replacement of windows and doors	24.600	385	2.964	6,7	8,3
	- Thermal insulation and roof repair	17.220	454	3.500	7,9	4,9
	Total of all EE measures	41.820	839	6.464	14,6	6,5
Education						
3)	Primary School „Hristijan T. Karposh,,					
	- Thermostatic valves	123.000	8.866	68.270	5	1,8
	- Thermal insulation of the roof	430.500	12.719	97.941	7,2	4,4
	- Modernization of lighting	136.000	3.050	23.485	48	5,8
	Total of all EE measures	698.500	24.635	189.696	20,1	4,0
4)	Elementary School „Hristijan T. Karposh,, v. German					
	- Replacement of windows and doors	100.737	1.213	9.338	3,2	10,8
	- Thermal insulation of the facade	280.440	5.379	41.418	14,5	6,8
	- Thermal insulation of the roof	73.185	1.254	9.656	3,4	7,6
	Total of all EE measures	454.362	7.846	60.412	21,2	7,5
5)	Elementary School „Hristijan T. Karposh,, v. Psacha					
	- Thermal insulation of the facade	715.860	11.892	91.568	10,3	7,8
	- Modernization of lighting	70.000	2.028	15.615	35	4,5
	- Thermostatic valves	92.250	5.750	44.275	5	2,1
	Total of all EE measures	878.110	19.670	151.458	17	5,8
6)	Elementary School „Hristijan T. Karposh,, v. Odreno					
	- Thermal insulation of the facade	402.210	2.671	20.567	16,2	19,6
	- Replacement of windows and doors	271.830	288	2.217	1,7	/
	- Renovation of the floor	147.600	792	6.100	4,8	24,2
	- Renovation of the roof	107.625	414	3.186	2,5	33,8
	Total of all EE measures	929.265	4.165	32.070	25	29
7)	Elementary School „Hristijan T. Karposh,, v. Radibush					
	- Thermal insulation of the facade	402.210	2.671	20.567	16,2	19,6
	- Replacement of windows and doors	271.830	288	2.217	1,7	/
	- Renovation of the floor	147.600	792	6.100	4,8	24,2
	- Renovation of the roof	107.625	414	3.186	2,5	33,8
	Total of all EE measures	929.265	4.165	32.070	25	29
Street lighting						
8)	Replacement of Hg with Na lights					
		161.730	53.392	394.674	54	0,4

1.2 Target indicators

Indicators and their target values that relate to the identified objectives are shown in Table 4

Table 4: Objectives and Indicators

Objective	Indicator and target value of the indicator	Method of measurement and validation
Reduction of annual energy consumption	By 2023 the average energy consumption (kWh / m ²) should be reduced by 50% compared to the current one	Reports of consumption measurements
Reducing the share of energy costs in the municipality	By 2023 reduce the cost of energy in the municipality by 40%	Reports on the costs
Energy efficient public lighting	By 2025 the complete public lighting in the municipality with new lights was replaced. Reduce consumption by 70% of the current one	Consumer Reports
Reducing the level of CO ₂ emissions in the atmosphere	By 2025, to reduce the level of CO ₂ emissions in the atmosphere by 50% compared to the current level	Reports from analyzes and measurements
Improving the internal comfort conditions in primary schools	By 2023 to improve internal conditions to a standard level of comfort in 100% of primary schools	Reports and surveys
Usage of RES	By 2025, 50% of all public buildings have implemented projects for the use of RES 100% share of RES in energy consumption in 2050	Reports on: implemented projects for RES use; and energy consumption
Gasification of the municipality	Gasification of public buildings by 2030	Reports on: Gasification projects implemented

2 Implementation Strategy

2.1 Step by step

Step 1 – Training: equipping and supporting the EE Team in the municipality

The success of the Program is completely dependent on commitment, participation and engagement of the Head and members of the Energy Efficiency Team (TEE). The members of the Energy Efficiency Team are from different departments of the municipality and are able to work closely with external advisers to carry out tasks, to set tasks and control the results.

One of the key TEE activities at this stage are: database management, collecting and storing data (types of building structures, technical systems, energy systems, energy sources and devices, as well as basic principles relating to administration in buildings); and identifying the necessary financial resources and modalities for implementation of the activities.

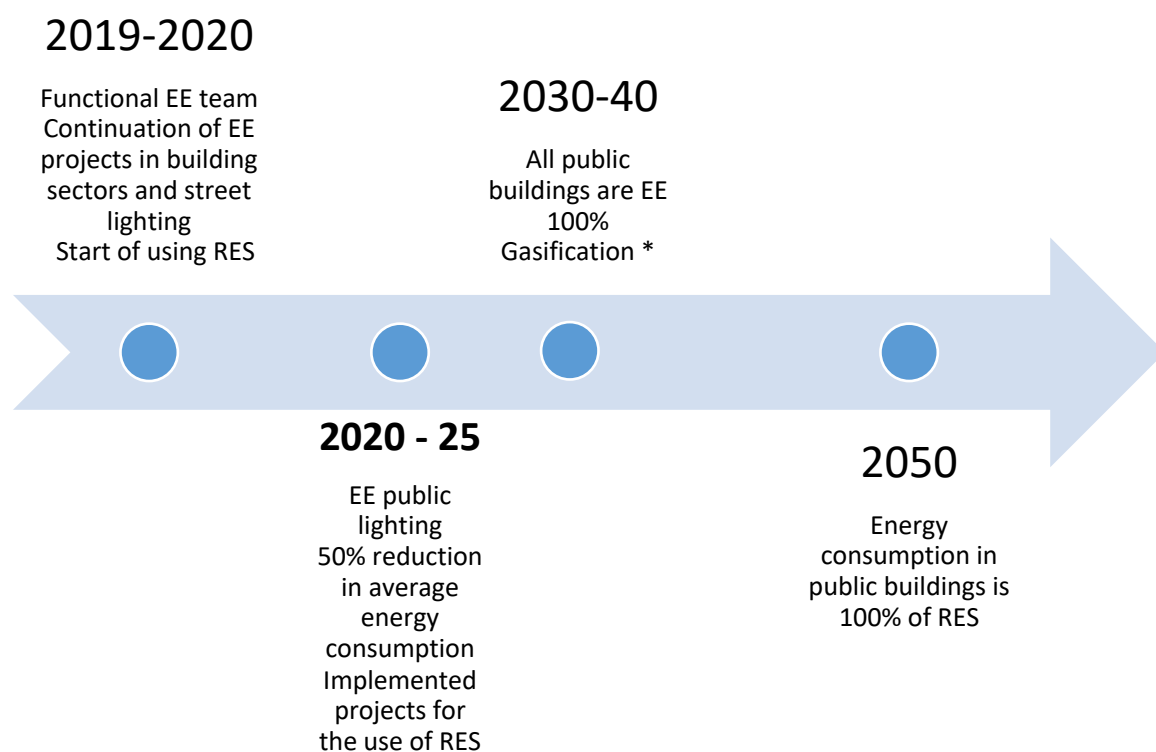
Step 2 – Organizing and implementing projects from the AP

Prioritization, organizing and implementing AP projects including: technical documentation investment deploy cost plans participants and program implementers modalities for the program's performance (subcontractors and advisors). Also key in this phase are the activities for increasing access to capital related to investments (access to sources and allocation of funds).

Step 3 – Using Renewable Energy

This step is specifically singled out in order to intensify the analysis identifying opportunities for greater use of RES, preparation of technical and project documentation sources of financial resources and implementation models.

2.2 Time frame



2.3 Budget and necessary resources

The necessary resources for implementation of the Action Plan are planned to be provided from different sources. One part of the funds will be provided in the budgets of the Municipality of Rankovce, and the respective ministries. An important part of the funds are planned to be provided by applying to the EU Programs: EU IPA grants for rural infrastructure, EU IPA cross-border cooperation and other donor organizations present in the country, as well as PPPs with the business sector.

3 Cooperation with the stakeholders

The main stakeholders involved in this activity are:

- The Municipality of Rankovce (including public institutions and enterprises);
- Households

The roles and responsibilities of the various stakeholders in the implementation of the Action Plan are presented in Table 5.

Table 5: Stakeholders

Stakeholders	Role and Responsibility of the Stakeholders	How it is involved and how it will communicate with the stakeholder
Municipality of Rankovce	<ul style="list-style-type: none">• Establishing and developing cooperation with other stakeholders• budget planning for implementation of the EE Action Plan• providing financial support for the implementation of the measures• monitoring the implementation of the action plan	Directly The holder of the implementation of the Action Plan. The responsible person for communication
Household	<ul style="list-style-type: none">• active participation in EE campaigns• monitoring and active reporting on the use of government measures to subsidize households in the area of EE	Indirectly Communication will take place through: <ul style="list-style-type: none">• gatherings• media

4 Monitoring strategy

In order to monitor the results of the implemented energy efficiency measures. Measurements are planned at different time periods and comparing the results with the calculators. The main indicators that are measured and compared are the following

- Consumption of energy (thermal and electrical).
- Comparison of the conditions in the objects (temperature differences, degree of brightness and humidity).
- Saving funds that are separated for energy.

The measurements will be carried out with determined dynamics throughout the year. In order to achieve uniqueness in the data, it is necessary to measure and collect them in kWh, both for electrical and thermal energy. In case other measures (eg J or this) are used, it is necessary to convert the units in kWh using appropriate conversion factors. To obtain relevant data. The municipality plans to use the following sources of information:

- Bills from the distribution center of EVN Kumanovo for electricity
- Bills from suppliers of oil and firewood
- Data on energy consumption from equipment manufacturers
- Measurement methods such as data loggers, flow meters, electricity meters and the like

The monitoring of energy efficiency activities in the municipality by the Energy Efficiency Team will be carried out in accordance with the legal requirements and is shown in Table 6

Table 6: Schedule for monitoring activities

Report	Delivery time
Action Plan for Energy Efficiency	Annual delivery at the end of the first quarter.
Annual report	Annual delivery within three months after the end of the year
Energy Efficiency Project Report	Regular report every month for the duration of the project, and a final report at the end of the project
Monitoring reports on energy measures	Quarterly, within 15 days from the end of the specific quarter

5 Risk Management

The risks, the probability of their occurrence and the manner of dealing with the risks are given in Table 7

Table 7: Risk management

Risk	Probability of risk	Measures for risk management
Non-functional EE team in the municipality	Medium	Training and increasing the EE Team's resources
Lack of financing	Medium	Initiation of projects funded through public grants / subsidies schemes, increased cooperation with the private sector
Insufficient promotion for the development and implementation of energy efficiency projects and RES	Low	Creating a campaign in order to raise the awareness of the population in terms of EE and RES
Insufficient potentials and resources for the implementation of the Projects in the NEPR	High	Promotion of projects at the national level and creation of partnerships

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Energy Efficiency

Title: Energy Efficient Public Sector

1 Objective

The purpose of this Action Plan for the Energy Efficient Municipality of Staro Nagoricane is to contribute to reducing the overall energy demand in the public sector of the municipality.

The objectives of the Energy Efficiency Program (EEP) in the municipality of Staro Nagoricane are to: 1) provide an overview of the current consumption and production of electricity in the municipality of Staro Nagoricane and to identify future trends; to identify the potential for more efficient and rational use of energy in the municipality and the availability of local sources of renewable energy; and 3) to define the appropriate steps towards better and more sustainable energy development in the municipality by defining the necessary actions for improving energy efficiency in the municipality (EE) and the renewable energy potential. This Program is the starting point in planning the activities for energy efficiency in the municipality.

By ranking the sectors for their energy consumption, the street lighting sector is the largest consumer with 40.1% of all energy costs or 6.8% of the total municipal budget for 2014 (base year). Second, the municipal buildings sector, where educational and administrative buildings account for 44.2% of the total energy consumption in the municipality or 6% of the total municipal budget for 2014. This is followed by the street lighting sector and the water sector (production and distribution).

In addition to electricity, extra light oil and wood are used as energy sources for heating in educational facilities; Wood pellets are used for heating the municipal administrative building. Since the water and street lighting sectors only consume electricity, electricity consumption in all three sectors is 60.8% of the total energy consumption. The transport sector is a consumer of gasoline and diesel and as a part of the total energy consumption it participates with 6,24%.

Table 1 provides an overview of energy consumption and costs per sector.

Table 1: Annual energy consumption and costs per sector

Type of sector	Consumption of electricity	Energy consumption from other sources of energy				Total energy consumption	Electricity costs	Costs for other sources of energy	Total energy costs
		Light fuel oil	Firewood	Wooden pellets	Total for other sources of energy				
	kWh/a	kWh/a	kWh/a	kWh/a	kWh/a	kWh/a	MKD/a	MKD/a	MKD/a
Water sector									
Potable Water	150,131	N/A	N/A	N/A	N/A	150,131	892,930.51	N/A	892,930.51
Street Lighting Sector									
	438,214.40	N/A	N/A	N/A	N/A	438,214.40	2,375,122.03	N/A	2,375,122.03
Municipal Buildings Sector									
Educational Buildings	45,505.14	160,000	241,425	N/A	401,425	446,930.14	452,102.50	1,102,326	1,554,428.50
Municipal Administrative Building	42,811	N/A	N/A	34,442.46	34,442.46	77,253.46	438,618	108,930	547,548
Total for municipal buildings	88,316.14	160,000	241,425	34,442.46	435,867.46	524,183.60	890,720.50	1,211,256	2,101,976.50
TOTAL	676,661.54	435,867.46				1,112,529	4,158,773.04	1,211,256	5,370,029.04

The Building Sector has much less environmental impact, based on energy consumption. This is due to the types of energy sources used in this sector. Often schools are heated by firewood as a heating body and extra light oil. These energy sources have smaller emission factors relative to electricity used as the main source in the two other sectors, the street lighting sector and the water sector, but are used only for heating in several of the buildings (Table 2 and Table 3).

Table 2: Total annual energy consumption and CO2 emissions per source of energy

Energy source	Emission factors kgCO2/kWhe q	Water sector			Street Lighting Sector		
		Energy consumption		CO2 emissions kgCO2/a	Energy consumption		CO2 emissions kgCO2/a
		kWh/a	ktOE*/a		kWh/a	ktOE*/a	
Electricity	0,915	150.131	0,0129	137.369,90	438.214,40	0,0377	400.966,20
Light fuel oil	0,267						
Firewood	0,403						
Wooden pellets	0,403						
Petrol	0,249						
Diesel	0,267						
TOTAL		150.131	0,0129	137.369,90	438.214,40	0,0377	400.966,20

Table 3: Total annual energy consumption and CO2 emissions per source of energy

Energy source	Emission factors kgCO2/kWheq	Municipal Buildings Sector			Sector transport		
		Energy consumption		CO2 emissions kg CO2/a	Energy consumption		CO2 emissions kg CO2/a
		kWh/a	ktoe*/a		kWh/a	ktoe*/a	
Electricity	0,915	88.316,14	0,0076	80.809,30			
Light fuel oil	0,267	160.000,00	0,0138	42.720,00			
Firewood	0,403	241.425,00	0,0208	97.294,30			
Wooden pellets	0,403	34.442,46	0,0030	13.880,30			
Petrol	0,249				20.475,00	0,0018	5.098,28
Diesel	0,267				53.600,00	0,0046	14.311,20
TOTAL		524.183,60	0,0452	234.703,90	74.075,00	0,0064	19.409,48

From Table 2 and Table 3 it can be concluded that each sector is a high CO2 emitter, especially the building sector and street lighting.

1.1 Scope of measures and target values

The Action Plan for an Energy Efficient Public Sector in the Municipality of Staro Nagorichane includes several energy efficiency measures that need to be implemented in the next period to enable it to achieve its goal.

These measures relate to:

- Implementation of ongoing activities in water, street lighting and municipal buildings.
- Strengthening the EE Team
- Development of technical documentation for EE and RES projects
- Supporting the implementation of investments for the use of RES
- Promote and support the improvement of EE and the use of RES by households.

1.2 Target values of indicators

Target indicators relating to the identified measures are shown in Table 4

Table 4: Indicators and target values

Objective	Target indicator	Method of measurement and validation
Making PEE and AP	<ul style="list-style-type: none"> • In 2019, the PEC for the period 2019-2022 will be developed 	Developed program and AP
EE Public Lighting	<ul style="list-style-type: none"> • Up to 2025 100% of the existing street lights are EE • By 2025, the annual energy consumption will be reduced by 	Reports from realized projects and maintenance Reports of consumption measurements

	40% compared to the current one	
Reduction of the share of energy in municipal investments	<ul style="list-style-type: none"> By 2025 decrease by 25% in relation to current investments 	Financial reports
Reducing the level of CO2 emissions in the atmosphere	<ul style="list-style-type: none"> Reduction of CO2 emissions in the atmosphere by 230 tCO2 / year 	Reports from analyzes and measurements
Inclusion of households in the implementation of EE and RES measures	<ul style="list-style-type: none"> By 2030, 30% of households have implemented a measure for EE and use of RES 	Surveys

2 Implementation Strategy

2.1 Step by step

Step 1 – Preparation of the EE Program and appropriate AP

Taking into consideration that the current program is valid until 2018, in 2019 the Municipality EE team should prepare a new program and appropriate Action Plans. In the process of elaboration of the program, it is necessary to provide external expert support and to monitor the database and to update the EE and RES data.

At this stage, focus should also be placed on the measures that will apply to households, as well as the possibilities for utilization of RES primarily solar, geothermal and wind energy.

In the municipality, there is a geothermal source that has great potential to be used as a renewable source of energy. It is located near the village of Strnovec, where the thermal water springs from a depth of 172 meters at a rate of 17 l / sec and a temperature of 40 ° C. A study of the potential of the thermal water in Macedonia⁶ shows that the water temperature can reach 180 ° C at a depth of 2,000-3,000 m. The potential thermal energy from the source is estimated at 207.6 MW, with 830.400 kWh per year. The utilization of this potential may divert the use of 159,400 tonnes / year of coal or 288,000 tonnes / year per tree. The reduction in CO2 emissions is expected to reach 296.5 tonnes / year. The total investment is projected to amount to 166m EUR.

Also, the "Study on Integration of Wind Power Plants in the Macedonian Transmission System" indicates that the municipality has the potential to develop wind power generation facilities with installed capacity of at least 20 MW, which should be connected to the transmission network of MEPSO.

The support for projects for obtaining electricity through photovoltaics should be directed towards the public sector, as well as towards the households and the business sector. To this end, these sectors need to find a place in the PEE in the use of RES.

Step 2 – Implementation of the Projects

Implement priority projects for which funds are provided in 2018 or will be provided in 2019. Start-up projects for the reconstruction of buildings and the street lighting sector should continue to be implanted. This is an important step from the aspect of the visibility of the implemented measures and is the basis for the future activities.

In this phase, the preparation of the technical documentation for the projects from the identified measures should start, in order to be able to apply for financial resources for their implementation.

For this purpose, the activities for project promotion and lobbying for the provision of funds should be strengthened.

Step 3 – Monitoring and Evaluation of Implementation

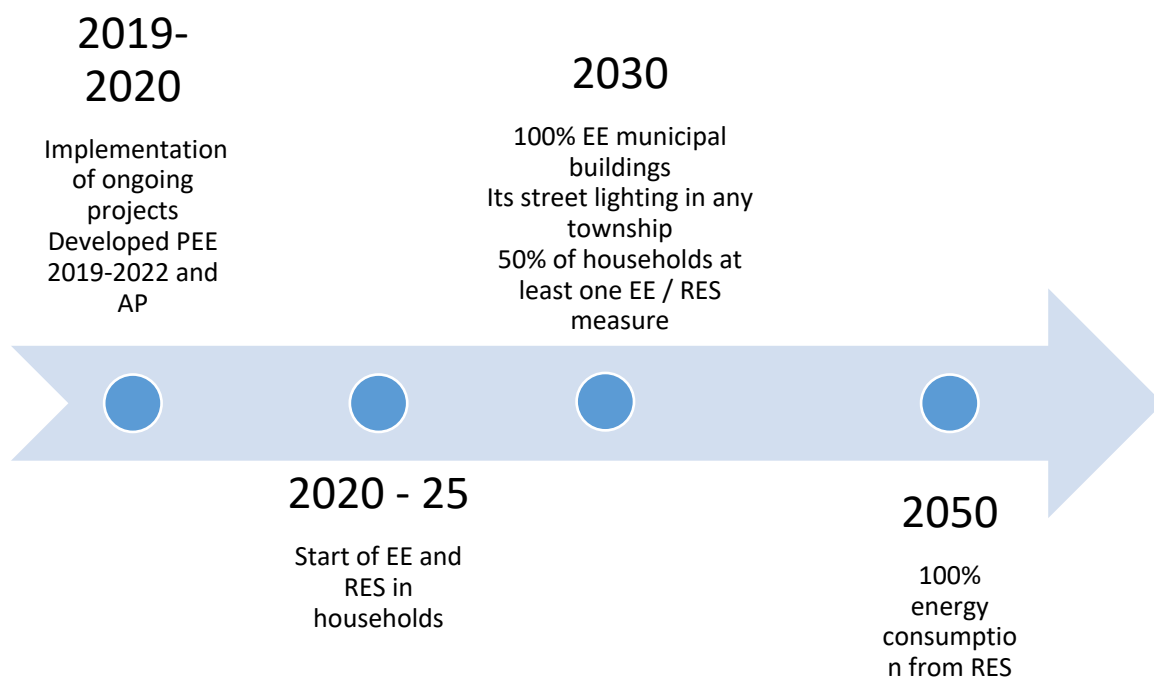
This step is significant from the aspect of the legal obligations on one hand, but also because of the constant upgrade of the capacities of the EE Team of the municipality. The evaluation will need to give guidance on revising the EE and RES measures or introducing new ones.

This is important before the start of the elaboration of the new three-year EE Program.

Step 4 – Sharing the results

In this step, it is necessary to create own events for promotion of EE measures and use of RES, as well as participation in events that will be organized in the Northeast planning region and beyond. Participation in fairs, conferences and other events for the promotion of EE and RES is important for the process of sharing experiences and creating partnerships for the development and implementation of EE projects and the use of RES.

2.2 Time Frame



2.3 Budget and necessary resources

The Municipality of Staro Nagoricane is in a position to gain access to a wide variety of sources of financing, although limited, have the potential to be used for the realization of investments in energy efficiency. One part of the funds will be provided in the budgets of the Municipality of Staro Nagoricane, JKP "Kozjak" and the respective ministries. Part of the funds are planned to be provided by applying to the EU Programs: EU IPA grants for rural infrastructure, EU IPA cross-border cooperation and other donor organizations present in the country.

3 Cooperation with the Stakeholders

The main stakeholders involved in this activity, their role, responsibility, the way of involvement and the type of communication are given in Table 5:

Table 5: Stakeholders

Stakeholders	Role and Responsibility of the Party concerned	How it is involved and how it will communicate with the stakeholder
Municipality of Staro Nagoricane	Implementator of activities It prepares, adopts, implements and monitors the EE Program and the respective AP. Establishes a communication system with other stakeholders	Directly through the EE Team Communication will take place through: • meetings • written communication • reports
MOH in settlements	Caring for the interests of citizens in settlements	Consultative Communication will take place through: • meetings • written communication • reports
Household	Submits requests and implement EE measures and use of RES	Indirectly Communication will take place through: • events • media
PCE Kozjak	Maintenance of the water supply and street lighting system in the municipality and takes care of the quality of the services	Directly through the EE Team Communication will take place through: • meetings • written communication • reports
EVN	Supplier of tariffs It concludes individual agreements with the end users, reads the meters, collects the payments, and transfers the communal fee for street lighting to the municipality	Directly through the EE Team Communication will take place through: • meetings • written communication • reports

4 Monitoring strategy

According to the Law on Energy, the municipalities prepare a Report on the implementation of the Action Plan for the previous year, ie the implementation of the Energy Efficiency Program and submit it to the Energy Agency.

The report presents all undertaken activities for the implementation of the Energy Efficiency Program from the previous year, and this is an evaluation, monitoring and verification. The report is submitted by the end of February every year.

In view of the above, the monitoring strategy of this Action Plan should monitor the activities and their dynamics according to the legal requirements.

As part of the continuous monitoring process, implemented projects can be assessed through their impact on energy consumption and CO₂ emissions reduction. Based on the results and the observed problems, if any, additional corrective and preventive measures and activities can be undertaken.

The implementation of the activities will be carefully monitored and evaluated annually by the municipal energy efficiency team in Staro Nagoricane. The evaluation will be done in November and December and will cover the current year.

The dynamics of monitoring the activities for energy efficiency in the municipality by the Energy Efficiency Team is shown in Табела 6.

Табела 6: Monitoring EE activities

Report	Delivery time
Action Plan for Energy Efficiency	Annual delivery at the end of the first quarter
Annual report	Annual delivery within three months after the end of the year
Energy Efficiency Project Report	Regular report every month for the duration of the project, and a final report at the end of the project
Reports on the monitoring of the energy efficiency measures for the implemented projects	Quarterly, within 15 days from the end of the specific quarter

5 Risk Management

The risks, the likelihood of their occurrence and the manner of risk management are given in the Table 8,

Табела 7: Risks, probability of risk and measures for dealing

Risk	Probability of risk	Measures for risk management
Non-functional EE team in the municipality	Medium	Training and increasing the EE Team's resources
Poor quality of network maintenance (pillars and lights)	Medium	Increased monitoring and communication with the supplier of energy and the maintenance of the network.
Insufficient utilization of RES	High	Promotion of EE and RES. Providing access to adequate funds
Lack of financing	Medium	Initiation of projects funded through public grants / subsidies schemes

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

of the Municipality of Kumanovo

Energy Efficient School Buildings

English version

Prepared by
Municipality of Kumanovo
Center for Development of NEPR and
Balkan Development Solutions Ltd

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7
Date: December 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Energy Efficiency

Title: Energy Efficient School Buildings

1 Objective

The Energy Efficiency Plan of the Municipality of Kumanovo contains the basic contents required by the Law on Energy¹, paying particular attention to the measures envisaged in the National Action Plan for Energy Efficiency (NEEAP), referring to the measures and policies that are from the scope of responsibility of the municipality. The Energy Efficiency Plan of the Municipality of Kumanovo contains the basic contents required by the Law on Energy, paying particular attention to the measures envisaged in the National Action Plan for Energy Efficiency (NEEAP), referring to the measures and policies that are from the scope of responsibility of the municipality.

The energy consumption in the education sector accounts for the largest part in the energy balance of the Municipality of Kumanovo (43%) and it can expect the greatest increase in the energy demand in the future, and consequently the greatest potential for energy savings.

Under the administration of the Municipality of Kumanovo in the education sector there are 45 facilities: 17 primary schools with 23 regional schools, 5 high schools. These facilities are managed by the Municipality and their data are entered in the energy efficiency database. A summary of the energy performance in the Education sector is shown in Table 1.

Table 1: Summary overview of energy characteristics in the Education sector

No.	Sector	Number of facilities	Heating surface (m ²)	Annual energy consumption MWh / year	Average energy consumption kWh / m ²
	Total education	45	65,339	10,395,27	159,09
1	Primary schools	40	47.204	7.868,41	166,68
2	High schools	5	18.135	2.526,86	139,33

The realization of the activities for energy efficiency will contribute to reducing the energy losses, and thus reducing the costs for heating and electricity from the municipal budget, improving the comfort in the school buildings, thus improving the atmosphere for work and education and more effective results in children's education will be achieved.

The purpose of this Action Plan is to reduce the costs and energy consumption in the school buildings in the Municipality of Kumanovo through their reconstruction (full or partial) by applying energy efficiency measures.

¹ Law on Energy Official Gazette of RM 96/18, Article 242

1.1 Scope of measures and target values

The long-term objectives for EE in the education sector are:

- Reduction of annual energy consumption in the Education sector
- Reducing the share of energy in municipal investments in the education sector
- Improvement of internal comfort conditions in primary and secondary schools
- Reducing the level of CO₂ emissions in the atmosphere
- Utilizing RES
- To reduce the number of health problems associated with the internal climate in school buildings
- Rapid identification and renewal of problematic systems in primary schools with high energy consumption.

The scope of the measures is currently focused on the part of the educational facilities, primarily in the part of the reconstruction or the construction of new ones, which include: thermal insulation of the external walls; new doors and windows with PVC frames; thermal insulation of the ceiling; and replacement of lightss.

The expected saving of energy, investments and financial savings after the implementation of all activities related to the implementation of the measures is shown in Table 2.

Table 2: Overview of EE measures in facilities in the education sector²

Primary and High schools				
Measures	Surface	Saved energy	Investment	Financial savings
	(m ²)	(kWh/yr)	€	€/yr
Thermal insulation of external walls	18.737	1.040.000	460.722	76.072
New doors and windows with PVC frames	6.522	1.274.000	940.799	108.587
Thermal insulation in the attic	26.416	388.000	476.668	31.029
Replacing lights	447	33.600	2.178	2.185
Total	52.122	2.735.600	1.880.367	217.873

1.2 Target indicators

Indicators and their target values that relate to the identified objectives are shown in Table 3.

² At the time of preparation of this AP, the process for preparation of study, project documentation and PPP for the installation of solar collectors of public facilities has begun. The results of these activities will be additionally incorporated into this plan.

Table 3: Objectives and Indicators

Objective	Indicator and target value of the indicator	Method of measurement and validation
Reduction of annual energy consumption in the education sector	By 2020, the annual energy consumption will be reduced by 12% compared to the current one Reduction of the specific energy consumption per m ² for 5.2% in school buildings	Reports of consumption measurements
Reducing the share of energy in municipal investments in the education sector	By 2025 it should be reduced by 25% in relation to current investments	Financial reports
Improving the internal comfort conditions in primary and high schools	Achieving the standard level of comfort of the internal conditions in 80% of primary and secondary schools	Reports on the achieved levels of standards
Reducing the level of CO ₂ emissions in the atmosphere	Reducing the level of CO ₂ emissions in the atmosphere by 30% compared to the current level	Reports from analyzes and measurements
To reduce the number of health problems related to the internal climate in school buildings	Reducing the number of sick students by 100% per year compared to the previous year	Reports of student absenteeism
Rapid identification and renewal of problematic systems in primary schools with high energy consumption.	The identification time is no longer than 7 days Recovery time not longer than 30 days	Reports from the record of identified problems and implemented interventions
Usage of RES in schools	By 2025, 30% of schools implemented projects for RES use 100% share of RES in energy consumption in 2050	Reports on: implemented projects for RES use; and energy consumption

2 Implementation Strategy

2.1 Step by step

Step 1 - Training, equipping and support of the EE Team in the municipality

The success of the Program is entirely dependent on the commitment, participation and engagement of the Head and members of the Energy Efficiency Team (TEE). The members of the Energy Efficiency Team are from different departments of the municipality and are able to work closely with external advisers to carry out tasks, to set tasks and control the results.

One of the key activities of the TEE at this stage are: database management, data collection and storage (building types of buildings, technical systems, energy systems, energy sources and devices, as well as the basic principles relating to administration in buildings); and identifying the necessary financial resources and modalities for implementation of the activities.

Step 2 – Organizing and implementing AP projects

Prioritization, organization and implementation of AP projects including: technical documentation, investments, schedules, cost plans, participants and program implementers, program modalities (subcontractors and consultants).

The tables below provide an overview of the identified implementation projects according to the EE measures in the facilities, the surface of the subject of intervention, the estimated energy savings, the assessment of the investment and the estimated financial savings:

Table 4: Thermal insulation of external walls

School project		Surface	Saved energy	Investment	Financial savings
		(m ²)	(kWh/yr)	€	€/yr
Primary and High Schools					
1	Primary School „11 Oktomvri,,	1.261	77.000	31.524	5.531
2	Primary School „Bajram Shabani,,	1.011	52.000	25.274	5.390
3	Primary School „Bitolski Kongres,, v. Lopate	538	29.000	13.452	2.504
4	Primary Schhol „Naim Frasheri,,	1.693	84.000	42.324	7.343
5	Primary School „Hristijan Karposh,, central	2.229	124.000	57.300	10.964
6	Primary School „Hristijan Karposh,, regional branch Igor Trickovic	605	33.000	15 125	3 121
7	Primary School „Kocho Racin,, central	1 751	36.000	43 774	4 222
8	Primary School „Magdalena Antova,,	777	49.000	19 437	2 336
9	Primary School „Vuk Karadzik,,	1 271	74.000	25.274	5.390
10	Primary School „Toli Zordumis,, central	1.471	30.000	36.775	2.679
11	Primary School „Jeronim de Rada,, v. Cherkeze	817	59.000	20.425	2.859

12	Primary School „Kiril I Metodij,, central village Romanovce	673	47.000	16.824	2.603
13	Primary School „Kiril I Metodij,, regional, village Agino	254	18.000	6.350	318
14	Music School „Panche Peshev,,	174	10.000	4.350	525
15	High School „Goce Delchev,,	2.724	145.000	68.100	11.856
16	DSTU „Nace Bugjoni,,	806	42.000	20.150	3.095
17	High School „Kiro Burnaz,,	1.800	92.000	45.000	9.033
18	MHS Gymnasium „Sami Frasheri,,	1 640	38 000	41 000	6 960
19	High School „Pero Nakov,,	1.904	39.000	47.600	5.982

Table 5: New doors and windows with PVC frames

School project		Surface	Saved energy	Investment	Financial savings
		(m ²)	(kWh/yr)	€	€/yr
Primary and High Schools					
1	Primary School „11 Oktomvri,, central	466	127.000	69.900	9.218
2	Primary School „Bajram Shabani,,	251	58.000	37.650	5.625
3	Primary School „Naim Frasheri,,	139	31.000	20.850	2.805
4	Primary School „Hristijan Karposh,, central	498	103.000	74.699	7.721
5	Primary School „Hristijan Karposh,, regional branch Igor Trickovic	97	14.000	14.550	1.301
6	Primary School „Kocho Racin,, central	579	134.000	86.850	10.441
7	Primary School „Magdalena Antova,,	139	59.000	20.850	3.032
8	Primary School „Vuk Karadzic,,	768	197.000	115.200	15.399
9	Primary School „Toli Zordumis,, central	588	143.000	88.200	12.418
10	Primary School „Jeronim de Rada,, v. Cherkeze	177	65.000	26.550	3.152
11	Primary School „Kiril I Metodij,, central village Romanovce	227	83.000	34.050	4.585
12	Primary School „Kiril I Metodij,, regional, village Agino	90	37.000	13.500	1.871
13	Primary School „Brakja Ribar,, primary, village Tabanovce	250	61 000	37 500	5 018
14	Music School „Panche Peshev,,	102	30.000	15.300	1.624
15	High School „Goce Delchev,,	484	79.000	72.600	6.982
16	MHS Gymnasium „Sami Frasheri,,	455	28.000	68.250	5.234
17	DSTU „Nace Bugjoni,,	168	39.000	25.200	2.600

18	High School „Kiro Burnaz,,	101	25.000	15.150	1.974
19	High School „Pero Nakov,,	943	22.000	141.450	12.605

Table 6: Thermal insulation on the attic

School project		Surface	Saved energy	Investment	Financial savings
		(m ²)	(kWh/yr)	€	€/yr
Primary and High Schools					
1	Primary School „11 Oktomvri,, central	2.121	20.000	38.178	1.499
2	Primary School „Bajram Shabani,,	1.133	7.000	20.394	715
3	Primary School „Bitolski Kongres,, v. Lopate	878	7.000	15.984	652
4	Primary School „Brakja Miladinovci,, central	2.450	22.000	44.100	1.768
5	Primary School „Krste Misirkov,,	2.450	22.000	44.100	1.768
6	Primary School „Naim Frasheri,,	1.800	16.000	32.400	1.544
7	Primary School „Hristijan Karposh,, central	789	7.000	14.202	575
8	Primary School „Hristijan Karposh,, regional branch Igor Trickovic	308	3.000	5.544	267
9	Primary School „Kocho Racin,, central	2.095	16.000	37.710	1.612
10	Primary School „Magdalena Antova,,	775	47.000	14.950	2.378
11	Primary School „Vuk Karadzik,,	750	6.000	13.500	523
12	Primary School „Toli Zordumis,, central	1.066	7.000	19.188	896
13	Primary School „Kiril I Metodij,, central village Romanovce	810	8.000	14.580	459
14	Primary School „Kiril I Metodij,, regional, village Agino	450	28.000	8.100	1.339
15	Primary School „Brakja Ribar,, primary, village Tabanovce	430	4.000	7.740	342
16	Music School „Panche Peshev,,	188	11.000	3.384	624
17	High School „Goce Delchev,,	2.404	22.000	43.272	1.989
18	MHS Gymnasium „Sami Frasheri,,	1.195	53.000	21.510	5.654
19	DSTU „Nace Bugjoni,,	808	50.000	14.544	3.310
20	High School „Kiro Burnaz,,	766	7.000	13.788	577

21	High School „Pero Nakov,,	2.750	25.000	49.500	2.538
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Table 7: Replacement of lights

School Project		Number of lights	Saved energy	Investment	Financial savings
		unit	(kWh/yr)	€	€/yr
Primary and High Schools					
1	Primary School „Bajram Shabani,,	4	1.600	20	18
2	Primary School „Bitolski Kongres,, v. Lopate	88	8.000	429	371
3	Primary School „Naim Frasheri,,	90	6.000	439	527
4	Primary School „Vuk Karadzik,,	30	2.000	146	135
5	Primary School „Toli Zordumis,, central	35	2.000	170	181
6	Primary School „Jeronim de Rada,, v. Cherkeze	78	5.000	380	403
7	Primary School „Kiril I Metodij,, central village Romanovce	45	3.000	219	235
8	Primary School „Kiril I Metodij,, regional, village Agino	23	1.000	112	60
9	Primary School „Brakja Ribar,, primary, village Tabanovce	12	1.000	58	62
10	High School „Goce Delchev,,	30	2.000	146	167
11	High School „Pero Nakov,,	12	2.000	59	26

The table gives a summary overview of the identified implementation projects according to the EE measures in the facilities.

Table 8: Summary overview of reconstruction measures to increase EE

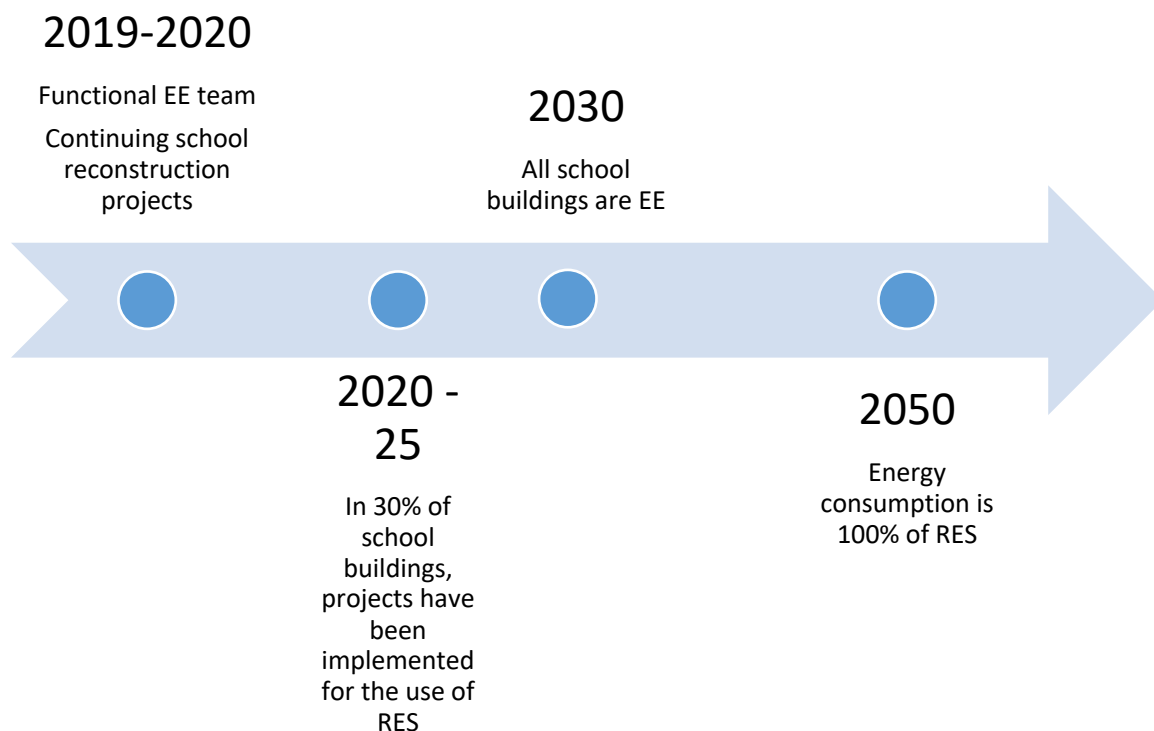
Primary and High Schools				
Measures	Surface	Saved energy	Investment	Financial savings
	(m ²)	(kWh/yr)	€	€/yr
Thermal insulation of external walls	18.737	1.040.000	460.722	76.072
New doors and windows with PVC frames	6.522	1.274.000	940.799	108.587
Heat insulation on the ceiling	26.416	388.000	476.668	31.029
Replacing lights	447	33.600	2.178	2.185
Total	52.122	2.735.600	1.880.367	217.873

Step 3 - Renewable energy sources in school buildings

This step is especially separate in order to intensify the analysis, identify the possibilities for greater use of RES in the education sector, the preparation of technical and project

documentation, sources of financial resources and implementation models. First of all, emphasis is placed on the already undertaken activities for placing solar panels on the facilities within the competence of the municipality.

2.2 Time frame



2.3 Budget and necessary resources

The necessary resources for implementation of the Action Plan are planned to be provided from different sources. One part of the funds will be provided in the budgets of the Municipality of Kumanovo, and the respective ministries. An important part of the funds are planned to be provided by applying to the EU Programs: EU IPA grants for rural infrastructure, EU IPA cross-border cooperation and other donor organizations present in the country that support activities in the education sector.

The indicative budget for the implementation of the EE measures and activities foreseen for the reconstruction of school buildings is given in Tables 3, 4, 5, 6 and 7.

3 Cooperation with the Stakeholders

The main stakeholders involved in this activity are:

- Municipality of Kumanovo, including primary and high schools;
- Students and their parents
- The business sector in the Municipality of Kumanovo and wider.

Roles on responsibilities of the various stakeholders in the implementation of the Action Plan are presented in the table below:

Table 9: Stakeholders

Stakeholder	Roles on responsibilities of the stakeholder	How it is involved and how it will communicate with the stakeholder
Mayor of the Municipality of Kumanovo	Implementing the AP and responsible for the establishment of the EE Team	Directly through the EE Team Communication will take place through: <ul style="list-style-type: none"> • meetings • written communication • reports
Council of the Municipality of Kumanovo	Adopts action plans, makes decisions for implementation.	Directly Communication will take place through: <ul style="list-style-type: none"> • meetings • written communication • reports
Municipal administration	Issues construction permits and performs urban planning. Provides funding from the Budget.	Directly Communication will take place through: <ul style="list-style-type: none"> • meetings • written communication • reports
Students and their parents	Awareness raising on the use of EE and RES measures	Indirectly Communication will take place through: <ul style="list-style-type: none"> • gatherings • media
Business sector	Participating directly in the realization of construction activities. Establishing of PPP	Directly Communication will take place through: <ul style="list-style-type: none"> • meetings • written communication • reports
Primary schools	Beneficiaries of project activities	Directly Communication will take place through: <ul style="list-style-type: none"> • meetings • written communication • reports

4 Monitoring Strategy

In order to monitor the results of the implemented energy efficiency measures, measurements are planned at different time intervals and comparing the results with the calculators. The main indicators that are measured and compared are the following:

- Energy consumption (thermal and electrical),
- Comparison of the conditions in the objects (temperature differences, degree of brightness and humidity),
- Saving funds that are separated for energy.

The measurements will be carried out with determined dynamics throughout the year. In order to achieve uniqueness in the data, it is necessary to measure and collect them in kWh for both electrical and thermal energy. In case other measures (eg J or toe) are used, it is necessary to convert the units in kWh using appropriate conversion factors.

In order to obtain relevant data, the municipality plans to use the following sources of information:

- Bills from the distribution center of EVN Kumanovo for electricity
- Bills from suppliers of oil and firewood
- Data on energy consumption from equipment manufacturers
- Measurement methods such as data loggers, flow meters, electricity meters and the like.

The monitoring of energy efficiency activities in the municipality by the Energy Efficiency Team will be conducted in accordance with the legal requirements.

5 Risk Management

The risks, the probability of their occurrence and the way of dealing with the risks are given in Table 10.

Table 10: Risk Management

Risk	Probability of risk	Measures for risk management
Non-functional EE team in the municipality	Medium	Training and increasing the EE Team's resources
Little interest in key stakeholders	Low	There is a strong partnership between key stakeholders Integration of activities across multiple sectors
Lack of financing	Medium	Initiation of projects funded through public grants / subsidies schemes, increased cooperation with the private sector
Insufficient potentials and resources for the implementation of the Projects in the NEPR	High	Promotion of projects at the national level and creation of partnerships

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

of the Municipality of Staro
Nagoricane

Energy Efficient Public Lighting

English version

Prepared by
Municipality of Staro Nagoricane
Center for Development of NEPR and
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PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7
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CENTRAL EASTERN EUROPEAN
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Priority area: Energy Efficiency

Title: Energy efficient street lighting

1 Objective

The purpose of this Action Plan for Energy Efficient Street Lighting in the Municipality of Staro Nagoricane is to contribute to reducing the overall energy demand of the municipality.

The objectives of the Energy Efficiency Program (EEP) in the municipality of Staro Nagoricane are to: 1) provide an overview of the current consumption and production of electricity in the municipality of Staro Nagoricane and to identify future trends; to identify the potential for more efficient and rational use of energy in the municipality and the availability of local sources of renewable energy; and 3) to define the appropriate steps towards better and more sustainable energy development in the municipality by defining the necessary actions for improving the energy efficiency in the municipality the municipality (EE) and the renewable energy potential. The street lighting sector has been identified as the first priority. After the ranking of the sectors after their energy consumption, the street lighting sector is the largest consumer with 44% of the energy costs, or 6.8% of the total budget of the municipality for 2014.

The main problems associated with street lighting are related to the lack of financial resources to maintain the system. Many of the settlements do not have street lighting, given the fact that the habitats in the municipality are dispersed.

The municipality of Staro Nagoricane is a partial owner of the municipal street lighting system. It owns 3% of the lighting columns (where the rest is owned by EVN¹) and 100% of the lights. Electricity costs for street lighting are paid from the monthly budget of the municipality on the basis of the data obtained from the metering devices of electricity and the monthly bills issued by EVN.

The maintenance of street lighting is performed by the Public Enterprise "Kozjak", the same public utility company that manages the municipal water supply system. The company employs staff to maintain street lighting and usually buys new lights several times a year depending on the needs. All maintenance costs are paid from the municipal budget depending on the work performed and the services rendered. Maintenance is performed when the population reports irregularities or defects in street lighting.

1.1 Scope of measures and target values

The Action Plan for Energy Efficient Street Lighting in the Municipality of Staro Nagoricane includes several energy efficiency measures that need to be implemented in the following period in order to achieve its goal.

¹ EVN is a retail distributor, that is, a supplier of tariffed consumers; <https://evn.mk/>

These measures apply to:

- Development of an "Integrated Public Lighting Assessment Program". The preparation of an audit of existing facilities, as well as the assessment of operational and maintenance activities, will help identify the appropriate measures for a significant increase in energy efficiency. Also, the preparation of a New Street Lighting Purchase Guide to replacing the defective will provide a set of guidelines and procurement tips to enable the municipal administration to conduct public tenders for the development and implementation of specific energy efficiency projects in the street lighting.
- Replacement of the existing ones: a) 695 hybrid poultry (LHC) lights, 160 W each, with 695 new high-pressure sodium lights (HPS) of 100 W each; b) 166 poultry (HPM) high-pressure lights, 250 W each, with 166 new high-pressure lights (HPS) lights, 150 W each. This scenario is expected to achieve energy savings of 251,536 kWh / year.

1.2 Target values of indicators

Target indicators relating to the identified measures are shown in Table 1

Table 1: Indicators and target values

Objective	Target indicator	Method of measurement and validation
Realized Public Lighting Assessment Program	<ul style="list-style-type: none"> • An assessment of the current situation was made • Nerve audit performed • Modernization program developed • Developed Guide for Procurement 	<p>Reports from the process of realization of the activities</p> <p>Developed documents</p>
Reduction of annual energy consumption for street lighting	<ul style="list-style-type: none"> • By 2025, the annual energy consumption will be reduced by 40% compared to the current one 	<p>Reports of consumption measurements</p>
Reduction of the share of energy in municipal investments	<ul style="list-style-type: none"> • By 2025 decrease by 25% in relation to current investments 	<p>Financial reports</p>
Replacing the street lights	<ul style="list-style-type: none"> • Up to 2025 100% of the existing street lights are EE 	<p>Reports of the completed replacement</p>
Reducing the level of CO ₂ emissions in the atmosphere	<ul style="list-style-type: none"> • Reduction of CO₂ emissions in the atmosphere by 230 tCO₂ / year 	<p>Reports from analyzes and measurements</p>

2 Implementation Strategy

2.1 Step by step

Step 1 – Full inverting of the street lighting system

An assessment of the current status of street lighting (including location, number and type of pillars, lamps, distribution through settlements, etc.) as well as an assessment of its operation and maintenance will help identify appropriate measures for a significant increase in energy efficiency.

Step 2 – Energy Audit for street lighting and modernization program

Incandescent lights traditionally used in street lighting are very inefficient because they do not produce enough light but produce a lot of heat because of their high energy consumption. New lighting technologies can significantly increase lighting efficiency and offer a longer life span. The purpose of this recommendation is to assess the current lighting efficiency and implement updates as needed.

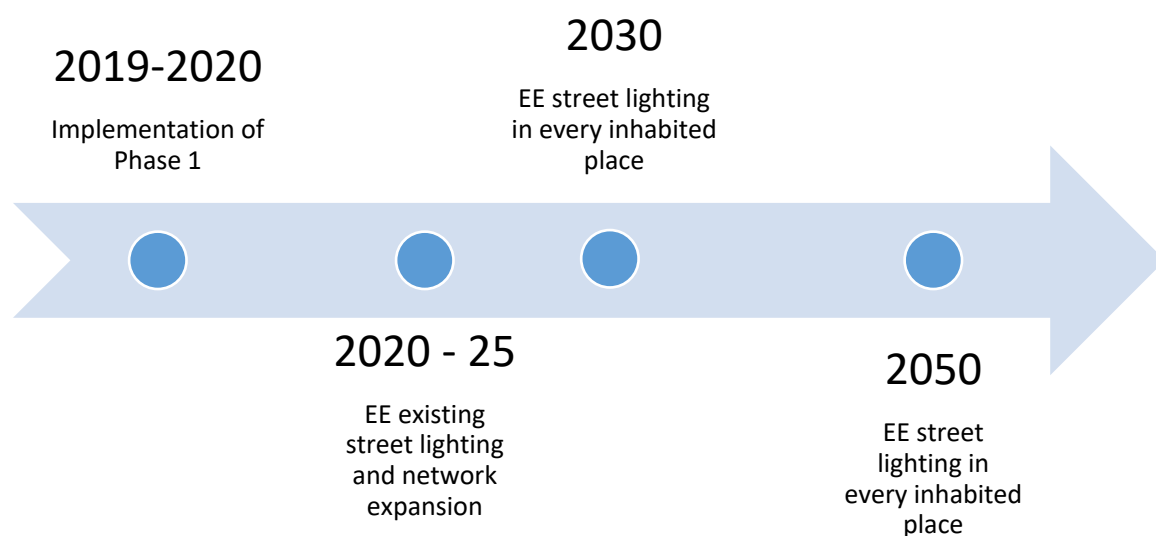
In this phase, a timing program for lighting should also be implemented. Lighting timer programs can reduce energy consumption, carbon emissions, and operating costs. A strategic timing and / or dimmer program tailored to specific lighting needs in certain areas can significantly reduce energy consumption while still delivering lighting at an appropriate level. Such programs often increase the life span of the lamps, reducing the need for maintenance and costs. The use of intelligent monitoring systems also enables rapid detection of errors, allowing for quick replacement, and thus improving the quality of public lighting.

Given that modernization can deliver the same light levels with lower energy consumption, thereby reducing carbon emissions and operating costs, within this step, a Program for the modernization of the street lighting system will be developed.

Step 3 – Implementation of the Program for modernization of the street lighting system

At this stage, sources of funding are more closely identified, lobbying for funding is planned, and technical projects are being prepared, public procurements are implemented, monitoring of the implementation of projects is monitored.

2.2 Time frame



2.3 Budget and necessary resources

The municipality of Staro Nagoricane is in a position to gain access to a wide variety of sources of financing, although limited, have the potential to be used for the realization of investments in energy efficiency. One part of the funds will be provided in the budgets of the Municipality of Staro Nagoricane, JKP "Kozjak" and the respective ministries. Part of the funds are planned to be provided by applying to the EU Programs: EU IPA grants for rural infrastructure, EU IPA cross-border cooperation and other donor organizations present in the country.

The indicative budget for the implementation of measures and activities is shown in Table 2.

Table 2: Indicative budget

Project	Amount of investment EUR
Program for street lighting renewal - Phase I	30.000
Total required funds	30.000

3 Cooperation with stakeholders

The main stakeholders involved in this activity, their role, responsibility, the way of involvement and the type of communication are given in Table 3:

Table 3: Stakeholders

Stakeholders	Role and Responsibility of the Party concerned	How it is involved and how it will communicate with the stakeholder
Municipality of Staro Nagoricane	Implementator of activities It prepares, adopts, implements and monitors the EE Program and the respective AP. Establishes a communication system with other stakeholders	Directly through the EE Team Communication will take place through: <ul style="list-style-type: none"> • meetings • written communication • reports
MOH in settlements	Submit requests Caring for the interests of citizens in settlements	Consultative Communication will take place through: <ul style="list-style-type: none"> • meetings • written communication • reports
PCE Kozjak	Maintenance of street lighting in the municipality Take care of the quality of street lighting - there are no irregularities and defects	Directly through the EE Team Communication will take place through: <ul style="list-style-type: none"> • meetings • written communication • reports
EVN	Supplier of tariffs It concludes individual agreements with the end users, reads the meters, collects the payments, and transfers the communal fee for street lighting to the municipality	Directly through the EE Team Communication will take place through: <ul style="list-style-type: none"> • meetings • written communication • reports

4 Monitoring Strategy

According to the Law on Energy, the municipalities prepare a Report for the implementation of the Action Plan for the previous year, ie the implementation of the Energy Efficiency Program and submit it to the Energy Agency.

The report presents all undertaken activities for the implementation of the Energy Efficiency Program from the previous year, and this is an evaluation, monitoring and verification. The report is submitted by the end of February every year.

In view of the above, the monitoring strategy of this Action Plan should monitor the activities and their dynamics according to the legal requirements.

As part of the continuous monitoring process, implemented projects can be assessed through their impact on energy consumption and CO₂ emissions reduction. Based on the results and the observed problems, if any, additional corrective and preventive measures and activities can be undertaken.

The implementation of the activities will be carefully monitored and evaluated annually by the municipal energy efficiency team in Staro Nagoricane. The evaluation will be done in November and December and will cover the current year.

The dynamics of monitoring the activities for energy efficiency in the municipality by the Energy Efficiency Team is shown in Table 4.

Table 4: Monitoring of EE activities

Report	Delivery time
Action Plan for Energy Efficiency	Annual delivery at the end of the first quarter
Annual report	Annual delivery within three months after the end of the year
Energy Efficiency Project Report	Regular report every month for the duration of the project, and a final report at the end of the project
Reports on the monitoring of the energy efficiency measures for the implemented projects	Quarterly, within 15 days from the end of the specific quarter

5 Risk Management

The risks, the probability of their occurrence and the manner of risk management are given in Table 5.

Table 5: Risks, probability of risk and measures for dealing

Risk	Probability of risk	Measures for risk management
Little interest in key stakeholders	Low	There is a strong partnership between key stakeholders
Non-functional EE team in the municipality	Medium	Training and increasing the EE Team's resources
Poor quality of network maintenance (pillars and lights)	Medium	Increased monitoring and communication with the supplier of energy and the maintenance of the network.
Lack of financing	Medium	Initiation of projects funded through public grants / subsidies schemes, increased cooperation with the private sector

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

of North East Planning Region

Solar Roofs in the Northeast

English version

Prepared by
Center for Development of NEPR and
Balkan Development Solutions Ltd

PANEL 2050 – Partnership for New Energy Leadership 2050

Deliverable 3.7

Date: December 2018



CENTRAL EASTERN EUROPEAN
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Priority area: Decentralized production of renewable energy

Title: Solar roofs in the Northeast

1 Objective

The Action Plan is prepared in order to contribute to the realization of the Vision for Energy Transition in the Northeast by 2050, with a focus on decentralized energy production, using solar collectors for heat and photovoltaics for electricity.

The main challenges of the region's energy economy by 2050 are:

- In the total final energy consumption, renewable energy resources will increase to 20% by 2030, up to 30% by 2040, and up to 40% by 2050.
- By 2050, the greenhouse gas emissions will be reduced by 30% compared to 2016.

The development of this plan uses the experiences and guidelines contained in the Action Plan: Sun roofs in Podravje from our partners in the Project Local Energy Agency from Dolno Podravje, the Republic of Slovenia ¹

Houses with zero net energy consumption and zero emission of carbon dioxide are called zero-energy houses. Zero net energy consumption means that these houses can be independent of the electricity grid, but in practice this means that in certain time periods these houses are connected to the network, while in other periods of time the energy produced in these houses returns to the electric circuit.

Approximately zero or a very small amount of energy required should be provided in a very substantial proportion of renewable energy sources, including energy from renewable sources installed at the place of consumption or in the vicinity.

Achieving the goal will require not only good isolation of the building and use of renewable heating sources, but will require simultaneous production of electricity.

About 160 building permits are issued each year in the North-East Europe, which is a significant potential for creating a critical mass of examples of installation and use of solar heat generators and solar photovoltaics.

The annual potential for solar power production in Macedonia is estimated at 1,300-1,550 kWh / kWp, which is a clear goal for future utilization.

With the new Law on Energy (Official Gazette of the Republic of Macedonia No. 96 of 28.5.2018), the new Rulebook on Renewable Energy Sources and the Decree on Measures to Support the Production of Electricity from Renewable Energy Sources the households, small consumers and budget users and the user unit can build an electricity generation

¹ <https://www.lea-ptuj.si/en/>

facility from a renewable energy source, where the generated electricity is used for own consumption, while the surplus of the produced electricity energy is transferred to the power distribution network.

The target is by 2050 at least 40% of the final energy consumption from RES is from local production through installed solar collectors for heat and photovoltaics.

1.1 Scope of measures and target values

The current contribution of solar energy to the final energy consumption of RES in the NEPR is 0.6% (0.67GWh). This low degree of utilization in relation to the potentials for using solar energy defines the scope of measures to achieve the goal.

Measures to achieve a significant increase in the share of solar energy in final energy consumption are:

- Defining a policy for the use of RES and its incorporation in the Programs for development of the NEPR and municipalities
- Encouraging households, businesses and the public sector to invest in the use of solar energy
- Supporting households, businesses and the public sector to make informed decisions
- Lobbying the central government to support the utilization of the potential for using solar energy

1.2 Target indicators

Indicators and their target values that refer to the identified targets after installed solar collectors and PV are shown in Table 1.

Table 1: Indicators and target values

Objective	Indicator and target value of the indicator	Method of measurement and validation
Electricity produced by solar photovoltaics	MWh/yr	Годишни податоци за Annual data on the energy produced
Thermal energy produced from solar collectors that generate heat	MWh/yr	Annual data on the energy produced
Reducing CO2	tCO2/yr	Calculated on the basis of energy production

2 Implementation Strategy

2.1 Step by step

In order to achieve the goal, the following steps have been identified on the basis of the measures envisaged:

Step 1 – Encouraging the use of solar energy through the planning system

The initiator of the activities is the Council for development of the NEPR with the support of the Center for development of the NEPR. Considering that the new Regional Development Strategy of the country should begin in 2019, as well as the Program for the development of the NEPP, this is a great opportunity to define a policy for the use of solar energy and its incorporation in the National Strategy for Regional Development, the development programs of the NEPR and the municipalities. This will enable the objectives and measures of the identified policy to be embedded in the strategies and programs of different sectors, which can be a source of resources for the implementation of AP measures.

The activities of the measures in this step should start in 2019 and continue continuously through the monitoring and evaluation of the respective policies and implemented projects.

Step 2 – Solar roofs in the NEPR

Encouraging households, businesses and the public sector to invest in the use of solar energy requires a number of different measures and activities that benefit the use of solar energy will be supported by the community. This requires co-operation between all stakeholders: local authorities, non-governmental organizations, citizens, research institutes and the central government.

The incentive measures that are important to enable the goal to be achieved in this step are:

- Promoting the benefits of using energy and sharing good examples

It is important here that the experiences from the use of solar energy in the country to be brought closer to the stakeholders in the NEPR. Promotional events and pilot projects are important here².

All this allows for the Northeast planning region to plan for the long term utilization of the potential of individual buildings and their roof surfaces for setting up solar photovoltaics.

- Implementing with an example

² This year, the first photovoltaic powerhouse was installed in the Taftalidze settlement in Skopje, on the roof of a private house. The building has 12 panels with a total maximum installed capacity of 3kW. The solution was developed by a team of experts in EVN who made an analysis of the specifics of the object and in order to maximize the potential of the solar energy developed a customized solution for the user. The service is "turnkey", which involves analysis, development of a specific solution, complete installation and maintenance of the photovoltaic system.

An important pioneering role should be played by the municipalities that will start investments in the use of solar energy in municipal buildings and street lighting. The action plans and the projects developed on them should be a priority in the period up to 2025, which will create examples of good practice in the region³.

- Establish regional and municipal grant schemes to support the use of solar energy
- Support the development of knowledge capacity for the use of RES in the North-East Europe NEPR, in order to provide stakeholders with guidance and clear information on the use of solar energy. Development of an interactive map in order to identify the potential for generating solar energy. Establishment of a support center for the use of RES in the NEPR.
- Support and create synergies

Lobbying the central government to support the utilization of the potential for the use of solar energy should be one of the activities of the members of the Council for development of the SIPR, starting in 2019 and over time. Without proper regulation, national investment and support, the achievement of the target will be at high risk.

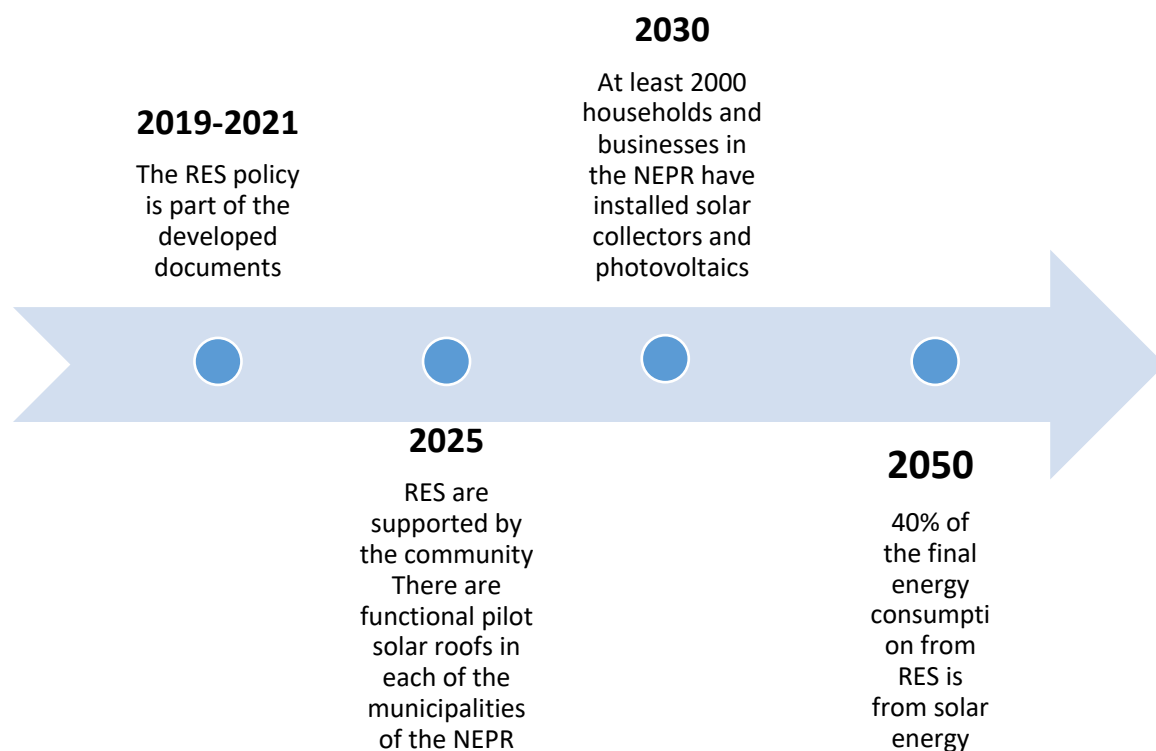
The implementation of these measures by 2025 should give the first results that will be a critical point in the further use of solar energy in the region. By 2030 all public buildings in the North-East Region have sun roofs and at least 2,000 households and businesses have installed solar collectors for the use of solar energy.

Step 3 – Promotion of good practices and sharing experiences

This step is important because it should enable overcoming the implementation risk, which is high, if there is no interest from the stakeholders to join the implementation of the measures. Identifying stakeholders between stakeholders who will support and initiate the process in their environments is important, especially in the early years, until the emergence of a critical mass of examples in the region. Each of the stakeholders should be involved in the process with appropriate marketing and promotional activities. Sharing experience and promoting good practices from other countries is an important segment for bringing the innovations and technical solutions closer to the stakeholders in the region. Participation in the PANEL 2050 for many of them represented an opportunity to expand the view in the use of RES. More importantly, the created CEESSEN network and the established contacts will represent a significant resource in the initial step of the stakeholders in their journey in the energy transition of the NEPR.

³ In this direction, the municipality of Kumanovo undertakes activities for installation of solar panels on its facilities through a public-private partnership

2.2 Time Frame



2.3 Budget and necessary resources

Resources needed for the implementation of the Action Plan should be provided through the budgets of the municipalities and the central government, and funds are also planned to be provided by applying to the EU Programs, other donors, the International Financial Institutions, the Commercial Banks. Household investments should play a significant role in achieving the goal.

3 Cooperation with the Stakeholders

The main Stakeholders involved in this activity are:

- Center for development of North East Planning region
- Municipalities
- Citizens in the municipalities
- Non-governmental sector
- Central government
- Donors
- Business sector
- Commercial banks

The roles and responsibilities of the various stakeholders in the implementation of the Action Plan are presented in Table 2.

Table 2: Stakeholders

Stakeholders	Role and Responsibility of the Stakeholders	How it is involved and how it will communicate with the stakeholder
Center for development of NEPR	Initiator of the process. Inclusion of the policy for the use of solar energy in the planning documents	Directly Communication will take place through: • meetings • written communication • reports
Municipalities in NEPR	Carriers of the process. Responsible for creating opportunities to support measures	Directly Communication will take place through: • meetings • written communication • reports
Citizens in NEPR	Initiators and implementers of the activities	Indirectly Communication will take place through: • Promotional events • media
NGO's	The role of promoters of the use of solar energy	Indirectly Communication will take place through: • meetings • written communication • reports
Central Government	Providing resources to support the implementation of the measures. Investing in intelligent networks.	Directly Communication will take place through: • meetings • written communication • reports
Donors	Providing financial support for the implementation of the measures.	Indirectly Communication will take place through: • meetings • written communication • reports
Business Sector	Investors in solar collectors for thermal energy and in phthalates for the production of electricity. Creating a PPP	Indirectly Communication will take place through: • meetings • written communication • reports

Commercial banks	Providing credit lines for the use of solar energy: for citizens, businesses and the public sector	Indirectly Communication will take place through: <ul style="list-style-type: none"> • meetings • written communication • reports
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4 Monitoring strategy

Considering that the implementation of this AP is in the long run, it is recommended that the monitoring and evaluation of the implementation of the measures be done every five years starting from 2025. An annual monitoring of the implemented activities from the Steps 1-3 should be made to this period.

The public sector should monitor the monitoring on the basis of legal requirements. The monitoring of the implementation of the measures by households and businesses will be done by the Center for support of the use of RES, based on the data from the databases and reports from the relevant municipal and state institutions, as well as from the data from the other concerned pages.

5 Risk Management

The risks, the probability of their occurrence and the way of dealing with the risks are given in Table 3.

Table 3: Risk Management

Risk	Probability of risk	Measures for risk management
Subsidies will no longer be available	High	New models for supporting the installation of solar collectors and photovoltaics. Support for production, not installation. Increased promotion of the benefits of own production of energy from the sun
Inability to provide funds	Medium	Applying to donor programs for using RES Applying for loans in commercial banks
Lack of interest of Public sector, households and business for using solar energy.	Medium	Increased promotion of the benefits of own production of energy from the sun

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

of ADUT GVN Ltd

RES for optimal technological process

English version

Prepared by
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PANEL 2050 – Partnership for New Energy Leadership 2050
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Priority area: Decentralized production of renewable energy

Title: RES for optimal technological process

1 Objective

The purpose of the Action Plan is to install photovoltaic collectors for meeting the needs of electricity in the technological process and energy optimization of the system for drying technology for food products.

ADUT GVN DOOEL was established as a family company based in a clean rural environment away from the industrial buildings in the village of Tromedja (the Municipality of Kumanovo) and is engaged in the confection of the most basic dietary supplements since the beginning of 2000. From a company that at first was only engaged in confectioning of granular and powdered products, it gradually turned into a company that started investing in its own production of spices, food acids, drying and dehydrating of fruits, vegetables and spices, as well as its own plantations certain non-industrial cereals, parsley, oregano, various spicy peppers, chili and other.

The system for serving the technological process is composed of the following assemblies, which together constitute the existing functional unit: 1) dryer; 2) energy unit.

The energy unit is composed of two parts: 1) a system of production of heat with solar energy, with its own heat accumulator of 2m³; 12 solar collectors with surface area 2m²; and 2) Hot water boiler of 70 kW / h. These two parts are hydraulically coupled through busbar dividers, and via pipelines are used for the operation of the dryer, the heating of sanitary hot water and parts of the building. The total maximum installed power is 72.5 kW / h. With the accumulation of energy in the heat accumulator, depending on the weather, it is possible to provide up to 30 kW of energy.

The consumption of electricity during the year is with the following dynamics (Table 1):

Table 1: Annual energy consumption

	Janu	Febru	Marc	April	May	June	July	Augu	Septe	Oktom	Nove	Dece	Σ
Spent kWh	700	771	114	652	661	236	413	203	66	81	118	1202	865
	131	1143	991	751	667	561	595	373	45	75	881	950	943

Of particular interest is the energy consumption in two periods of the year, so called winter (October-March) and summer (April-September) mode of operation. The average monthly energy consumption in these two years is in (Table 2):

Table 2: Average monthly consumption 2016 and 2017

Period of year	2016	2017	Процек 2016/17
	kWh/monthly	kWh/monthly	kWh/monthly
Winter period	943	956	950
Summer period	471	566	519

Based on the data on the average monthly energy consumption, it is concluded that the average daily electricity demand is: Winter period - 40 kWh/day, Summer period - 22 kWh/day.

The average production of electricity from solar collectors is: Winter period - 2.32 kWh/day, and in the Summer period - 5.77 kWh/day, or average year-round is 4.04 kWh/day.

Given the real needs of energy, the installed power is insufficient for the proper functioning of the system, it is necessary to increase the capacities of energy production. The source may be in many ways, but primarily from renewable sources. The way the system is now functioning is enormously large energy losses and it is necessary to make efforts to increase energy efficiency.

To meet these electricity needs, the number of solar collectors for average annual use is: minimum 5.4 and maximum 9.8 kW.

The completed analysis is for 3 cases, with the installation of solar collectors with a capacity of 5, 6 and 7 kW, with the required area of collectors average 6-7 m² / kW. It is assumed that the surplus produced electricity is used to reduce the consumption of energy from biomass.

The financial benefits of saving with own production of electricity and from reduced costs for biomass on an annual basis, the necessary investment for placing collectors, shown in Table 3:

Table 3: Financial benefits and investment

kW	kWh e	kWh w	reduced cost per year			investment (EUR)
			electric	biomass	total	
7	3.120	4.146	26.957	8.803	35.760	5.600
6	3.120	3.108	26.957	6.599	33.556	4.800
5	3.120	2.070	26.957	4.395	31.352	4.000

Economic analysis shows that it is best to invest in a 5 kW installed capacity system.

1.1 Scope of measures and target values

Given the actual dysfunction of the existing system, it is possible to just indicate the available benefits in terms of the technical characteristics of the newly envisaged elements.

- By installing a recuperation element on the smoke side of the boiler, benefits of about 16.8 kW/h are expected, or about 24%.
- The utilization of the "waste" energy that is disposed of in the current technological system, ranging between 18 and 25 kW/h of energy depending on the temperature and humidity in the space, which is on average 29.72%.
- Install another heat accumulator with a suitable exchanger in order to achieve the desired energy utilization (above all, the discontinuity) of the production. This would result in a direct benefit of 10 to 20% depending on the weather conditions at the time of the operation of the dryer.

- By placing a central heat accumulator that at any given moment gives an adequate temperature for the needs of the technological line, all empty steps will be avoided and the duration of the technological process will be reduced.
- Setting automation to control and manage the technological process that contributes experience in such systems to 10% savings.

1.2 Target indicators

Indicators and their target values that refer to the identified objectives are shown in Table 4:

From the above, it is visible to expect a benefit - saving up to 70%. Of course this is only in case a complete reconstruction of the system is carried out by incorporating and connecting all of the foreseen elements.

Table 4: Indicators and target values

Objective	Indicator and target value of the indicator	Method of measurement and validation
Developing project documentation	By 2020, project documentation should be developed	Developed project documentation
Providing way of financing	By 2020, funding will be provided for the Action Plan	Provided way of funding
Full reconstruction of the system with the installation and connection of all provided elements	By 2020, a 100% reconstruction of the system will be carried out	Functional system
Reducing annual energy consumption	By 2021, the annual energy consumption will be reduced by 70% compared to the current one	Reports of consumption measurements
Sharing the results	Participation in EE and RES events	Number of events for energy transition events

2 Implementation Strategy

2.1 Step by step

Step 1 – Developing project documentation

An optimization of the technology for the drying of food products was made. The preparation of the project documentation will be pre-financed by the company, and it will be made by a publicly-engineered design company. This activity should be completed in 2019.

Step 2 – Providing way of financing

On the basis of the project documentation and the appropriate business plan, the application for financial support from the donors and the possibilities for obtaining loans for support of the EE measures and the use of RES by the commercial banks will begin immediately.

Step 3 – Optimization of the technology for drying food products

It is evident that the entire system as set has several disadvantages that can be defined as:

- Lack of energy
- Lack of continuity in work (energy)
- Not having automation of the process, it is based on experience only, but not on the achievement of parameters
- Automation in the part of the "solar system" is evident that it does not work optimally
- In the part of heat exchangers water-air, in the dryer itself there is no "changeable surface"
- There is no preparation for fresh air

It is necessary to increase the production of thermal energy, the existing part to be automated; the efficiency of the system to increase with the necessary automation; To install appropriate equipment that will have the opportunity for continuous production of energy.

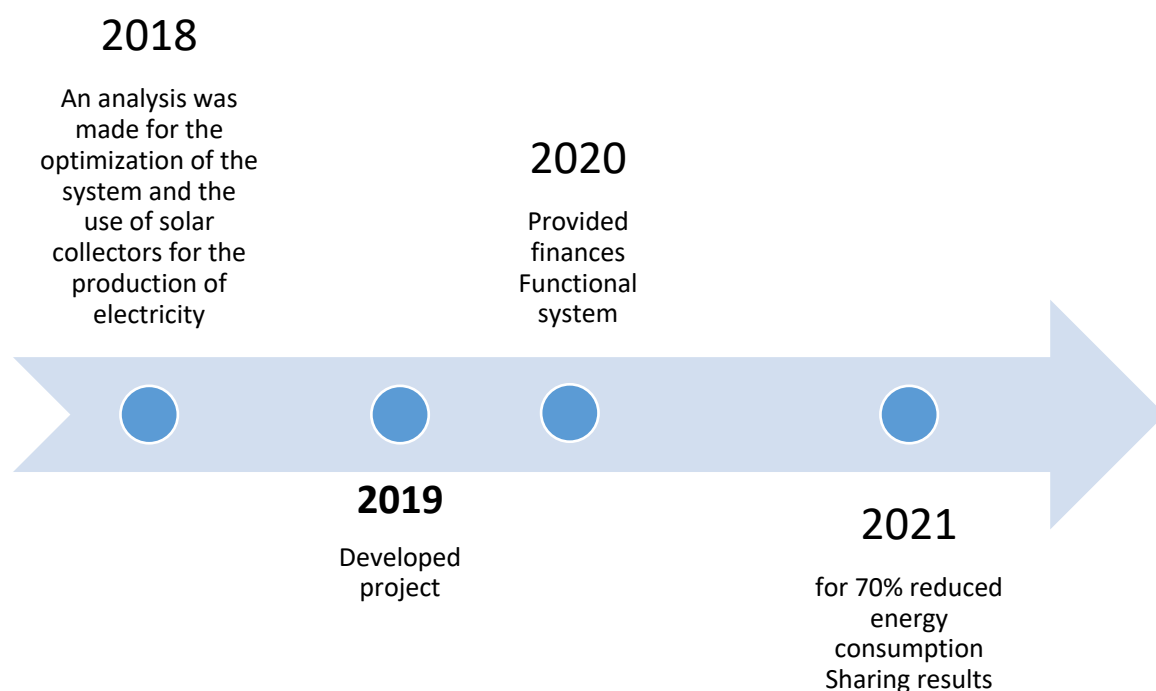
Step 4 – System Exploitation

With the realized complete reconstruction of the system with the installation and connection of all envisaged elements, it is expected to reduce the energy consumption by 70%. With the installed new energy part, the capacity of the dryer will increase in many ways: 1) 3-5 times per week depending on the product that is dried from the current 1 - 2; 2) the possibility to process a large number of products that have not yet existed a technical possibility to be processed; 3) system at any moment can be upgraded both after installed power and after automation.

Step 5 – Promotion of the results of the implementation of the measures

Participation in events organized by the municipality in the direction of promoting and supporting the improvement of EE and the use of RES.

2.2 Time Frame



2.3 Budget and necessary resources

The necessary resources for the realization of the Action Plan are presented in Table 5. A part of the funds will be the company's own share, and a significant part of the funds are planned to be provided by applying to the EU Programs for Energy Efficiency and RES.

Table 5: Budget and necessary resources

Activity	Amount (EUR)
Developing project documents	1.400
Upgrading of the boiler plant	1.500
Upgrading the system of heat accumulators	4.800
Hydraulic system processing	3.000
Automation for running the thermo-technical part	3.700
Setting up recuperation units	2.700
Insulation and other necessary things	1.000
Electro-motor decay	400
Sharing the results	1.000
Total	19.500

3 Cooperation with the Stakeholders

The main stakeholders involved in this activity are:

- ADUT GVN Ltd
- Donors
- Municipality of Kumanovo
- Commercial Banks

The roles and responsibilities of the various stakeholders in the implementation of the Action Plan are presented in Table 6.

Table 6: Stakeholders

Stakeholders	Role and Responsibility of the Stakeholders	How it is involved and how it will communicate with the stakeholder
ADUT GVN Ltd	Implementation of the AP	Directly through the EE Team Communication will take place through: <ul style="list-style-type: none"> • meetings • written communication • reports
Donors	Providing financial support for the implementation of the measures	Indirectly Communication will take place through: <ul style="list-style-type: none"> • meetings • written communication • reports
Municipality of Kumanovo	Support to donors in providing funds. Organizing campaigns for EE and RES.	Indirectly Communication will take place through: <ul style="list-style-type: none"> • meetings • written communication • reports
Commercial banks	Providing funds through EE and RES credit lines	Indirectly Communication will take place through: <ul style="list-style-type: none"> • meetings • written communication • reports

4 Monitoring strategy

The approach on which the monitoring of the results of the implemented measures for the implementation of the action plan how will be carried out is shown in Table 7

Table 7: Schedule for monitoring the activities

Period	Time frame and reports
Until the provision of funds	On a two-month level; reports from financial applications
During the implementation	Casual surveillance; Report from the technical acceptance of the system
During the exploitation	Regular monthly reports on energy consumption
During the promotion	After each event

5 Risk Management

The risks, the probability of their occurrence and the way of dealing with the risks are given in Table 8.

Table 8: Risk Management

Risk	Probability of risk	Measures for risk management
Неможност за обезбедување на финансиски средства Inability to provide funds	Medium	Applying to EE and RES donor programs Applying for loans in commercial banks
Absence of support for the implementation of the AP	Medium	Presentation of the AP and lobbying
Optimization of the technology for the drying of food products	Low	Technical supervision in the phase of implementation of the system
Insufficient promotion of energy efficiency projects and RES	Low	Creating a campaign in order to raise the awareness of the population in terms of EE and RES
Insufficient potentials and resources for the implementation of the Projects in the NEPR	High	Promotion of projects at the national level and creation of partnerships

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

of North East Planning Region

Eco-villages in the Northeast

English version

Prepared by
Center for Development of NEPR and
Balkan Development Solutions Ltd

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7
Date: December 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Integrated measures for low carbon economy

Title: Eco-villages in the North-East

1 Objective

The Action Plan was prepared in order to contribute to the realization of the Vision for Energy Transition in the North-East Region by 2050, with a focus on decentralized energy production, sustainable tourism development and organic production.

According to the Vision by 2050 the North East Planning Region is recognized as a "green" region with energy efficient innovative businesses and households, and developed sustainable tourism and organic farming.

The development of this plan uses the experiences and guidelines contained in the Action Plan: Eco-villages for example for the region of Borsod-Abaúj-Zemplén and Heves Counties made by our partners in the WWF Project Hungary¹.

According to Robert Gilman, eco-villages are populated places in which human activities are safely integrated into the natural world in a way that supports healthy human development and can successfully continue in an undetermined future².

Regarding energy management, the buildings in the environment are with or close to a passive standard, while the materials used have a low environmental impact. Energy needs are covered by renewable energy in buildings. Mobility needs are covered by low-carbon transport mode: bicycle, public transport or a common electric car. Apart from energy needs, other activities also apply close to natural solutions, which also reduce the carbon of the community, e.g. locally grown organic food.

Eco-villages can either be traditional when existing rural villages and communities decide to design their own way in the future, using participatory processes to combine traditional wisdom and positive new innovations, or intentional, created by people who meet again with a common goal or vision.

The goal of the action plan is that by the year 2050 in the region there will be at least 12 eco-villages.

These villages can serve as a knowledge center for climate smart solutions where energy is used effectively, energy consumption is provided by local renewable energy sources, as well as mobility and nutritional needs that are covered by low-carbon solutions.

¹ <http://wwf.hu/en/wwf-hungary>

² Gilman, Robert (Summer, 1991). "The Eco-village Challenge"

1.1 Scope of measures and target values

The population living in rural areas faces a lower quality of life than those living in urban areas, resulting in a continuous migration trend for young people from villages in the cities, or lately and outside the country. This results in the loss of the most vital working population from the rural areas and the gradual devastation of the villages. Therefore, through rural development policies, there is a need to increase investment in infrastructure and investment in the revitalization of villages in order to make them attractive places for young people and entrepreneurs to live and work in them.

Given that eco-villages are a relatively new and innovative model for the development of rural areas, the scope of measures to ensure their establishment is wider and create synergies between different innovative climate and socio-economic models.

In order to achieve the goal, this Action Plan provides measures for:

- Development of the eco-village model
- Promotion of the eco-village model
- Supporting the provision of financial resources for the establishment of eco-villages
- Creation of eco-villages
- Marketing and sharing experiences

1.2 Target indicators

Indicators and their target values that refer to the identified objectives are shown in Table 1

Table 1: Indicators and target values

Objective	Indicator and target value of the indicator	Method of measurement and validation
Created eco-villages	Number of Eco-villages By 2030 2; up to 2040 6; by 2050 there will be 12 eco-villages	Visits, stay and number of households
Developed eco-village model	Until 2021 Developed a model and tools for development of eco-village	Manual and Tools Available Mentors
The eco-village model accepted by the stakeholders	Application of the eco-village model to 2025 Number of educational and promotional events At least 5 years	Leaders Reports from held events
Available funds for the development of eco-villages	Invested funds for implementing the measures	Reports
Recognized eco-village brand	Number of Marketing Campaigns By 2030, eco-villages are a brand	Surveys and visits

2 Implementation Strategy

2.1 Step by step

In order to achieve the goal, the following steps have been identified on the basis of the measures envisaged:

Step 1 – General Management

The initiator of the activities is the Center for development of NEPR. The Center will include as many activities as possible in its development programs and action plans that will support the implementation of the measures from the Action Plan. This will be a challenge before the municipal councils to incorporate this initiative into municipal development documents, especially in the area of rural support. Over time, management can be allocated to different stakeholders, in which local communities and the non-governmental sector can play a significant role.

Step 2 – Development of the eco-village model

Creating an eco-village requires extensive knowledge, on a variety of topics such as energy management, agriculture, wastewater treatment, water management, etc. This requires cooperation among local authorities, non-governmental organizations, research institutes and the central government.

In order to develop the eco-village model, a comprehensive manual should be developed that includes all the necessary knowledge within the national context, as well as to organize workshops that will guide stakeholders to create their own eco-villages. The development of this manual and the implementation of training programs requires broad cooperation among stakeholders. The manual should be prepared in the first year of the action, before any physical implementation. The workshops should be conducted in the first few (2-3 years).

Step 3 – Promotion of the eco-village model

This step is significant because it should enable overcoming the implementation risk, which is high, if there is no interest from the municipalities and individuals to join the initiative. Identifying stakeholders between stakeholders who will support and initiate the process in their environments is crucial for the realization of the activities. Also, this step should enable sharing of success stories (the root of the eco-village is from the 1970s), which means that in some areas four to five decades of experience can help new eco-village communities.

At this stage, the stakeholders should demonstrate commitment to the implementation of the eco-village model. Within this phase, several models should be developed that will provide support in the first 20 years of implementation of measures such as a good practice platform, mentoring schemes that will help the creation of ecosystems until the moment when the eco-communities themselves take on the role of supporting new eco-villages. This should be prepared in the first year after the developed model and the start of promotion activities, and before any physical implementation.

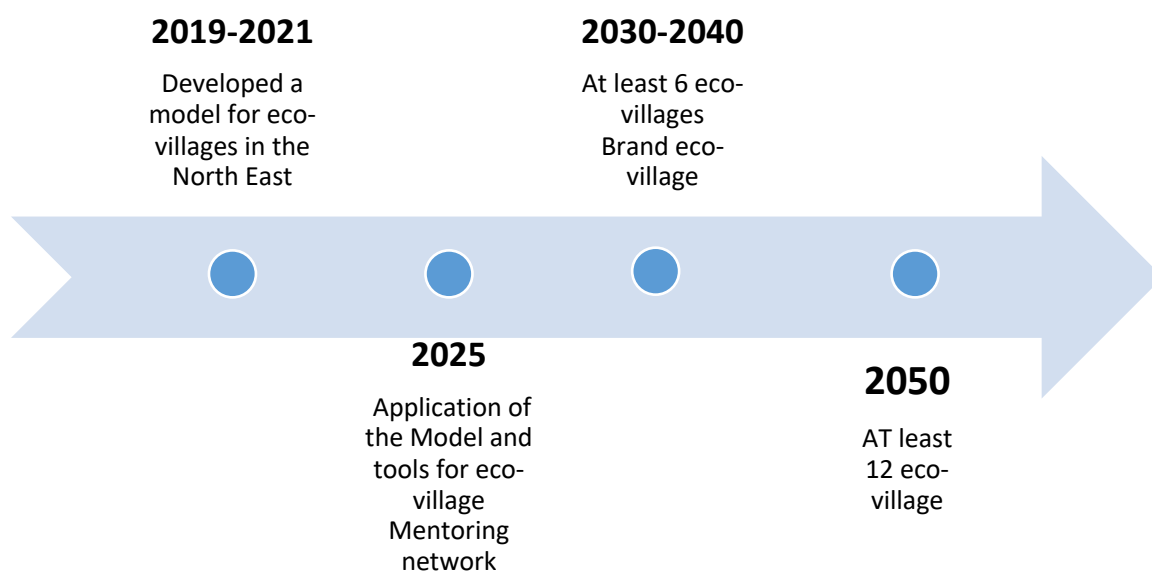
Step 4 – Creating eco-villages

This step marks the beginning of the creation of eco-village, which will serve as examples/living laboratories for their further development. Once the support system has been prepared with the preparation of the manual, tools, workshops and the mentoring scheme, as well as the received support from the stakeholders, it is necessary to provide financial support to the initiatives. Projects that relate to the use of RES, organic farming, rural tourism, the use of natural materials in construction, waste management and water purification, etc. should be found in the action plans of the municipalities, ministries and investment plans of entrepreneurs.

This will be a challenge for all stakeholders, ranging from municipalities to the central government that can use this model to reduce negative demographic trends in the long-term villages.

By 2030, the first eco-villages in the region are expected to be created.

2.2 Time Frame



2.3 Budget and necessary resources

Resources needed for the implementation of the Action Plan should be provided through the budgets of the municipalities and the central government, and funds are also planned to be provided by applying to the EU Programs, other donors, the International Financial Institutions, the Commercial Banks. Household investments can also play a significant role in creating eco-villages.

3 Cooperation with the Stakeholders

The main Stakeholders involved in this activity are:

- Center for development of North East Planning region
- Municipalities
- Citizens in the municipalities
- Non-governmental sector
- Central government
- Donors
- Business sector

The roles and responsibilities of the various stakeholders in the implementation of the Action Plan are presented in Table 2.

Table 2: Stakeholders

Stakeholders	Role and Responsibility of the Stakeholders	How it is involved and how it will communicate with the stakeholder
Center for development of NEPR	Initiator of the process. Inclusion in the Center Development Program in 2019. General management in the first phase	Directly Communication will take place through: • meetings • written communication • reports
Municipalities in NEPR	Carriers of the process. Responsible for creating opportunities to support measures	Directly Communication will take place through: • meetings • written communication • reports
Citizens in NEPR	Initiators and implementers of the activities	Indirectly Communication will take place through: • Promotional events • media
NGO's	The role of eco-village promoters	Directly Communication will take place through: • meetings • written communication • reports
Central Government	Providing resources to support the implementation of measures and the creation of eco-villages	Directly Communication will take place through: • meetings • written communication • reports
Donors	Providing financial support for the implementation of the measures	Indirectly Communication will take place through: • meetings • written communication • reports
Business Sector	Investors in eco-villages	Indirectly Communication will take place through: • meetings • written communication • reports

4 Monitoring strategy

Considering that the implementation of this AP is in the long run, it is recommended that the monitoring and evaluation of the implementation of the measures be done every five years starting from 2025. An annual monitoring of the implemented activities from the Steps 1-3 should be made to this period.

The key achievements are:

- By the end of 2021, the handbook, the training program and the mentoring scheme should be finalized and sent to the municipalities. Because, without this support scheme, local programs can not be started
- By 2025, the application of the eco-village model has begun
- By 2030, at least 2 eco-villages will be in the region. This achievement should be checked by collective documents from the municipalities. If the target number is not met, municipalities should be advised and updated on the basis of feedback feedback
- By the year 2040, there will be at least 6 eco-villages in the region. The way of tracking is the same as in the previous point
- By the year 2050, there will be at least 12 eco-villages in the region. The way of tracking is the same as in the previous point

5 Risk Management

The risks, the probability of their occurrence and the way of dealing with the risks are given in Table 3:

Table 3: Risk Management

Risk	Probability of risk	Measures for risk management
Absence of support for implementation of AP measures - stakeholders not interested in its implementation	High	Dedicated promotion of the process will mitigate this risk, and also related activities to increase awareness of climate change and the use of RES.
Inability to provide funds	Medium	Applying to EE and RES donor programs Applying for loans in commercial banks

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLANS

for the Region of Mazovian
Voivodeship (Mazovia Region)

Construction of renewable energy
installations in Domanice municipality

English version

prepared by
Mazovia Energy Agency (MAE)

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: 31.10.2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Share of renewable energy sources in overall energy production

Title: Construction of renewable energy installations in Domanice municipality

1 Objective

The aim of the action plan is to: increase the production of electricity from renewable sources in the Domanice municipality, reduce the amount of greenhouse gases emitted to the atmosphere and diversify energy sources by installing solar photovoltaic installations in public buildings. This activity is also intended to encourage the residents of the municipality to develop further renewable energy in its area, which will contribute to the implementation of the plans established in the municipality's strategic documents. As a result of the project, 9 photovoltaic installations will be built with a total energy production amounting to 83,33 MWh / year.

1.1 Objective scope and targets values

The action will be implemented in 4 localities of the Domanice municipality: Domanice, Domanice Kolonia, Olszyc Szlachecki and Przywory Duże. As a result, photovoltaic installations will be built in 9 public buildings with a total power of 86.7 kW. These installations will also contribute not only to increasing the amount of energy produced from renewable energy sources, but also to reducing greenhouse gas emissions by 27.28 MgCO₂ / year. The project also includes a promotional, dissemination and educational part, within which informational and educational meetings will be organized in the municipality on the subject of the use of renewable energy sources and its benefits. The investment is planned for 2020-2023.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Number of units generating electricity from RES	9 pc.	Acceptance report of construction works
The ability to generate electricity from renewable sources	0,0867 MW	Annual reports on generated energy from RES
Electricity production from installations using renewable energy sources	83,33 MWhe/year	Annual reports on generated energy from RES
Estimated annual reduction in CO ₂ emissions	27,28 tonnes of CO ₂ equivalent / year	Annual reports on generated energy from RES

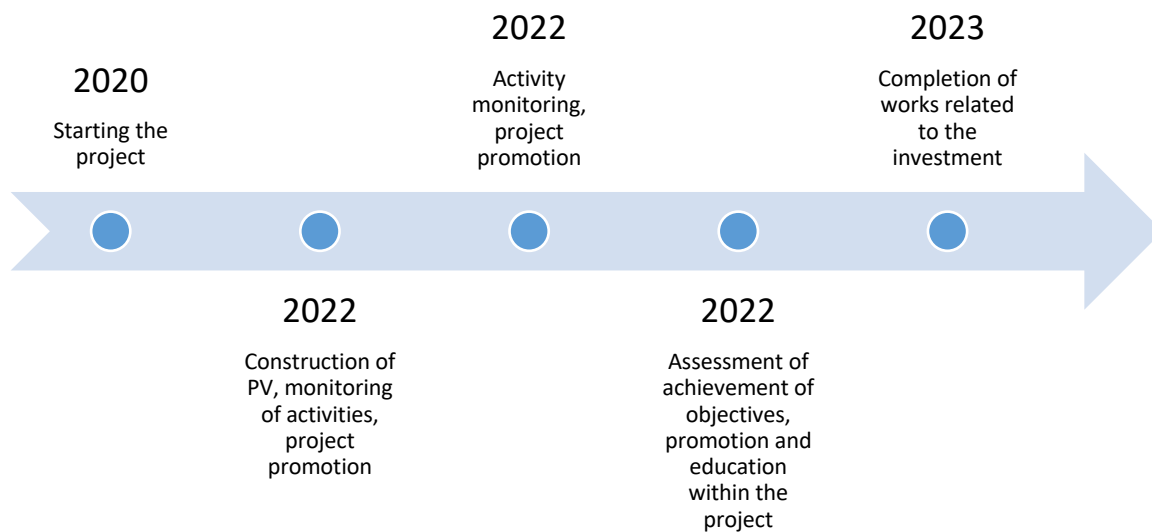
2 Implementation strategy

2.1 Step by step description

Steps and tasks foreseen during the implementation of the plan in the Domanice municipality:

1. Preparation of tender documentation - the purpose of this task is to prepare documentation in accordance with the Public Procurement Law and to correctly carry out the tender procedure along with the selection of the contractor. This will depend on checking the correctness of documentation, preparation of specimen specification of essential terms of the contract with attachments, preparation of a description of the subject of the order, conditions of participation of contractors in the procedure, criteria based on which offers will be evaluated and the contract template. In addition, the scope of this task will also include the obligation to prepare responses on behalf of the ordering party, to represent him, as well as to verify offers, review them and recommend a suitable offer to the contracting authority.
2. Preparation of technical documentation for photovoltaic installation for public utility buildings - as a result, construction and executive documents for photovoltaic installations will be created. The task contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.
3. Construction of photovoltaic installation - as a result of this task 9 solar installations will be made on public buildings. The entity responsible for the task will be selected through an open tender.
4. Investor's supervision - in order to conduct supervision, the entity / person to be entrusted with the investor's supervision will be selected. The supervisory inspector is to supervise the proper conduct and execution of construction works including the implementation of photovoltaic installations.
5. Project promotion - the aim of this activity is to disseminate activities related to the promotion and dissemination of the project.

2.2 Time schedule



2.3 Budget and resources needed

Expected costs incurred related to given tasks (gross):

1. Preparation of the tender documentation - PLN 7,000
2. Preparation of technical documentation - PLN 21,000
3. Construction of a photovoltaic installation - PLN 520,000
4. Investor's supervision - PLN 6,500
5. Promotion of the activity - PLN 2,500

Together, all the tasks give the total cost of the action in the amount of PLN 557,000

The project will be 80% co-financed if the application is approved by the decision-making body.

3 Collaboration with stakeholders

During the development of the Action Plan, the main stakeholder was the residents of the Domanice municipality. Cooperation with the beneficiaries of the planned investment was the most important. The activities carried out during the course of the investment were coordinated with them, which installations will be created, which translates into the size and investment costs.

Partner institutions: Kotuń, Skórzec and Wodynie are partner entities that cooperate with the Applicant as part of the project.

Through promotional activities, educational activities and an increase in energy awareness of the municipality's inhabitants, the number of entities interested in taking part in the activity may increase.

In the future, significant participants of the project will be companies that develop technical documentation and construction of RES installations, which will be selected through an open tender. The subject / person involved in investor's supervision will be an important participant, necessary in the further phases of the project.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholders groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipality, Municipality Board	Preparation of the application regarding financing of planned activities and preparation of tender documents. The commune office will be responsible for the selection of the contractor, implementation of the planned activities and supervision of the investment	E-mail or telephone communication. Inter-municipal cooperation through meetings on planned activities and joint fundraising.

Political decision-makers	Mayor of the municipality	Identifying the most advantageous source of financing, obtaining funds, securing funds in the commune budget	Management of the implementation process of the action plan and communication with residents as well as information and promotion activities carried out jointly with non-governmental organizations
Target groups	Residents of the municipality	Cooperation with the municipality by responding to surveys and determining the source of energy from RES that they are interested in.	Telephone communication and meetings in the municipality with persons responsible for the project. Participation as a beneficiary.
Groups supporting implementation, communication and promotion	<p>Volunteer Fire Department</p> <p>Association "Local Action Group of the Siedlce Poviať"</p> <p>Agritourism farms</p> <p>Villages</p>	Actions to increase energy awareness of residents and interest of residents in activities for the implementation of low-emission economy	<p>Disseminating good practices in the field of energy efficiency improvement and the use of renewable energy sources.</p> <p>Information, promotional and educational activities among the residents of the commune (children, youth and adults), as well as people visiting the commune</p>

4 Monitoring Strategy

In the course of the project, the indicators determining the effectiveness of the implementation of investments are indicators of the achievement of the project objectives, as well as result indicators. These indicators clearly show how the investment progresses - the indicators of achieving the project's objectives, and what final results the investment had - the result indicators.

The person / entity responsible for investor's supervision (monitoring) is the person / entity that will be entrusted with these duties. The task is necessary due to the fact that the applicant does not have the appropriate know-how to perform such a task by himself. The supervision inspector is to watch over the proper implementation of works involving the construction of renewable energy installations.

The monitoring of activities and works related to the project will be continued for three years of the duration of the investment. It should be systematic.

Systematic verification of the progress of works is important in the smooth course of activities and implementation of the tasks set out in the Action Plan, because it gives us full insight into the current situation, which can allow us to react in situations when the implementation of actions will not be correct.

The parameters assessing the quality of the course of the investment, ie the indicators of achieving the project objectives should be a determinant of how the Plan is being implemented. If the values resulting from such documents as "Reports of acceptance of construction works" or "Annual reports of generated RES energy" do not equal those of the Action Plan, the goals set in it must be redefined.

The monitoring person also has the task of confirming the works performed, and if problems arise, his duties are to immediately removed them.

5 Risk management

Risk	Probability of realising	Mitigation measure
Increase in maintenance costs	Medium	In order to minimize the risk, long-term contracts with suppliers are recommended that allow for a permanent reduction and maintenance of service prices.
Increase in the value of investment outlays - related to the potential increase in prices	Medium	In order to mitigate the risk, it is recommended to create a provision for other purposes and to prepare detailed tender documentation and delivery schedule
Change in the discount rate	Low	none

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLANS

for the Region of Mazovian
Voivodeship (Mazovia Region)

Replacement of heating factors with
the installation of renewable energy
sources in Jablonna Lacki municipality

English version

prepared by
Mazovia Energy Agency (MAE)

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Energy efficiency in the private sector

Title: Replacement of heating factors with the installation of renewable energy sources in Jablonna Lacki municipality

1 Objective

The aim of the action plan is to improve the air quality in the municipality of Jablonna Lacki by reducing the emission of pollutants and greenhouse gases from households. The investment consists in exchanging heat sources from those with low efficiency for automatic boilers for biomass, oil, gasifying wood, electric and gas. The aim of the project is to increase the number of new ecological units of thermal energy production, increase the capacity of thermal energy production from renewable sources, increase the share of renewable energy sources in the overall energy balance of the Mazovian voivodship. The measure aims to increase the energy efficiency of 20 residential homes and reduce CO₂ and PM10 emissions to the atmosphere. The estimated annual drop is 255,9 Mg CO₂ / year.

1.1 Objective scope and targets values

For the needs of residential buildings, 12 new biomass boilers with a total installed capacity of 0.24MW will be installed in Jablonna Lacka, 6 gas boilers with a total installed power of 0.099 MW, 6 boilers for gasifying wood with installed capacity of 0.126 MW and 2 electric boilers with a total capacity 0.038 MW installed. In total, 26 boilers for various fuels with a total installed power of 0.503 MW will be installed. In the municipality of Jablonna Lacka, the area subject to a change in the heating method will amount to 4964 m² - including 2184 m² heated with biomass boilers, 950 m² heated with gas boilers, 1270 m² heated with boilers for gasifying wood and 560 m² heated with electric boilers. In addition to the replacement of boilers, the installation of 10 solar installations (solar collectors) with a total capacity of 0.046 MW and 15 photovoltaic installations with a total capacity of 0.065 MW is also planned. This gives a total of 0.111 MW of additional capacity for generating energy from renewable sources. The investment will be implemented in 2019-2022

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Area subject to change in the heating method	4964 m ²	technical documentation of heating devices; acceptance reports
Installed power of electricity and heat	0,614 MW	technical documentation of heating devices; acceptance reports
Number of units for generating thermal energy from RES	10 pc.	technical documentation of heating devices; acceptance reports
Number of units generating electricity generated from RES	15 pc.	technical documentation of heating devices; acceptance reports
The ability to generate electricity from renewable sources	0,065 MWe	technical documentation of heating devices; acceptance reports
The ability to generate heat from renewable sources	0,046 MWt	technical documentation of heating devices; acceptance reports
Thermal energy production from installations using renewable energy sources	20,4 MWh _t /year	The data will be obtained from heat energy meters

Electricity production from installations using renewable energy sources	66,74 MWhe/ year	The data will be obtained from electricity meters
Estimated annual reduction in CO ₂ emissions	255,9 tonnes of CO ₂ equivalent / year	technical documentation of heating devices; acceptance reports
Reduction of final energy consumption as a result of projects	808 383,3 GJ/year	technical documentation of heating devices; acceptance reports

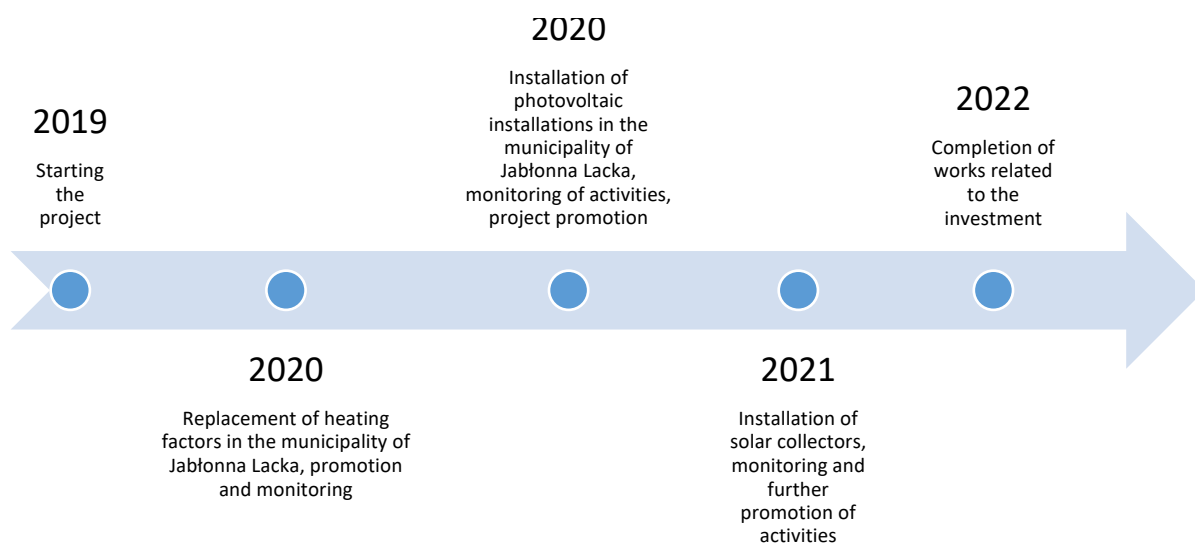
2 Implementation strategy

2.1 Step by step description

Steps and tasks foreseen during the implementation of the plan in the Korczew municipality:

1. Preparation of tender documentation - the purpose of this task is to prepare documentation in accordance with the Public Procurement Law and to correctly carry out the tender procedure along with the selection of the contractor.
2. Preparation of technical documentation for boilers that will be installed for the residents of the commune - as a result, construction and executive documents will be created. The task contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.
3. Replacement of heating factors - as part of the task there will be replacement of low efficiency heat sources (solid fuel central heating boilers) for automatic central heating boilers burning biomass, oil using gas and electric fuel.
4. Construction of photovoltaic installations - photovoltaic installations will be built as part of the task. Installations will be installed on the roofs of buildings.
5. Construction of a solar collector installation - solar collector installations will be built as part of the task. Installations will be installed on the roofs of buildings.
6. Investor's supervision - in order to conduct supervision, the entity / person to be entrusted with the investor's supervision will be selected. The supervision supervisor has to supervise the proper course and performance of modernization works.
7. Project promotion - the aim of this activity is to disseminate activities related to the promotion and dissemination of the project.

2.2 Time schedule



2.3 Budget and resources needed

Expected costs incurred with associated tasks (gross):

1. Replacement of heating factors - PLN 347,000, including:

Installation of biomass boilers - 170,000 PLN

Installation of gas boilers - PLN 92,000

Installation of boilers for gasifying wood - PLN 76,000

Installation of electric boilers - PLN 9,000

2. Installation of photovoltaic installations - PLN 281,000

3. Installation of solar collectors - 111 000 PLN

Together, all the tasks give a total exchange of heating factors in the municipality of Jabłonna Lacka in the amount of PLN 739,000

The project will be 80% co-financed if the application is approved by the decision-making body.

3 Collaboration with stakeholders

During the development of the Action Plan the main stakeholder was the Municipality of Jablonna Lacki, as well as people dealing with public utility buildings that will be thermomodernized.

The Korczew municipality is a partner entity that cooperates with the Applicant as part of the project

Until now, the executive team consisted of employees of the Jablonna Lacki municipality, ie the Applicants of the project, as well as cooperating companies supporting it in content-related matters, regarding ex-ante energy audits as well as the valuation of project costs.

Through promotional activities, educational activities and an increase in energy awareness of the municipality's inhabitants, the number of entities interested in taking part in the activity may increase.

In the future, significant participants of the project will be companies that develop technical documentation and construction of RES installations, which will be selected through an open tender. The subject / person involved in investor's supervision will be an important participant, necessary in the further phases of the project.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholders groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipality, Municipality Board	Preparation of the application regarding financing of planned activities and preparation of tender documents. The commune office will be responsible for the selection of the contractor, implementation of the planned activities and supervision of the	E-mail or telephone communication. Inter-municipal cooperation through meetings on planned activities and joint fundraising.

		investment	
Political decision-makers	Mayor of the municipality	Identifying the most advantageous source of financing, obtaining funds, securing funds in the commune budget	Management of the implementation process of the action plan and communication with residents as well as information and promotion activities carried out jointly with non-governmental organizations
Target groups	Residents of the municipality	Cooperation with the municipality by responding to surveys and determining the source of energy from RES that they are interested in.	Telephone communication and meetings in the municipality with persons responsible for the project. Participation as a beneficiary.
Groups supporting implementation, communication and promotion	<p>Volunteer Fire Department</p> <p>Association "Local Action Group - Crucible of the Bug Valley"</p> <p>Bug River Local Tourist Organization</p> <p>Agritourism farms</p> <p>Villages</p>	Actions to increase energy awareness of residents and interest of residents in activities for the implementation of low-emission economy	Disseminating good practices in the field of energy efficiency improvement and the use of renewable energy sources. Information, promotional and educational activities among the residents of the commune (children, youth and adults), as well as people visiting the commune

4 Monitoring Strategy

In the course of the project, the indicators determining the effectiveness of the implementation of investments are indicators of the achievement of the project objectives, as well as result indicators. These indicators clearly show how the investment progresses - the indicators of achieving the project's objectives, and what final results the investment had - the result indicators.

The person / entity responsible for investor's supervision (monitoring) is the person / entity that will be entrusted with these duties. The task is necessary due to the fact that the applicant does not have the appropriate know-how to perform such a task by himself. The supervision inspector is to watch over the proper implementation of works involving the construction of renewable energy installations.

The monitoring of activities and works related to the project will be continued for 3 years of the duration of the investment. It should be systematic.

Systematic verification of the progress of works is important in the smooth course of activities and implementation of the tasks set out in the Action Plan, because it gives us full insight into the current situation, which can allow us to react in situations when the implementation of actions will not be correct.

The parameters assessing the quality of the course of the investment, ie the indicators of achieving the project's objectives should be a determinant of how the Plan is being implemented. If the values resulting from such documents as "Reports of acceptance of works" or "Energy audits ex-post" do not equal those of the Action Plan, then the goals set in it must be redefined.

The monitoring person also has the task of confirming the works performed, and if problems arise, his duties are to immediately removed them.

5 Risk management

Risk	Probability of realising	Mitigation measure
Increase in maintenance costs	Medium	In order to minimize the risk, long-term contracts with suppliers are recommended that allow for a permanent reduction and maintenance of service prices.
Increase in the value of investment outlays - related to the potential increase in prices	Medium	In order to mitigate the risk, it is recommended to create a provision for other purposes and to prepare detailed tender documentation and delivery schedule
Change in the discount rate	Low	none

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLANS

for the Region of Mazovian
Voivodeship (Mazovia Region)

Sunny municipalities of East Mazovia -
solar energy in Korczew municipality

English version

prepared by
Mazovia Energy Agency (MAE)

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: 31.10.2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Share of renewable energy sources in overall energy production

Title: Sunny municipalities of East Mazovia - solar energy in Korczew municipality

1 Objective

The aim of the action plan is the installation of photovoltaic installations and solar collectors in the municipality of Korczew which is to increase the ability to produce renewable energy on farms and reduce the emission of atmospheric pollutants from conventional energy sources. The municipality has a large demand for energy, both thermal and electric. The use of renewable energy sources may help to satisfy them to some extent and also diversify its sources. This activity is to encourage the residents of the Korczew municipality to develop renewable energy in its area, and to disseminate it, which will contribute to the plans set in the municipality strategic documents. As a result of the measure, 208 RES installations will be created, which will allow generating energy in the amount of 402 MWh / year.

1.1 Objective scope and targets values

Within the municipality of Korczew, 72 photovoltaic installations will be installed on private facilities (46 on residential buildings, 26 outside residential buildings) and 1 on public facilities. The total number of PV installations will be 73. Installations of solar collectors (135 sets) will be installed on the roofs of private buildings. The total number of installations will be 208. The installation will also contribute in increasing the amount of energy produced from renewable energy sources, and also to reduce greenhouse gas emissions by 236.8 MgCO₂ / year. The implementation of the action also includes the publication of articles in the regional press and the preparation of an educational presentation on renewable energy. Promotional and educational activities will be spread over the duration of the investment. The investment is planned for 2019-2022.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Number of units generating heat from RES	135 pc.	Acceptance report of construction works
Number of units generating electricity from RES	73 pc.	Acceptance report of construction works
The ability to generate electricity from renewable sources	0,2184 MWe	internal documentation of the applicant (reports), technical specification of installed devices.
The ability to generate heat from renewable sources	0,3611 MWt	internal documentation of the applicant (reports), technical specification of installed devices.
Heat production from installations using renewable energy sources	184 MWht/year	electricity meters, technical specifications of installed devices, internal reports
Electricity production from installations using renewable energy sources	218 MWhe/year	electricity meters, technical specifications of installed devices, internal reports
Estimated annual reduction in CO ₂ emissions	236,8 tonnes of CO ₂ equivalent / year	post-completion documentation

2 Implementation strategy

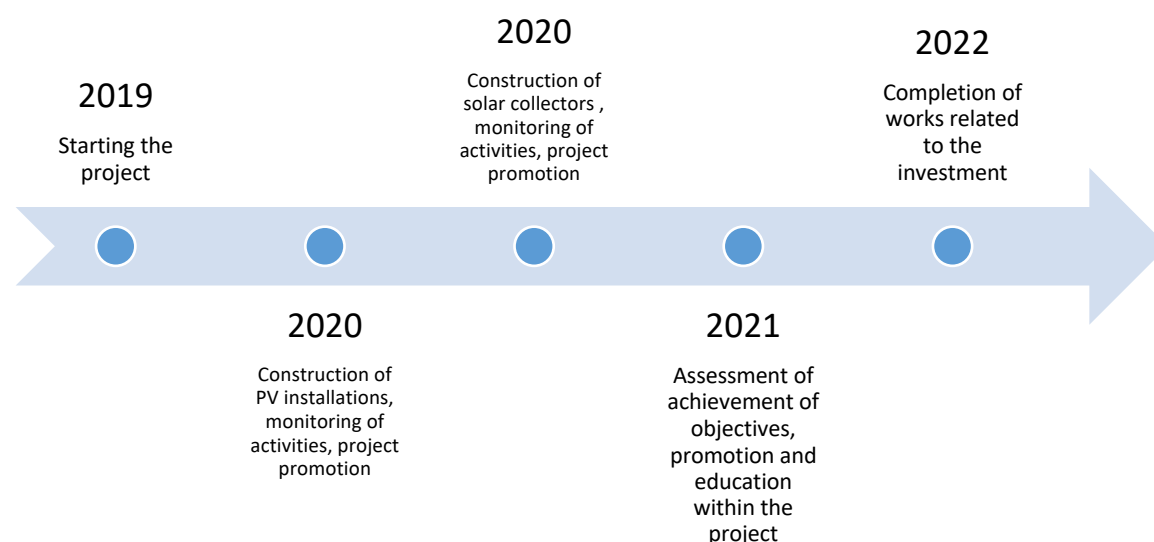
2.1 Step by step description

Steps and tasks foreseen during the implementation of the plan in the Korczew municipality:

1. Project preparation - the aim of this task is to evaluate and analyse the potential of the project, which is to support the decision-making process by objective and rational determination of its strengths and weaknesses and opportunities and threats related to it, resources that will be necessary to implement the project, and evaluation chance for his success
2. Photovoltaic installation project works - the purpose of this task is to develop technical documentation for photovoltaic installations. As a result, construction and executive documents for photovoltaic installations will be created. The Contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.
3. Installations of photovoltaic panels on residential buildings - installation of solar installations on residential buildings. The entity responsible for the task will be selected through an open tender.
4. Installation of photovoltaic panels outside residential buildings - installation of solar installations outside residential buildings. The entity responsible for the task will be selected through an open tender.
5. Installations of photovoltaic panels on public buildings - installation of solar installations on public buildings. The entity responsible for the task will be selected through an open tender.
6. Design work of solar collectors installation - the purpose of this task is to develop technical documentation for solar collector installations. As a result, construction and executive documents for solar installations will be created. The Contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.
7. Installations of solar collectors on residential buildings - installation of solar collectors on residential buildings. The entity responsible for the task will be selected through an open tender.
8. Project promotion and education - the aim of this activity is to disseminate activities related to the promotion and dissemination of the project.

9. Supervision over the implementation of the investment - in order to conduct the supervision, the entity / person to be entrusted with the investor's supervision will be selected. The supervisory inspector is to supervise the proper conduct and execution of construction works including the installation of collectors and photovoltaic installations.

2.2 Time schedule



2.3 Budget and resources needed

Expected costs incurred with associated tasks (gross):

1. Photovoltaic project works on residential buildings - PLN 33,000
2. Photovoltaic panel installations on residential buildings - PLN 710,000
3. Photovoltaic project works outside residential buildings - PLN 20,000
4. Photovoltaic panel installations outside residential buildings - PLN 486,000
5. Project works of solar installations on public buildings - PLN 6,000
6. Photovoltaic panel installations on public buildings - PLN 140,000
7. Design work of solar collector installations on residential buildings - 54 000 PLN
8. Installations of solar collectors on residential buildings - PLN 1 180 000

9. Investor's supervision - PLN 81,000

10. Promotion of the project - PLN 6,500

Together, all the tasks give the total cost of the project in the municipality of Korczew in the amount of PLN 2 716 500

The project will be 80% co-financed if the application is approved by the decision-making body.

3 Collaboration with stakeholders

During the development of the Action Plan, the main stakeholder was the residents of the Kotun municipality. Cooperation with the beneficiaries of the planned investment was the most important. The activities carried out during the course of the investment were coordinated with them, which installations will be created, which translates into the size and investment costs.

Until now, the executive team consisted of employees of the Kotun municipality, that is, the Applicants of the project, as well as cooperating enterprises supporting it in content-related matters, i.e. energy matters, financial analysis.

Partner institutions: Przesmyki, Paprotnia and Repki are partner entities that cooperate with the Applicant as part of the project.

Through promotional activities, educational activities and an increase in energy awareness of the municipality's inhabitants, the number of entities interested in taking part in the activity may increase.

In the future, significant participants of the project will be companies that develop technical documentation and construction of RES installations, which will be selected through an open tender. The subject / person involved in investor's supervision will be an important participant, necessary in the further phases of the project.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholders groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipality, Municipality Board	<p>Preparation of the application regarding financing of planned activities and preparation of tender documents.</p> <p>The commune office will be responsible for the selection of the contractor, implementation of the planned activities and supervision of the investment</p>	<p>E-mail or telephone communication.</p> <p>Inter-municipal cooperation through meetings on planned activities and joint fundraising.</p>
Political decision-makers	Mayor of the municipality	<p>Identifying the most advantageous source of financing, obtaining funds, securing funds in the commune budget</p>	<p>Management of the implementation process of the action plan and communication with residents as well as information and promotion activities carried out jointly with non-governmental organizations</p>
Target groups	Residents of the municipality	<p>Cooperation with the municipality by responding to surveys and determining the source of energy from RES that they are interested in.</p>	<p>Telephone communication and meetings in the municipality with persons responsible for the project.</p> <p>Participation as a beneficiary.</p>

Groups supporting implementation, communication and promotion	Volunteer Fire Department Association "Local Action Group - Crucible of the Bug Valley" Bug River Local Tourist Organization Agritourism farms UKS Tęcza Korczew Villages	Actions to increase energy awareness of residents and interest of residents in activities for the implementation of low-emission economy	Disseminating good practices in the field of energy efficiency improvement and the use of renewable energy sources. Information, promotional and educational activities among the residents of the commune (children, youth and adults), as well as people visiting the commune
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4 Monitoring Strategy

In the course of the project, the indicators determining the effectiveness of the implementation of investments are indicators of the achievement of the project objectives, as well as result indicators. These indicators clearly show how the investment progresses - the indicators of achieving the project's objectives, and what final results the investment had - the result indicators.

The person / entity responsible for investor's supervision (monitoring) is the person / entity that will be entrusted with these duties. The task is necessary due to the fact that the applicant does not have the appropriate know-how to perform such a task by himself. The supervision inspector is to watch over the proper implementation of works involving the construction of renewable energy installations.

The monitoring of activities and works related to the project will be continued for three years of the duration of the investment. It should be systematic.

Systematic verification of the progress of works is important in the smooth course of activities and implementation of the tasks set out in the Action Plan, because it gives us full insight into the current situation, which can allow us to react in situations when the implementation of actions will not be correct.

The parameters assessing the quality of the course of the investment, ie the indicators of achieving the project objectives should be a determinant of how the Plan is being implemented. If the values resulting from such documents as "Reports of acceptance of construction works" or "Annual reports of generated RES energy" do not equal those of the Action Plan, the goals set in it must be redefined.

The monitoring person also has the task of confirming the works performed, and if problems arise, his duties are to immediately removed them.

5 Risk management

Risk	Probability of realising	Mitigation measure
Increase in maintenance costs	Medium	In order to minimize the risk, long-term contracts with suppliers are recommended that allow for a permanent reduction and maintenance of service prices.
Increase in the value of investment outlays - related to the potential increase in prices	Medium	In order to mitigate the risk, it is recommended to create a provision for other purposes and to prepare detailed tender documentation and delivery schedule
Change in the discount rate	Low	none

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLANS

for the Region of Mazovian
Voivodeship (Mazovia Region)

Thermomodernization of public
buildings in Korczew municipality

English version

prepared by
Mazovia Energy Agency (MAE)

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: 31.10.2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Energy efficiency in the public sector

Title: Thermomodernization of public buildings in Korczew municipality

1 Objective

The aim of the action plan is to increase energy efficiency and reduce heat losses of 2 public buildings with a target demand for primary energy below 65 kWh / m² in the municipality of Korczew. The implementation of the project will reduce the need for heat in public buildings by implementing appropriate thermo-modernization improvements. These works will reduce the annual energy demand, reduce the operating costs of a public building, reduce greenhouse gas emissions, and improve the energy efficiency of a building.

1.1 Objective scope and targets values

Thermo-modernization works in buildings at the Municipality Office in Korczew will reduce the annual energy demand by 65 458.86 kWh, reducing operating costs by approx. PLN 24 531.85 / year. In addition, the goal is to achieve the environmental goal and reduce greenhouse gas emissions by 14.71 tonnes CO₂ equivalent. As a result of thermo-modernization works, the building envelope will obtain appropriate heat transfer coefficients and heat losses will be reduced, which will increase the comfort of building users. As a result of this work, the level of demand for non-renewable primary energy in the final state for the purposes of ventilation, heating and hot water preparation will be 68.85 kWh / (m² * year). In addition, a 5 kW photovoltaic installation will be installed on the public utility building. The investment will be implemented in 2019-2020.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Number of units generating electricity from RES	1 pc.	Report of acceptance of works; ex-post energy audit
Number of modernized buildings	2 pc.	Report of acceptance of works; ex-post energy audit
Estimated annual reduction in CO ₂ emissions	14,71 tonnes of CO ₂ equivalent / year	ex-post energy audit
Decrease in annual primary energy consumption in public buildings	65 459 kWh/ year	ex-post energy audit

2 Implementation strategy

2.1 Step by step description

Steps and tasks foreseen during the implementation of the plan in the Korczew municipality:

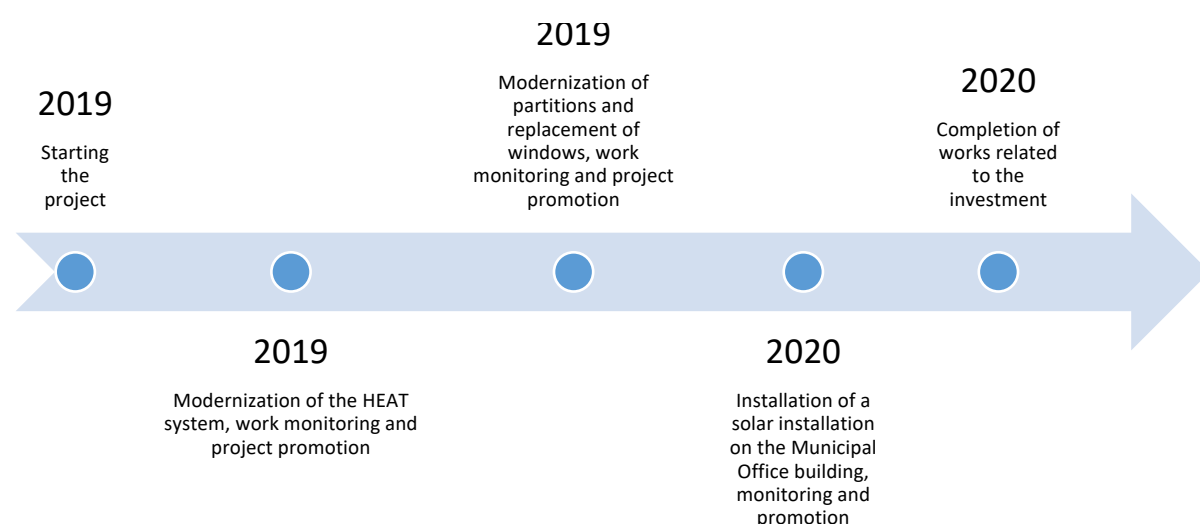
1. Project documentation - the aim of this task is to prepare project documentation and to prepare technical documentation and cost estimates.
2. Modernization of the heat system - the purpose of this task is to modernize the heating installation, replace radiators and install thermostatic valves.
3. Modernization of partitions with necessary electrical works - the scope of works related to this task includes insulation of the ceiling, internal walls, roof, walls of foundations, external walls and replacement of windows with new ones.

4. Installation of PV - within the scope of this task, the installation of PV on the roof of the Municipal Office building with a capacity of 5 kW.

5. Project promotion - the aim of this activity is to disseminate activities related to the promotion and dissemination of the project.

6. Investor's supervision - in order to conduct supervision, an entity / person will be chosen to be entrusted with investor's supervision duties. The supervision supervisor has to supervise the proper course and performance of modernization works. The tasks of the entity / person will include the management of the construction process and consultancy, verification of contractors, performance of inspection activities and monitoring of construction settlements.

2.2 Time schedule



2.3 Budget and resources needed

1. Project documentation - PLN 23,000

including:

- Project preparation - PLN 9,000
- Preparation of technical and cost documentation - PLN 12,000
- Other documentation costs - PLN 2,500

2. Thermomodernization - modernization of the c.o. - PLN 76,000

3. Modernization of partitions with necessary electrical works - PLN 390,000

Including:

- Thermo-modernization of partitions with the replacement of lighting fittings - PLN 266,000
- Other jobs - PLN 95,000
- Electrical installation - PLN 29,000

4. Installation of PV - 35 000 PLN

5. Promotion of the project - PLN 2,500

6. Investor's supervision over works - PLN 14,000

Together, all the tasks give the total cost of the project in the municipality of Korczew in the amount of PLN 540,500

The project will be 80% co-financed if the application is approved by the decision-making body.

3 Collaboration with stakeholders

During the development of the Action Plan the main stakeholder was the Municipality of Korczew, as well as people dealing with public utility buildings that will be thermomodernized.

Until now, the executive team consisted of employees of the Korczew municipality, ie the Applicants of the project, as well as cooperating companies supporting it in content-related matters, regarding ex-ante energy audits as well as the valuation of project costs.

Through promotional activities, educational activities and an increase in energy awareness of the municipality's inhabitants, the number of entities interested in taking part in the activity may increase.

In the future, significant participants of the project will be companies that develop technical documentation and construction of RES installations, which will be selected through an open tender. The subject / person involved in investor's supervision will be an important participant, necessary in the further phases of the project.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholders groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipality, Municipality Board	<p>Preparation of the application regarding financing of planned activities and preparation of tender documents.</p> <p>The commune office will be responsible for the selection of the contractor, implementation of the planned activities and supervision of the investment</p>	<p>E-mail or telephone communication.</p> <p>Inter-municipal cooperation through meetings on planned activities and joint fundraising.</p>
Political decision-makers	Mayor of the municipality	<p>Identifying the most advantageous source of financing, obtaining funds, securing funds in the commune budget</p>	<p>Management of the implementation process of the action plan and communication with residents as well as information and promotion activities carried out jointly with non-governmental organizations</p>
Target groups	Employees of branches in thermo-modernized buildings	<p>Cooperation with the municipality by responding to surveys and determining thermo-modernization works and a new source of heat that they are interested in.</p> <p>As installation users -</p>	<p>Telephone communication and meetings in the municipality with persons responsible for the project.</p> <p>Participation as a beneficiary.</p>

		owner supervision over the implementation of the task	
Groups supporting implementation, communication and promotion	Volunteer Fire Department Association "Local Action Group - Crucible of the Bug Valley" Bug River Local Tourist Organization Agritourism farms UKS Tęcza Korczew Villages	Actions to increase energy awareness of residents and interest of residents in activities for the implementation of low-emission economy	Disseminating good practices in the field of energy efficiency improvement and the use of renewable energy sources. Information, promotional and educational activities among the residents of the commune (children, youth and adults), as well as people visiting the commune

4 Monitoring Strategy

In the course of the project, the indicators determining the effectiveness of the implementation of investments are indicators of the achievement of the project objectives, as well as result indicators. These indicators clearly show how the investment progresses - the indicators of achieving the project's objectives, and what final results the investment had - the result indicators.

The person / entity responsible for investor's supervision (monitoring) is the person / entity that will be entrusted with these duties. The task is necessary due to the fact that the applicant does not have the appropriate know-how to perform such a task by himself. The supervision inspector is to watch over the proper implementation of works involving the construction of renewable energy installations.

The monitoring of activities and works related to the project will be continued for two years of the duration of the investment. It should be systematic.

Systematic verification of the progress of works is important in the smooth course of activities and implementation of the tasks set out in the Action Plan, because it gives us full insight into the current situation, which can allow us to react in situations when the implementation of actions will not be correct.

The parameters assessing the quality of the course of the investment, ie the indicators of achieving the project's objectives should be a determinant of how the Plan is being implemented. If the values resulting from such documents as "Reports of acceptance of works" or "Energy audits ex-post" do not equal those of the Action Plan, then the goals set in it must be redefined.

The monitoring person also has the task of confirming the works performed, and if problems arise, his duties are to immediately removed them.

5 Risk management

Risk	Probability of realising	Mitigation measure
Increase in maintenance costs	Medium	In order to minimize the risk, long-term contracts with suppliers are recommended that allow for a permanent reduction and maintenance of service prices.
Increase in the value of investment outlays - related to the potential increase in prices	Medium	In order to mitigate the risk, it is recommended to create a provision for other purposes and to prepare detailed tender documentation and delivery schedule
Change in the discount rate	Low	none

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLANS

for the Region of Mazovian
Voivodeship (Mazovia Region)

Replacement of heating devices with
the installation of renewable energy
sources in Korczew municipality

English version

prepared by
Mazovia Energy Agency (MAE)

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: 31.10.2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Energy efficiency in the private sector

Title: Replacement of heating devices with the installation of renewable energy sources in Korczew municipality

1 Objective

The aim of the action plan is to improve the air quality in the municipality of Korczew by reducing the emission of pollutants and greenhouse gases from households. The investment consists in exchanging heat sources from those with low efficiency for automatic boilers for biomass, oil, gasifying wood, electric and gas. The aim of the project is to increase the number of new ecological units of thermal energy production of the Mazovian voivodship. The measure aims to increase the energy efficiency of 80 residential homes and reduce CO₂ and PM10 emissions to the atmosphere. The estimated annual drop is 650 Mg CO₂ / year.

1.1 Objective scope and targets values

For the needs of residential buildings, 5 new biomass boilers will be installed in the Municipality of Korczew with a total installed capacity of 0.09MW, 59 gas boilers with a total installed power of 1,172 MW, 13 boilers for gasifying wood with an installed capacity of 0.245 MW and 3 oil boilers with a total installed power 0.057 MW. In total, 80 boilers for different fuels will be installed with a total installed capacity of 1.564 MW. In the Korczew municipality, the area subject to a change in the heating method will be 15 971.11 m² - including 815 m² heated with biomass boilers, 12,439.41 m² heated with gas boilers, 1801.7 m² heated with wood gasification boilers and 355 m² heated with oil boilers. As part of this project, 80 households will be involved. The investment will be implemented in 2019-2022.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Area subject to change in the heating method	15 411,11 m ²	technical documentation of heating devices; acceptance reports
Installed power of electricity and heat	1,18 MW	technical documentation of heating devices; acceptance reports
Estimated annual reduction in CO ₂ emissions	649,15 tonnes of CO ₂ equivalent / year	technical documentation of heating devices; acceptance reports
Reduction of final energy consumption as a result of projects	979751,5 GJ/ year	technical documentation of heating devices; acceptance reports

2 Implementation strategy

2.1 Step by step description

Steps and tasks foreseen during the implementation of the plan in the Korczew municipality:

1. Preparation of tender documentation - the purpose of this task is to prepare documentation in accordance with the Public Procurement Law and to correctly carry out the tender procedure along with the selection of the contractor.

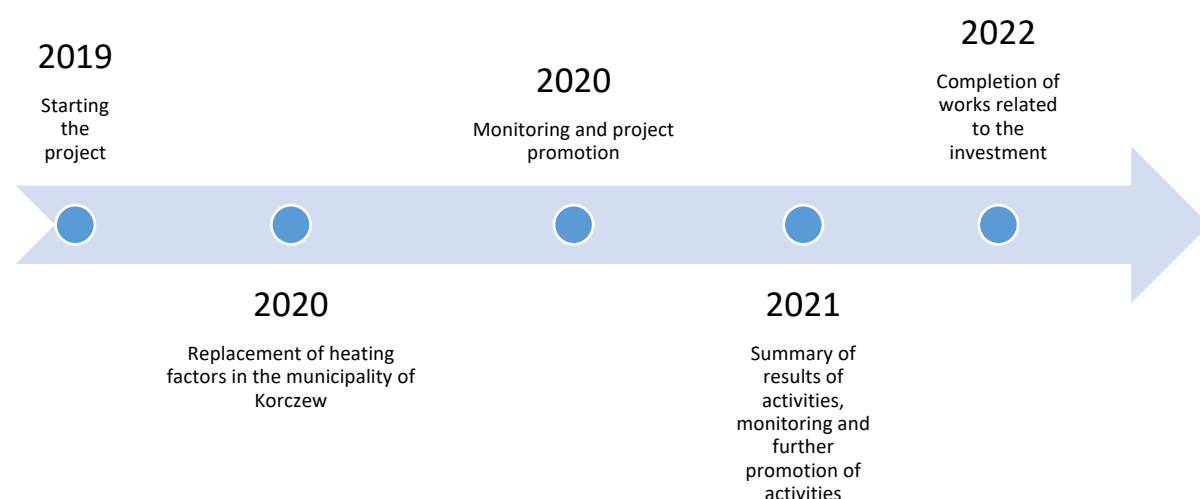
2. Preparation of technical documentation for boilers that will be installed for the residents of the commune - as a result, construction and executive documents will be created. The task contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.

3. Replacement of heating factors - as part of the task there will be replacement of low efficiency heat sources (solid fuel central heating boilers) for automatic central heating boilers burning biomass, oil using gas and electric fuel.

4. Investor's supervision - in order to conduct supervision, the entity / person to be entrusted with the investor's supervision will be selected. The supervision supervisor has to supervise the proper course and performance of modernization works.

5. Project promotion - the aim of this activity is to disseminate activities related to the promotion and dissemination of the project.

2.2 Time schedule



2.3 Budget and resources needed

Expected costs incurred with associated tasks (gross):

1. Replacement of heating factors - PLN 1 291 000, including:

Installation of biomass boilers - PLN 69,000

Installation of gas boilers - PLN 1,050,000

Installation of boilers for gasifying wood - PLN 162,000

Installation of oil boilers - PLN 10,000

Together, all the tasks give a total exchange of heating factors in the municipality of Korczew in the amount of PLN 1 291 000

3 Collaboration with stakeholders

During the development of the Action Plan the main stakeholder was the Municipality of Korczew, as well as people dealing with public utility buildings that will be thermomodernized.

The Jabłonna Lacka municipality is a partner entity that cooperates with the Applicant as part of the project

Until now, the executive team consisted of employees of the Korczew municipality, ie the Applicants of the project, as well as cooperating companies supporting it in content-related matters, regarding ex-ante energy audits as well as the valuation of project costs.

Through promotional activities, educational activities and an increase in energy awareness of the municipality's inhabitants, the number of entities interested in taking part in the activity may increase.

In the future, significant participants of the project will be companies that develop technical documentation and construction of RES installations, which will be selected through an open tender. The subject / person involved in investor's supervision will be an important participant, necessary in the further phases of the project.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholders groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipality, Municipality Board	<p>Preparation of the application regarding financing of planned activities and preparation of tender documents.</p> <p>The commune office will be responsible for the selection of the contractor, implementation of the planned activities and supervision of the investment</p>	<p>E-mail or telephone communication.</p> <p>Inter-municipal cooperation through meetings on planned activities and joint fundraising.</p>
Political decision-makers	Mayor of the municipality	<p>Identifying the most advantageous source of financing, obtaining funds, securing funds in the commune budget</p>	<p>Management of the implementation process of the action plan and communication with residents as well as information and promotion activities carried out jointly with non-governmental organizations</p>
Target groups	Residents of the municipality	<p>Cooperation with the municipality by responding to surveys and determining the source of energy from RES that they are interested in.</p>	<p>Telephone communication and meetings in the municipality with persons responsible for the project.</p> <p>Participation as a beneficiary.</p>

Groups supporting implementation, communication and promotion	Volunteer Fire Department Association "Local Action Group - Crucible of the Bug Valley" Bug River Local Tourist Organization Agritourism farms UKS Tęcza Korczew Villages	Actions to increase energy awareness of residents and interest of residents in activities for the implementation of low-emission economy	Disseminating good practices in the field of energy efficiency improvement and the use of renewable energy sources. Information, promotional and educational activities among the residents of the commune (children, youth and adults), as well as people visiting the commune
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4 Monitoring Strategy

In the course of the project, the indicators determining the effectiveness of the implementation of investments are indicators of the achievement of the project objectives, as well as result indicators. These indicators clearly show how the investment progresses - the indicators of achieving the project's objectives, and what final results the investment had - the result indicators.

The person / entity responsible for investor's supervision (monitoring) is the person / entity that will be entrusted with these duties. The task is necessary due to the fact that the applicant does not have the appropriate know-how to perform such a task by himself. The supervision inspector is to watch over the proper implementation of works involving the construction of renewable energy installations.

The monitoring of activities and works related to the project will be continued for 3 years of the duration of the investment. It should be systematic.

Systematic verification of the progress of works is important in the smooth course of activities and implementation of the tasks set out in the Action Plan, because it gives us full insight into the current situation, which can allow us to react in situations when the implementation of actions will not be correct.

The parameters assessing the quality of the course of the investment, ie the indicators of achieving the project's objectives should be a determinant of how the Plan is being implemented. If the values resulting from such documents as "Reports of acceptance of works" or "Energy audits ex-post" do not equal those of the Action Plan, then the goals set in it must be redefined.

The monitoring person also has the task of confirming the works performed, and if problems arise, his duties are to immediately removed them.

5 Risk management

Risk	Probability of realising	Mitigation measure
Increase in maintenance costs	Medium	In order to minimize the risk, long-term contracts with suppliers are recommended that allow for a permanent reduction and maintenance of service prices.
Increase in the value of investment outlays - related to the potential increase in prices	Medium	In order to mitigate the risk, it is recommended to create a provision for other purposes and to prepare detailed tender documentation and delivery schedule
Change in the discount rate	Low	none

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLANS

for the Region of Mazovian
Voivodeship (Mazovia Region)

Replacement of heating devices in
residential buildings in Stara Kornica
municipality

English version

prepared by
Mazovia Energy Agency (MAE)

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: 31.10.2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Energy efficiency in the private sector

Title: Replacement of heating devices in residential buildings in Stara Kornica municipality

1 Objective

The aim of the action plan is to improve air cleanliness in the Municipality of Stara Kornica by reducing pollution to the atmosphere and increasing the energy efficiency of household buildings. The investment consists in exchanging heat sources of low efficiency (solid fuel central heating boilers) for automatic biomass boilers, oil, gasified wood, electric and gas. This objective requires improving the efficiency of thermal energy use, reducing the costs of heating objects or introducing society into the ecological thinking path.

1.1 Objective scope and targets values

The aim of the project is to exchange heating devices in 45 buildings in the Stara Kornica municipality. The area subject to change in the heating method is about 6858 m². There will be installed 9 boilers for pellets heating the total area of 694.5 m², 6 oil boilers heating the surface of approx. 1230 m², 6 boilers for briquettes heating the household with an area of 615 m², 24 gas boilers heating the area of approximately 4,290 m². The estimated annual decrease in greenhouse gas emissions is 288 Mg CO₂ / year. The investment is planned to be implemented in 2019-2023

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Area subject to change in the heating method	6858 m ²	work acceptance report, ex-post energy audit
Installed power of electricity and heat	0,36 MW	work acceptance report, ex-post energy audit
Estimated annual reduction in CO ₂ emissions	288 tonnes of CO ₂ equivalent / year	ex-post energy audit
The amount of heat energy saved	376 089 GJ /year	ex-post energy audit

2 Implementation strategy

2.1 Step by step description

Steps and tasks foreseen during the implementation of the plan in the Korczew municipality:

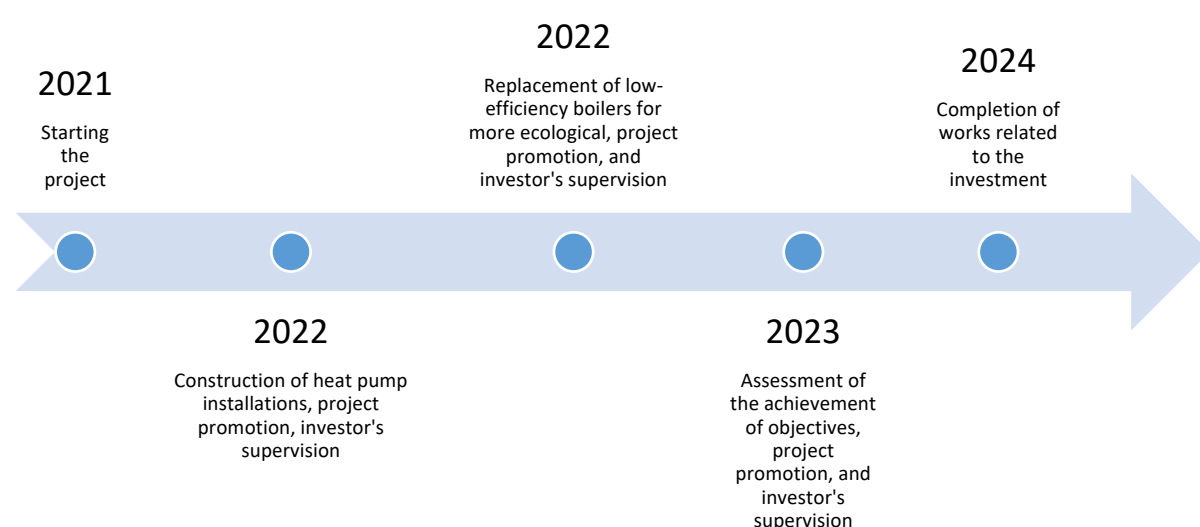
1. Preparation of tender documentation - the purpose of this task is to prepare documentation in accordance with the Public Procurement Law and to correctly carry out the tender procedure along with the selection of the contractor.
2. Preparation of technical documentation for boilers that will be installed for the residents of the commune - as a result, construction and executive documents will be created. The task contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.

3. Replacement of heating equipment in households - as a result of this measure, heat sources will be replaced from ineffective low-efficiency boilers, for pellet boilers, briquettes, gas and oil boilers.

4. Investor's supervision - in order to conduct supervision, the entity / person to be entrusted with the investor's supervision will be selected. The supervision supervisor has to supervise the proper course and performance of modernization works.

5. Project promotion - the aim of this activity is to disseminate activities related to the promotion and dissemination of the project.

2.2 Time schedule



2.3 Budget and resources needed

Expected costs incurred with associated tasks (gross):

1. Replacement of heating equipment in households in the municipality Stara Kornica - 667 500 PLN

Including:

- Installation of gas boilers - 432,000 PLN
- Installation of pellet boilers - PLN 126,000
- Installation of briquetting boilers - 90,000 PLN
- Installation of oil boilers - PLN 19,500

Together, all the tasks give the total cost of the project in the municipality of Stara Kornica in the amount of 667 500 PLN

The project will be 80% co-financed if the application is approved by the decision-making body.

3 Collaboration with stakeholders

During the development of the Action Plan the main stakeholder was the Municipality of Stara Kornica, as well as people dealing with public utility buildings that will be thermomodernized.

Until now, the executive team consisted of employees of the Stara Kornica municipality, ie the Applicants of the project, as well as cooperating companies supporting it in content-related matters, regarding ex-ante energy audits as well as the valuation of project costs.

Through promotional activities, educational activities and an increase in energy awareness of the municipality's inhabitants, the number of entities interested in taking part in the activity may increase.

In the future, significant participants of the project will be companies that develop technical documentation and construction of RES installations, which will be selected through an open tender. The subject / person involved in investor's supervision will be an important participant, necessary in the further phases of the project.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholders groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipality, Municipality Board	<p>Preparation of the application regarding financing of planned activities and preparation of tender documents.</p> <p>The commune office will be responsible for the selection of the contractor, implementation of the planned activities and supervision of the investment</p>	<p>E-mail or telephone communication.</p> <p>Inter-municipal cooperation through meetings on planned activities and joint fundraising.</p>
Political decision-makers	Mayor of the municipality	<p>Identifying the most advantageous source of financing, obtaining funds, securing funds in the commune budget</p>	<p>Management of the implementation process of the action plan and communication with residents as well as information and promotion activities carried out jointly with non-governmental organizations</p>
Target groups	Residents of the municipality	<p>Cooperation with the municipality by responding to surveys and determining the source of energy from RES that they are interested in.</p>	<p>Telephone communication and meetings in the municipality with persons responsible for the project.</p> <p>Participation as a beneficiary.</p>

<p>Groups supporting implementation, communication and promotion</p>	<p>Association "Local Action Group - Crucible of the Bug Valley"</p> <p>Bug River Local Tourist Organization</p> <p>Agritourism farms</p> <p>Villages</p> <p>Association of Rural Development "PARK"</p> <p>Association "Local Initiative - Common Goal"</p> <p>KREDA Association</p> <p>Cultural and Educational Association in Kobylany</p> <p>Volunteer Fire Department</p> <p>Student Sports Club "KORONA"</p>	<p>Actions to increase energy awareness of residents and interest of residents in activities for the implementation of low-emission economy</p>	<p>Disseminating good practices in the field of energy efficiency improvement and the use of renewable energy sources.</p> <p>Information, promotional and educational activities among the residents of the commune (children, youth and adults), as well as people visiting the commune</p>
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4 Monitoring Strategy

In the course of the project, the indicators determining the effectiveness of the implementation of investments are indicators of the achievement of the project objectives, as well as result indicators. These indicators clearly show how the investment progresses - the indicators of achieving the project's objectives, and what final results the investment had - the result indicators.

The person / entity responsible for investor's supervision (monitoring) is the person / entity that will be entrusted with these duties. The task is necessary due to the fact that the applicant does not have the appropriate know-how to perform such a task by himself.

The supervision inspector is to watch over the proper implementation of works involving the construction of renewable energy installations.

The monitoring of activities and works related to the project will be continued for 3 years of the duration of the investment. It should be systematic.

Systematic verification of the progress of works is important in the smooth course of activities and implementation of the tasks set out in the Action Plan, because it gives us full insight into the current situation, which can allow us to react in situations when the implementation of actions will not be correct.

The parameters assessing the quality of the course of the investment, ie the indicators of achieving the project's objectives should be a determinant of how the Plan is being implemented. If the values resulting from such documents as "Reports of acceptance of works" or "Energy audits ex-post" do not equal those of the Action Plan, then the goals set in it must be redefined.

The monitoring person also has the task of confirming the works performed, and if problems arise, his duties are to immediately removed them.

5 Risk management

Risk	Probability of realising	Mitigation measure
Increase in maintenance costs	Medium	In order to minimize the risk, long-term contracts with suppliers are recommended that allow for a permanent reduction and maintenance of service prices.
Increase in the value of investment outlays - related to the potential increase in prices	Medium	In order to mitigate the risk, it is recommended to create a provision for other purposes and to prepare detailed tender documentation and delivery schedule
Change in the discount rate	Low	none

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLANS

for the Region of Mazovian
Voivodeship (Mazovia Region)

Construction of renewable energy
installations in Kotun municipality

English version

prepared by
Mazovia Energy Agency (MAE)

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: 31.10.2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Share of renewable energy sources in overall energy production

Title: Construction of renewable energy installations in Kotun municipality

1 Objective

The aim of the action plan is to: increase the production of electricity and heat from renewable sources in the Kotun municipality, reduce the amount of greenhouse gases emitted to the atmosphere and diversify energy sources. The project is to bring the above results by installing photovoltaic installations and solar collectors in renewable energy sources, the production of electricity and heat will increase. This activity is to encourage the residents of the Kotun municipality to develop renewable energy in its area, which will contribute to the implementation of the plans established in the municipality's strategic documents. As a result of the project, 265 RES installations will be built with a total energy production amounting to 1287,6 MWh / year.

1.1 Objective scope and targets values

The project will be implemented in 28 towns of Kotun municipality: Albinów, Bojmie, Broszków, Chlewiska, Cisie-Zagrudzie, Gręzów, Jagodne, Kępa, Koszewnica, Kotuń, Łączka, Łęki, Marysin, Mingosy, Nowa Dąbrówka, Oleksin, Pieńki, Pieróg, Polaki, Rososz, Ryczycza, Sionna, Sosnowe, Trzemieszka, Wilczonek, Żdżar, Żeliszew Duży, Żeliszew Podkościelny.

As a result of this project, installations within the Kotun municipality will generate energy from renewable energy sources for 216 households and 4 public buildings. Most in the town of Kotuń - 55 farms. The project involves the creation of 94 photovoltaic installations (60 on residential buildings, 30 outside residential buildings, and 4 solar installations on public buildings), 146 solar collector installations, and 25 heat pump installations (24 land and 1 air). The installation of these installations will also contribute not only to increasing the amount of energy produced from renewable energy sources, but also to reducing greenhouse gas emissions by 431.14 MgCO₂ / year. In addition to the investment part, the activity also assumes a promotional and dissemination part, which will include informational and educational meetings in the commune concerning the use of renewable energy sources. The investment is planned for 2020-2023.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Number of units generating heat from RES	171 pc.	Acceptance report of construction works
Number of units generating electricity from RES	94 pc.	Acceptance report of construction works
The ability to generate electricity from renewable sources	0,43 MWe	Annual reports on generated energy from RES
The ability to generate heat from renewable sources	0,85 MWt	Annual reports on generated energy from RES
Heat production from installations using renewable energy sources	881,6 MWh/year	Annual reports on generated energy from RES
Electricity production from installations using renewable energy sources	406 MWhe/year	Annual reports on generated energy from RES
Estimated annual reduction in CO ₂ emissions	431,14 tonnes of CO ₂ equivalent / year	Annual reports on generated energy from RES

2 Implementation strategy

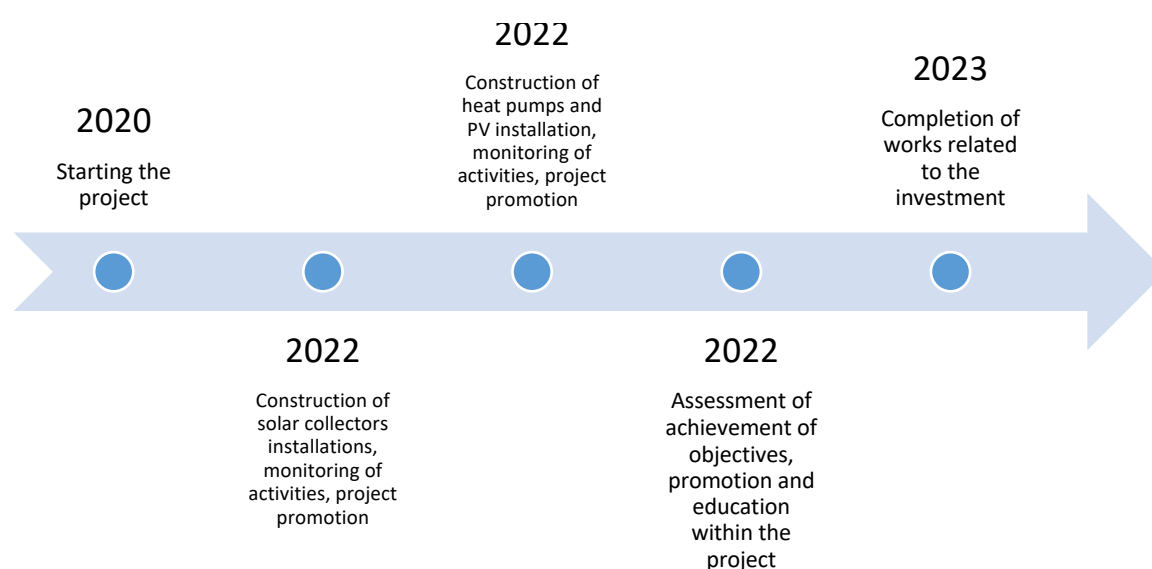
2.1 Step by step description

Steps and tasks foreseen during the implementation of the plan in the Kotun municipality:

1. Preparation of tender documentation - the purpose of this task is to prepare documentation in accordance with the Public Procurement Law and to correctly carry out the tender procedure along with the selection of the contractor. This will depend on checking the correctness of documentation, preparation of specimen specification of essential terms of the contract with attachments, preparation of a description of the subject of the order, conditions of participation of contractors in the procedure, criteria based on which offers will be evaluated and the contract template. In addition, the scope of this task will also include the obligation to prepare responses on behalf of the ordering party, to represent him, as well as to verify offers, review them and recommend a suitable offer to the contracting authority.
2. Preparation of technical documentation for the installation of solar collectors - as a result, building and executive documents for solar installations will be created. The task contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.
3. Construction of a solar collector installation - as a result of this task solar collector installations will be made. The entity responsible for the task will be selected through an open tender.
4. Preparation of technical documentation for air pump heat pumps - as a result a set of building and executive documents for the installation of an air heat pump will be created. The task contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.
5. Construction of air pump heat pumps - as a result of this task the installation of an air heat pump will be performed. The entity responsible for the task will be selected through an open tender.
6. Preparation of technical documentation for the installation of ground heat pumps - as a result sets of construction and executive documents for the installation of ground heat pumps will be created. The task contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.
7. Construction of ground source heat pump installations - as a result of this task, ground heat pump installations will be performed. The entity responsible for the task will be selected through an open tender.

8. Preparation of technical documentation for the photovoltaic installation - as a result, documents for construction and executive photovoltaic installations will be created. The task contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.
9. Construction of photovoltaic installation - photovoltaic installations will be carried out as a result of this task. The entity responsible for the task will be selected through an open tender.
10. Investor's supervision - in order to conduct supervision, the entity / person to be entrusted with the investor's supervision will be selected. The supervisory inspector is to supervise the proper conduct and execution of construction works including the implementation of photovoltaic installations.
11. Project promotion - the aim of this activity is to disseminate activities related to the promotion and dissemination of the project.

2.2 Time schedule



2.3 Budget and resources needed

Expected costs incurred related to given tasks (gross):

1. Preparation of tender documentation - PLN 16,500
2. Preparation of technical documentation for the installation of solar collectors - PLN 72 000

3. Construction of a solar collector installation on residential buildings - PLN 510,000
4. Construction of solar collectors (outside residential buildings) - PLN 86,000
5. Preparation of technical documentation for air pump heat pumps - PLN 600
6. Construction of air pump heat pumps - PLN 12,000
7. Preparation of technical documentation for ground heat pumps - PLN 45,000
8. Construction of ground heat pump installations (works in the building) - PLN 485,000
9. Construction of ground heat pump installations (boreholes) - 552,000 PLN
10. Preparation of photovoltaic installation documentation - PLN 9,000
11. Construction of a photovoltaic installation on residential buildings - PLN 1,235,000
12. Construction of a photovoltaic installation (outside residential buildings) - PLN 1,001,000
13. Preparation of photovoltaic system documentation for public utility buildings - PLN 7,000
14. Construction of a photovoltaic installation for public utility buildings - PLN 163,000
15. Investor's supervision - PLN 57,000
16. Promotion of the project - PLN 23,000

Together, all the tasks give the total cost of the project - in the amount of PLN 5,362,100

The project will be 80% co-financed if the application is approved by the decision-making body.

3 Collaboration with stakeholders

During the development of the Action Plan, the main stakeholder was the residents of the Kotun municipality. Cooperation with the beneficiaries of the planned investment was the most important. The activities carried out during the course of the investment were coordinated with them, which installations will be created, which translates into the size and investment costs.

Until now, the executive team consisted of employees of the Kotun municipality, that is, the Applicants of the project, as well as cooperating enterprises supporting it in content-related matters, i.e. energy matters, financial analysis.

Partner institutions: Wodymie, Domanice and Skorzec are partner entities that cooperate with the Applicant as part of the project.

Through promotional activities, educational activities and an increase in energy awareness of the municipality's inhabitants, the number of entities interested in taking part in the activity may increase.

In the future, significant participants of the project will be companies that develop technical documentation and construction of RES installations, which will be selected through an open tender. The subject / person involved in investor's supervision will be an important participant, necessary in the further phases of the project.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholders groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipality, Municipality Board	<p>Preparation of the application regarding financing of planned activities and preparation of tender documents.</p> <p>The commune office will be responsible for the selection of the contractor, implementation of the planned activities and supervision of the investment</p>	<p>E-mail or telephone communication.</p> <p>Inter-municipal cooperation through meetings on planned activities and joint fundraising.</p>
Political decision-makers	Mayor of the municipality	<p>Identifying the most advantageous source of financing, obtaining funds, securing funds in the commune budget</p>	<p>Management of the implementation process of the action plan and communication with residents as well as information and promotion activities carried out jointly with non-governmental organizations</p>

Target groups	Residents of the municipality	Cooperation with the municipality by responding to surveys and determining the source of energy from RES that they are interested in.	Telephone communication and meetings in the municipality with persons responsible for the project. Participation as a beneficiary.
Groups supporting implementation, communication and promotion	<p>Volunteer Fire Department</p> <p>Association "Local Action Group of the Siedlce Powiat"</p> <p>Agritourism farms</p> <p>Villages</p>	<p>Actions to increase energy awareness of residents and interest of residents in activities for the implementation of low-emission economy</p>	<p>Disseminating good practices in the field of energy efficiency improvement and the use of renewable energy sources.</p> <p>Information, promotional and educational activities among the residents of the commune (children, youth and adults), as well as people visiting the commune</p>

4 Monitoring Strategy

In the course of the project, the indicators determining the effectiveness of the implementation of investments are indicators of the achievement of the project objectives, as well as result indicators. These indicators clearly show how the investment progresses - the indicators of achieving the project's objectives, and what final results the investment had - the result indicators.

The person / entity responsible for investor's supervision (monitoring) is the person / entity that will be entrusted with these duties. The task is necessary due to the fact that the applicant does not have the appropriate know-how to perform such a task by himself. The supervision inspector is to watch over the proper implementation of works involving the construction of renewable energy installations.

The monitoring of activities and works related to the project will be continued for three years of the duration of the investment. It should be systematic.

Systematic verification of the progress of works is important in the smooth course of activities and implementation of the tasks set out in the Action Plan, because it gives us

full insight into the current situation, which can allow us to react in situations when the implementation of actions will not be correct.

The parameters assessing the quality of the course of the investment, ie the indicators of achieving the project objectives should be a determinant of how the Plan is being implemented. If the values resulting from such documents as "Reports of acceptance of construction works" or "Annual reports of generated RES energy" do not equal those of the Action Plan, the goals set in it must be redefined.

The monitoring person also has the task of confirming the works performed, and if problems arise, his duties are to immediately removed them.

5 Risk management

Risk	Probability of realising	Mitigation measure
Increase in maintenance costs	Medium	In order to minimize the risk, long-term contracts with suppliers are recommended that allow for a permanent reduction and maintenance of service prices.
Increase in the value of investment outlays - related to the potential increase in prices	Medium	In order to mitigate the risk, it is recommended to create a provision for other purposes and to prepare detailed tender documentation and delivery schedule
Change in the discount rate	Low	none

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLANS

for the Region of Mazovian
Voivodeship (Mazovia Region)

Thermomodernization of public
buildings in municipality of Kotun

English version

prepared by
Mazovia Energy Agency (MAE)

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: 31.10.2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Energy efficiency in the public sector

Title: Thermomodernization of public buildings in municipality of Kotun

1 Objective

The aim of the action plan is to improve the purity of air in the Kotuń Municipality by reducing pollution to the atmosphere and increasing the energy efficiency of buildings. This objective requires improving the efficiency of thermal energy use, reducing the heating costs of facilities, using energy from renewable sources, improving the conditions of use of public facilities or introducing society into the ecological thinking path. To this end, the project will first carry out energy audits, investor cost estimates, and on their basis thermo-modernization of selected public buildings.

1.1 Objective scope and targets values

As a result of the implementation of the action 5 public buildings, with a total cubic capacity of 7666 m³, will be subjected to thermo-modernization works. As a result of the thermo-modernization works, 500.64 MWh / a year of energy will be saved. The goal of the project is achievable within the assumed scope and scale. The applicant will provide adequate financial and organizational resources, thanks to which the implementation of the assumed investment will proceed as planned. Thermo-modernization works will be carried out in the buildings of Primary Schools in the municipality of Kotuń, which are located in Koszewnica and Cisie-Zagrudzie. The Elementary School in Koszewnica consists of two buildings with a total usable area of 575 m², while the School in Cisiu-Zagrudz consists of three buildings with a total usable area of 965.91 m². Energy audits indicate that the project implementation will contribute to increasing the annual energy efficiency of public buildings for final energy by about 80%. There will be a reduction in the amount of greenhouse gas emissions by about 50%. The investment is planned to be implemented in 2019-2021.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Number of units generating heat from RES	2 pc.	Report of acceptance of works, ex-post energy audit
Number of units generating electricity from RES	5 pc.	Report of acceptance of works, ex-post energy audit
Usable area of buildings subjected to thermo-modernization	1540,91 m ²	Report of acceptance of works
The ability to generate heat from renewable sources	0,12 MWt	ex-post energy audit
The amount of heat energy saved	2 259,90 GJ/year	ex-post energy audit
Heat production from installations using renewable energy sources	59,38 MWh _t /year	ex-post energy audit
Estimated annual reduction in CO ₂ emissions	111,60 tonnes of CO ₂ equivalent / year	ex-post energy audit
Reduction of final energy consumption	2 192,25 GJ/year	ex-post energy audit
Decrease in annual primary energy consumption in public buildings	500 640,00 kWh/ year	ex-post energy audit

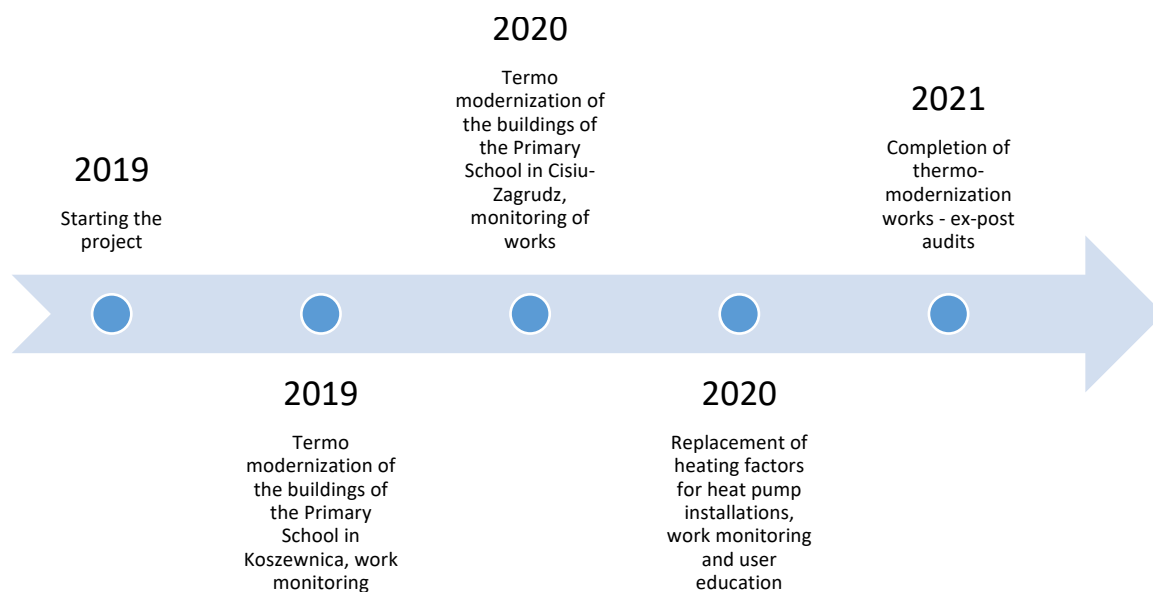
2 Implementation strategy

2.1 Step by step description

Steps and tasks foreseen during the implementation of the plan in the Kotun municipality:

1. Preparation of tender documentation - the purpose of this task is to prepare documentation in line with the Public Procurement Law and to properly carry out the tender procedure together with the contractor selecting the thermo-modernization undertaking and the entity that will replace the heat source.
2. Thermomodernization of buildings being part of the Primary School in Koszewnica- the scope of the works includes the performance of thermomodernization works in public building with a total usable area of 575 m².
3. Installation of a heat pump as the main source of heat with a capacity of 42.8 kW in a public building - Primary School in Koszewnica
4. Thermomodernization of buildings being part of the Primary School in Cisiu-Zagrudziu - the scope of the works includes the performance of thermomodernization works in public building with a total usable area of 965,91 m²
5. Installation of a heat pump as the main source of heat in a public building - Primary School in Cisiu-Zagrudz
6. Performing ex-post audits in thermo-modernized public buildings
8. Project promotion and education - the aim of this activity is to disseminate activities related to the promotion and dissemination of the project, as well as work aimed at providing information on RES installations for households, information on funding opportunities, etc.

2.2 Time schedule



2.3 Budget and resources needed

Expected costs incurred related to given tasks (gross):

1. Thermal modernization of the School buildings in Koszewnica - PLN 2 490 500

including:

- Thermo-modernization of the roof - PLN 290,000
- Wall elevation - PLN 115,000
- Window and door woodwork - PLN 25,000
- Warming of the floor - 180,000 PLN
- Foundation insulation - PLN 19,000
- Internal sanitary installations - disassembly works - PLN 1,500
- CO installation - 56 000 PLN
- Floor installation - PLN 57,000
- Technological heat installation - 59 000 PLN

- Boiler room (installation + heat pump) - PLN 234,000
- Ventilation - PLN 242,000
- Electrical installations (disassembly + new fittings) - PLN 67,000
- External installations - wells - 250,000 PLN
- Promotion - PLN 2,500
- Construction works - demolition works - 59 000 PLN
- Adaptation works - PLN 230,000
- Demolition of the chalet - PLN 31,000
- Land development - PLN 112,000
- Water connection - 8000 PLN
- Internal sanitary installations - 250,000 PLN
- Electrical installations - PLN 86,000
- Sewage treatment plant - PLN 113,000
- Ex-post audit - PLN 3,500

2. Thermal modernization of the buildings of the School in Cisiu-Zagrudz - PLN 3,341,000

including:

- Thermo-modernization of the roof - PLN 218,000
- Wall elevation - PLN 236,000
- Window and door woodwork - 37 000 PLN
- Warming of the floor - PLN 197,000
- Foundation insulation - PLN 21,000
- Internal sanitary installations - disassembly works - PLN 14,000
- CO installation - 143 000 PLN
- Floor installation - 59 000 PLN
- Technological heat installation - PLN 122,000
- Boiler room (installation + heat pump) - 358 000 PLN

- Ventilation - 250,000 PLN
 - Electrical installations (disassembly + new fittings) - PLN 115,000
 - External installations - wells - PLN 448,000
 - Promotion - PLN 2,500
 - Construction works - demolition works - PLN 69,000
 - Adaptation works - PLN 275,000
 - Demolition of the chalet - PLN 31,000
 - Land development - PLN 129,000
 - Water connection - PLN 36,000
 - Internal sanitary installations - PLN 325,000
 - Electrical installations - 134,000 PLN
 - Sewage treatment plant - PLN 118,000
 - Ex-post audit - PLN 3,500
3. Investor's supervision - School in Koszewnica - PLN 25,000
4. Investor's supervision - School in Cisiu-Zagrudz - PLN 34,000

Together, all the tasks give the total cost of the project in the amount of 5 890 500 PLN

The project will be 80% co-financed if the application is approved by the decision-making body.

3 Collaboration with stakeholders

During the development of the Action Plan the main stakeholder was the Municipality of Kotuń, as well as people dealing with public utility buildings that will be thermomodernized.

Until now, the executive team consisted of employees of the Kotuń municipality, ie the Applicants of the project, as well as cooperating companies supporting it in content-related matters, regarding ex-ante energy audits as well as the valuation of project costs.

Through promotional activities, educational activities and an increase in energy awareness of the municipality's inhabitants, the number of entities interested in taking part in the activity may increase.

In the future, significant participants of the project will be companies that develop technical documentation and construction of RES installations, which will be selected through an open tender. The subject / person involved in investor's supervision will be an important participant, necessary in the further phases of the project.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholders groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipality, Municipality Board	<p>Preparation of the application regarding financing of planned activities and preparation of tender documents.</p> <p>The commune office will be responsible for the selection of the contractor, implementation of the planned activities and supervision of the investment</p>	<p>E-mail or telephone communication.</p> <p>Inter-municipal cooperation through meetings on planned activities and joint fundraising.</p>
Political decision-makers	Mayor of the municipality	<p>Identifying the most advantageous source of financing, obtaining funds, securing funds in the commune budget</p>	<p>Management of the implementation process of the action plan and communication with residents as well as information and promotion activities carried out jointly with non-governmental organizations</p>

Target groups	Employees of branches in thermo-modernized buildings	Cooperation with the municipality by responding to surveys and determining thermo-modernization works and a new source of heat that they are interested in. As installation users - owner supervision over the implementation of the task	Telephone communication and meetings in the municipality with persons responsible for the project. Participation as a beneficiary.
Groups supporting implementation, communication and promotion	Volunteer Fire Department Association "Local Action Group of the Siedlce Powiat" Agritourism farms Villages	Actions to increase energy awareness of residents and interest of residents in activities for the implementation of low-emission economy	Disseminating good practices in the field of energy efficiency improvement and the use of renewable energy sources. Information, promotional and educational activities among the residents of the commune (children, youth and adults), as well as people visiting the commune

4 Monitoring Strategy

In the course of the project, the indicators determining the effectiveness of the implementation of investments are indicators of the achievement of the project objectives, as well as result indicators. These indicators clearly show how the investment progresses - the indicators of achieving the project's objectives, and what final results the investment had - the result indicators.

The person / entity responsible for investor's supervision (monitoring) is the person / entity that will be entrusted with these duties. The task is necessary due to the fact that the applicant does not have the appropriate know-how to perform such a task by himself.

The supervision inspector is to watch over the proper implementation of works involving the construction of renewable energy installations.

The monitoring of activities and works related to the project will be continued for two years of the duration of the investment. It should be systematic.

Systematic verification of the progress of works is important in the smooth course of activities and implementation of the tasks set out in the Action Plan, because it gives us full insight into the current situation, which can allow us to react in situations when the implementation of actions will not be correct.

The parameters assessing the quality of the course of the investment, ie the indicators of achieving the project's objectives should be a determinant of how the Plan is being implemented. If the values resulting from such documents as "Reports of acceptance of works" or "Energy audits ex-post" do not equal those of the Action Plan, then the goals set in it must be redefined.

The monitoring person also has the task of confirming the works performed, and if problems arise, his duties are to immediately removed them.

5 Risk management

Risk	Probability of realising	Mitigation measure
Increase in maintenance costs	Medium	In order to minimize the risk, long-term contracts with suppliers are recommended that allow for a permanent reduction and maintenance of service prices.
Increase in the value of investment outlays - related to the potential increase in prices	Medium	In order to mitigate the risk, it is recommended to create a provision for other purposes and to prepare detailed tender documentation and delivery schedule
Change in the discount rate	Low	none

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLANS

for the Region of Mazovian
Voivodeship (Mazovia Region)

Construction of renewable energy
installations in Mokobody municipality

English version

prepared by
Mazovia Energy Agency (MAE)

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: 31.10.2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Share of renewable energy sources in overall energy production

Title: Construction of renewable energy installations in Mokobody municipality

1 Objective

The aim of the action plan is to: increase the production of electricity from renewable sources in the Mokobody municipality, reduce the amount of greenhouse gases emitted to the atmosphere and diversify energy sources. The project is to bring the above results by installing PV and solar collectors in households. Thanks to the use of renewable energy sources, the production of electricity and heat will increase. This activity is also intended to encourage the residents of the municipality to develop further renewable energy in its area, which will contribute to the implementation of the plans established in the municipality's strategic documents. As a result of the project, 228 RES installations will be built with a total energy production of 890 MWh / year.

1.1 Objective scope and targets values

The action will be implemented in 24 localities of the Mokobody municipality: Bale, Dąbrowa, Kapuściaki, Kisielany-Kuce, Kisielany-Żmichy, Księżopole-Jałmużny, Księżopole-Smolaki, Męczyn, Męczyn-Kolonia, Mokobody, Niwiski, Osiny Dolne, Osiny Górne, Pieńki, Skupie, Świniary, Wesota, Wólka Żukowska, Wyłazy, Zaliwie-Brzozówka, Zaliwie-Piegawki, Zemty i Ziomaki.

As a result of the implementation of the operation in the Mokobody municipality, installations producing energy from renewable energy sources will be created in 208 households. The project assumes the establishment of 46 photovoltaic installations, 168 installations of solar collectors, as well as 14 heat pump installations (13 ground and 1 air). The installation will also contribute in increasing the amount of energy produced from renewable energy sources, but also to reducing greenhouse gas emissions by 247.62 MgCO₂ / year. In addition to the investment part, the project also includes a promotional, dissemination and educational part, within which informational and educational meetings will be organized in the municipality on the use of renewable energy sources. The investment is planned for 2020-2023.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Number of units generating heat from RES	182 pc.	Acceptance report of construction works
Number of units generating electricity from RES	46 pc.	Acceptance report of construction works
The ability to generate electricity from renewable sources	0,2059 MWe	Annual reports on generated energy from RES
The ability to generate heat from renewable sources	0,7742 MWt	Annual reports on generated energy from RES
Electricity production from installations using renewable energy sources	206 MWhe/year	Annual reports on generated energy from RES
Heat production from installations using renewable energy sources	684 MWht/year	Annual reports on generated energy from RES
Estimated annual reduction in CO ₂ emissions	247,62 tonnes of CO ₂ equivalent / year	Annual reports on generated energy from RES

2 Implementation strategy

2.1 Step by step description

Steps and tasks foreseen during the implementation of the plan in the Mokobody municipality:

1. Preparation of tender documentation - the purpose of this task is to prepare documentation in accordance with the Public Procurement Law and to correctly carry out the tender procedure along with the selection of the contractor. This will depend on checking the correctness of documentation, preparation of specimen specification of essential terms of the contract with attachments, preparation of a description of the subject of the order, conditions of participation of contractors in the procedure, criteria based on which offers will be evaluated and the contract template. In addition, the scope of this task will also include the obligation to prepare responses on behalf of the ordering party, to represent him, as well as to verify offers, review them and recommend a suitable offer to the contracting authority.
2. Preparation of technical documentation for the installation of solar collectors for the residents of the commune - as a result, building and executive documents for solar installations will be created. The task contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.
3. Construction of a solar collector installation - as a result of this task solar collector installations will be made. The entity responsible for the task will be selected through an open tender.
4. Preparation of technical documentation for the installation of air heat pumps - as a result a set of construction and executive documents for the installation of an air heat pump will be created. The task contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.
5. Construction of air pump heat pumps - as a result of this task the installation of an air heat pump will be performed. The entity responsible for the task will be selected through an open tender.
6. Preparation of technical documentation for ground heat pump installations - as a result sets of construction and executive documents for the installation of ground heat pumps will be created. The task contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.

7. Construction of ground heat pump installations - as a result of this task, ground heat pump installations will be performed. The entity responsible for the task will be selected through an open tender.

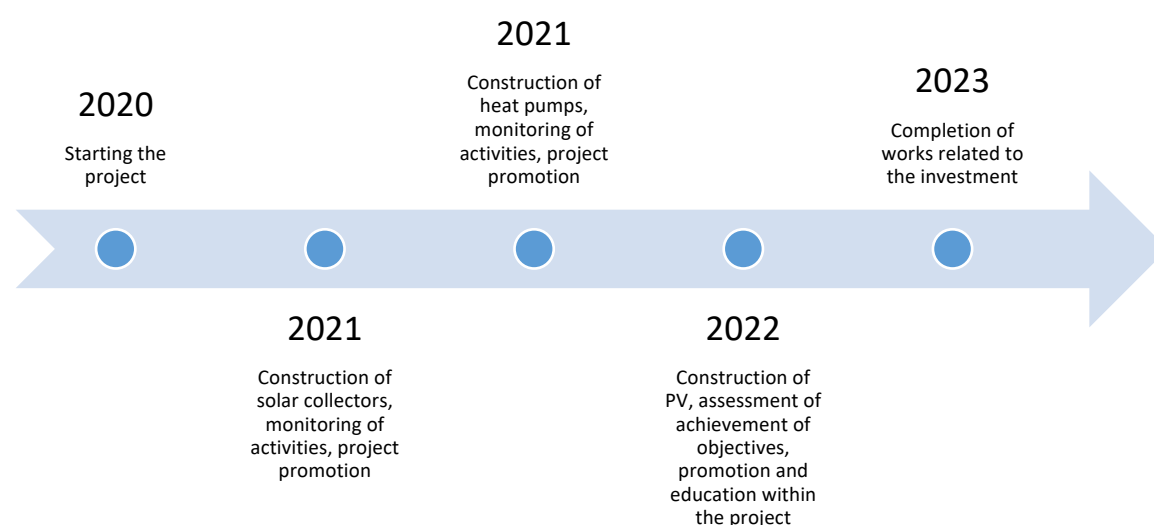
8. Preparation of technical documentation for photovoltaic - as a result, construction and executive documents for photovoltaic installations will be created. The task contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.

9. Construction of photovoltaic installation - photovoltaic installations will be performed as a result of this task. The entity responsible for the task will be selected through an open tender.

10. Investor's supervision - in order to conduct supervision, an entity / person will be chosen to be entrusted with investor's supervision duties. The supervision supervisor is to supervise the proper course and execution of construction works including the installation of collectors, photovoltaic installations, and heat pump installations.

11. Project promotion - the aim of this activity is to disseminate activities related to the promotion and dissemination of the project.

2.2 Time schedule



2.3 Budget and resources needed

Expected costs incurred related to given tasks (gross):

1. Preparation of tender documentation - PLN 9,500

2. Preparation of technical documentation for the installation of solar collectors - PLN 77 000
3. Construction of solar collector installations on residential buildings - PLN 1 630 000
4. Construction of solar collector installations (outside residential buildings) - PLN 52,000
5. Preparation of technical documentation for air pump heat pumps - PLN 1,500
6. Construction of air pump heat pumps - PLN 24,000
7. Preparation of technical documentation for ground heat pumps - PLN 24,000
8. Construction of ground heat pump installations (works in the building) - PLN 263,000
9. Construction of ground heat pump installations (boreholes) - 300,000 PLN
10. Preparation of photovoltaic installation documentation - PLN 52,000
11. Construction of a photovoltaic installation on residential buildings - PLN 682,000
12. Construction of a photovoltaic installation (outside residential buildings) - PLN 510,000
13. Investor's supervision - PLN 36,000
14. Promotion of the project - PLN 14,000

Together, all the tasks give the total cost of the project in the municipality of Mokobody in the amount of PLN 3 675 000

The project will be 80% co-financed if the application is approved by the decision-making body.

3 Collaboration with stakeholders

During the development of the Action Plan, the main stakeholder was the residents of the Mokobody municipality. Cooperation with the beneficiaries of the planned investment was the most important. The activities carried out during the course of the investment were coordinated with them, which installations will be created, which translates into the size and investment costs.

Until now, the executive team consisted of employees of the Mokobody Municipality, or the Applicants of the project, as well as cooperating companies supporting it in content-related matters, i.e. energy matters, financial analysis.

Partner institutions: Kotuń, Suchożebry and Wodynie are partner entities that cooperate with the Applicant as part of the project.

Through promotional activities, educational activities and an increase in energy awareness of the municipality's inhabitants, the number of entities interested in taking part in the activity may increase.

In the future, significant participants of the project will be companies that develop technical documentation and construction of RES installations, which will be selected through an open tender. The subject / person involved in investor's supervision will be an important participant, necessary in the further phases of the project.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholders groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipality, Municipality Board	<p>Preparation of the application regarding financing of planned activities and preparation of tender documents.</p> <p>The commune office will be responsible for the selection of the contractor, implementation of the planned activities and supervision of the investment</p>	<p>E-mail or telephone communication.</p> <p>Inter-municipal cooperation through meetings on planned activities and joint fundraising.</p>
Political decision-makers	Mayor of the municipality	<p>Identifying the most advantageous source of financing, obtaining funds, securing funds in the commune budget</p>	<p>Management of the implementation process of the action plan and communication with residents as well as information and promotion activities carried out jointly with non-governmental organizations</p>

Target groups	Residents of the municipality	Cooperation with the municipality by responding to surveys and determining the source of energy from RES that they are interested in.	Telephone communication and meetings in the municipality with persons responsible for the project. Participation as a beneficiary.
Groups supporting implementation, communication and promotion	Volunteer Fire Department Association "Local Action Group of the Siedlce Poviāt" Agritourism farms Villages	Actions to increase energy awareness of residents and interest of residents in activities for the implementation of low-emission economy	Disseminating good practices in the field of energy efficiency improvement and the use of renewable energy sources. Information, promotional and educational activities among the residents of the commune (children, youth and adults), as well as people visiting the commune

4 Monitoring Strategy

In the course of the project, the indicators determining the effectiveness of the implementation of investments are indicators of the achievement of the project objectives, as well as result indicators. These indicators clearly show how the investment progresses - the indicators of achieving the project's objectives, and what final results the investment had - the result indicators.

The person / entity responsible for investor's supervision (monitoring) is the person / entity that will be entrusted with these duties. The task is necessary due to the fact that the applicant does not have the appropriate know-how to perform such a task by himself. The supervision inspector is to watch over the proper implementation of works involving the construction of renewable energy installations.

The monitoring of activities and works related to the project will be continued for three years of the duration of the investment. It should be systematic.

Systematic verification of the progress of works is important in the smooth course of activities and implementation of the tasks set out in the Action Plan, because it gives us

full insight into the current situation, which can allow us to react in situations when the implementation of actions will not be correct.

The parameters assessing the quality of the course of the investment, ie the indicators of achieving the project objectives should be a determinant of how the Plan is being implemented. If the values resulting from such documents as "Reports of acceptance of construction works" or "Annual reports of generated RES energy" do not equal those of the Action Plan, the goals set in it must be redefined.

The monitoring person also has the task of confirming the works performed, and if problems arise, his duties are to immediately removed them.

5 Risk management

Risk	Probability of realising	Mitigation measure
Increase in maintenance costs	Medium	In order to minimize the risk, long-term contracts with suppliers are recommended that allow for a permanent reduction and maintenance of service prices.
Increase in the value of investment outlays - related to the potential increase in prices	Medium	In order to mitigate the risk, it is recommended to create a provision for other purposes and to prepare detailed tender documentation and delivery schedule
Change in the discount rate	Low	none

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLANS

for the Region of Mazovian
Voivodeship (Mazovia Region)

Sunny municipalities of East Mazovia -
solar energy in Paprotnia municipality

English version

prepared by
Mazovia Energy Agency (MAE)

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Share of renewable energy sources in overall energy production

Title: Sunny municipalities of East Mazovia - solar energy in Paprotnia municipality

1 Objective

The aim of the action plan is the installation of photovoltaic installations and solar collectors in the municipality of Paprotnia which is to increase the ability to produce renewable energy on farms and reduce the emission of atmospheric pollutants from conventional energy sources. The municipality has a large demand for energy, both thermal and electric. The use of renewable energy sources may help to satisfy them to some extent and also diversify its sources. This activity is to encourage the residents of the Paprotnia municipality to develop renewable energy in its area, and to disseminate it, which will contribute to the plans set in the municipality strategic documents. As a result of the measure, 270 RES installations will be created, which will allow generating energy in the amount of 478 MWh / year.

1.1 Objective scope and targets values

In the area of the Paprotnia municipality, 82 photovoltaic installations will be installed on private facilities (63 on residential buildings, 19 outside residential buildings) and 1 on public facilities. The total number of PV installations will be 83. Installations of solar collectors (187 sets) will be installed on the roofs of private buildings. The total number of installations will be 270. Installation will contribute in increasing the amount of energy produced from renewable energy sources, and also to reduce greenhouse gas emissions by 431.14 MgCO₂ / year. The implementation of the action also includes the publication of articles in the press of a regional character, preparation of an educational presentation on renewable energy. Promotional and educational activities will be spread over the duration of the project. The investment is planned for 2019-2022.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Number of units generating heat from RES	187 pc.	Acceptance report of construction works
Number of units generating electricity from RES	83 pc.	Acceptance report of construction works
The ability to generate electricity from renewable sources	0,22364 MWe	internal documentation of the applicant (reports), technical specification of installed devices.
The ability to generate heat from renewable sources	0,5003 MWt	internal documentation of the applicant (reports), technical specification of installed devices.
Heat production from installations using renewable energy sources	254 MWht/year	electricity meters, technical specifications of installed devices, internal reports
Electricity production from installations using renewable energy sources	224 MWhe/year	electricity meters, technical specifications of installed devices, internal reports
Estimated annual reduction in CO ₂ emissions	261,08 tonnes of CO ₂ equivalent / year	post-completion documentation

2 Implementation strategy

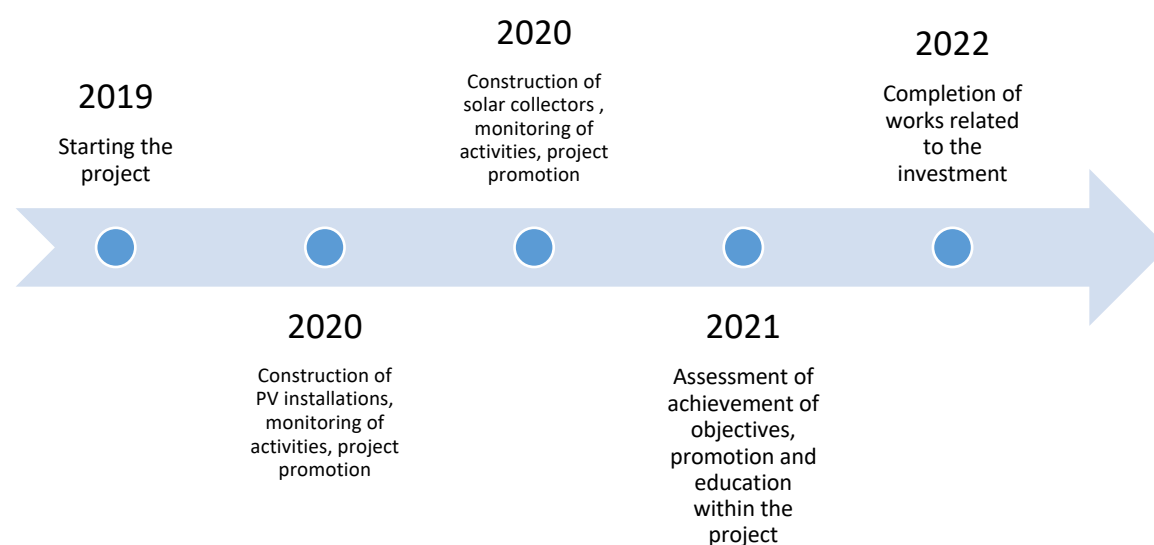
2.1 Step by step description

Steps and tasks foreseen during the implementation of the plan in the Paprotnia municipality:

1. Project preparation - the aim of this task is to evaluate and analyse the potential of the project, which is to support the decision-making process by objective and rational determination of its strengths and weaknesses and opportunities and threats related to it, resources that will be necessary to implement the project, and evaluation chance for his success
2. Photovoltaic installation project works - the purpose of this task is to develop technical documentation for photovoltaic installations. As a result, construction and executive documents for photovoltaic installations will be created. The Contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.
3. Installations of photovoltaic panels on residential buildings - installation of solar installations on residential buildings. The entity responsible for the task will be selected through an open tender.
4. Installation of photovoltaic panels outside residential buildings - installation of solar installations outside residential buildings. The entity responsible for the task will be selected through an open tender.
5. Installations of photovoltaic panels on public buildings - installation of solar installations on public buildings. The entity responsible for the task will be selected through an open tender.
6. Design work of solar collectors installation - the purpose of this task is to develop technical documentation for solar collector installations. As a result, construction and executive documents for solar installations will be created. The Contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.
7. Installations of solar collectors on residential buildings - installation of solar collectors on residential buildings. The entity responsible for the task will be selected through an open tender.
8. Project promotion and education - the aim of this activity is to disseminate activities related to the promotion and dissemination of the project.

9. Supervision over the implementation of the investment - in order to conduct the supervision, the entity / person to be entrusted with the investor's supervision will be selected. The supervisory inspector is to supervise the proper conduct and execution of construction works including the installation of collectors and photovoltaic installations.

2.2 Time schedule



2.3 Budget and resources needed

Expected costs incurred with associated tasks (gross):

1. Photovoltaic project works on residential buildings - PLN 45,000
2. Photovoltaic panel installations on residential buildings - PLN 975,000
3. Photovoltaic project works outside residential buildings - PLN 13,000
4. Photovoltaic panel installations outside residential buildings – PLN 320,000
5. Project works of solar installations on public buildings - PLN 1,500
6. Photovoltaic panel installations on public buildings - PLN 36,000
7. Design work of solar collector installations on residential buildings - 66 000 PLN
8. Installations of solar collectors on residential buildings - PLN 1 440 000

9. Investor's supervision - PLN 81,000

10. Promotion of the project - PLN 6,500

Together, all the tasks give the total cost of the project in the municipality of Korczew in the amount of PLN 2 984 000

The project will be 80% co-financed if the application is approved by the decision-making body.

3 Collaboration with stakeholders

During the development of the Action Plan, the main stakeholder was the residents of the Paprotnia municipality. Cooperation with the beneficiaries of the planned investment was the most important. The activities carried out during the course of the investment were coordinated with them, which installations will be created, which translates into the size and investment costs.

Until now, the executive team consisted of employees of the Paprotnia municipality, that is, the Applicants of the project, as well as cooperating enterprises supporting it in content-related matters, i.e. energy matters, financial analysis.

Partner institutions: Przesmyki, Korczew and Repki are partner entities that cooperate with the Applicant as part of the project.

Through promotional activities, educational activities and an increase in energy awareness of the municipality's inhabitants, the number of entities interested in taking part in the activity may increase.

In the future, significant participants of the project will be companies that develop technical documentation and construction of RES installations, which will be selected through an open tender. The subject / person involved in investor's supervision will be an important participant, necessary in the further phases of the project.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholders groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipality, Municipality Board	<p>Preparation of the application regarding financing of planned activities and preparation of tender documents.</p> <p>The commune office will be responsible for the selection of the contractor, implementation of the planned activities and supervision of the investment</p>	<p>E-mail or telephone communication.</p> <p>Inter-municipal cooperation through meetings on planned activities and joint fundraising.</p>
Political decision-makers	Mayor of the municipality	<p>Identifying the most advantageous source of financing, obtaining funds, securing funds in the commune budget</p>	<p>Management of the implementation process of the action plan and communication with residents as well as information and promotion activities carried out jointly with non-governmental organizations</p>
Target groups	Residents of the municipality	<p>Cooperation with the municipality by responding to surveys and determining the source of energy from RES that they are interested in.</p>	<p>Telephone communication and meetings in the municipality with persons responsible for the project.</p> <p>Participation as a beneficiary.</p>

Groups supporting implementation, communication and promotion	<p>Volunteer Fire Department</p> <p>Association "Local Action Group of the Siedlce Poviát"</p> <p>Agritourism farms</p> <p>Villages</p>	<p>Actions to increase energy awareness of residents and interest of residents in activities for the implementation of low-emission economy</p>	<p>Disseminating good practices in the field of energy efficiency improvement and the use of renewable energy sources.</p> <p>Information, promotional and educational activities among the residents of the commune (children, youth and adults), as well as people visiting the commune</p>
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4 Monitoring Strategy

In the course of the project, the indicators determining the effectiveness of the implementation of investments are indicators of the achievement of the project objectives, as well as result indicators. These indicators clearly show how the investment progresses - the indicators of achieving the project's objectives, and what final results the investment had - the result indicators.

The person / entity responsible for investor's supervision (monitoring) is the person / entity that will be entrusted with these duties. The task is necessary due to the fact that the applicant does not have the appropriate know-how to perform such a task by himself. The supervision inspector is to watch over the proper implementation of works involving the construction of renewable energy installations.

The monitoring of activities and works related to the project will be continued for three years of the duration of the investment. It should be systematic.

Systematic verification of the progress of works is important in the smooth course of activities and implementation of the tasks set out in the Action Plan, because it gives us full insight into the current situation, which can allow us to react in situations when the implementation of actions will not be correct.

The parameters assessing the quality of the course of the investment, ie the indicators of achieving the project objectives should be a determinant of how the Plan is being implemented. If the values resulting from such documents as "Reports of acceptance of construction works" or "Annual reports of generated RES energy" do not equal those of the Action Plan, the goals set in it must be redefined.

The monitoring person also has the task of confirming the works performed, and if problems arise, his duties are to immediately removed them.

5 Risk management

Risk	Probability of realising	Mitigation measure
Increase in maintenance costs	Medium	In order to minimize the risk, long-term contracts with suppliers are recommended that allow for a permanent reduction and maintenance of service prices.
Increase in the value of investment outlays - related to the potential increase in prices	Medium	In order to mitigate the risk, it is recommended to create a provision for other purposes and to prepare detailed tender documentation and delivery schedule
Change in the discount rate	Low	none

Contact

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLANS

for the Region of Mazovian
Voivodeship (Mazovia Region)

Sunny municipalities of East Mazovia -
solar energy in Przesmyki municipality

English version

prepared by
Mazovia Energy Agency (MAE)

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: 31.10.2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Share of renewable energy sources in overall energy production

Title: Sunny municipalities of East Mazovia - solar energy in Przesmyki municipality

1 Objective

The aim of the action plan is the installation of photovoltaic installations and solar collectors in the municipality of Przesmyki which is to increase the ability to produce renewable energy on farms and reduce the emission of atmospheric pollutants from conventional energy sources. The municipality has a large demand for energy, both thermal and electric. The use of renewable energy sources may help to satisfy them to some extent and also diversify its sources. This activity is to encourage the residents of the Przesmyki municipality to develop renewable energy in its area, and to disseminate it, which will contribute to the plans set in the municipality strategic documents. As a result of the measure, 226 RES installations will be created, which will allow generating energy in the amount of 415 MWh / year.

1.1 Objective scope and targets values

In the area of the Przesmyki municipality, 72 photovoltaic installations will be installed on private facilities (34 on residential buildings, 38 outside residential buildings) and 1 on public facilities. The total number of PV installations will be 72. The project also includes the installation of solar collectors (153 installations in private buildings). The total number of installations will be 226. Installation will contribute in increasing the amount of energy produced from renewable energy sources, and also to reduce greenhouse gas emissions by 240.03 MgCO₂ / year. The implementation of the action also includes the publication of articles in the press of a regional character, preparation of an educational presentation on renewable energy. Promotional and educational activities will be spread over the duration of the project. The investment is planned for 2019-2023.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Number of units generating heat from RES	153 pc.	Acceptance report of construction works
Number of units generating electricity from RES	72 pc.	Acceptance report of construction works
The ability to generate electricity from renewable sources	0,2102 MWe	internal documentation of the applicant (reports), technical specification of installed devices.
The ability to generate heat from renewable sources	0,4024 MWt	internal documentation of the applicant (reports), technical specification of installed devices.
Heat production from installations using renewable energy sources	205 MWht/year	electricity meters, technical specifications of installed devices, internal reports
Electricity production from installations using renewable energy sources	210 MWhe/year	electricity meters, technical specifications of installed devices, internal reports
Estimated annual reduction in CO ₂ emissions	240,03 tonnes of CO ₂ equivalent / year	post-completion documentation

2 Implementation strategy

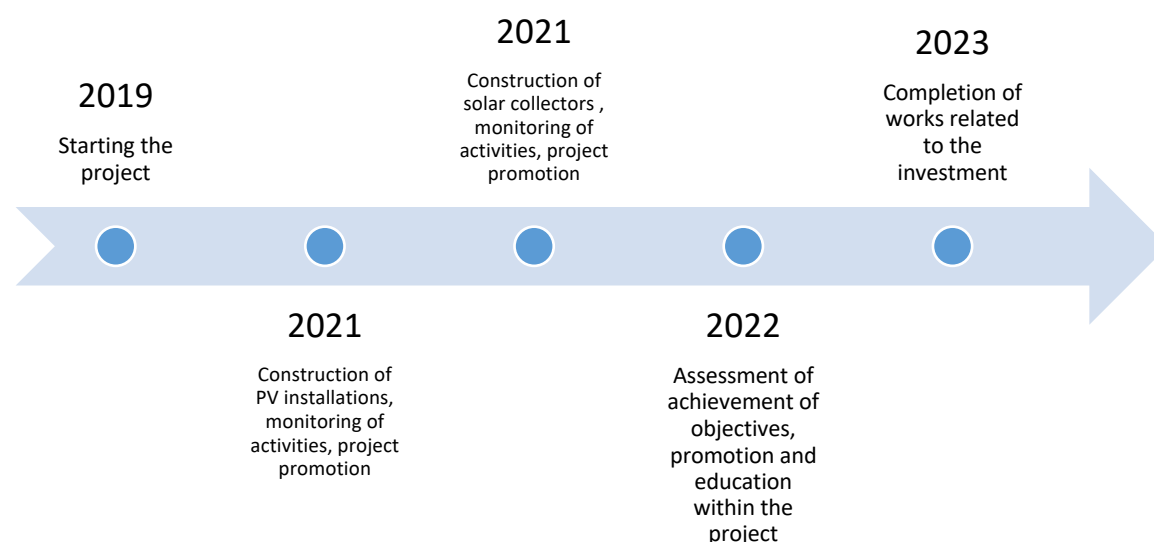
2.1 Step by step description

Steps and tasks foreseen during the implementation of the plan in the Przesmyki municipality:

1. Project preparation - the aim of this task is to evaluate and analyse the potential of the project, which is to support the decision-making process by objective and rational determination of its strengths and weaknesses and opportunities and threats related to it, resources that will be necessary to implement the project, and evaluation chance for his success
2. Photovoltaic installation project works - the purpose of this task is to develop technical documentation for photovoltaic installations. As a result, construction and executive documents for photovoltaic installations will be created. The Contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.
3. Installations of photovoltaic panels on residential buildings - installation of solar installations on residential buildings. The entity responsible for the task will be selected through an open tender.
4. Installation of photovoltaic panels outside residential buildings - installation of solar installations outside residential buildings. The entity responsible for the task will be selected through an open tender.
5. Installations of photovoltaic panels on public buildings - installation of solar installations on public buildings. The entity responsible for the task will be selected through an open tender.
6. Design work of solar collectors installation - the purpose of this task is to develop technical documentation for solar collector installations. As a result, construction and executive documents for solar installations will be created. The Contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.
7. Installations of solar collectors on residential buildings - installation of solar collectors on residential buildings. The entity responsible for the task will be selected through an open tender.
8. Project promotion and education - the aim of this activity is to disseminate activities related to the promotion and dissemination of the project.

9. Supervision over the implementation of the investment - in order to conduct the supervision, the entity / person to be entrusted with the investor's supervision will be selected. The supervisory inspector is to supervise the proper conduct and execution of construction works including the installation of collectors and photovoltaic installations.

2.2 Time schedule



2.3 Budget and resources needed

Expected costs incurred with associated tasks (gross):

1. Design work of solar installations on residential buildings - PLN 26,000
2. Photovoltaic panel installations on residential buildings - PLN 565,000
3. Photovoltaic project works outside residential buildings - PLN 29,000
4. Photovoltaic panel installations outside residential buildings - PLN 760,000
5. Design works of solar collectors installation on residential buildings - 54 000 PLN
6. Installations of solar collectors on residential buildings - PLN 1,200,000
7. Investor's supervision - PLN 81,000
8. Project promotion - PLN 6,500

Together, all the tasks give the total cost of the project in the municipality of Przesmyki in the amount of PLN 2 721 500

The project will be 80% co-financed if the application is approved by the decision-making body.

3 Collaboration with stakeholders

During the development of the Action Plan, the main stakeholder was the residents of the Przesmyki municipality. Cooperation with the beneficiaries of the planned investment was the most important. The activities carried out during the course of the investment were coordinated with them, which installations will be created, which translates into the size and investment costs.

Until now, the executive team consisted of employees of the Przesmyki municipality, that is, the Applicants of the project, as well as cooperating enterprises supporting it in content-related matters, i.e. energy matters, financial analysis.

Partner institutions: Paprotnia, Korczew and Repki are partner entities that cooperate with the Applicant as part of the project.

Through promotional activities, educational activities and an increase in energy awareness of the municipality's inhabitants, the number of entities interested in taking part in the activity may increase.

In the future, significant participants of the project will be companies that develop technical documentation and construction of RES installations, which will be selected through an open tender. The subject / person involved in investor's supervision will be an important participant, necessary in the further phases of the project.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholders groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipality, Municipality Board	<p>Preparation of the application regarding financing of planned activities and preparation of tender documents.</p> <p>The commune office will be responsible for the selection of the contractor, implementation of the planned activities and supervision of the investment</p>	<p>E-mail or telephone communication.</p> <p>Inter-municipal cooperation through meetings on planned activities and joint fundraising.</p>
Political decision-makers	Mayor of the municipality	Identifying the most advantageous source of financing, obtaining funds, securing funds in the commune budget	Management of the implementation process of the action plan and communication with residents as well as information and promotion activities carried out jointly with non-governmental organizations
Target groups	Residents of the municipality	Cooperation with the municipality by responding to surveys and determining the source of energy from RES that they are interested in.	Telephone communication and meetings in the municipality with persons responsible for the project. Participation as a beneficiary.

Groups supporting implementation, communication and promotion	<p>Volunteer Fire Department</p> <p>Association "Local Action Group of the Siedlce Poviat"</p> <p>Agritourism farms</p> <p>Villages</p>	<p>Actions to increase energy awareness of residents and interest of residents in activities for the implementation of low-emission economy</p>	<p>Disseminating good practices in the field of energy efficiency improvement and the use of renewable energy sources.</p> <p>Information, promotional and educational activities among the residents of the commune (children, youth and adults), as well as people visiting the commune</p>
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4 Monitoring Strategy

In the course of the project, the indicators determining the effectiveness of the implementation of investments are indicators of the achievement of the project objectives, as well as result indicators. These indicators clearly show how the investment progresses - the indicators of achieving the project's objectives, and what final results the investment had - the result indicators.

The person / entity responsible for investor's supervision (monitoring) is the person / entity that will be entrusted with these duties. The task is necessary due to the fact that the applicant does not have the appropriate know-how to perform such a task by himself. The supervision inspector is to watch over the proper implementation of works involving the construction of renewable energy installations.

The monitoring of activities and works related to the project will be continued for three years of the duration of the investment. It should be systematic.

Systematic verification of the progress of works is important in the smooth course of activities and implementation of the tasks set out in the Action Plan, because it gives us full insight into the current situation, which can allow us to react in situations when the implementation of actions will not be correct.

The parameters assessing the quality of the course of the investment, ie the indicators of achieving the project objectives should be a determinant of how the Plan is being implemented. If the values resulting from such documents as "Reports of acceptance of construction works" or "Annual reports of generated RES energy" do not equal those of the Action Plan, the goals set in it must be redefined.

The monitoring person also has the task of confirming the works performed, and if problems arise, his duties are to immediately removed them.

5 Risk management

Risk	Probability of realising	Mitigation measure
Increase in maintenance costs	Medium	In order to minimize the risk, long-term contracts with suppliers are recommended that allow for a permanent reduction and maintenance of service prices.
Increase in the value of investment outlays - related to the potential increase in prices	Medium	In order to mitigate the risk, it is recommended to create a provision for other purposes and to prepare detailed tender documentation and delivery schedule
Change in the discount rate	Low	none

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLANS

for the Region of Mazovian
Voivodeship (Mazovia Region)

Sunny municipalities of East Mazovia -
solar energy in Repki municipality

English version

prepared by
Mazovia Energy Agency (MAE)

PANEL 2050 – Partnership for New Energy Leadership 2050
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Priority area: Share of renewable energy sources in overall energy production

Title: Sunny municipalities of East Mazovia - solar energy in Repki municipality

1 Objective

The aim of the action plan is the installation of photovoltaic installations and solar collectors in the municipality of Repki which is to increase the ability to produce renewable energy on farms and reduce the emission of atmospheric pollutants from conventional energy sources. The municipality has a large demand for energy, both thermal and electric. The use of renewable energy sources may help to satisfy them to some extent and also diversify its sources. This activity is to encourage the residents of the Repki municipality to develop renewable energy in its area, and to disseminate it, which will contribute to the plans set in the municipality strategic documents. As a result of the measure, 372 RES installations will be created, which will allow generating energy in the amount of 688 MWh / year.

1.1 Objective scope and targets values

In the area of the Repki municipality, 121 photovoltaic installations will be installed on private facilities (71 on residential buildings, 50 outside residential buildings) and 1 on public facilities. The total number of PV installations will be 122. The project also includes the installation of solar collectors (250 installations in private buildings). The total number of installations will be 372. Installation will contribute in increasing the amount of energy produced from renewable energy sources, and also to reduce greenhouse gas emissions by 395.69 MgCO₂ / year. The implementation of the action also includes the publication of articles in the press of a regional character, preparation of an educational presentation on renewable energy. Promotional and educational activities will be spread over the duration of the project. The investment is planned for 2019-2022.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Number of units generating heat from RES	250 pc.	Acceptance report of construction works
Number of units generating electricity from RES	122 pc.	Acceptance report of construction works
The ability to generate electricity from renewable sources	0,3487 MWe	internal documentation of the applicant (reports), technical specification of installed devices.
The ability to generate heat from renewable sources	0,6681 MWt	internal documentation of the applicant (reports), technical specification of installed devices.
Heat production from installations using renewable energy sources	340 MWht/year	electricity meters, technical specifications of installed devices, internal reports
Electricity production from installations using renewable energy sources	349 MWhe/year	electricity meters, technical specifications of installed devices, internal reports
Estimated annual reduction in CO ₂ emissions	395,69 tonnes of CO ₂ equivalent / year	post-completion documentation

2 Implementation strategy

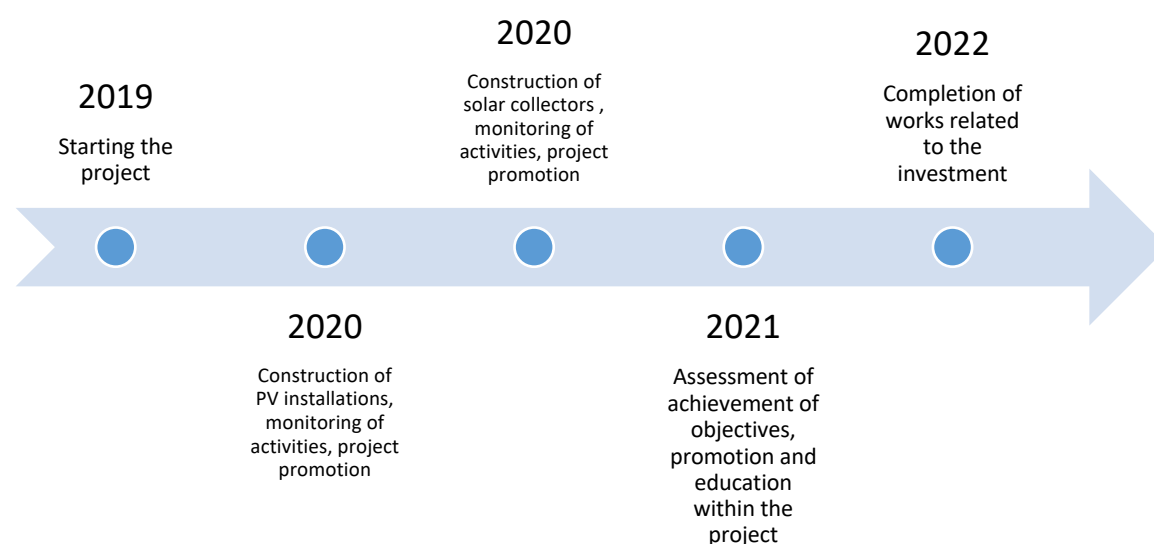
2.1 Step by step description

Steps and tasks foreseen during the implementation of the plan in the Repki municipality:

1. Project preparation - the aim of this task is to evaluate and analyse the potential of the project, which is to support the decision-making process by objective and rational determination of its strengths and weaknesses and opportunities and threats related to it, resources that will be necessary to implement the project, and evaluation chance for his success
2. Photovoltaic installation project works - the purpose of this task is to develop technical documentation for photovoltaic installations. As a result, construction and executive documents for photovoltaic installations will be created. The Contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.
3. Installations of photovoltaic panels on residential buildings - installation of solar installations on residential buildings. The entity responsible for the task will be selected through an open tender.
4. Installation of photovoltaic panels outside residential buildings - installation of solar installations outside residential buildings. The entity responsible for the task will be selected through an open tender.
5. Installations of photovoltaic panels on public buildings - installation of solar installations on public buildings. The entity responsible for the task will be selected through an open tender.
6. Design work of solar collectors installation - the purpose of this task is to develop technical documentation for solar collector installations. As a result, construction and executive documents for solar installations will be created. The Contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.
7. Installations of solar collectors on residential buildings - installation of solar collectors on residential buildings. The entity responsible for the task will be selected through an open tender.
8. Project promotion and education - the aim of this activity is to disseminate activities related to the promotion and dissemination of the project.
9. Supervision over the implementation of the investment - in order to conduct the supervision, the entity / person to be entrusted with the investor's supervision will be

selected. The supervisory inspector is to supervise the proper conduct and execution of construction works including the installation of collectors and photovoltaic installations.

2.2 Time schedule



2.3 Budget and resources needed

Expected costs incurred with associated tasks (gross):

1. Project works of solar installations on residential buildings - PLN 50,000
2. Photovoltaic panel installations on residential buildings - PLN 1,100,000
3. Photovoltaic project works outside residential buildings - PLN 39,000
4. Photovoltaic panel installations outside residential buildings - PLN 960,000
5. Project works of photovoltaic installations on public buildings - PLN 3,500
6. Installations of solar panels on public buildings - 80,000 PLN
7. Design work of solar collectors installation on residential buildings - PLN 88,000
8. Installations of solar collectors on residential buildings - PLN 1,950,000
9. Investor's supervision - PLN 81,000

10. Promotion of the project - PLN 6,500

Together, all the tasks give the total cost of the project in the municipality of Przesmyki in the amount of PLN 4 358 000

The project will be 80% co-financed if the application is approved by the decision-making body.

3 Collaboration with stakeholders

During the development of the Action Plan, the main stakeholder was the residents of the Repki municipality. Cooperation with the beneficiaries of the planned investment was the most important. The activities carried out during the course of the investment were coordinated with them, which installations will be created, which translates into the size and investment costs.

Until now, the executive team consisted of employees of the Repki municipality, that is, the Applicants of the project, as well as cooperating enterprises supporting it in content-related matters, i.e. energy matters, financial analysis.

Partner institutions: Paprotnia, Korczew and Przesmyki are partner entities that cooperate with the Applicant as part of the project.

Through promotional activities, educational activities and an increase in energy awareness of the municipality's inhabitants, the number of entities interested in taking part in the activity may increase.

In the future, significant participants of the project will be companies that develop technical documentation and construction of RES installations, which will be selected through an open tender. The subject / person involved in investor's supervision will be an important participant, necessary in the further phases of the project.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholders groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipality, Municipality Board	<p>Preparation of the application regarding financing of planned activities and preparation of tender documents.</p> <p>The commune office will be responsible for the selection of the contractor, implementation of the planned activities and supervision of the investment</p>	<p>E-mail or telephone communication.</p> <p>Inter-municipal cooperation through meetings on planned activities and joint fundraising.</p>
Political decision-makers	Mayor of the municipality	<p>Identifying the most advantageous source of financing, obtaining funds, securing funds in the commune budget</p>	<p>Management of the implementation process of the action plan and communication with residents as well as information and promotion activities carried out jointly with non-governmental organizations</p>
Target groups	Residents of the municipality	<p>Cooperation with the municipality by responding to surveys and determining the source of energy from RES that they are interested in.</p>	<p>Telephone communication and meetings in the municipality with persons responsible for the project.</p> <p>Participation as a beneficiary.</p>

Groups supporting implementation, communication and promotion	<p>Volunteer Fire Department</p> <p>Association "Local Action Group of the Siedlce Powiat"</p> <p>Agritourism farms</p> <p>Villages</p>	<p>Actions to increase energy awareness of residents and interest of residents in activities for the implementation of low-emission economy</p>	<p>Disseminating good practices in the field of energy efficiency improvement and the use of renewable energy sources.</p> <p>Information, promotional and educational activities among the residents of the commune (children, youth and adults), as well as people visiting the commune</p>
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4 Monitoring Strategy

In the course of the project, the indicators determining the effectiveness of the implementation of investments are indicators of the achievement of the project objectives, as well as result indicators. These indicators clearly show how the investment progresses - the indicators of achieving the project's objectives, and what final results the investment had - the result indicators.

The person / entity responsible for investor's supervision (monitoring) is the person / entity that will be entrusted with these duties. The task is necessary due to the fact that the applicant does not have the appropriate know-how to perform such a task by himself. The supervision inspector is to watch over the proper implementation of works involving the construction of renewable energy installations.

The monitoring of activities and works related to the project will be continued for three years of the duration of the investment. It should be systematic.

Systematic verification of the progress of works is important in the smooth course of activities and implementation of the tasks set out in the Action Plan, because it gives us full insight into the current situation, which can allow us to react in situations when the implementation of actions will not be correct.

The parameters assessing the quality of the course of the investment, ie the indicators of achieving the project objectives should be a determinant of how the Plan is being implemented. If the values resulting from such documents as "Reports of acceptance of construction works" or "Annual reports of generated RES energy" do not equal those of the Action Plan, the goals set in it must be redefined.

The monitoring person also has the task of confirming the works performed, and if problems arise, his duties are to immediately removed them.

5 Risk management

Risk	Probability of realising	Mitigation measure
Increase in maintenance costs	Medium	In order to minimize the risk, long-term contracts with suppliers are recommended that allow for a permanent reduction and maintenance of service prices.
Increase in the value of investment outlays - related to the potential increase in prices	Medium	In order to mitigate the risk, it is recommended to create a provision for other purposes and to prepare detailed tender documentation and delivery schedule
Change in the discount rate	Low	none

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLANS

for the Region of Mazovian
Voivodeship (Mazovia Region)

Construction of renewable energy
installations in Skorzec municipality

English version

prepared by
Mazovia Energy Agency (MAE)

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: 31.10.2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Share of renewable energy sources in overall energy production

Title: Construction of renewable energy installations in Skorzec municipality

1 Objective

The aim of the action plan is to: increase the production of electricity and heat from renewable sources in the Skorzec municipality, reduce the amount of greenhouse gases emitted to the atmosphere and diversify energy sources. The project is to bring the above results by installing photovoltaic installations and heat pumps in public buildings. Thanks to the use of renewable energy sources, the production of electricity and heat will increase. This activity is also intended to encourage the residents of municipality to develop renewable energy in its area, which will contribute to the implementation of the plans established in the municipality's strategic documents. As a result of the project, there will be 12 RES installations with a total energy production of 341 MWh / year.

1.1 Objective scope and targets values

The project will be implemented in 5 localities of the Skorzec municipality: Czerniejew, Dąbrówka-Stany, Grala-Dąbrowizna, Skórzec and Żelków.

As a result of this project, installations in the Skorzec municipality will generate energy from renewable energy sources in 10 public buildings. Most installations are in Skórzec - 4 installations. 4 installations will also be built on three buildings in Grala-Dąbrowizna, and one in Czerniejewo, Dąbrówka-Stany and Żelków. The project involves the creation of 10 photovoltaic installations (8 on public buildings and 2 outside public buildings) and 2 installations of ground heat pumps. . The installations will contribute in increasing the amount of energy produced from renewable energy sources, but also in reducing greenhouse gas emissions by 111.62 MgCO₂ / year. The project also includes a promotional, dissemination and educational part, within which informational and educational meetings will be organized in the municipality on the use of renewable energy sources. The investment is planned for 2020-2023.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Number of units generating heat from RES	2 pc.	Acceptance report of construction works
Number of units generating electricity from RES	10 pc.	Acceptance report of construction works
The ability to generate electricity from renewable sources	0,203 MWe	Annual reports on generated energy from RES
The ability to generate thermal energy from renewable sources	0,1284 MWt	Annual reports on generated energy from RES
Heat production from installations using renewable energy sources	145,86 MWht/year	Annual reports on generated energy from RES
Electricity production from installations using renewable energy sources	195,08 MWhe/year	Annual reports on generated energy from RES
Estimated annual reduction in CO ₂ emissions	111,62 tonnes of CO ₂ equivalent / year	Annual reports on generated energy from RES

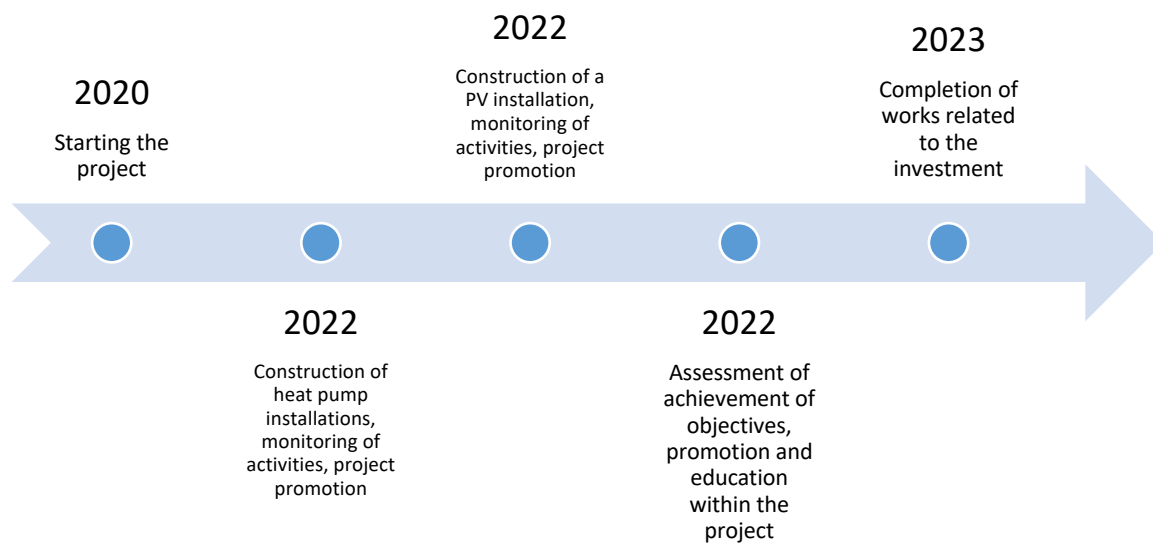
2 Implementation strategy

2.1 Step by step description

Steps and tasks foreseen during the implementation of the plan in the Skorzec municipality:

1. Preparation of tender documentation - the purpose of this task is to prepare documentation in accordance with the Public Procurement Law and to correctly carry out the tender procedure along with the selection of the contractor. This will depend on checking the correctness of documentation, preparation of specimen specification of essential terms of the contract with attachments, preparation of a description of the subject of the order, conditions of participation of contractors in the procedure, criteria based on which offers will be evaluated and the contract template. In addition, the scope of this task will also include the obligation to prepare responses on behalf of the ordering party, to represent him, as well as to verify offers, review them and recommend a suitable offer to the contracting authority.
2. Preparation of technical documentation for the installation of ground heat pumps - as a result sets of construction and executive documents for the installation of ground heat pumps will be created. The task contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.
3. Construction of ground source heat pump installations - as a result of this task, ground heat pump installations will be performed. The entity responsible for the task will be selected through an open tender.
4. Preparation of technical documentation for the photovoltaic installation - as a result, documents for construction and executive photovoltaic installations will be created. The task contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.
5. Construction of photovoltaic installation - photovoltaic installations will be carried out as a result of this task. The entity responsible for the task will be selected through an open tender.
6. Investor's supervision - in order to conduct supervision, the entity / person to be entrusted with the investor's supervision will be selected. The supervisory inspector is to supervise the proper conduct and execution of construction works including the implementation of photovoltaic installations.
7. Project promotion - the aim of this activity is to disseminate activities related to the promotion and dissemination of the project.

2.2 Time schedule



2.3 Budget and resources needed

Expected costs incurred related to given tasks (gross):

1. Preparation of the tender documentation - PLN 6,800
2. Preparation of technical documentation for ground-source heat pumps for public utility buildings - PLN 47,000
3. Construction of ground heat pump installations for public utility buildings - PLN 1,200,000
4. Preparation of photovoltaic system documentation on public buildings - PLN 49,000
5. Construction of photovoltaic installations for public buildings - PLN 1,220,000 - PLN
6. Investor's supervision - PLN 27 100.00
7. Promotion of the project - PLN 11,000.00

Together, all the tasks give the total cost of the project in the amount of PLN 2 560 900.

The project will be 80% co-financed if the application is approved by the decision-making body.

3 Collaboration with stakeholders

During the development of the Action Plan, the main stakeholder was the residents of the Skorzec municipality. Cooperation with the beneficiaries of the planned investment was the most important. The activities carried out during the course of the investment were coordinated with them, which installations will be created, which translates into the size and investment costs.

Until now, the executive team consisted of employees of the Skorzec municipality, that is, the Applicants of the project, as well as cooperating enterprises supporting it in content-related matters, i.e. energy matters, financial analysis.

Partner institutions: Kotuń, Domanice and Wodynie are partner entities that cooperate with the Applicant as part of the project.

Through promotional activities, educational activities and an increase in energy awareness of the municipality's inhabitants, the number of entities interested in taking part in the activity may increase.

In the future, significant participants of the project will be companies that develop technical documentation and construction of RES installations, which will be selected through an open tender. The subject / person involved in investor's supervision will be an important participant, necessary in the further phases of the project.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholders groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipality, Municipality Board	Preparation of the application regarding financing of planned activities and preparation of tender documents. The commune office will be responsible for the selection of the contractor, implementation of the planned activities and supervision of the	E-mail or telephone communication. Inter-municipal cooperation through meetings on planned activities and joint fundraising.

		investment	
Political decision-makers	Mayor of the municipality	Identifying the most advantageous source of financing, obtaining funds, securing funds in the commune budget	Management of the implementation process of the action plan and communication with residents as well as information and promotion activities carried out jointly with non-governmental organizations
Target groups	Residents of the municipality	Cooperation with the municipality by responding to surveys and determining the source of energy from RES that they are interested in.	Telephone communication and meetings in the municipality with persons responsible for the project. Participation as a beneficiary.
Groups supporting implementation, communication and promotion	<p>Volunteer Fire Department</p> <p>Association "Local Action Group of the Siedlce Poviati"</p> <p>Agritourism farms</p> <p>Villages</p>	Actions to increase energy awareness of residents and interest of residents in activities for the implementation of low-emission economy	<p>Disseminating good practices in the field of energy efficiency improvement and the use of renewable energy sources.</p> <p>Information, promotional and educational activities among the residents of the commune (children, youth and adults), as well as people visiting the commune</p>

4 Monitoring Strategy

In the course of the project, the indicators determining the effectiveness of the implementation of investments are indicators of the achievement of the project objectives, as well as result indicators. These indicators clearly show how the investment progresses - the indicators of achieving the project's objectives, and what final results the investment had - the result indicators.

The person / entity responsible for investor's supervision (monitoring) is the person / entity that will be entrusted with these duties. The task is necessary due to the fact that the applicant does not have the appropriate know-how to perform such a task by himself. The supervision inspector is to watch over the proper implementation of works involving the construction of renewable energy installations.

The monitoring of activities and works related to the project will be continued for three years of the duration of the investment. It should be systematic.

Systematic verification of the progress of works is important in the smooth course of activities and implementation of the tasks set out in the Action Plan, because it gives us full insight into the current situation, which can allow us to react in situations when the implementation of actions will not be correct.

The parameters assessing the quality of the course of the investment, ie the indicators of achieving the project objectives should be a determinant of how the Plan is being implemented. If the values resulting from such documents as "Reports of acceptance of construction works" or "Annual reports of generated RES energy" do not equal those of the Action Plan, the goals set in it must be redefined.

The monitoring person also has the task of confirming the works performed, and if problems arise, his duties are to immediately removed them.

5 Risk management

Risk	Probability of realising	Mitigation measure
Increase in maintenance costs	Medium	In order to minimize the risk, long-term contracts with suppliers are recommended that allow for a permanent reduction and maintenance of service prices.
Increase in the value of investment outlays - related to the potential increase in prices	Medium	In order to mitigate the risk, it is recommended to create a provision for other purposes and to prepare detailed tender documentation and delivery schedule
Change in the discount rate	Low	none

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLANS

for the Region of Mazovian
Voivodeship (Mazovia Region)

Energy for the future - renewable
energy sources in Stara Kornica
municipality

English version

prepared by
Mazovia Energy Agency (MAE)

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: 31.10.2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Share of renewable energy sources in overall energy production

Title: Energy for the future - renewable energy sources in Stara Kornica municipality

1 Objective

The aim of the action plan is to carry out construction works involving the assembly of photovoltaic devices and installations, solar collectors on private buildings and on public buildings located in the municipality of Stara Kornica. This is to improve air quality by reducing greenhouse gas emissions and increasing energy security through diversification of energy sources and partial independence from energy generated in the combustion of fossil fuels through the installation of renewable energy installations. The indirect objectives of the project include economic goals, ie lowering the costs of electricity purchase, reducing the costs of heating hot tap water and heating buildings, or environmental ones as reducing atmospheric pollution in the form of reducing CO₂ emissions

1.1 Objective scope and targets values

There are 247 installations planned under 238 locations with a total energy production from RES in the amount of 580 MWh / year. Establishment of 212 installations of solar collectors and 35 photovoltaic installations. They will allow to obtain 350 MWh / year of thermal energy and 178 MWh / a year of electricity, which gives a combined energy production from RES in the amount of 528 MWh / year. Consequently, the goal of reducing carbon dioxide emissions, which will fall by 257.91 t / year, will also be met. The capacity of generating energy in the Stara Kornica municipality will increase by 0.86 MW. In addition to the investment part, the project also includes a promotional, dissemination and educational part, within which informational and educational meetings will be organized in the municipality on the use of renewable energy sources. This investment is planned for 2019-2022.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Number of units generating heat from RES	212 pc.	post-completion documentation
Number of units generating electricity from RES	35 pc.	post-completion documentation
The ability to generate electricity from renewable sources	0,1782 MWe	post-completion documentation
The ability to generate heat from renewable sources	0,6873 MWt	post-completion documentation
Electricity production from installations using renewable energy sources	178 MWhe/year	Electricity meters
Heat production from installations using renewable energy sources	350 MWht/year	Heat energy meters
Estimated annual reduction in CO ₂ emissions	257,91 tonnes of CO ₂ equivalent / year	post-completion documentation

2 Implementation strategy

2.1 Step by step description

Steps and tasks foreseen during the implementation of the plan in the Stara Kornica municipality:

1. 1. Preparatory work.

2. Design works - works related to installation works - they are related to the specificity of the investment, i.e. the need to install a large number of installations with similar characteristics, so they will be implemented partly before partly in parallel with the installation works. As part of this work, it is necessary to prepare and submit an application for co-financing under the Regional Operational Program for the Mazovian Voivodeship for the years 2014-2020. The receipt of co-financing will allow achieving the project's objectives, i.e. improving air quality and increasing energy security.

3. Installations of photovoltaic panels on residential buildings - installation of solar installations on residential buildings. The entity responsible for the task will be selected through an open tender.

4. Installations of solar panels outside residential buildings -

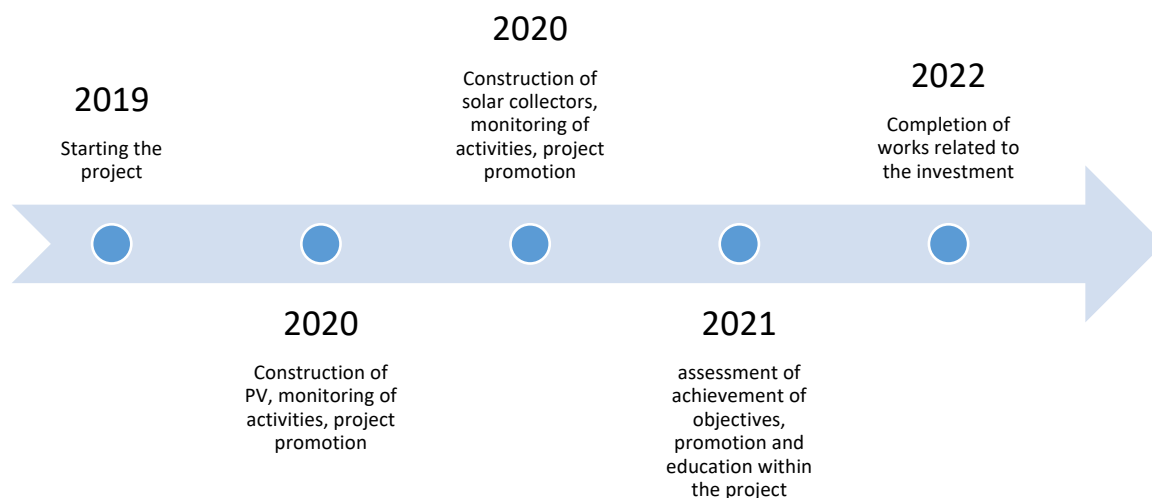
5. Installations of photovoltaic panels on public buildings - installation of solar installations on public buildings. The entity responsible for the task will be selected through an open tender.

6. Installations of solar collectors on residential buildings - installation of solar collectors on residential buildings. The entity responsible for the task will be selected through an open tender.

7. Investor's supervision - in order to conduct supervision, the entity / person to be entrusted with the investor's supervision duties will be selected. The supervisory inspector is to supervise the proper conduct and execution of construction works including the installation of collectors and photovoltaic installations.

8. Project promotion and education - the aim of this activity is to disseminate activities related to the promotion and dissemination of the project, as well as work aimed at providing information on RES installations for households, information on funding opportunities, etc.

2.2 Time schedule



2.3 Budget and resources needed

Expected costs incurred related to given tasks (gross):

1. Photovoltaic installation project works on residential buildings - PLN 25,000
2. Photovoltaic panel installations on residential buildings - PLN 530,000
3. Project works of solar installations on public buildings - PLN 28,000
4. Photovoltaic panel installations on public buildings - PLN 700,000
5. Design works of solar collectors installation on residential buildings - PLN 88,000
6. Installations of solar collectors on residential buildings - PLN 1,930,000
7. Investor's supervision - PLN 47,000
8. Promotion of the project - PLN 17,000

Together, all the tasks give the total cost of the project in the municipality of Stara Kornica in the amount of PLN 3 365 000

The project will be 80% co-financed if the application is approved by the decision-making body.

3 Collaboration with stakeholders

During the development of the Action Plan, the main stakeholder was the residents of the Stara Kornica municipality. Cooperation with the beneficiaries of the planned investment was the most important. The activities carried out during the course of the investment were coordinated with them, which installations will be created, which translates into the size and investment costs.

Until now, the executive team consisted of employees of the Stara Kornica, municipality or the Applicants of the project, as well as cooperating enterprises supporting it in content-related matters, i.e. energy matters, financial analysis.

Through promotional activities, educational activities and an increase in energy awareness of the municipality's inhabitants, the number of entities interested in taking part in the activity may increase.

In the future, significant participants of the project will be companies that develop technical documentation and construction of RES installations, which will be selected through an open tender. The subject / person involved in investor's supervision will be an important participant, necessary in the further phases of the project.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholders groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipality, Municipality Board	Preparation of the application regarding financing of planned activities and preparation of tender documents. The commune office will be responsible for the selection of the contractor, implementation of	E-mail or telephone communication. Inter-municipal cooperation through meetings on planned activities and joint fundraising.

		the planned activities and supervision of the investment	
Political decision-makers	Mayor of the municipality	Identifying the most advantageous source of financing, obtaining funds, securing funds in the commune budget	Management of the implementation process of the action plan and communication with residents as well as information and promotion activities carried out jointly with non-governmental organizations
Target groups	Residents of the municipality	Cooperation with the municipality by responding to surveys and determining the source of energy from RES that they are interested in.	Telephone communication and meetings in the municipality with persons responsible for the project. Participation as a beneficiary.
Groups supporting implementation, communication and promotion	<p>Association "Local Action Group - Crucible of the Bug Valley"</p> <p>Bug River Local Tourist Organization</p> <p>Agritourism farms</p> <p>Villages</p> <p>Association of Rural Development "PARK"</p> <p>Association "Local</p>	Actions to increase energy awareness of residents and interest of residents in activities for the implementation of low-emission economy	Disseminating good practices in the field of energy efficiency improvement and the use of renewable energy sources. Information, promotional and educational activities among the residents

	Initiative - Common Goal"		of the commune (children, youth and adults), as well as people visiting the commune
	KREDA Association		
	Cultural and Educational Association in Kobylany		
	Volunteer Fire Department		
	Student Sports Club "KORONA"		

4 Monitoring Strategy

In the course of the project, the indicators determining the effectiveness of the implementation of investments are indicators of the achievement of the project objectives, as well as result indicators. These indicators clearly show how the investment progresses - the indicators of achieving the project's objectives, and what final results the investment had - the result indicators.

The person / entity responsible for investor's supervision (monitoring) is the person / entity that will be entrusted with these duties. The task is necessary due to the fact that the applicant does not have the appropriate know-how to perform such a task by himself. The supervision inspector is to watch over the proper implementation of works involving the construction of renewable energy installations.

The monitoring of activities and works related to the project will be continued for three years of the duration of the investment. It should be systematic.

Systematic verification of the progress of works is important in the smooth course of activities and implementation of the tasks set out in the Action Plan, because it gives us full insight into the current situation, which can allow us to react in situations when the implementation of actions will not be correct.

The parameters assessing the quality of the course of the investment, ie the indicators of achieving the project objectives should be a determinant of how the Plan is being implemented. If the values resulting from such documents as "Reports of acceptance of construction works" or "Annual reports of generated RES energy" do not equal those of the Action Plan, the goals set in it must be redefined.

The monitoring person also has the task of confirming the works performed, and if problems arise, his duties are to immediately removed them.

5 Risk management

Risk	Probability of realising	Mitigation measure
Increase in maintenance costs	Medium	In order to minimize the risk, long-term contracts with suppliers are recommended that allow for a permanent reduction and maintenance of service prices.
Increase in the value of investment outlays - related to the potential increase in prices	Medium	In order to mitigate the risk, it is recommended to create a provision for other purposes and to prepare detailed tender documentation and delivery schedule
Change in the discount rate	Low	none

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLANS

for the Region of Mazovian
Voivodeship (Mazovia Region)

Thermomodernization of public
buildings in Stara Kornica municipality

English version

prepared by
Mazovia Energy Agency (MAE)

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: 31.10.2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Energy efficiency in the public sector

Title: Thermomodernization of public buildings in Stara Kornica municipality

1 Objective

The aim of the action plan is to carry out thermo-modernization works of buildings and reduce energy consumption in: Junior High School with Gymnasium, Primary School, Kindergarten with Food Block being part of the Public Educational Institutes for them. Regaining Independence in Stara Kornica in such a way that the elements that undergo thermo-modernization had energy efficiency parameters required by the regulations that will apply from 01.01.2021, which were specified in the implementing measures to Directive 2009/125 / EC of October 21, 2009 .

1.1 Objective scope and targets values

The specific objectives of the project are to reduce primary energy consumption by 414.7 MWh / year, reduce electricity consumption by 34.535 MWh, reduce operating costs by PLN 131 403, increase the share of energy from RES in buildings to 59.8% and reduce carbon dioxide emissions 144.64 t. The goal will be achieved by carrying out thermo-modernization works such as: building insulation, replacement of lighting with energy-efficient ones, reconstruction of the heating system together with the exchange of heat source for the heat pump, installation of photovoltaic panels.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Number of units generating heat from RES	1 pc.	Report of acceptance of works
Number of modernized buildings	4 pc.	Report of acceptance of works
Usable area of buildings subjected to thermo-modernization	4 349 m ²	Report of acceptance of works
The ability to generate heat from renewable sources	0,28 MWt	Report of acceptance of works
The ability to generate electricity from renewable sources	0,009 MWe	Report of acceptance of works; ex-post energy audit
The amount of heat energy saved	2 259,90 GJ/year	ex-post energy audit
The amount of electricity saved	34,54 MWh/ year	ex-post energy audit
Heat production from installations using renewable energy sources	79,94 MWht/year	ex-post energy audit
Electricity production from installations using renewable energy sources	8,65 MWhe/year	ex-post energy audit

Estimated annual reduction in CO ₂ emissions	144,64 tonnes of CO ₂ equivalent / year	ex-post energy audit
Reduction of final energy consumption	2 074,23 GJ/year	ex-post energy audit
Decrease in annual primary energy consumption in public buildings	547 514,83 kWh/ year	ex-post energy audit

2 Implementation strategy

2.1 Step by step description

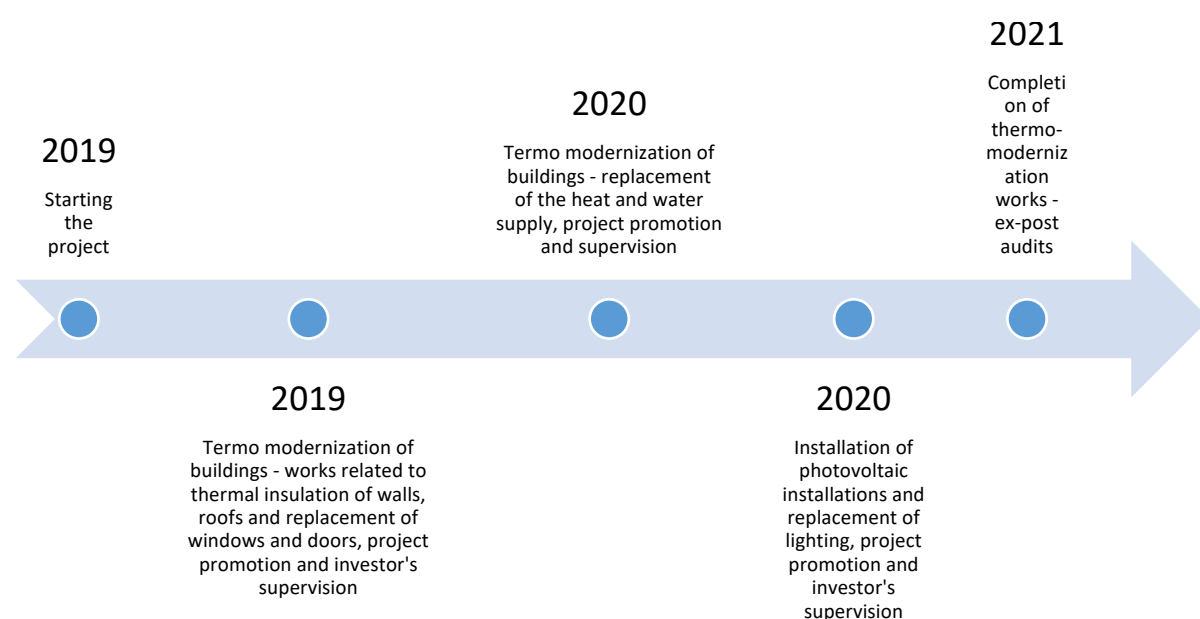
Steps and tasks foreseen during the implementation of the plan in the Stara Kornica municipality:

1. Insulation of walls - the external walls of the gymnasium, hall, nutritional block, kindergarten, boiler room and elementary school are assumed in this step.
2. Insulation of the flat roof / roof / ceilings.
3. Replacement of windows - the improvement includes the replacement of existing windows with tight windows with better heat transfer coefficients $U = 0.9-1.1 \text{ W / m}^2\text{K}$
4. Replacing the door - improving the exchange of existing doors for tight doors with better heat transfer coefficients $U = 1,3 \text{ W / m}^2\text{K}$
5. Exchange of hot-water systems - this step assumes improvement of the system of supplying hot utility water by replacing and insulating the pipes, installing thermostatic valves on the circulation under the branches or on the branches, regulating the circulation system, replacing the basin faucets with batteries equipped with aerators.
6. Replacement of the central heat and modernization of the heat source.
7. Photovoltaic installation and replacement of lighting. - in this step, the replacement of existing lighting with LED luminaires will be performed. In addition, a 9 kW photovoltaic installation will be installed to produce energy for the building's needs.
8. Documentation - development of documents such as energy audits

9. Investor's supervision - in order to conduct supervision, the entity / person to be entrusted with the investor's supervision duties will be selected. The supervision supervisor is to supervise the proper conduct and execution of construction works including the performance of thermo-modernization works of heat pump installations.

10. Project promotion - the aim of this activity is to disseminate activities related to the promotion and dissemination of the project.

2.2 Time schedule



2.3 Budget and resources needed

Expected costs incurred related to given tasks (gross):

1. Wall insulation - 405 000 PLN
2. Insulation of the flat roof / dach / ceopów - 515 000 PLN
3. Replacement of windows - 330,000 PLN
4. Door replacement - PLN 52,000
5. Exchange of hot-water systems - PLN 95,000
6. Replacement of the heat system and modernization of the heat source - PLN 1 375,000
7. Photovoltaic installation and replacement of lighting - 315 000 PLN

8. Documentation - PLN 140,000

9. Investor's supervision - PLN 50,000

10. Promotion of the project - PLN 5,000

Together, all the tasks give the total cost of the project in the Stara Kornica in the amount of PLN 3,282,000

The project will be 80% co-financed if the application is approved by the decision-making body.

3 Collaboration with stakeholders

During the development of the Action Plan the main stakeholder was the Municipality of Stara Kornica, as well as people dealing with public utility buildings that will be thermomodernized.

Until now, the executive team consisted of employees of the Stara Kornica municipality, ie the Applicants of the project, as well as cooperating companies supporting it in content-related matters, regarding ex-ante energy audits as well as the valuation of project costs.

Through promotional activities, educational activities and an increase in energy awareness of the municipality's inhabitants, the number of entities interested in taking part in the activity may increase.

In the future, significant participants of the project will be companies that develop technical documentation and construction of RES installations, which will be selected through an open tender. The subject / person involved in investor's supervision will be an important participant, necessary in the further phases of the project.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholders groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipality, Municipality Board	<p>Preparation of the application regarding financing of planned activities and preparation of tender documents.</p> <p>The commune office will be responsible for the selection of the contractor, implementation of the planned activities and supervision of the investment</p>	<p>E-mail or telephone communication.</p> <p>Inter-municipal cooperation through meetings on planned activities and joint fundraising.</p>
Political decision-makers	Mayor of the municipality	<p>Identifying the most advantageous source of financing, obtaining funds, securing funds in the commune budget</p>	<p>Management of the implementation process of the action plan and communication with residents as well as information and promotion activities carried out jointly with non-governmental organizations</p>
Target groups	Employees of branches in thermo-modernized buildings	<p>Cooperation with the municipality by responding to surveys and determining thermo-modernization works and a new source of heat that they are interested in.</p> <p>As installation users -</p>	<p>Telephone communication and meetings in the municipality with persons responsible for the project.</p> <p>Participation as a beneficiary.</p>

		owner supervision over the implementation of the task	
Groups supporting implementation, communication and promotion	<p>Association "Local Action Group - Crucible of the Bug Valley"</p> <p>Bug River Local Tourist Organization</p> <p>Agritourism farms</p> <p>Villages</p> <p>Association of Rural Development "PARK"</p> <p>Association "Local Initiative - Common Goal"</p> <p>KREDA Association</p> <p>Cultural and Educational Association in Kobylany</p> <p>Volunteer Fire Department</p> <p>Student Sports Club "KORONA"</p>	<p>Actions to increase energy awareness of residents and interest of residents in activities for the implementation of low-emission economy</p>	<p>Disseminating good practices in the field of energy efficiency improvement and the use of renewable energy sources. Information, promotional and educational activities among the residents of the commune (children, youth and adults), as well as people visiting the commune</p>

4 Monitoring Strategy

In the course of the project, the indicators determining the effectiveness of the implementation of investments are indicators of the achievement of the project objectives, as well as result indicators. These indicators clearly show how the investment progresses - the indicators of achieving the project's objectives, and what final results the investment had - the result indicators.

The person / entity responsible for investor's supervision (monitoring) is the person / entity that will be entrusted with these duties. The task is necessary due to the fact that the applicant does not have the appropriate know-how to perform such a task by himself. The supervision inspector is to watch over the proper implementation of works involving the construction of renewable energy installations.

The monitoring of activities and works related to the project will be continued for two years of the duration of the investment. It should be systematic.

Systematic verification of the progress of works is important in the smooth course of activities and implementation of the tasks set out in the Action Plan, because it gives us full insight into the current situation, which can allow us to react in situations when the implementation of actions will not be correct.

The parameters assessing the quality of the course of the investment, ie the indicators of achieving the project's objectives should be a determinant of how the Plan is being implemented. If the values resulting from such documents as "Reports of acceptance of works" or "Energy audits ex-post" do not equal those of the Action Plan, then the goals set in it must be redefined.

The monitoring person also has the task of confirming the works performed, and if problems arise, his duties are to immediately removed them.

5 Risk management

Risk	Probability of realising	Mitigation measure
Increase in maintenance costs	Medium	In order to minimize the risk, long-term contracts with suppliers are recommended that allow for a permanent reduction and maintenance of service prices.
Increase in the value of investment outlays - related to the potential increase in prices	Medium	In order to mitigate the risk, it is recommended to create a provision for other purposes and to prepare detailed tender documentation and delivery schedule
Change in the discount rate	Low	none

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLANS

for the Region of Mazovian
Voivodeship (Mazovia Region)

Ecological Mazovia Municipalities -
solar energy in Suchozebry
municipality

English version

prepared by
Mazovia Energy Agency (MAE)

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Share of renewable energy sources in overall energy production

Title: Ecological Mazovia Municipalities - solar energy in Suchożebry municipality

1 Objective

The aim of the action plan is to increase the share of renewable energy in production on a national basis. The production of energy, both electricity and heat, will be increased through the implementation of the project. The aim is also to increase the share of renewable energy in terms of region, which will allow for the partial independence of households and public buildings from conventional energy sources. The indirect objectives of the project include economic goals, ie lowering the costs of electricity purchase, reducing the costs of heating hot utility water and heating buildings, or environmental ones, such as reduction of atmospheric pollution in the form of reduction of CO₂ gas emissions. This action is to encourage the residents of the municipality of Suchożebry to develop renewable energy in its area, as well as to disseminate it, which will contribute to the implementation of the plans established in the municipality's strategic documents.

1.1 Objective scope and targets values

The action will be implemented in 18 localities of the Suchożebry: Borki Siedleckie, Brzozów, Kopcie, Kownaciska, Krynica, Krześlin, Krześlinek, Nakory, Podnieśno, Przygody, Sosna-Kicki, Sosna-Korabie, Sosna-Kozółki, Sosna-Trojanki, Stany Duże, Stany Małe, Suchożebry oraz Wola Suchożebrska.

As a result of the project, 192 installations of solar collectors, 134 photovoltaic installations as well as 25 ground heat pump installations will be created in the municipality of Suchożebry. The installation will contribute not only in increasing the amount of energy produced from renewable energy sources, but also to reducing greenhouse gas emissions by 195,75 MgCO₂ / year. In addition to the investment part, as part of the project implementation in the municipality, promotional, dissemination and educational activities will take place. The project will be distributed in the municipality by means of media such as the Internet, press and radio. The capacity of producing energy from renewable sources will increase by 1.4536 MW. Thanks to the investment, 351 RES

installations will be built with a total energy production of 1805 MWh / year. The investment is planned for 2020-2023.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Number of units generating heat from RES	217 pc.	Acceptance report of construction works
Number of units generating electricity from RES	134 pc.	Acceptance report of construction works
The ability to generate electricity from renewable sources	0,7743 MWe	Annual reports on generated energy from RES
The ability to generate heat from renewable sources	0,6793 MWt	Annual reports on generated energy from RES
Electricity production from installations using renewable energy sources	1031 MWhe/year	Annual reports on generated energy from RES
Heat production from installations using renewable energy sources	774 MWht/year	Annual reports on generated energy from RES
Estimated annual reduction in CO ₂ emissions	195,75 tonnes of CO ₂ equivalent / year	Annual reports on generated energy from RES

2 Implementation strategy

2.1 Step by step description

Steps and tasks foreseen during the implementation of the plan in the Suchożebry municipality:

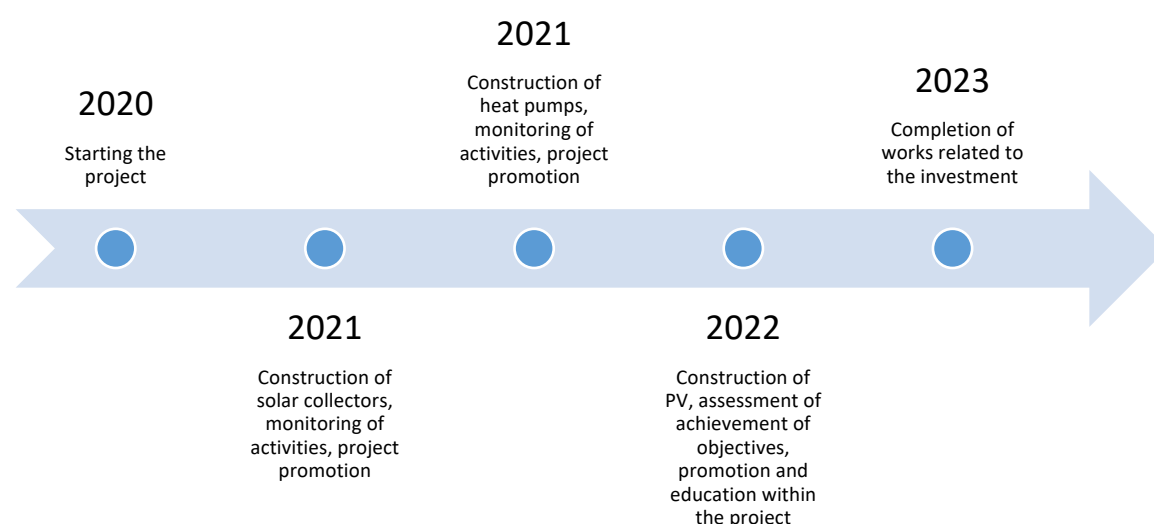
1. Preparation of tender documentation - the purpose of this task is to prepare documentation in accordance with the Public Procurement Law and to correctly carry out the tender procedure along with the selection of the contractor. This will depend on checking the correctness of documentation, preparation of specimen specification of essential terms of the contract with attachments, preparation of a description of the subject of the order, conditions of participation of contractors in the procedure, criteria based on which offers will be evaluated and the contract template. In addition, the scope of this task will also include the obligation to prepare responses on behalf of the ordering party, to represent him, as well as to verify offers, review them and recommend a suitable offer to the contracting authority.
2. Preparation of technical documentation for the installation of solar collectors for the residents of the commune - as a result, building and executive documents for solar installations will be created. The task contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.
3. Construction of a solar collector installation - as a result of this task solar collector installations will be made. The entity responsible for the task will be selected through an open tender.
4. Preparation of technical documentation for ground heat pump installations - as a result sets of construction and executive documents for the installation of ground heat pumps will be created. The task contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.
5. Construction of ground heat pump installations - as a result of this task, ground heat pump installations will be performed. The entity responsible for the task will be selected through an open tender.
6. Preparation of technical documentation for photovoltaic - as a result, construction and executive documents for photovoltaic installations will be created. The task contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.

7. Construction of photovoltaic installation - photovoltaic installations will be performed as a result of this task. The entity responsible for the task will be selected through an open tender.

8. Investor's supervision - in order to conduct supervision, an entity / person will be chosen to be entrusted with investor's supervision duties. The supervision supervisor is to supervise the proper course and execution of construction works including the installation of collectors, photovoltaic installations, and heat pump installations.

10. Project promotion - the aim of this activity is to disseminate activities related to the promotion and dissemination of the project.

2.2 Time schedule



2.3 Budget and resources needed

Expected costs incurred related to given tasks (gross):

1. Preparation of tender documentation - PLN 9,500
2. Preparation of technical documentation for the installation of solar collectors - PLN 84,000
3. Construction of a solar collector installation on residential buildings - PLN 1 750 000
4. Construction of solar collector installations (outside residential buildings) - PLN 126,000
5. Preparation of technical documentation for ground heat pumps - PLN 45,000

6. Construction of ground heat pump installations (works in the building) - PLN 505,000
7. Construction of ground heat pump installations (boreholes) - PLN 575,000
8. Preparation of photovoltaic system documentation - PLN 195,000
9. Construction of a photovoltaic installation on residential buildings - PLN 1,950,000
10. Construction of photovoltaic installation (outside residential buildings) - PLN 2,590,000
11. Investor's supervision - PLN 76,000
12. Promotion of the project - PLN 30,000

Together, all the tasks give the total cost of the project in the commune of Suchożebry in the amount of PLN 7 936 500

The project will be 80% co-financed if the application is approved by the decision-making body.

3 Collaboration with stakeholders

During the development of the Action Plan, the main stakeholder was the residents of the Suchożebry municipality. Cooperation with the beneficiaries of the planned investment was the most important. The activities carried out during the course of the investment were coordinated with them, which installations will be created, which translates into the size and investment costs.

Partner institutions: Kotuń, Mokobody and Wodynie are partner entities that cooperate with the Applicant as part of the project.

Through promotional activities, educational activities and an increase in energy awareness of the municipality's inhabitants, the number of entities interested in taking part in the activity may increase.

In the future, significant participants of the project will be companies that develop technical documentation and construction of RES installations, which will be selected through an open tender. The subject / person involved in investor's supervision will be an important participant, necessary in the further phases of the project.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholders groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipality, Municipality Board	<p>Preparation of the application regarding financing of planned activities and preparation of tender documents.</p> <p>The commune office will be responsible for the selection of the contractor, implementation of the planned activities and supervision of the investment</p>	<p>E-mail or telephone communication.</p> <p>Inter-municipal cooperation through meetings on planned activities and joint fundraising.</p>
Political decision-makers	Mayor of the municipality	Identifying the most advantageous source of financing, obtaining funds, securing funds in the commune budget	Management of the implementation process of the action plan and communication with residents as well as information and promotion activities carried out jointly with non-governmental organizations
Target groups	Residents of the municipality	Cooperation with the municipality by responding to surveys and determining the source of energy from RES that they are interested in.	Telephone communication and meetings in the municipality with persons responsible for the project. Participation as a beneficiary.

Groups supporting implementation, communication and promotion	<p>Volunteer Fire Department</p> <p>Association "Local Action Group of the Siedlce Powiat"</p> <p>Agritourism farms</p> <p>Villages</p>	<p>Actions to increase energy awareness of residents and interest of residents in activities for the implementation of low-emission economy</p>	<p>Disseminating good practices in the field of energy efficiency improvement and the use of renewable energy sources.</p> <p>Information, promotional and educational activities among the residents of the commune (children, youth and adults), as well as people visiting the commune</p>
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4 Monitoring Strategy

In the course of the project, the indicators determining the effectiveness of the implementation of investments are indicators of the achievement of the project objectives, as well as result indicators. These indicators clearly show how the investment progresses - the indicators of achieving the project's objectives, and what final results the investment had - the result indicators.

The person / entity responsible for investor's supervision (monitoring) is the person / entity that will be entrusted with these duties. The task is necessary due to the fact that the applicant does not have the appropriate know-how to perform such a task by himself. The supervision inspector is to watch over the proper implementation of works involving the construction of renewable energy installations.

The monitoring of activities and works related to the project will be continued for three years of the duration of the investment. It should be systematic.

Systematic verification of the progress of works is important in the smooth course of activities and implementation of the tasks set out in the Action Plan, because it gives us full insight into the current situation, which can allow us to react in situations when the implementation of actions will not be correct.

The parameters assessing the quality of the course of the investment, ie the indicators of achieving the project objectives should be a determinant of how the Plan is being implemented. If the values resulting from such documents as "Reports of acceptance of construction works" or "Annual reports of generated RES energy" do not equal those of the Action Plan, the goals set in it must be redefined.

The monitoring person also has the task of confirming the works performed, and if problems arise, his duties are to immediately removed them.

5 Risk management

Risk	Probability of realising	Mitigation measure
Increase in maintenance costs	Medium	In order to minimize the risk, long-term contracts with suppliers are recommended that allow for a permanent reduction and maintenance of service prices.
Increase in the value of investment outlays - related to the potential increase in prices	Medium	In order to mitigate the risk, it is recommended to create a provision for other purposes and to prepare detailed tender documentation and delivery schedule
Change in the discount rate	Low	none

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLANS

for the Region of Mazovian
Voivodeship (Mazovia Region)

Construction of renewable energy
installations in Wodynie municipality

English version

prepared by
Mazovia Energy Agency (MAE)

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: 31.10.2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Share of renewable energy sources in overall energy production

Title: Construction of renewable energy installations in Wodynie municipality

1 Objective

The aim of the action plan is to: increase the production of electricity and heat from renewable sources in the Wodynie municipality, reduce the amount of greenhouse gases emitted to the atmosphere and diversify energy sources. The project is to bring the above results by installing photovoltaic installations and solar collectors in renewable energy sources, the production of electricity and heat will increase. This activity is to encourage the residents of the Wodynie municipality to develop renewable energy in its area, which will contribute to the implementation of the plans established in the municipality's strategic documents. As a result of the project, 152 RES installations will be built with a total energy production amounting to 1008,4 MWh / year.

1.1 Objective scope and targets values

The project will be implemented in 22 towns of Wodynie municipality: Borki, Brodki, Budy, Helenów, Kaczory, Kamieniec, Kołodziej, Łomnica, Młynki, Oleśnica, Ruda Szostkowska, Ruda Wolińska, Rudnik Duży, Rudnik Mały, Seroczyn, Soćki, Szostek, Szostek Kolonia, Wodynie, Wola Serocka, Wola Wodyńska, Beggar.

As a result of this project, installations producing energy from renewable energy sources will be built in 105 households and 12 public buildings in the municipality of Wodynie. The most in them is in Oleśnica - 14 farms. The project involves the creation of 73 photovoltaic installations (47 on residential buildings, 14 outside residential buildings, 11 solar installations on public buildings and one on a private building), 63 solar collector installations, and 16 heat pump installations (15 land and 1 air). The installation of these installations will also contribute not only to increasing the amount of energy produced from renewable energy sources, but also to reducing greenhouse gas emissions by 410,3 MgCO₂ / year. In addition to the investment part, the project also includes a promotional, dissemination and educational part, within which informational and educational meetings will be organized in the municipality on the use of renewable energy sources. The investment is planned for 2020-2023.

1.2 Target indicators

Objective	Target indicator	Method of measurement and validation
Number of units generating heat from RES	79 pc.	Acceptance report of construction works
Number of units generating electricity from RES	73 pc.	Acceptance report of construction works
The ability to generate electricity from renewable sources	0,58 MWe	Annual reports on generated energy from RES
The ability to generate thermal energy from renewable sources	0,43 MWt	Annual reports on generated energy from RES
Heat production from installations using renewable energy sources	605,44 MWht/year	Annual reports on generated energy from RES
Electricity production from installations using renewable energy sources	403 MWhe/year	Annual reports on generated energy from RES
Estimated annual reduction in CO ₂ emissions	410,3 tonnes of CO ₂ equivalent / year	Annual reports on generated energy from RES

2 Implementation strategy

2.1 Step by step description

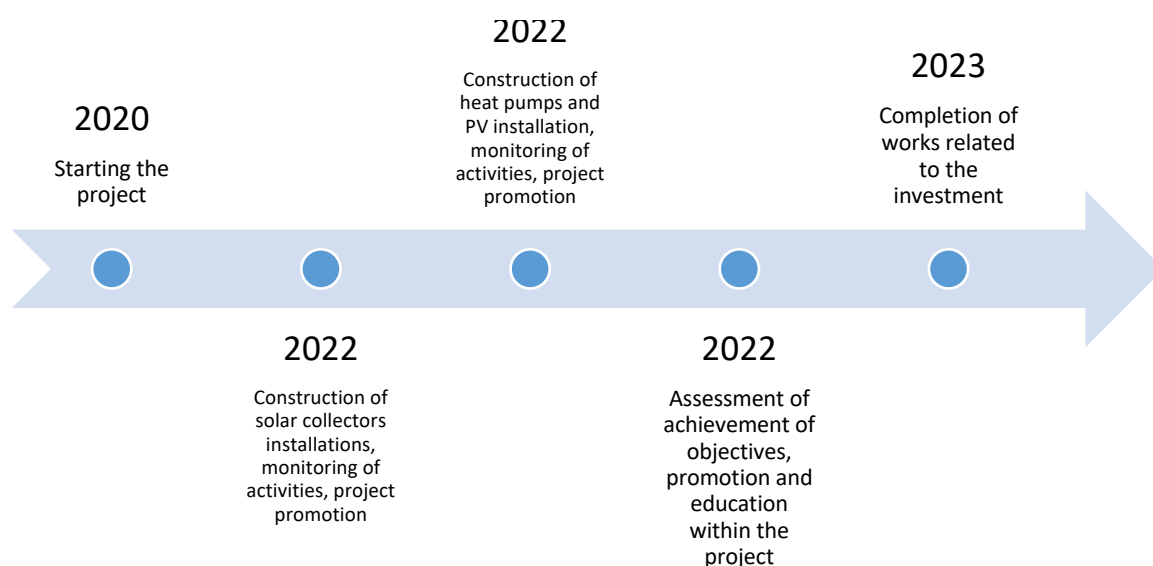
Steps and tasks foreseen during the implementation of the plan in the Wodynie municipality:

1. Preparation of tender documentation - the purpose of this task is to prepare documentation in accordance with the Public Procurement Law and to correctly carry out the tender procedure along with the selection of the contractor. This will depend on checking the correctness of documentation, preparation of specimen specification of essential terms of the contract with attachments, preparation of a description of the subject of the order, conditions of participation of contractors in the procedure, criteria based on which offers will be evaluated and the contract template. In addition, the scope of this task will also include the obligation to prepare responses on behalf of the ordering party, to represent him, as well as to verify offers, review them and recommend a suitable offer to the contracting authority.
2. Preparation of technical documentation for the installation of solar collectors - as a result, building and executive documents for solar installations will be created. The task contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.
3. Construction of a solar collector installation - as a result of this task solar collector installations will be made. The entity responsible for the task will be selected through an open tender.
4. Preparation of technical documentation for air pump heat pumps - as a result a set of building and executive documents for the installation of an air heat pump will be created. The task contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.
5. Construction of air pump heat pumps - as a result of this task the installation of an air heat pump will be performed. The entity responsible for the task will be selected through an open tender.
6. Preparation of technical documentation for the installation of ground heat pumps - as a result sets of construction and executive documents for the installation of ground heat pumps will be created. The task contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.
7. Construction of ground source heat pump installations - as a result of this task, ground heat pump installations will be performed. The entity responsible for the task will be selected through an open tender.
8. Preparation of technical documentation for the photovoltaic installation - as a result, documents for construction and executive photovoltaic installations will be

created. The task contractor will be selected through an open tender procedure in accordance with the Public Procurement Law.

9. Construction of photovoltaic installation - photovoltaic installations will be carried out as a result of this task. The entity responsible for the task will be selected through an open tender.
10. Investor's supervision - in order to conduct supervision, the entity / person to be entrusted with the investor's supervision will be selected. The supervisory inspector is to supervise the proper conduct and execution of construction works including the implementation of photovoltaic installations.
11. Project promotion - the aim of this activity is to disseminate activities related to the promotion and dissemination of the project.

2.2 Time schedule



2.3 Budget and resources needed

Expected costs incurred related to given tasks (gross):

1. Preparation of tender documentation - PLN 17,000
2. Preparation of technical documentation for the installation of solar collectors - PLN 42 500
3. Construction of a solar collector installation on residential buildings - PLN 640,000

4. Construction of solar collectors (outside residential buildings) - PLN 335,000
5. Preparation of technical documentation for air pump heat pumps - PLN 1,100
6. Construction of air pump heat pumps - PLN 24,000
7. Preparation of technical documentation for ground heat pumps - PLN 28,000
8. Construction of ground heat pump installations (works in the building) - PLN 305,000
9. Construction of ground heat pump installations (boreholes) - 350,000 PLN
10. Preparation of photovoltaic installation documentation - PLN 58,000
11. Construction of a photovoltaic installation on residential buildings - PLN 960,000
12. Construction of a photovoltaic installation (outside residential buildings) - PLN 365,000
13. Preparation of photovoltaic system documentation for public utility buildings - PLN 43,000
14. Construction of a photovoltaic installation for public utility buildings - PLN 1,100,000
15. Investor's supervision - PLN 45,000
16. Promotion of the project - PLN 18 500

Together, all the tasks give the total cost of the project - in the amount of PLN 4,333,100

The project will be 80% co-financed if the application is approved by the decision-making body.

3 Collaboration with stakeholders

During the development of the Action Plan, the main stakeholder was the residents of the Wodynie municipality. Cooperation with the beneficiaries of the planned investment was the most important. The activities carried out during the course of the investment were coordinated with them, which installations will be created, which translates into the size and investment costs.

Until now, the executive team consisted of employees of the Wodynie municipality, that is, the Applicants of the project, as well as cooperating enterprises supporting it in content-related matters, i.e. energy matters, financial analysis.

Partner institutions: Kotuń, Domanice and Skorzec are partner entities that cooperate with the Applicant as part of the project.

Through promotional activities, educational activities and an increase in energy awareness of the municipality's inhabitants, the number of entities interested in taking part in the activity may increase.

In the future, significant participants of the project will be companies that develop technical documentation and construction of RES installations, which will be selected through an open tender. The subject / person involved in investor's supervision will be an important participant, necessary in the further phases of the project.

Roles and responsibilities of different actors for Action Plan implementation

Stakeholders groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipality, Municipality Board	<p>Preparation of the application regarding financing of planned activities and preparation of tender documents.</p> <p>The commune office will be responsible for the selection of the contractor, implementation of the planned activities and supervision of the investment</p>	<p>E-mail or telephone communication.</p> <p>Inter-municipal cooperation through meetings on planned activities and joint fundraising.</p>
Political decision-makers	Mayor of the municipality	<p>Identifying the most advantageous source of financing, obtaining funds, securing funds in the commune budget</p>	<p>Management of the implementation process of the action plan and communication with residents as well as information and promotion activities carried out jointly with non-governmental organizations</p>

Target groups	Residents of the municipality	Cooperation with the municipality by responding to surveys and determining the source of energy from RES that they are interested in.	Telephone communication and meetings in the municipality with persons responsible for the project. Participation as a beneficiary.
Groups supporting implementation, communication and promotion	<p>Volunteer Fire Department</p> <p>Association "Local Action Group of the Siedlce Poviāt"</p> <p>Agritourism farms</p> <p>Villages</p>	<p>Actions to increase energy awareness of residents and interest of residents in activities for the implementation of low-emission economy</p>	<p>Disseminating good practices in the field of energy efficiency improvement and the use of renewable energy sources.</p> <p>Information, promotional and educational activities among the residents of the commune (children, youth and adults), as well as people visiting the commune</p>

4 Monitoring Strategy

In the course of the project, the indicators determining the effectiveness of the implementation of investments are indicators of the achievement of the project objectives, as well as result indicators. These indicators clearly show how the investment progresses - the indicators of achieving the project's objectives, and what final results the investment had - the result indicators.

The person / entity responsible for investor's supervision (monitoring) is the person / entity that will be entrusted with these duties. The task is necessary due to the fact that the applicant does not have the appropriate know-how to perform such a task by himself. The supervision inspector is to watch over the proper implementation of works involving the construction of renewable energy installations.

The monitoring of activities and works related to the project will be continued for three years of the duration of the investment. It should be systematic.

Systematic verification of the progress of works is important in the smooth course of activities and implementation of the tasks set out in the Action Plan, because it gives us

full insight into the current situation, which can allow us to react in situations when the implementation of actions will not be correct.

The parameters assessing the quality of the course of the investment, ie the indicators of achieving the project objectives should be a determinant of how the Plan is being implemented. If the values resulting from such documents as "Reports of acceptance of construction works" or "Annual reports of generated RES energy" do not equal those of the Action Plan, the goals set in it must be redefined.

The monitoring person also has the task of confirming the works performed, and if problems arise, his duties are to immediately removed them.

5 Risk management

Risk	Probability of realising	Mitigation measure
Increase in maintenance costs	Medium	In order to minimize the risk, long-term contracts with suppliers are recommended that allow for a permanent reduction and maintenance of service prices.
Increase in the value of investment outlays - related to the potential increase in prices	Medium	In order to mitigate the risk, it is recommended to create a provision for other purposes and to prepare detailed tender documentation and delivery schedule
Change in the discount rate	Low	none

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

Thermo-renovation of private own multi story apartments blocks on Bucharest Sector 2

English version

prepared by
AEEPM – Local Energy Agency Bucharest

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: November 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Energy efficiency in households

Title: Thermo-renovation of private own multi story apartments blocks on Bucharest Sector 2

1 Objective

According with the Romanian national legislation, 121/2014 Law regarding energy efficiency, transposing EE Directive public authorities has obligations to design and implement an Energy Action Plan for buildings energy deep renovation (public or private own).

Taking in to consideration Bucharest-Ilfov Energy Strategy adopted by Ilfov County on November 2018 by 2050 all public and private buildings (old stock) must be totally renovated and transformed in to “**A energy class**” buildings and for all new buildings (build after 2020) the request is to be only Near Zero Energy Buildings.

1.1 Objective scope and targets values

Supported by AEEPM under PANEL 2050 project Bucharest Sector 2 Municipality has the determination and motivation to implement this action plan together with household associations.

The purpose of this Action Plan is to reduce the costs and energy consumption in all apartment buildings connected to the centralized heating system.

The goal is to renovate all apartment buildings connected to the centralized heating system. Currently, 140 buildings are renovated out of **2100 apartment buildings** in the Bucharest Sector 2 Municipality.

The energy renovation project foresees the implementation of measures on the building envelope (facade, ceiling, window replacement), replacement of lighting, renovation of the ventilation system and the replacement/renovation of the heating system.

The main indicators for this action will be:

- Energy savings in kWh;
- CO2 savings.

Table 1: indicators and measurement methods.

Objective	Target indicator	Method of measurement and validation
Energy saving	<ul style="list-style-type: none"> kWh of savings through implemented measures. 	<ul style="list-style-type: none"> calculated based on annual use of electricity and energy for heating compared with the baseline values.
CO2 reduction	<ul style="list-style-type: none"> Tons of CO2 reduction per year. 	<ul style="list-style-type: none"> Calculated based on the annual use of electricity and energy for heating.

2 Implementation strategy

2.1 Step by step description

Romanian legislation defines very clear steps to be followed for an energy renovation project, so following steps are to be carried out:

- an initial analysis of the current situation of a building and **energy certificates** shows if there is a need for implementing measures to increase the energy efficiency of a building;
- In-depth analysis. The second step is a more in-depth analysis, which is done with the energy audit of the building. With an energy audit, the use of energy and the efficiency of existing energy systems are being analysed. The aim is to provide economically and technically justified measures to improve the energy efficiency of buildings and the use of renewable resources;
- After an energy renovation feasibility study, all necessary documents must be prepared – funding, implementation plans, works permitting, permits for implementation;
- the execution of a public contract procedure (for the selection of the contractor), implementation of renovation works;
- **final energy audit** and issuing the new energy certificate to see if the works done give the expected energy efficiency results;
- monitoring of results for the minimum period of 5 years after finalization of works.

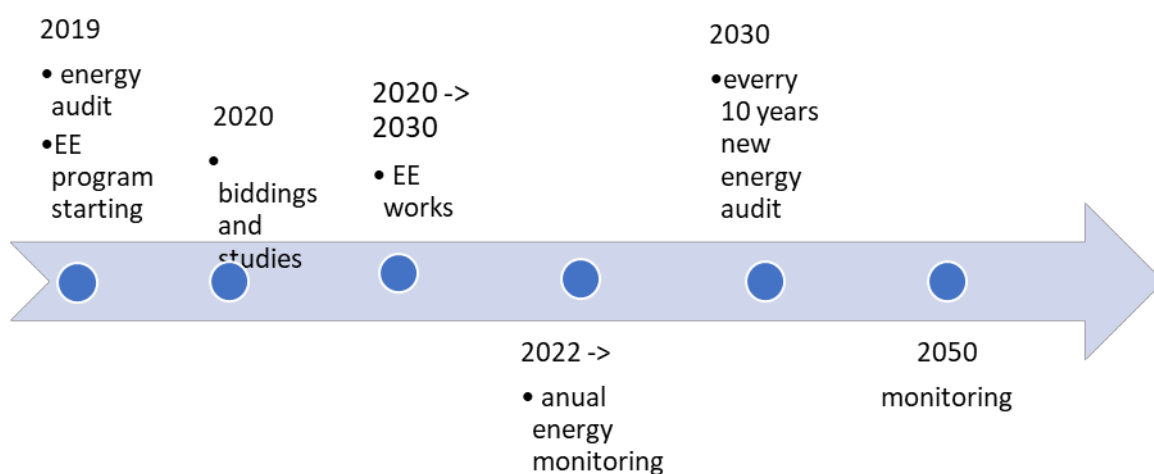
During our PANEL 2050 project support **Bucharest Sector 2 Municipality** to conduct discussions and negotiations with household associations of those 2100 apartment

buildings and during stakeholder's mobilization **Ilfov County make commitment** to financial support with **30%** of deep renovation budget, owners support 35% of costs and **Bucharest Sector 2 Municipality** 35% from local budget and/or European Funds.

2.2 Time schedule

Starting with the initial energy audit in 2019, the investment program will continue 2020-2030.

According with the Romanian legislation AEEPM will help municipality to monitoring energy consumption on the annual basis but a new energy certificate must be issuing every 10 years.



2.3 Budget and resources needed

Identified sources of funding are:

- European Commission Cohesion funds;
- EU funds of targeted programs;
- 30% contribution from Ilfov County Budget
- 30% State budget funds for the owners in energy poverty;
- 35% household association funds;
- Funds of Bucharest Sector 2 Municipality.

A part of the funding will reach the region through the Ilfov County Council according to approved priorities on the County Energy Strategy.

3 Collaboration with stakeholders

Main stakeholders involved into this action are:

- Ilfov County;
- Local Energy Agency - AEEPМ;
- Bucharest Sector 2 Municipality;
- House owner's association representatives.

Roles and responsibilities of different actors for Action Plan implementation

In the table below are listed the main stakeholders involved, their role and involvement in this action.

Table 2: Stakeholder involvement

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Bucharest Sector 2 Municipality staff	Carrying out public biddings for energy audits and other needed analysis.	Involvement into the action in all steps. Phone/email/personal meetings.
	Based on the mandate given by the owner associations General Assembly vote.	Preparation of the application for County budget Preparation of implementation plans. Supervision of implementation works.	
	AEEPМ – Local Energy Agency	Monitoring and reporting.	
building owners	House owner's association representatives	Owners (decision to participate in to programme must be taken with majority of the house owners)	Involvement into the action in all steps. Phone/email/personal meetings.

Political decision-makers	Ilfov County administrator Bucharest Sector 2 Municipality mayor	Important for decision on implementation and financing of the action.	Phone/email/personal meetings.
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4 Monitoring Strategy

After 2 years of the implementation of renovation works the monitoring phase will start. According to the national requirements there is an annual reporting period of achieved energy savings. Once a year, it is necessary to report on energy consumption and the costs of energy and the calculations of achieved indicators for the previous year. The basis for the calculation of the savings will be the average consumptions.

According with 121/2014 energy efficiency legislation every municipality with over 5000 inhabitants has obligation to hire an energy manager responsible for monitoring and reporting on achieved savings to the ANRE (Romania Energy Regulatory Authority).

5 Risk management

Table3: Description of possible risks and according mitigation measures.

Risk	Probability of realizing	Mitigation measure
Political risk (every 4-year new local council and new mayor will be elected)	medium	Multi-level governance assures the implementation of this plan since the Ilfov County Energy Strategy was approved with unanimity and all political spectrum approved as long-term target.
Risk of low interest for funding of this Action.	medium	In the case that there will be no funding at the EU or national level, the local communities and other

		relevant stakeholders will be engaged for funding (30% from Ilfov County already approved).
Low interest of energy consumers.	medium	In the case of low interest of house owners, additional efforts will be needed to show the importance of this measures. In this efforts, examples of good practices could be very helpful.

6 Contact

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

Thermo-renovation of private own multi-story apartments blocks on Bucharest Sector 3

English version

prepared by
AEEPM – Local Energy Agency Bucharest

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: November 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Energy efficiency in households

Title: Thermo-renovation of private own multi-story apartments blocks on Bucharest Sector 3

1 Objective

According with the Romanian national legislation, 121/2014 Law regarding energy efficiency, transposing EE Directive public authorities has obligations to design and implement an Energy Action Plan for buildings energy deep renovation (public or private own).

Taking in to consideration Bucharest-Ilfov Energy Strategy adopted by Ilfov County on November 2018 by 2050 all public and private buildings (old stock) must be totally renovated and transformed in to “**A energy class**” buildings and for all new buildings (build after 2020) the request is to be only Near Zero Energy Buildings.

1.1 Objective scope and targets values

Supported by AEEPM under PANEL 2050 project Bucharest Sector 3 Municipality has the determination and motivation to implement this action plan together with household associations.

The purpose of this Action Plan is to reduce the costs and energy consumption in all apartment buildings connected to the centralized heating system.

The goal is to renovate all apartment buildings connected to the centralized heating system. Currently, 215 buildings are renovated out of **2450 apartment buildings** in the Sector 3.

The energy renovation project foresees the implementation of measures on the building envelope (facade, ceiling, window replacement), replacement of lighting, renovation of the ventilation system and the replacement/renovation of the heating system.

The main indicators for this action will be:

- Energy savings in kWh;
- CO2 savings.

Table 1: indicators and measurement methods.

Objective	Target indicator	Method of measurement and validation
Energy saving	<ul style="list-style-type: none"> kWh of savings through implemented measures. 	<ul style="list-style-type: none"> calculated based on annual use of electricity and energy for heating compared with the baseline values.
CO2 reduction	<ul style="list-style-type: none"> Tons of CO2 reduction per year. 	<ul style="list-style-type: none"> Calculated based on the annual use of electricity and energy for heating.

2 Implementation strategy

2.1 Step by step description

Romanian legislation defines very clear steps to be followed for an energy renovation project, so following steps are to be carried out:

- an initial analysis of the current situation of a building and **energy certificates** shows if there is a need for implementing measures to increase the energy efficiency of a building;
- In-depth analysis. The second step is a more in-depth analysis, which is done with the energy audit of the building. With an energy audit, the use of energy and the efficiency of existing energy systems are being analysed. The aim is to provide economically and technically justified measures to improve the energy efficiency of buildings and the use of renewable resources;
- After an energy renovation feasibility study, all necessary documents must be prepared – funding, implementation plans, works permitting, permits for implementation;
- the execution of a public contract procedure (for the selection of the contractor), implementation of renovation works;
- **final energy audit** and issuing the new energy certificate to see if the works done give the expected energy efficiency results;
- monitoring of results for the minimum period of 5 years after finalization of works.

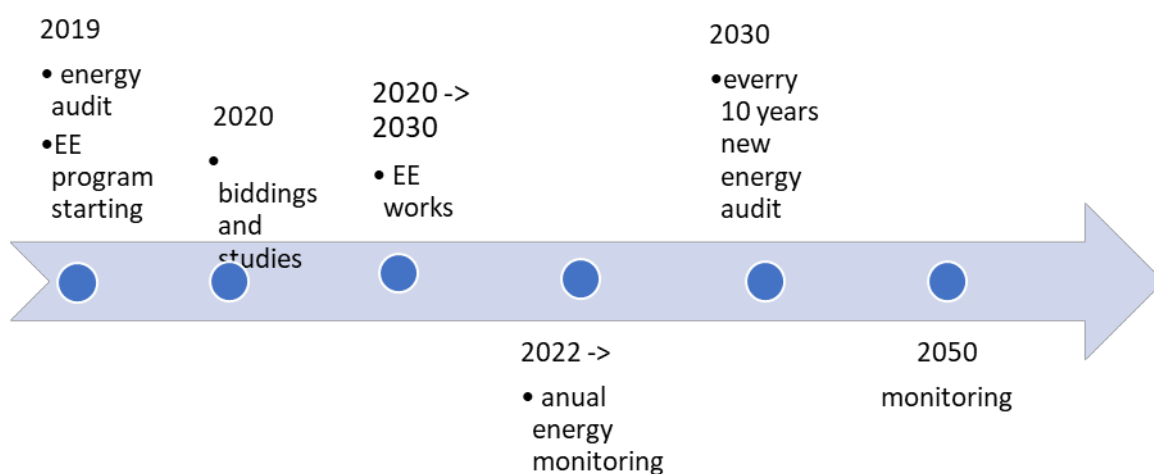
During our PANEL 2050 project support **Bucharest Sector 3 Municipality** to conduct discussions and negotiations with household associations of those 2450 apartment

buildings and during stakeholder's mobilization **Ilfov County make commitment** to financial support with **30%** of deep renovation budget, owners support 35% of costs and **Bucharest Sector 3 Municipality** 35% from local budget and/or European Funds.

2.2 Time schedule

Starting with the initial energy audit in 2019, the investment program will continue 2020-2030.

According with the Romanian legislation AEEPM will help municipality to monitoring energy consumption on the annual basis but a new energy certificate must be issuing every 10 years.



2.3 Budget and resources needed

Identified sources of funding are:

- European Commission Cohesion funds;
- EU funds of targeted programs;
- 30% contribution from Ilfov County Budget
- 30% State budget funds for the owners in energy poverty;
- 35% household association funds;
- Funds of Bucharest Sector 3 Municipality.

A part of the funding will reach the region through the Ilfov County Council according to approved priorities on the County Energy Strategy.

3 Collaboration with stakeholders

Main stakeholders involved into this action are:

- Ilfov County;
- Local Energy Agency - AEEPM;
- Bucharest Sector 3 Municipality;
- House owner's association representatives.

Roles and responsibilities of different actors for Action Plan implementation

In the table below are listed the main stakeholders involved, their role and involvement in this action.

Table 2: Stakeholder involvement

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Bucharest Sector 3 Municipality staff	Carrying out public biddings for energy audits and other needed analysis.	Involvement into the action in all steps. Phone/email/personal meetings.
	Based on the mandate given by the owner associations General Assembly vote.	Preparation of the application for County budget Preparation of implementation plans. Supervision of implementation works.	
	AEEPM – Local Energy Agency	Monitoring and reporting.	
building owners	House owner's association representatives	Owners (decision to participate in to programme must be taken with majority of the house owners)	Involvement into the action in all steps. Phone/email/personal meetings.

Political decision-makers	Ilfov County administrator Bucharest Sector 3 Municipality mayor	Important for decision on implementation and financing of the action.	Phone/email/personal meetings.
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4 Monitoring Strategy

After 2 years of the implementation of renovation works the monitoring phase will start. According to the national requirements there is an annual reporting period of achieved energy savings. Once a year, it is necessary to report on energy consumption and the costs of energy and the calculations of achieved indicators for the previous year. The basis for the calculation of the savings will be the average consumptions.

According with 121/2014 energy efficiency legislation every municipality with over 5000 inhabitants has obligation to hire an energy manager responsible for monitoring and reporting on achieved savings to the ANRE (Romania Energy Regulatory Authority).

5 Risk management

Table3: Description of possible risks and according mitigation measures.

Risk	Probability of realizing	Mitigation measure
Political risk (every 4-year new local council and new mayor will be elected)	medium	Multi-level governance assures the implementation of this plan since the Ilfov County Energy Strategy was approved with unanimity and all political spectrum approved as long-term target.
Risk of low interest for funding of this Action.	medium	In the case that there will be no funding at the EU or national level, the local communities and other

		relevant stakeholders will be engaged for funding (30% from Ilfov County already approved).
Low interest of energy consumers.	medium	In the case of low interest of house owners, additional efforts will be needed to show the importance of this measures. In this efforts, examples of good practices could be very helpful.

6 Contact

AEEPM – Local Energy Agency Bucharest,

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

Thermo-renovation of private own multi-story apartments blocks on Bucharest Sector 6

English version

prepared by
AEEPM – Local Energy Agency Bucharest

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: November 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Energy efficiency in households

Title: Thermo-renovation of private own multi-story apartments blocks on Bucharest Sector 6

1 Objective

According with the Romanian national legislation, 121/2014 Law regarding energy efficiency, transposing EE Directive public authorities has obligations to design and implement an Energy Action Plan for buildings energy deep renovation (public or private own).

Taking in to consideration Bucharest-Ilfov Energy Strategy adopted by Ilfov County on November 2018 by 2050 all public and private buildings (old stock) must be totally renovated and transformed in to “**A energy class**” buildings and for all new buildings (build after 2020) the request is to be only Near Zero Energy Buildings.

1.1 Objective scope and targets values

Supported by AEEPM under PANEL 2050 project Bucharest Sector 6 Municipality has the determination and motivation to implement this action plan together with household associations.

The purpose of this Action Plan is to reduce the costs and energy consumption in all apartment buildings connected to the centralized heating system.

The goal is to renovate all apartment buildings connected to the centralized heating system. Currently, 75 buildings are renovated out of **1450 apartment buildings** in the Bucharest Sector 6 Municipality.

The energy renovation project foresees the implementation of measures on the building envelope (facade, ceiling, window replacement), replacement of lighting, renovation of the ventilation system and the replacement/renovation of the heating system.

The main indicators for this action will be:

- Energy savings in kWh;
- CO2 savings.

Table 1: indicators and measurement methods.

Objective	Target indicator	Method of measurement and validation
Energy saving	<ul style="list-style-type: none"> kWh of savings through implemented measures. 	<ul style="list-style-type: none"> calculated based on annual use of electricity and energy for heating compared with the baseline values.
CO2 reduction	<ul style="list-style-type: none"> Tons of CO2 reduction per year. 	<ul style="list-style-type: none"> Calculated based on the annual use of electricity and energy for heating.

2 Implementation strategy

2.1 Step by step description

Romanian legislation defines very clear steps to be followed for an energy renovation project, so following steps are to be carried out:

- an initial analysis of the current situation of a building and **energy certificates** shows if there is a need for implementing measures to increase the energy efficiency of a building;
- In-depth analysis. The second step is a more in-depth analysis, which is done with the energy audit of the building. With an energy audit, the use of energy and the efficiency of existing energy systems are being analysed. The aim is to provide economically and technically justified measures to improve the energy efficiency of buildings and the use of renewable resources;
- After an energy renovation feasibility study, all necessary documents must be prepared – funding, implementation plans, works permitting, permits for implementation;
- the execution of a public contract procedure (for the selection of the contractor), implementation of renovation works;
- **final energy audit** and issuing the new energy certificate to see if the works done give the expected energy efficiency results;
- monitoring of results for the minimum period of 5 years after finalization of works.

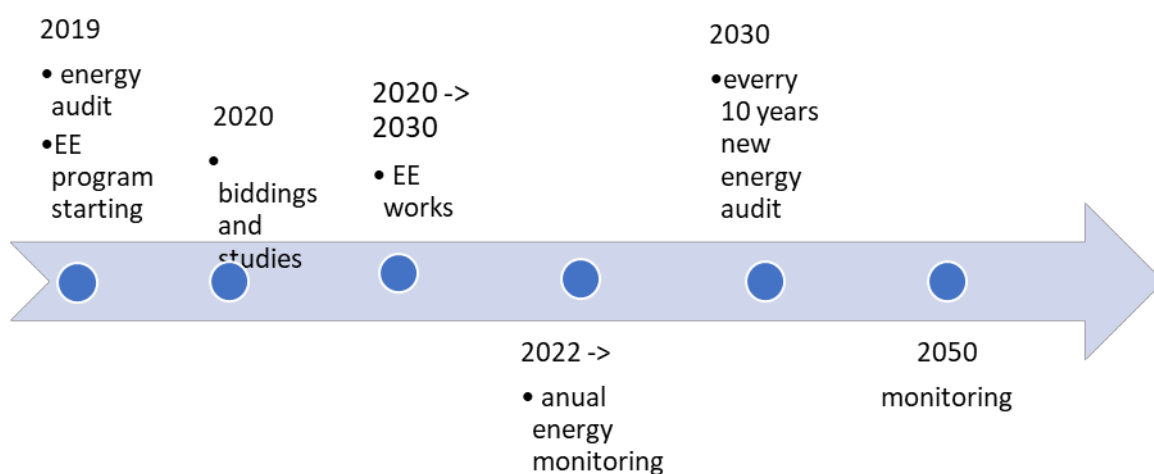
During our PANEL 2050 project support **Bucharest Sector 6 Municipality** to conduct discussions and negotiations with household associations of those 1450 apartment

buildings and during stakeholder's mobilization **Ilfov County make commitment** to financial support with **30%** of deep renovation budget, owners support 35% of costs and **Bucharest Sector 6 Municipality** 35% from local budget and/or European Funds.

2.2 Time schedule

Starting with the initial energy audit in 2019, the investment program will continue 2020-2030.

According with the Romanian legislation AEEPM will help municipality to monitoring energy consumption on the annual basis but a new energy certificate must be issuing every 10 years.



2.3 Budget and resources needed

Identified sources of funding are:

- European Commission Cohesion funds;
- EU funds of targeted programs;
- 30% contribution from Ilfov County Budget
- 30% State budget funds for the owners in energy poverty;
- 35% household association funds;
- Funds of Bucharest Sector 6 Municipality.

A part of the funding will reach the region through the Ilfov County Council according to approved priorities on the County Energy Strategy.

3 Collaboration with stakeholders

Main stakeholders involved into this action are:

- Ilfov County;
- Local Energy Agency - AEEPM;
- Bucharest Sector 6 Municipality;
- House owner's association representatives.

Roles and responsibilities of different actors for Action Plan implementation

In the table below are listed the main stakeholders involved, their role and involvement in this action.

Table 2: Stakeholder involvement

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Bucharest Sector 6 Municipality staff	Carrying out public biddings for energy audits and other needed analysis.	Involvement into the action in all steps. Phone/email/personal meetings.
	Based on the mandate given by the owner associations General Assembly vote.	Preparation of the application for County budget Preparation of implementation plans. Supervision of implementation works.	
	AEEPM – Local Energy Agency	Monitoring and reporting.	
building owners	House owner's association representatives	Owners (decision to participate in to programme must be	Involvement into the action in all steps.

		taken with majority of the house owners)	Phone/email/personal meetings.
Political decision-makers	Ilfov County administrator Bucharest Sector 6 Municipality mayor	Important for decision on implementation and financing of the action.	Phone/email/personal meetings.

4 Monitoring Strategy

After 2 years of the implementation of renovation works the monitoring phase will start. According to the national requirements there is an annual reporting period of achieved energy savings. Once a year, it is necessary to report on energy consumption and the costs of energy and the calculations of achieved indicators for the previous year. The basis for the calculation of the savings will be the average consumptions.

According with 121/2014 energy efficiency legislation every municipality with over 5000 inhabitants has obligation to hire an energy manager responsible for monitoring and reporting on achieved savings to the ANRE (Romania Energy Regulatory Authority).

5 Risk management

Table3: Description of possible risks and according mitigation measures.

Risk	Probability of realizing	Mitigation measure
Political risk (every 4-year new local council and new mayor will be elected)	medium	Multi-level governance assures the implementation of this plan since the Ilfov County Energy Strategy was approved with unanimity and all political spectrum approved as long-term target.

Risk of low interest for funding of this Action.	medium	In the case that there will be no funding at the EU or national level, the local communities and other relevant stakeholders will be engaged for funding (30% from Ilfov County already approved).
Low interest of energy consumers.	medium	In the case of low interest of house owners, additional efforts will be needed to show the importance of this measures. In this efforts, examples of good practices could be very helpful.

6 Contact

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

**Thermo-renovation of private own
multi-story apartments blocks on
Magurele Municipality**

English version

**prepared by
AEEPM – Local Energy Agency Bucharest**

**PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7**

Date: November 2018



**CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK**

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Energy efficiency in households

Title: Thermo-renovation of private own multi-story apartments blocks on Magurele Municipality

1 Objective

According with the Romanian national legislation, 121/2014 Law regarding energy efficiency, transposing EE Directive public authorities has obligations to design and implement an Energy Action Plan for buildings energy deep renovation (public or private own).

Taking in to consideration Bucharest-Ilfov Energy Strategy adopted by Ilfov County on November 2018 by 2050 all public and private buildings (old stock) must be totally renovated and transformed in to “**A energy class**” buildings and for all new buildings (build after 2020) the request is to be only Near Zero Energy Buildings.

1.1 Objective scope and targets values

Supported by AEEPM under PANEL 2050 project Magurele Municipality has the determination and motivation to implement this action plan together with household associations.

The purpose of this Action Plan is to reduce the costs and energy consumption in all apartment buildings connected to the centralized heating system.

Currently, 15 buildings are renovated out of **150 apartment buildings** on Magurele Municipality.

The energy renovation project foresees the implementation of measures on the building envelope (facade, ceiling, window replacement), replacement of lighting, renovation of the ventilation system and the replacement/renovation of the heating system.

The main indicators for this action will be:

- Energy savings in kWh;
- CO2 savings.

Table 1: indicators and measurement methods.

Objective	Target indicator	Method of measurement and validation
Energy saving	<ul style="list-style-type: none"> kWh of savings through implemented measures. 	<ul style="list-style-type: none"> calculated based on annual use of electricity and energy for heating compared with the baseline values.
CO2 reduction	<ul style="list-style-type: none"> Tons of CO2 reduction per year. 	<ul style="list-style-type: none"> Calculated based on the annual use of electricity and energy for heating.

2 Implementation strategy

2.1 Step by step description

Romanian legislation defines very clear steps to be followed for an energy renovation project, so following steps are to be carried out:

- an initial analysis of the current situation of a building and **energy certificates** shows if there is a need for implementing measures to increase the energy efficiency of a building;
- In-depth analysis. The second step is a more in-depth analysis, which is done with the energy audit of the building. With an energy audit, the use of energy and the efficiency of existing energy systems are being analysed. The aim is to provide economically and technically justified measures to improve the energy efficiency of buildings and the use of renewable resources;
- After an energy renovation feasibility study, all necessary documents must be prepared – funding, implementation plans, works permitting, permits for implementation;
- the execution of a public contract procedure (for the selection of the contractor), implementation of renovation works;
- **final energy audit** and issuing the new energy certificate to see if the works done give the expected energy efficiency results;
- monitoring of results for the minimum period of 5 years after finalization of works.

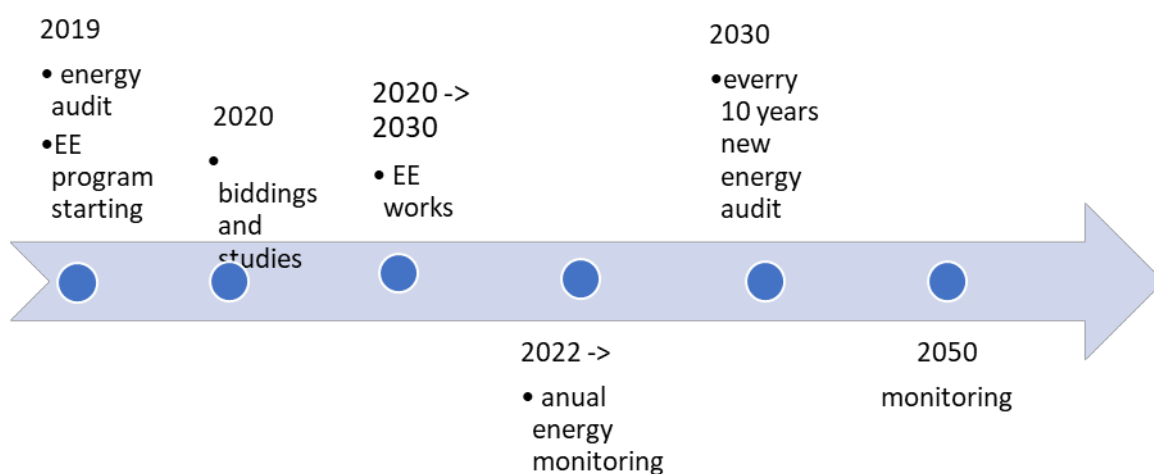
During our PANEL 2050 project support **Magurele Municipality** to conduct discussions and negotiations with household associations of those 150 apartment buildings and during

stakeholder's mobilization **Ilfov County make commitment** to financial support with **30%** of deep renovation budget, owners support 35% of costs and Magurele Municipality 35% from local budget and/or European Funds.

2.2 Time schedule

Starting with the initial energy audit in 2019, the investment program will continue 2020-2030.

According with the Romanian legislation AEEPM will help municipality to monitoring energy consumption on the annual basis but a new energy certificate must be issuing every 10 years.



2.3 Budget and resources needed

Identified sources of funding are:

- European Commission Cohesion funds;
- EU funds of targeted programs;
- 30% contribution from Ilfov County Budget
- 30% State budget funds for the owners in energy poverty;
- 35% household association funds;
- Funds of Magurele Municipality.

A part of the funding will reach the region through the Ilfov County Council according to approved priorities on the County Energy Strategy.

3 Collaboration with stakeholders

Main stakeholders involved into this action are:

- Ilfov County;
- Local Energy Agency - AEEPM;
- Municipality of Magurele;
- House owner's association representatives.

Roles and responsibilities of different actors for Action Plan implementation

In the table below are listed the main stakeholders involved, their role and involvement in this action.

Table 2: Stakeholder involvement

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipality of Magurele staff	Carrying out public biddings for energy audits and other needed analysis.	Involvement into the action in all steps. Phone/email/personal meetings.
	Based on the mandate given by the owner associations General Assembly vote.	Preparation of the application for County budget	
		Preparation of implementation plans.	
		Supervision of implementation works.	
		Monitoring and reporting.	
	AEEPM – Local Energy Agency		
building owners	House owner's association representatives	Owners (decision to participate in to programme must be	Involvement into the action in all steps.

		taken with majority of the house owners)	Phone/email/personal meetings.
Political decision-makers	Ilfov County administrator Magurele Municipality mayor	Important for decision on implementation and financing of the action.	Phone/email/personal meetings.

4 Monitoring Strategy

After 2 years of the implementation of renovation works the monitoring phase will start. According to the national requirements there is an annual reporting period of achieved energy savings. Once a year, it is necessary to report on energy consumption and the costs of energy and the calculations of achieved indicators for the previous year. The basis for the calculation of the savings will be the average consumptions.

According with 121/2014 energy efficiency legislation every municipality with over 5000 inhabitants has obligation to hire an energy manager responsible for monitoring and reporting on achieved savings to the ANRE (Romania Energy Regulatory Authority).

5 Risk management

Table3: Description of possible risks and according mitigation measures.

Risk	Probability of realizing	Mitigation measure
Political risk (every 4-year new local council and new mayor will be elected)	medium	Multi-level governance assures the implementation of this plan since the Ilfov County Energy Strategy was approved with unanimity and all political spectrum approved as long-term target.

Risk of low interest for funding of this Action.	medium	In the case that there will be no funding at the EU or national level, the local communities and other relevant stakeholders will be engaged for funding (30% from Ilfov County already approved).
Low interest of energy consumers.	medium	In the case of low interest of house owners, additional efforts will be needed to show the importance of this measures. In this efforts, examples of good practices could be very helpful.

6 Contact

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

Energy Efficiency in public buildings Voluntari Municipality

English version

prepared by
AEEPM – Local Energy Agency Bucharest

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: November 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Energy Efficiency on public buildings

Title: Energy Efficiency in public buildings Voluntari Municipality

1 Objective

According with the Romanian national legislation, 121/2014 Law regarding energy efficiency, transposing EE Directive public authorities has obligations to deep renovate annual 4% of public buildings stock (referring at all public buildings with over 250 sqm surface and energy inefficient).

Taking in to consideration Bucharest-Ilfov Energy Strategy adopted by Ilfov County on November 2018 by 2050 all public buildings (old stock) must be totally renovated and transformed in to “**A energy class**” buildings and for all new public buildings the request is to be only Near Zero Energy Buildings.

1.1 Objective scope and targets values

Despite all financial, political or technical barriers Voluntari Municipality has the determination and motivation to implement this action plan we supported.

The purpose of this Action Plan is to reduce the costs and energy consumption in the **8 school buildings** recognized as energy inefficient.

The energy renovation project foresees the implementation of measures on the building envelope (facade, ceiling, window replacement), replacement of lighting, renovation of the ventilation system and the replacement/renovation of the heating system.

The main indicators for this action will be:

- Energy savings in kWh;
- CO2 savings.

Table 1: indicators and measurement methods.

Objective	Target indicator	Method of measurement and validation
Energy saving	<ul style="list-style-type: none"> kWh of savings through implemented measures. 	<ul style="list-style-type: none"> calculated based on annual use of electricity and energy for heating compared with the baseline values.
CO2 reduction	<ul style="list-style-type: none"> Tons of CO2 reduction per year. 	<ul style="list-style-type: none"> Calculated based on the annual use of electricity and energy for heating.

2 Implementation strategy

2.1 Step by step description

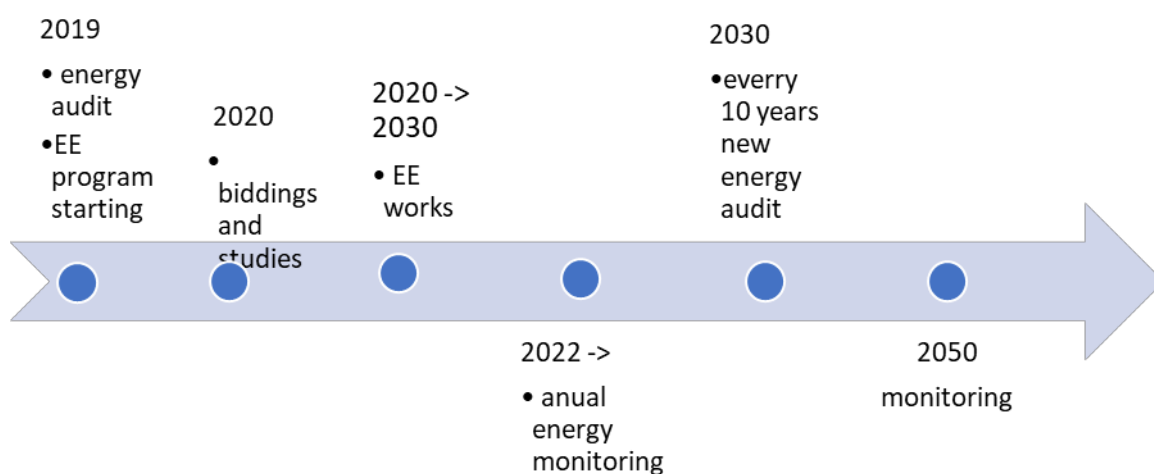
Romanian legislation defines very clear steps to be followed for an energy renovation project, so following steps are to be carried out:

- an initial analysis of the current situation of a building and **energy certificates** shows if there is a need for implementing measures to increase the energy efficiency of a building;
- In-depth analysis. The second step is a more in-depth analysis, which is done with the energy audit of the building. With an energy audit, the use of energy and the efficiency of existing energy systems are being analysed. The aim is to provide economically and technically justified measures to improve the energy efficiency of buildings and the use of renewable resources;
- After an energy renovation feasibility study, all necessary documents must be prepared – funding, implementation plans, works permitting, permits for implementation;
- the execution of a public contract procedure (for the selection of the contractor), implementation of renovation works;
- **final energy audit** and issuing the new energy certificate to see if the works done give the expected energy efficiency results;
- monitoring of results for the minimum period of 5 years after finalization of works.

During our PANEL 2050 project support Voluntari Municipality carries out energy audit for the **8 school buildings** and during stakeholder's mobilization **Ilfov County** make commitment to financial support with **30%** of deep renovation budget.

2.2 Time schedule

Starting with the initial energy audit in 2019, the investment program will continue 2020-2030. According with the Romanian legislation AEEPM will help municipality to monitoring energy consumption on the annual basis but a new energy certificate must be issuing every 10 years.



2.3 Budget and resources needed

Identified sources of funding are:

- European Commission Cohesion funds;
- EU funds of targeted programs;
- 30% contribution from Ilfov County Budget
- 30% State budget funds;
- Funds of Voluntari Municipality.

A part of the funding will reach the region through the Ilfov County Council according to approved priorities on the County Energy Strategy.

3 Collaboration with stakeholders

Main stakeholders involved into this action are:

- Ilfov County;
- Local Energy Agency - AEEPM;
- Municipality of Voluntari;

Roles and responsibilities of different actors for Action Plan implementation

In the table below are listed the main stakeholders involved, their role and involvement in this action.

Table 2: Stakeholder involvement

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	<p>Municipality of Voluntari staff</p> <p>AEEPM – Local Energy Agency</p>	<p>Carrying out public biddings for energy audits and other needed analysis.</p> <p>Preparation of the application for County budget</p> <p>Preparation of implementation plans.</p> <p>Supervision of implementation works.</p> <p>Monitoring and reporting.</p>	<p>Involvement into the action in all steps.</p> <p>Phone/email/personal meetings.</p>
Public building owners	Municipality of Voluntari School authority	Owners.	<p>Involvement into the action in all steps.</p> <p>Phone/email/personal meetings.</p>
Political decision-makers	<p>Ilfov County administrator</p> <p>Voluntari Municipality mayor</p>	Important for decision on implementation and financing of the action.	Phone/email/personal meetings.

4 Monitoring Strategy

After 2 years of the implementation of renovation works the monitoring phase will start. According to the national requirements there is an annual reporting period of achieved energy savings. Once a year, it is necessary to report on energy consumption and the costs of energy and the calculations of achieved indicators for the previous year. The basis for the calculation of the savings will be the average consumptions.

According with 121/2014 energy efficiency legislation every municipality with over 5000 inhabitants has obligation to hire an energy manager responsible for monitoring and reporting on achieved savings to the ANRE (Romania Energy Regulatory Authority).

5 Risk management

Table3: Description of possible risks and according mitigation measures.

Risk	Probability of realizing	Mitigation measure
Political risk (every 4-year new local council and new mayor will be elected)	medium	Multi-level governance assures the implementation of this plan since the Ilfov County Energy Strategy was approved with unanimity and all political spectrum approved as long-term target.
Risk of low interest for funding of this Action.	medium	In the case that there will be no funding at the EU or national level, the local communities and other relevant stakeholders will be engaged for funding (30% from Ilfov County already approved).
Low interest of energy consumers.	medium	In the case of low interest of municipality, additional efforts will be needed to show the importance of this measures. In this efforts, examples of good practices could be very helpful.

6 Contact

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

Energy Efficiency in public buildings Popesti-Leordeni Municipality

English version

prepared by
AEEPM – Local Energy Agency Bucharest

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: November 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Energy Efficiency on public buildings

Title: Energy Efficiency in public buildings Popesti-Leordeni Municipality

1 Objective

According with the Romanian national legislation, 121/2014 Law regarding energy efficiency, transposing EE Directive public authorities has obligations to deep renovate annual 4% of public buildings stock (referring at all public buildings with over 250 sqm surface and energy inefficient).

Taking in to consideration Bucharest-Ilfov Energy Strategy adopted by Ilfov County on November 2018 by 2050 all public buildings (old stock) must be totally renovated and transformed in to “**A energy class**” buildings and for all new public buildings the request is to be only Near Zero Energy Buildings.

1.1 Objective scope and targets values

Supported by AEEPM under PANEL 2050 project Popesti-Leordeni Municipality has the determination and motivation to implement this action plan we supported.

The purpose of this Action Plan is to reduce the costs and energy consumption in the **6 school** buildings and **2 regional hospital buildings** recognized as energy inefficient. The energy renovation project foresees the implementation of measures on the building envelope (facade, ceiling, window replacement), replacement of lighting, renovation of the ventilation system and the replacement/renovation of the heating system.

The main indicators for this action will be:

- Energy savings in kWh;
- CO2 savings.

Table 1: indicators and measurement methods.

Objective	Target indicator	Method of measurement and validation
Energy saving	<ul style="list-style-type: none"> kWh of savings through implemented measures. 	<ul style="list-style-type: none"> calculated based on annual use of electricity and energy for heating compared with the baseline values.
CO2 reduction	<ul style="list-style-type: none"> Tons of CO2 reduction per year. 	<ul style="list-style-type: none"> Calculated based on the annual use of electricity and energy for heating.

2 Implementation strategy

2.1 Step by step description

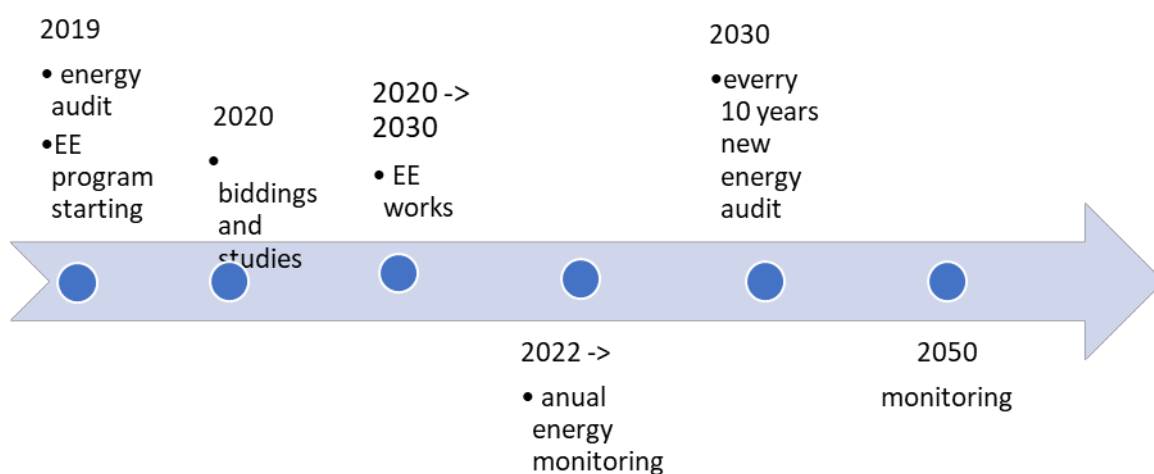
Romanian legislation defines very clear steps to be followed for an energy renovation project, so following steps are to be carried out:

- an initial analysis of the current situation of a building and **energy certificates** shows if there is a need for implementing measures to increase the energy efficiency of a building;
- In-depth analysis. The second step is a more in-depth analysis, which is done with the energy audit of the building. With an energy audit, the use of energy and the efficiency of existing energy systems are being analysed. The aim is to provide economically and technically justified measures to improve the energy efficiency of buildings and the use of renewable resources;
- After an energy renovation feasibility study, all necessary documents must be prepared – funding, implementation plans, works permitting, permits for implementation;
- the execution of a public contract procedure (for the selection of the contractor), implementation of renovation works;
- **final energy audit** and issuing the new energy certificate to see if the works done give the expected energy efficiency results;
- monitoring of results for the minimum period of 5 years after finalization of works.

During our PANEL 2050 project support **Popesti-Leordeni Municipality** carries out energy audit for all public building and during stakeholder's mobilization **Ilfov County** make **commitment** to financial support with **30%** of deep renovation budget.

2.2 Time schedule

Starting with the initial energy audit in 2019, the investment program will continue 2020-2030. According with the Romanian legislation AEEPM will help municipality to monitoring energy consumption on the annual basis but a new energy certificate must be issuing every 10 years.



2.3 Budget and resources needed

Identified sources of funding are:

- European Commission Cohesion funds;
- EU funds of targeted programs;
- 30% contribution from Ilfov County Budget
- 30% State budget funds;
- Funds of Popesti-Leordeni Municipality.

A part of the funding will reach the region through the Ilfov County Council according to approved priorities on the County Energy Strategy.

3 Collaboration with stakeholders

Main stakeholders involved into this action are:

- Ilfov County;
- Local Energy Agency - AEEPM;
- Municipality of Popesti-Leordeni;

Roles and responsibilities of different actors for Action Plan implementation

In the table below are listed the main stakeholders involved, their role and involvement in this action.

Table 2: Stakeholder involvement

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	<p>Municipality of Popesti-Leordeni staff</p> <p>AEEPM – Local Energy Agency</p>	<p>Carrying out public biddings for energy audits and other needed analysis.</p> <p>Preparation of the application for County budget</p> <p>Preparation of implementation plans.</p> <p>Supervision of implementation works.</p> <p>Monitoring and reporting.</p>	<p>Involvement into the action in all steps.</p> <p>Phone/email/personal meetings.</p>
Public building owners	Municipality of Popesti-Leordeni public buildings department	Owners.	<p>Involvement into the action in all steps.</p> <p>Phone/email/personal meetings.</p>
Political decision-makers	<p>Ilfov County administrator</p> <p>Popesti-Leordeni Municipality mayor</p>	Important for decision on implementation and financing of the action.	Phone/email/personal meetings.

4 Monitoring Strategy

After 2 years of the implementation of renovation works the monitoring phase will start. According to the national requirements there is an annual reporting period of achieved energy savings. Once a year, it is necessary to report on energy consumption and the costs of energy and the calculations of achieved indicators for the previous year. The basis for the calculation of the savings will be the average consumptions.

According with 121/2014 energy efficiency legislation every municipality with over 5000 inhabitants has obligation to hire an energy manager responsible for monitoring and reporting on achieved savings to the ANRE (Romania Energy Regulatory Authority).

5 Risk management

Table3: Description of possible risks and according mitigation measures.

Risk	Probability of realizing	Mitigation measure
Political risk (every 4-year new local council and new mayor will be elected)	medium	Multi-level governance assures the implementation of this plan since the Ilfov County Energy Strategy was approved with unanimity and all political spectrum approved as long-term target.
Risk of low interest for funding of this Action.	medium	In the case that there will be no funding at the EU or national level, the local communities and other relevant stakeholders will be engaged for funding (30% from Ilfov County already approved).
Low interest of energy consumers.	medium	In the case of low interest of municipality, additional efforts will be needed to show the importance of this measures. In this efforts, examples of good practices could be very helpful.

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AEEPM – Local Energy Agency Bucharest,

224 Calea Victoriei, et.3, ap.12, Bucharest-010099, Romania

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

Energy Efficiency in public buildings Pantelimon Municipality

English version

prepared by
AEEPM – Local Energy Agency Bucharest

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: November 2018



CENTRAL EASTERN EUROPEAN
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Energy Efficiency on public buildings

Title: Energy Efficiency in public buildings Pantelimon Municipality

1 Objective

According with the Romanian national legislation, 121/2014 Law regarding energy efficiency, transposing EE Directive public authorities has obligations to deep renovate annual 4% of public buildings stock (referring at all public buildings with over 250 sqm surface and energy inefficient).

Taking in to consideration Bucharest-Ilfov Energy Strategy adopted by Ilfov County on November 2018 by 2050 all public buildings (old stock) must be totally renovated and transformed in to “**A energy class**” buildings and for all new public buildings the request is to be only Near Zero Energy Buildings.

1.1 Objective scope and targets values

With PANEL 2050 project support and according with recent approved Ilfov County Energy Strategy Pantelimon Municipality has the determination and motivation to implement this action plan.

The purpose of this Action Plan is to reduce the costs and energy consumption in the **5 school buildings** and **6 social houses building** recognized as energy inefficient.

The energy renovation project foresees the implementation of measures on the building envelope (facade, ceiling, window replacement), replacement of lighting, renovation of the ventilation system and the replacement/renovation of the heating system.

The main indicators for this action will be:

- Energy savings in kWh;
- CO2 savings.

Table 1: indicators and measurement methods.

Objective	Target indicator	Method of measurement and validation
Energy saving	<ul style="list-style-type: none"> kWh of savings through implemented measures. 	<ul style="list-style-type: none"> calculated based on annual use of electricity and energy for heating compared with the baseline values.
CO2 reduction	<ul style="list-style-type: none"> Tons of CO2 reduction per year. 	<ul style="list-style-type: none"> Calculated based on the annual use of electricity and energy for heating.

2 Implementation strategy

2.1 Step by step description

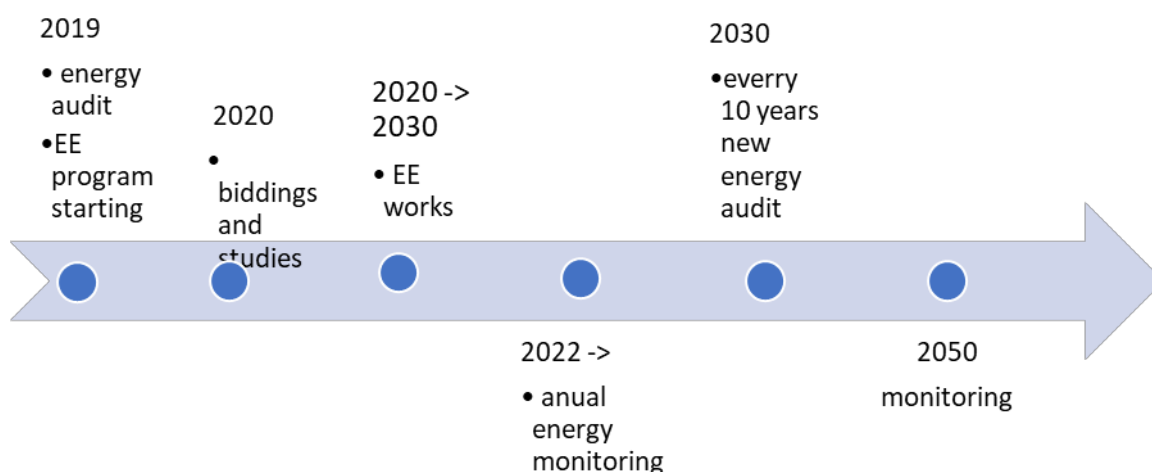
Romanian legislation defines very clear steps to be followed for an energy renovation project, so following steps are to be carried out:

- an initial analysis of the current situation of a building and **energy certificates** shows if there is a need for implementing measures to increase the energy efficiency of a building;
- In-depth analysis. The second step is a more in-depth analysis, which is done with the energy audit of the building. With an energy audit, the use of energy and the efficiency of existing energy systems are being analysed. The aim is to provide economically and technically justified measures to improve the energy efficiency of buildings and the use of renewable resources;
- After an energy renovation feasibility study, all necessary documents must be prepared – funding, implementation plans, works permitting, permits for implementation;
- the execution of a public contract procedure (for the selection of the contractor), implementation of renovation works;
- **final energy audit** and issuing the new energy certificate to see if the works done give the expected energy efficiency results;
- monitoring of results for the minimum period of 5 years after finalization of works.

During our PANEL 2050 project support Pantelimon Municipality carries out energy audit for the **5 school buildings** and **6 social houses building** and during stakeholder's mobilization Ilfov County make commitment to financial support with 30% of deep renovation budget.

2.2 Time schedule

Starting with the initial energy audit in 2019, the investment program will continue 2020-2030. According with the Romanian legislation AEEPM will help municipality to monitoring energy consumption on the annual basis but a new energy certificate must be issuing every 10 years.



2.3 Budget and resources needed

Identified sources of funding are:

- European Commission Cohesion funds;
- EU funds of targeted programs;
- 30% contribution from Ilfov County Budget
- 30% State budget funds;
- Funds of Pantelimon Municipality.

A part of the funding will reach the region through the Ilfov County Council according to approved priorities on the County Energy Strategy.

3 Collaboration with stakeholders

Main stakeholders involved into this action are:

- Ilfov County;
- Local Energy Agency - AEEPM;
- Municipality of Pantelimon;

Roles and responsibilities of different actors for Action Plan implementation

In the table below are listed the main stakeholders involved, their role and involvement in this action.

Table 2: Stakeholder involvement

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	<p>Municipality of Pantelimon staff</p> <p>AEEPM – Local Energy Agency</p>	<p>Carrying out public biddings for energy audits and other needed analysis.</p> <p>Preparation of the application for County budget</p> <p>Preparation of implementation plans.</p> <p>Supervision of implementation works.</p> <p>Monitoring and reporting.</p>	<p>Involvement into the action in all steps.</p> <p>Phone/email/personal meetings.</p>
Public building owners	Municipality of Pantelimon public buildings department	Owners.	<p>Involvement into the action in all steps.</p> <p>Phone/email/personal meetings.</p>
Political decision-makers	<p>Ilfov County administrator</p> <p>Pantelimon Municipality mayor</p>	Important for decision on implementation and financing of the action.	Phone/email/personal meetings.

4 Monitoring Strategy

After 2 years of the implementation of renovation works the monitoring phase will start. According to the national requirements there is an annual reporting period of achieved energy savings. Once a year, it is necessary to report on energy consumption and the costs of energy and the calculations of achieved indicators for the previous year. The basis for the calculation of the savings will be the average consumptions.

According with 121/2014 energy efficiency legislation every municipality with over 5000 inhabitants has obligation to hire an energy manager responsible for monitoring and reporting on achieved savings to the ANRE (Romania Energy Regulatory Authority).

5 Risk management

Table3: Description of possible risks and according mitigation measures.

Risk	Probability of realizing	Mitigation measure
Political risk (every 4-year new local council and new mayor will be elected)	medium	Multi-level governance assures the implementation of this plan since the Ilfov County Energy Strategy was approved with unanimity and all political spectrum approved as long-term target.
Risk of low interest for funding of this Action.	medium	In the case that there will be no funding at the EU or national level, the local communities and other relevant stakeholders will be engaged for funding (30% from Ilfov County already approved).
Low interest of energy consumers.	medium	In the case of low interest of municipality, additional efforts will be needed to show the importance of this measures. In this efforts, examples of good practices could be very helpful.

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ACTION PLAN

Energy Efficiency in public buildings Chitila Municipality

English version

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Energy Efficiency on public buildings

Title: Energy Efficiency in public buildings Chitila Municipality

1 Objective

According with the Romanian national legislation, 121/2014 Law regarding energy efficiency, transposing EE Directive public authorities has obligations to deep renovate annual 4% of public buildings stock (referring at all public buildings with over 250 sqm surface and energy inefficient).

Taking in to consideration Bucharest-Ilfov Energy Strategy adopted by Ilfov County on November 2018 by 2050 all public buildings (old stock) must be totally renovated and transformed in to “**A energy class**” buildings and for all new public buildings the request is to be only Near Zero Energy Buildings.

1.1 Objective scope and targets values

Despite all financial, political or technical barriers Chitila Municipality has the determination and motivation to implement this action plan we supported.

The purpose of this Action Plan is to reduce the costs and energy consumption in the **6 school** buildings and **4 social houses buildings** recognized as energy inefficient. The energy renovation project foresees the implementation of measures on the building envelope (facade, ceiling, window replacement), replacement of lighting, renovation of the ventilation system and the replacement/renovation of the heating system.

The main indicators for this action will be:

- Energy savings in kWh;
- CO2 savings.

Table 1: indicators and measurement methods.

Objective	Target indicator	Method of measurement and validation
Energy saving	<ul style="list-style-type: none"> kWh of savings through implemented measures. 	<ul style="list-style-type: none"> calculated based on annual use of electricity and energy for heating compared with the baseline values.
CO2 reduction	<ul style="list-style-type: none"> Tons of CO2 reduction per year. 	<ul style="list-style-type: none"> Calculated based on the annual use of electricity and energy for heating.

2 Implementation strategy

2.1 Step by step description

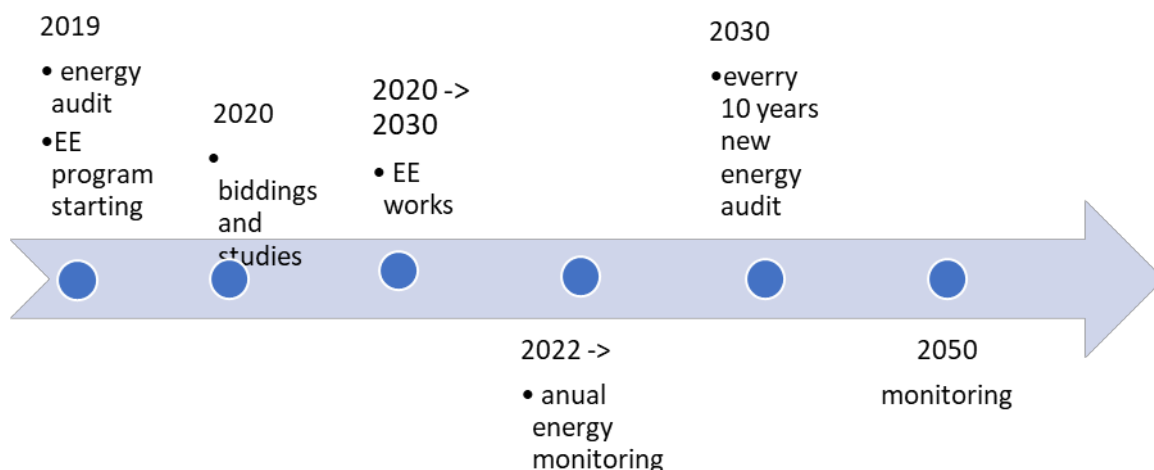
Romanian legislation defines very clear steps to be followed for an energy renovation project, so following steps are to be carried out:

- an initial analysis of the current situation of a building and **energy certificates** shows if there is a need for implementing measures to increase the energy efficiency of a building;
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- the execution of a public contract procedure (for the selection of the contractor), implementation of renovation works;
- **final energy audit** and issuing the new energy certificate to see if the works done give the expected energy efficiency results;
- monitoring of results for the minimum period of 5 years after finalization of works.

During our PANEL 2050 project support **Chitila Municipality** carries out energy audit for the **6 school buildings** and **4 social houses buildings** and during stakeholder's mobilization **Ilfov County make commitment** to financial support with **30%** of deep renovation budget.

2.2 Time schedule

Starting with the initial energy audit in 2019, the investment program will continue 2020-2030. According with the Romanian legislation AEEPM will help municipality to monitoring energy consumption on the annual basis but a new energy certificate must be issuing every 10 years.



2.3 Budget and resources needed

Identified sources of funding are:

- European Commission Cohesion funds;
- EU funds of targeted programs;
- 30% contribution from Ilfov County Budget
- 30% State budget funds;
- Funds of Chitila Municipality.

A part of the funding will reach the region through the Ilfov County Council according to approved priorities on the County Energy Strategy.

3 Collaboration with stakeholders

Main stakeholders involved into this action are:

- Ilfov County;
- Local Energy Agency - AEEPM;
- Municipality of Chitila;

Roles and responsibilities of different actors for Action Plan implementation

In the table below are listed the main stakeholders involved, their role and involvement in this action.

Table 2: Stakeholder involvement

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	<p>Municipality of Chitila staff</p> <p>AEEPM – Local Energy Agency</p>	<p>Carrying out public biddings for energy audits and other needed analysis.</p> <p>Preparation of the application for County budget</p> <p>Preparation of implementation plans.</p> <p>Supervision of implementation works.</p> <p>Monitoring and reporting.</p>	<p>Involvement into the action in all steps.</p> <p>Phone/email/personal meetings.</p>
Public building owners	Municipality of Chitila public buildings department	Owners.	<p>Involvement into the action in all steps.</p> <p>Phone/email/personal meetings.</p>
Political decision-makers	<p>Ilfov County administrator</p> <p>Chitila Municipality mayor</p>	Important for decision on implementation and financing of the action.	Phone/email/personal meetings.

4 Monitoring Strategy

After 2 years of the implementation of renovation works the monitoring phase will start. According to the national requirements there is an annual reporting period of achieved energy savings. Once a year, it is necessary to report on energy consumption and the costs of energy and the calculations of achieved indicators for the previous year. The basis for the calculation of the savings will be the average consumptions.

According with 121/2014 energy efficiency legislation every municipality with over 5000 inhabitants has obligation to hire an energy manager responsible for monitoring and reporting on achieved savings to the ANRE (Romania Energy Regulatory Authority).

5 Risk management

Table3: Description of possible risks and according mitigation measures.

Risk	Probability of realizing	Mitigation measure
Political risk (every 4-year new local council and new mayor will be elected)	medium	Multi-level governance assures the implementation of this plan since the Ilfov County Energy Strategy was approved with unanimity and all political spectrum approved as long-term target.
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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

Energy Efficiency in public buildings Otopeni Municipality

English version

prepared by
AEEPM – Local Energy Agency Bucharest

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: November 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Energy Efficiency on public buildings

Title: Energy Efficiency in public buildings Otopeni Municipality

1 Objective

According with the Romanian national legislation, 121/2014 Law regarding energy efficiency, transposing EE Directive public authorities has obligations to deep renovate annual 4% of public buildings stock (referring at all public buildings with over 250 sqm surface and energy inefficient).

Taking in to consideration Bucharest-Ilfov Energy Strategy adopted by Ilfov County on November 2018 by 2050 all public buildings (old stock) must be totally renovated and transformed in to “**A energy class**” buildings and for all new public buildings the request is to be only Near Zero Energy Buildings.

1.1 Objective scope and targets values

Supported by AEEPM under PANEL 2050 project Otopeni Municipality has the determination and motivation to implement this action plan.

The purpose of this Action Plan is to reduce the costs and energy consumption in the **4 school** buildings and **6 social houses buildings** recognized as energy inefficient. The energy renovation project foresees the implementation of measures on the building envelope (facade, ceiling, window replacement), replacement of lighting, renovation of the ventilation system and the replacement/renovation of the heating system.

The main indicators for this action will be:

- Energy savings in kWh;
- CO2 savings.

Table 1: indicators and measurement methods.

Objective	Target indicator	Method of measurement and validation
Energy saving	<ul style="list-style-type: none"> kWh of savings through implemented measures. 	<ul style="list-style-type: none"> calculated based on annual use of electricity and energy for heating compared with the baseline values.
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2.1 Step by step description

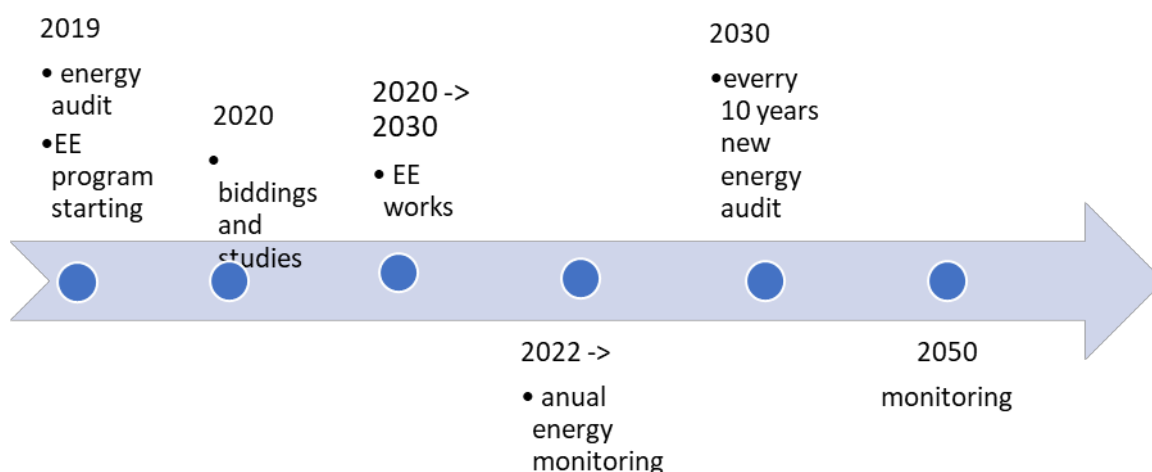
Romanian legislation defines very clear steps to be followed for an energy renovation project, so following steps are to be carried out:

- an initial analysis of the current situation of a building and **energy certificates** shows if there is a need for implementing measures to increase the energy efficiency of a building;
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- **final energy audit** and issuing the new energy certificate to see if the works done give the expected energy efficiency results;
- monitoring of results for the minimum period of 5 years after finalization of works.

During our PANEL 2050 project support **Otopeni Municipality** carries out energy audit for the **4 school buildings** and **6 social houses buildings** and during stakeholder's mobilization **Ilfov County make commitment** to financial support with **30%** of deep renovation budget.

2.2 Time schedule

Starting with the initial energy audit in 2019, the investment program will continue 2020-2030. According with the Romanian legislation AEEPM will help municipality to monitoring energy consumption on the annual basis but a new energy certificate must be issuing every 10 years.



2.3 Budget and resources needed

Identified sources of funding are:

- European Commission Cohesion funds;
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Main stakeholders involved into this action are:

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- Local Energy Agency - AEEPM;
- Municipality of Otopeni;

Roles and responsibilities of different actors for Action Plan implementation

In the table below are listed the main stakeholders involved, their role and involvement in this action.

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Stakeholder groups		Role and responsibility	Involvement and communication strategy
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Public building owners	Municipality of Otopeni public buildings department	Owners.	<p>Involvement into the action in all steps.</p> <p>Phone/email/personal meetings.</p>
Political decision-makers	<p>Ilfov County administrator</p> <p>Otopeni Municipality mayor</p>	Important for decision on implementation and financing of the action.	Phone/email/personal meetings.

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

Extension and modernization of public lighting on Buftea Municipality

English version

AEEPM – Local Energy Agency Bucharest

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7
Date: December 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Priority area: Extension and modernization of public lighting

Title: Extension and modernization of public lighting on Buftea Municipality

1 Objective

The purpose of this Action Plan for Extension and modernization of public lighting on Buftea Municipality is to contribute to reducing the overall energy demand of the municipality.

The main objective is to extend and modernized public lighting system by replacing all existing lamps with more energy efficient LED technology combined with automate management system and solar energy source.

The objectives of this Action Plans in the municipality of Buftea are to:

- 1) provide an overview of the current consumption and identify future trends;
- 2) to identify the potential for more efficient and rational use of energy in the municipality and the potential of local sources of renewable energy;
- 3) to define the appropriate steps towards better and more sustainable energy development in the municipality by defining the necessary actions for improving the energy efficiency in the municipality (EE) and the renewable energy potential.

The street lighting sector has been identified as the first priority with in the discussion during the preparation of this Action Plan with the municipal staff and the inhabitants associations.

Electricity costs for street lighting are paid from the monthly budget of the municipality based on the data obtained from the metering devices of electricity and the monthly bills issued by ENEL.

The maintenance of street lighting is performed by the Public Lighting Department of Buftea Municipality.

All maintenance costs are paid from the municipal budget depending on the work performed and the services rendered.

1.1 Scope of measures and target values

The Action Plan for Energy Efficient Street Lighting in the **Municipality of Buftea** includes several energy efficiency measures that need to be implemented in the following period in order to achieve its goal.

These measures apply to:

- The preparation of an energy audit of existing facilities, as well as the assessment of operational and maintenance activities in order to identify the appropriate measures for a significant increase in energy efficiency.
- The preparation of an extension strategy and a set of guidelines and procurement tips to enable the municipal administration to conduct public tenders for the development and implementation of specific energy efficiency projects in the street lighting.
- Replacement of the existing ones: replacing all existing lamps with more energy efficient LED technology combined with automate management system and solar energy source.

1.2 Target values of indicators

Target indicators relating to the identified measures are shown in Table 1

Table 1: Indicators and target values

Objective	Target indicator	Method of measurement and validation
Realized Public Lighting energy audit	<ul style="list-style-type: none">• Energy audit performed• Modernization program proposal developed	Reports from the process of realization of the activities Developed documents
Reduction of annual energy consumption for street lighting	<ul style="list-style-type: none">• By 2028, the annual energy consumption will be reduced by 30% compared to the current one	Reports of consumption measurements
Reduction of the share of energy in municipal investments	<ul style="list-style-type: none">• By 2030 decrease by 20% in relation to current investments	Energy consumption reports
Replacing the street lights	<ul style="list-style-type: none">• Up to 2028 100% of the existing street lights are EE	Reports of the completed replacement
Reducing the level of CO2 emissions	<ul style="list-style-type: none">• Reduction of CO2 emissions in by 40% based on 2017 emissions	Reports of consumption/emissions measurements

2 Implementation Strategy

2.1 Step by step

Step 1 – Full technical audit of the street lighting system

An assessment of the current status of street lighting (including location, number and type of pillars, lamps, distribution through settlements, etc.) as well as an assessment of its operation and maintenance will help identify appropriate measures for a significant increase in energy efficiency.

Step 2 – Energy Audit for street lighting and modernization program

In this phase, a timing program for lighting should also be implemented.

Lighting automatization can reduce energy consumption, carbon emissions, and operating costs. A strategic timing and / or dimmer program tailored to specific lighting needs in certain areas can significantly reduce energy consumption while still delivering lighting at an appropriate level.

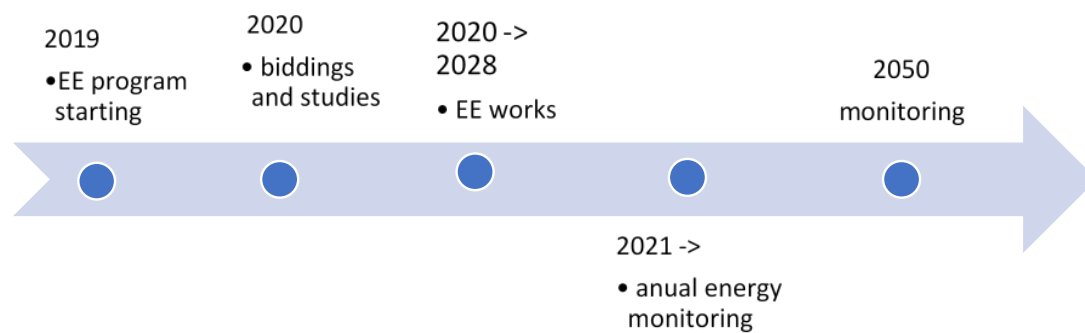
Monitoring systems also enables rapid detection of errors, allowing for quick replacement, and thus improving the quality of public lighting.

Step 3 – Implementation of the Program forextension and modernization of the street lighting system

At this stage, sources of funding are more closely identified, lobbying for funding is planned, and technical projects are being prepared, public procurements are implemented, monitoring of the implementation of projects is monitored.

Step 4 – Implementation of a continuu monitoring system for the street lighting in Buftea Municipality

2.2 Time frame



2.3 Budget and necessary resources

Identified sources of funding are:

- European Commission Cohesion funds;
- EU funds of targeted programs;
- 30% contribution from Ilfov County Budget
- 30% State budget funds;
- Funds of Buftea municipality;

A part of the funding will reach the region through the Ilfov County Council according to approved priorities and concrete projects. Another part of the measures can be funded by submitting project applications to targeted funds and competing with national and EU projects.

3 Cooperation with stakeholders

The main stakeholders involved in this activity, their role, responsibility, the way of involvement and the type of communication are given in Table 2:

Table 2: Stakeholders

Stakeholders	Role and Responsibility of the Party concerned	How it is involved and how it will communicate with the stakeholder
Buftea Municipality	Implementator of activities It prepares, adopts, implements and monitors the EE Program and the respective AP. Establishes a communication system with other stakeholders	Directly through the EE Team Communication take place through: <ul style="list-style-type: none"> • meetings • written communication • reports
Buftea Household associations	expressing the interests of citizens in Public lighting extension and modernization	Consultative Communication through: <ul style="list-style-type: none"> • meetings • written communication • reports
Public Lighting department	Maintenance of street lighting in the municipality Take care of the quality of street lighting	Directly through the EE Team Communication <ul style="list-style-type: none"> • meetings • written communication • reports
ENEL X smart city Division	Support with expertise and good practices developed by ENEL in other municipalities	Directly through the EE Team Communication will take place through: <ul style="list-style-type: none"> • meetings • written communication • reports

4 Monitoring Strategy

After 2 years of the implementation of renovation works the monitoring phase will start. According to the national requirements there is an annual reporting period of achieved energy savings.

Once a year, it is necessary to report on energy consumption and the costs of energy and the calculations of achieved indicators for the previous year. The basis for the calculation of the savings will be the average consumptions.

According with 121/2014 energy efficiency legislation every municipality with over 5000 inhabitants has obligation to hire an energy manager responsible for monitoring and reporting on achieved savings to the ANRE (Romania Energy Regulatory Authority).

5 Risk Management

The risks, the probability of their occurrence and the manner of risk management are given in 3.

Table 3: Risks, probability of risk and measures for dealing

Risk	Probability of realizing	Mitigation measure
Political risk (every 4-year new local council and new mayor will be elected)	medium	Multi-level governance assures the implementation of this plan since the Ilfov County Energy Strategy was approved with unanimity and all political spectrum approved as long-term target.
Risk of low interest for funding of this Action.	medium	In the case that there will be no funding at the EU or national level, the local communities and other relevant stakeholders will be engaged for funding (30% from Ilfov County already approved).
Non-functional EE team in the municipality	medium	AEEPM periodical trainings and increasing the EE Team's resources

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

Mitigating energy poverty in Podravje

English version

prepared by
LEA Spodnje Podravje

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: October 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Energy efficiency of public buildings and households

Title: Mitigating energy poverty in Podravje

1 Objective

It has been well established that energy poverty is an issue of rising concern for the whole Europe. To date, efforts to address energy poverty have been deficient for several reasons. Traditional outreach methods are inadequate, as, potential beneficiaries need to be approached because they will not come themselves due to lack of information, motivation, stigma attached to energy poverty among other reasons.

Energy poverty is a complicated problem that results from at least three groups of factors: Energy affordability (income level, energy prices, energy consumption), Energy use patterns (Energy consumption, Type of heating system and share of central heating) and housing patterns (tenure system housing characteristics). Secondary factors, such as social aspects (gender, household composition, disability status) have also been found to be relevant as well.

These factors often occur at the same, time, meaning that addressing only one aspect of the issue will most likely not solve the problem. The co-occurring issues associated with energy poverty often are of a technical, financial and social nature – requiring solutions that improve energy infrastructure (i.e. change of building systems) as well as addressing needed behaviour change of (often low-income) end users. However, many interventions that have been developed to try and reduce energy poverty have focused primarily on the technical aspects, for example through the use of energy advisors who make household visits/audits. Moreover, energy advisors often lack expertise in communications and are not connected to other social support actions, thus making it more difficult for them to identify at-risk or current energy poor households. Even when they do identify energy poor, they have found it difficult to achieve lasting behaviour change among their key target group. As a result, one-size will not fit all when it comes to addressing energy poverty in Europe. Tailored approaches must be taken to consider unique circumstances of different subsets of the energy poor.

Energy advisers from ENSVET energy advising network funded by the ECO Fund have been engaged in energy counselling to households receiving social assistance since 2016. They already possess expertise in implementing energy saving solutions in such households but require additional knowledge on the social aspects of working with energy poor people.

1.1 Objective scope and targets values

The aim of this action is to support and improve existing measures in order to achieve a greater impact. This support is provided through trainings for staff working with this vulnerable group of people (Energy advisers, social workers, etc.), workshops for the promotion of soft measures and other investment measures intended for energy poor households, home visits, etc.

Research has shown that with activities related to the prevention of energy poverty in Podravje region, it is possible to achieve energy savings of at least 150.000 kWh/year and CO₂ reduction of 40 tons/year.

With this action we aim to improve the existing measures and to introduce new one to households at the risk of energy poverty. The target number of involved consumers into this action is 200/year for the region of Podravje. Consumers will be involved through home visits, workshops and other activities.

1.2 Target indicators

The main indicators for this action will be:

- Number of involved consumers (energy poor households);
- Energy savings based on carried out home visits, workshops, leaflets, brochures, etc.;
- Financial investments into measures for improving energy efficiency of households and the use of RES.

Table 1: indicators and measurement methods.

Objective	Target indicator	Method of measurement and validation
Involved consumers	<ul style="list-style-type: none">• 200 directly involved consumers per year.	<ul style="list-style-type: none">• Attendance lists, checklists, etc.
Energy saving	<ul style="list-style-type: none">• 140.000 kWh of savings/year per directly involved consumer (home visit, workshop).	<ul style="list-style-type: none">• calculated based on national methodology for calculation of savings
Energy saving	<ul style="list-style-type: none">• 10.000 kWh of savings/year per indirectly involved consumer (brochures, leaflets).	<ul style="list-style-type: none">• calculated based on national methodology for calculation of savings

Financial investment	<ul style="list-style-type: none"> • 5 applications for subsidies for energy renovation per year. 	<ul style="list-style-type: none"> • Number of submitted applications/year
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2 Implementation strategy

2.1 Step by step description

This action is divided into 3 measures:

1. Development of training materials and carrying out trainings for two main target groups: social workers and existing energy advisers.

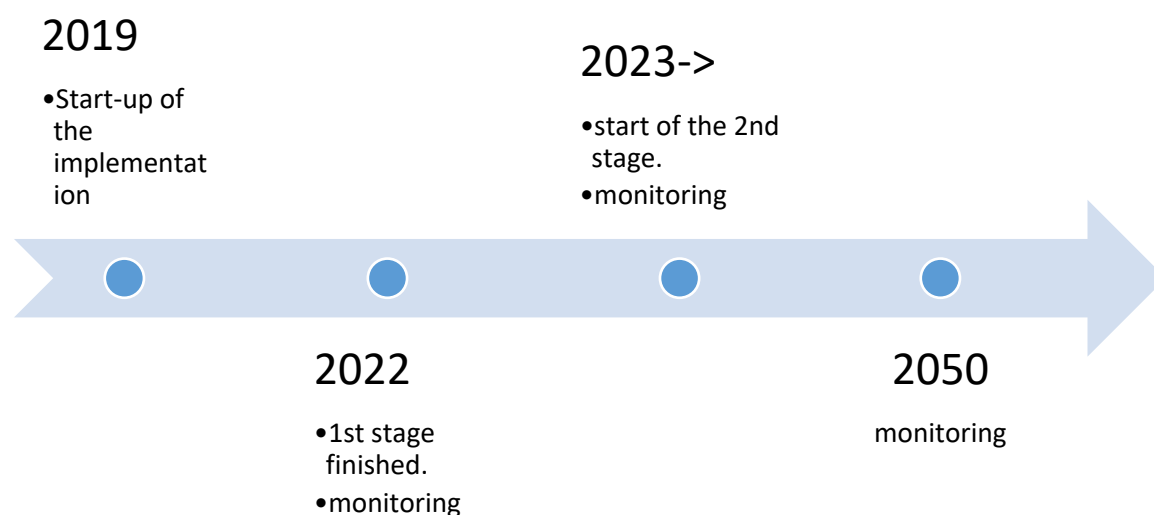
2. Carrying out home visits to the households at the risk of energy poverty. At the home visits, energy advisers will check the energy situation of the household and provide advice what soft measures and investments can be undertaken in order to improve the overall energy situation and save money. Workshops in small municipalities will also be implemented, where consumers will be informed about co-financing possibilities and soft measures that can be undertaken (example: tips on how to optimally set up the heating system before the heating season begins).

3. Help all consumers, that are interested in investments for improving the energy efficiency and the use of RES, to elaborate and submit the applications for co-financing.

2.2 Time schedule

The time schedule depends on the financing of this action. Ideally it will be performed at 2 stages:

- 1st stage: 2019 – 2022;
- 2nd stage: after 2022;
- Monitoring will be performed constantly after 2020.



2.3 Budget and resources needed

A project that implements this action has already been submitted to the Horizon 2020 programme. After the project ends the financial sources needed will have to be ensured at national or local level.

3 Collaboration with stakeholders

Main stakeholders involved into this action are:

- ECO Fund of Slovenia;
- Centre for social work;
- Municipalities of Podravje;
- LEA Spodnje Podravje;
- ENSVET;
- High school in Ptuj;

Roles and responsibilities of different actors for Action Plan implementation

In the table below are listed the main stakeholders involved, their role and involvement in this action.

Table 2: Stakeholder involvement.

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Lea Spodnje Podravje	Responsible for trainings to social workers and Energy advisers.	Involvement in all activities of the action. Personal meetings/e-mail/phone.
Political decision-makers	Municipalities in the region (over 30 municipalities)	Important for possible financing of measures at the local level.	Personal meetings/e-mail/phone.
Political decision-makers	Ministry of infrastructure; Ministry of Labour, Family, Social Affairs and Equal Opportunities	Important for possible financing of the action. Interested in the results in terms of replication possibilities Possibility of the implementation of the outcomes into the national legislation.	Involved into the dissemination activities. Personal meetings/e-mail/phone.
Target groups	ECO Fund	Financer of existing measures. Interested in activities of this action.	Involved into the dissemination activities. Personal meetings/e-mail/phone.
Target groups	ENSVET – network of energy advisers	Energy advising network under the ECO Fund. Will be involved into the training activities.	Involved into the activities of energy advising. Personal meetings/e-mail/phone.
Target groups	Social workers	Centres for social work – under the Ministry of Labour, Family, Social Affairs and Equal Opportunities, will be	Involved into the advising activities. Personal meetings/e-mail/phone.

		involved into the training activities.	
Target groups	Students	Will be involved into the training activities. Carrying out interventions to energy poor households.	Involved into the advising activities. Personal meetings/e-mail/phone.

4 Monitoring Strategy

The results of this action will be monitored constantly and evaluated each year separately in order to elaborate the annual impact. The workshop and other promotional activities in a larger group will be monitored by attendance sheets and by surveys. The impact of home visits will be elaborated based on data obtained at the on spot visit and a "check survey" after 3 months.

Regular monitoring of achieved results allows us a to immediately perform corrective measures if needed.

5 Risk management

Table3: Description of possible risks and according mitigation measures.

Risk	Probability of realizing	Mitigation measure
Describe the risk and how it might affect the reaching of the objective	High/medium/low	Describe mitigation measures with clear responsibilities
Risk of low interest for funding of this Action.	medium	In the case that there will be no funding at the EU level, the local communities and other relevant stakeholders will be engaged for funding.
Low interest of energy poor consumers.	medium	In the case of low interest of energy poor consumers, a closer cooperation with local social workers and energy advisers will be needed. Additionally, other relevant

		organizations dealing with social endangered people will be involved into project activities.
Low interest of Social workers and Energy advisers.	medium	In case of low interest the cooperation with stakeholders will be strengthen.

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Dr. Janez Petek is the Director LEA of Spodnje Podravje, Director of Steng - National Centre for Cleaner Production Ltd., the leader of the research group at the Institute for Sanitary Engineering and head of the research group Eco Design. He has 24 years of experience in the industry and the public sector in the field of cleaner production, preventive environmental protection, energy efficiency and renewable energy sources.

Roman Kekec, has graduated at the University of Civil Engineering in Maribor. Since 2014 he is working in the field of energy, and carries out energy audits, elaboration of building performance, cooperation in design, preparation of the documentation for energy renovation projects. He is also experienced in EU funded projects (Interreg, Horizon 2020).



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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

Improvement of the electricity grid and the implementation of smart measures

English version

prepared by
LEA Spodnje Podravje

PANEL 2050 – Partnership for New Energy Leadership 2050
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Date: October 2018



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Improvement of the energy infrastructure and the production of smart communities

Title: Improvement of the electricity grid and the implementation of smart measures

1 Objective

Some of the more important actions until 2050 will affect the electrical infrastructure. In order to be able to handle all additional loads that will arise from individual electricity production or from the transport sector that will promote the use of e-vehicles, the electrical grid will have to be improved and at the same time it will be needed to implement smart grids, which will be able cost effectively include the characteristics and activities of all users connected to it - producers, customers and those who are both at the same time, in order to provide an economically efficient, sustainable low-loss network of energy networks, a high level of quality and security of supply.

1.1 Objective scope and targets values

Despite investments in the development of smart grids, investments in the development of the primary electricity network will still be needed. New technologies will make it possible to make better use of the existing network, which will reduce the need for investment in the renovation of the existing network.

The electricity grid is faced with new elements whose integration leads to additional investment expenditures. At present, the biggest problem is the massive integration of dispersed sources. Therefore, it is reasonable to upgrade the classical planning procedures gradually with the development of new advanced design concepts that will optimally take into account the state of the art and the long-term development of smart grid technologies.

The data is showing that on average, installed kW of dispersed sources means 450 EUR of additional investment expenditure in the distribution network. The integration of dispersed sources with the dynamics required to meet the environmental commitments of Slovenia (25 % of renewables up to 2020 and 30 % by 2030) for the distribution network means tens of millions of additional investment expenditure annually for which the distribution companies do not have sufficient own resources. Renewables also affect the operation and quality of electricity, which is why network reinforcement is needed again. In addition, spending projections show its constant growth (new investments in the network), and it is

also necessary to replace existing equipment that is already at the end of its life. Therefore, with the concept of smart grids, the focus is on lowering investment expenditure on the network and reducing the costs of network operation.

National targets for the development of smart grids over the next 10 years will focus on developing devices or individual concepts that can be integrated into the electricity network and will generate savings and have positive effects. Priority will be given to the equipment that can be put into the market at this time. So-called demonstration projects, which, under realistic conditions, test the functioning of such concepts and individual communication devices are important for this purpose.

In the region there is already running a demonstration project in which more than 700 households connected to the same distribution station are participating in the pilot demonstration of limiting and time delay peak shaving, where users, the electricity distribution network operator and energy suppliers demonstrate that with improved communication and co-operation, peak loads can be managed, thus reducing the peak load in the use of electricity.

The result of this project will be an advanced infrastructure that will help to fulfil the legally required obligations and improve the quality of services for electricity consumers using sustainable and environmentally friendly solutions.

The results of this Action will have a positive effect to the domestic economy, since they will push the development of smart devices and placing those devices at the market. The results will also have a positive effect to the environment and consequently contribute to set national/regional/local targets.

1.2 Target indicators

The main indicator for this action will be the amount of energy savings achieved with smart communication devices.

Table 1: indicators and measurement methods.

Objective	Target indicator	Method of measurement and validation
Energy savings	<ul style="list-style-type: none">MWh/year.	<ul style="list-style-type: none">Measurements from the electrical grid operator.
Investment in smart communication devices	<ul style="list-style-type: none">CO2/year.	<ul style="list-style-type: none">Calculated based on number of devices installed.

2 Implementation strategy

2.1 Step by step description

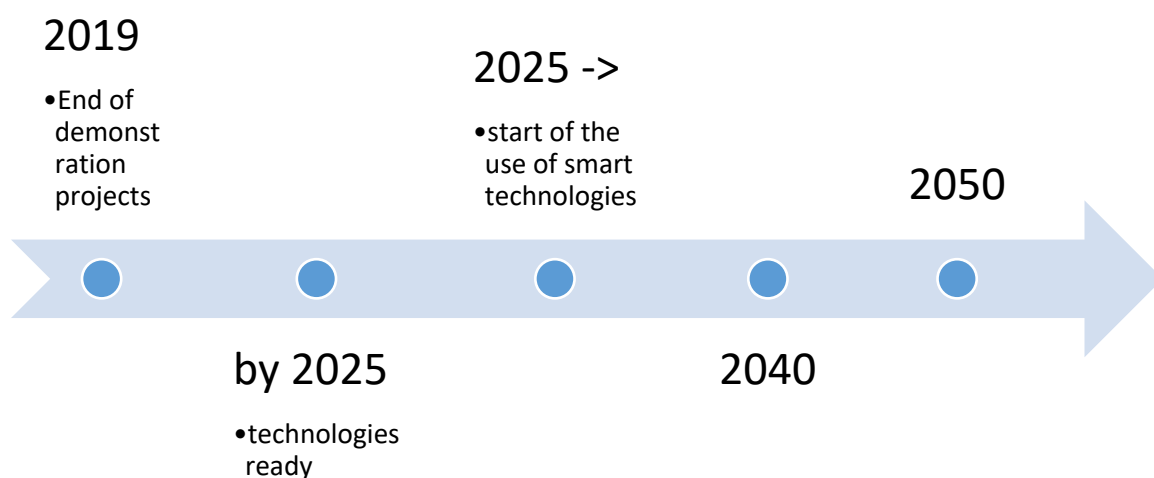
The first step will be to finish the demonstration project or if needed to conduct new one. Based on the results of the demonstration projects will be the set of equipment that is the most suitable for the use.

Second step will be the installation of the equipment in households, public buildings, etc. and the integration into the electrical grid. However, this step will require all necessary policy changes in the field of electricity distribution at the national level.

After the implementation of smart devices, the monitoring phase will start.

2.2 Time schedule

- 2019 – results of the demonstration project;
- By 2025 – prepared smart communication technologies;
- From 2025 on – the use/implementation of smart communication devices.



2.3 Budget and resources needed

The demonstration projects that are already running in are being financed through a three-year large scale project of national importance.

It is foreseen that in the future the use of this devices will become mandatory. If the installation of this equipment will be at the costs of the consumers it will be helpful to ensure co-financing at least in the introducing years.

3 Collaboration with stakeholders

Main stakeholders involved into this action are:

- Municipalities of Podravje;
- LEA Spodnje Podravje;
- Electricity distribution companies and grid operators.

Roles and responsibilities of different actors for Action Plan implementation

In the table below are listed the main stakeholders involved, their role and involvement in this action.

Table 2: Stakeholder involvement.

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Political decision-makers	Municipalities of Podravje	Possible financing. Owner of public buildings.	Local decision makers (phone/email/meetings)
Other	LEA Spodnje Podravje	Promotion of smart technologies. Advising activities to the public sector.	(phone/email/meetings)
Implementing parties	Electricity distribution companies and grid operators	System grid operators. Implementing parties.	(phone/email/meetings)

4 Monitoring Strategy

After the project will be implemented the new parameters will be monitored constantly.

5 Risk management

Table3: Description of possible risks and according mitigation measures.

Risk	Probability of realizing	Mitigation measure
Describe the risk and how it might affect the reaching of the objective	High/ medium/ low	Describe mitigation measures with clear responsibilities
No political support.	low	The improvement of the electric network has become necessary so the risk of political non-interest is low. In the event that this situation arises, intensive communication with decision makers will be required.
No financing.	medium	In the case that no national or local financing will be available, activities in terms of seeking additional funding will be needed.

6 Contact

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

Micro district heating systems in small municipalities

English version

prepared by
LEA Spodnje Podravje

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

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CENTRAL EASTERN EUROPEAN
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RES for heat and electricity production

Title: Micro district heating systems in small municipalities

1 Objective

Podravje region consists of 41 municipalities of which 28 have less than 5.000 inhabitants. Usually, public buildings like the municipal building, primary school buildings, kindergartens, community halls, health centres etc., are located in the main town centres. These public buildings could be connected with micro district heating systems on RES, preferably on wood biomass, in order to replace the individual heating systems of this buildings that are often still using fossil fuels. The supply of biomass for such systems could be supplied regionally/locally and in that way contribute to the local economy.

Hereinafter, this action plan presents a project that has a high potential for replication and can be implemented in most of the smaller town centres across the Podravje region.

1.1 Objective scope and targets values

Municipality of Cirkulane is located in the area of Spodnje Podravje and has 2.324 inhabitants (statistical data from 2018). The municipality covers an area of 32 km² and the main centre of the municipality, where the public buildings are located, is the settlement Cirkulane.

In order to replace the fossil fuel heating systems of public buildings, the municipality of Cirkulane is planning a district heating system on wood biomass. The main plan is to use the existing pellet boiler installed in the boiler room of the Primary school of Cirkulane building and construct a hot water network to connect additional public building. With this action the municipality wants to connect 5 buildings into a micro district heating system on wood biomass.

Today, the Primary School of Cirkulane and the Sports hall is being heated with a pellet boiler installed in the boiler room of the school building. The installed boiler has a nominal power of 200 kW. The municipal building and the kindergarten is heated with Liquified petrol and the Local community building is heated with heating oil. With the planned action, the construction of a 358 m long hot water network is planned, with which the facilities will be connected to the system of a micro-district heating.

1.2 Target indicators

This action represents an implementing measure, which means that it will be measurable with clear indicators at all stages of the implementation and later in operation. In order to achieve the objectives of the action plan, it will be important to measure the effects after the project is implemented when the district heating system is in operation. The main indicator will be the annual energy production and the CO2 reduction.

Table 1: indicators and measurement methods.

Objective	Target indicator	Method of measurement and validation
Heat produced from RES	<ul style="list-style-type: none">• 270.000 KWh/year.	<ul style="list-style-type: none">• annual energy bills.• Measurements from the central control system.
CO2 reduction	<ul style="list-style-type: none">• 35.500 kg CO2/year.	<ul style="list-style-type: none">• Calculated based on the energy production.

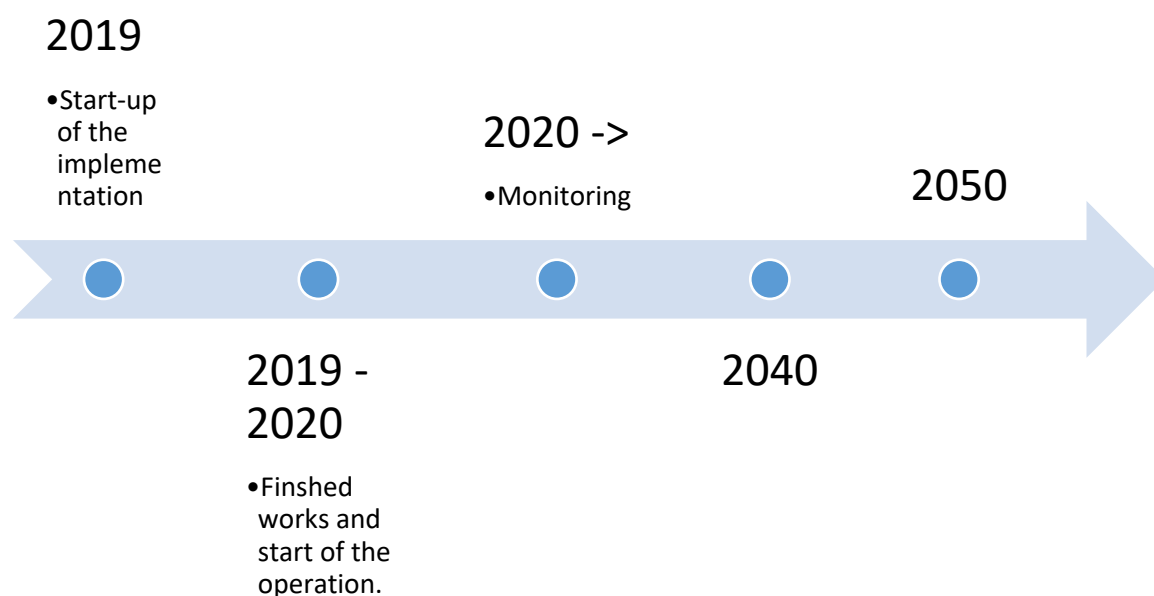
2 Implementation strategy

2.1 Step by step description

LEA Spodnje Podravje has already carried out all necessary analyses and prepared the implementation plans for the project described. After the municipality of Cirkulane will obtain all necessary permissions and a contractor will be found, the implementation works will start. The implementation of this project will be launched in 2019 and in 2020 the monitoring of the achieved results will begin.

As already described above, this measure could be applicable in many other municipalities across the Podravje region.

2.2 Time schedule



2.3 Budget and resources needed

The costs of the construction of a hot water network and the set-up of a micro district heating system by using the existing wood pellet boiler in the boiler room of the Primary School of Cirkulane are estimated at 100.000 EUR. The Municipality plans to cover this costs with their own sources.

ECO Fund offers to the public sector favourable loans for Construction of a distribution system for district heating and/or cooling, i.e. distribution network, connections to customers, control systems, etc.

3 Collaboration with stakeholders

Main stakeholders involved into this action are:

- Municipality of Cirkulane
- LEA Spodnje Podravje
- Municipalities of the Podravje region

Roles and responsibilities of different actors for Action Plan implementation

In the table below are listed the main stakeholders involved, their role and involvement in this action.

Table 2: Stakeholder involvement

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Municipality of Cirkulane	Investor and owner of the buildings involved into this project.	Involved into the project preparation. In regular communication (phone/email/meetings).
	LEA Spodnje Podravje	Project planner.	Involved into the project preparation. In regular communication (phone/email/meetings).
Implementing parties	Municipalities of the Podravje region	Potential investors and owners of the buildings involved into this action plan.	Involved into potential micro district heating projects (phone/email/meetings).

4 Monitoring Strategy

After the project will be implemented the heat production and the new parameters will be monitored constantly. Within the energy management and energy bookkeeping, LEA Spodnje Podravje will monitor the heat production and supply on a monthly basis. Annual reports will be prepared to show the achievement of indicators such as energy savings, costs savings and the reduction of CO₂ emissions.

5 Risk management

Table3: Description of possible risks and according mitigation measures.

Risk	Probability of realizing	Mitigation measure
Describe the risk and how it might affect the reaching of the objective	High/ medium/ low	Describe mitigation measures with clear responsibilities
New elected local government will stop or hinder the project implementation.	medium	Additional communication efforts to keep them involved and to show them the importance of the project.
The funds will not be available anymore.	medium	In the case that own funds will not be available, it will be searched for other funding possibilities like the ECO Fund or private investors.

6 Contact

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Henrik Glatz, Researcher and Energy designer. Henrik is a designer of mechanical installations and hardware for demanding, less demanding and simple structures, He has experiences in the development of project ideas in the field of energy efficiency, renewables integration and other topics in the field of energy, he performs energy audits, energy renovation projects and energy certificates. He is a member of the Board of Directors of the parent section of Mechanical Engineers at the Chamber of engineers of Slovenia.



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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

Promotion of energy efficiency and RES

English version

prepared by
LEA Spodnje Podravje

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: October 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Energy efficiency and RES in public buildings and households

Title: Promotion of energy efficiency and RES

1 Objective

Consumers play an important role in energy consumption and can, with their behavior based on avoiding unnecessary energy expenditure, significantly affect the reduction of energy and emissions in a municipality.

The way people use energy at home, at work, and traveling from one place to another represents a potential that allows up to 20 % savings in final energy consumption. 5 % to 10 % savings are available without any compromises on the quality of life.

A change in behavior plays an important role in raising awareness and promoting a sustainable lifestyle, in which people are aware of the importance of using sustainable modes of transport, switching off lights, televisions, computers and other equipment when they are not needed, etc.

1.1 Objective scope and targets values

With this Action two types of measures are provided:

1. Educational and advisory activities for citizens

Information and educational activities for different target groups (primary school pupils, students, general public, etc.) are carried out in order to raise people's awareness of the opportunities offered by reasonable use of energy and to influence the introduction of RES measures. Advisory activities are intended to inform people about the possibilities of obtaining grants from the Eco Fund, energy efficient renovation of buildings, etc. The examples of good practices and examples from the public sector are further encouraged to invest in EEU and RES in households.

2. Educational events for public institutions

There is a lack of education and awareness of the importance and relevance of energy efficiency in public buildings. With non-investment measures in the field of organization and operation of existing energy systems, which enable the use of the available energy saving potential in a particular building, it is possible to achieve a 5-10% reduction in energy consumption and, consequently, lower energy costs, and a higher level of comfort impact on productivity of employees and reduction of environmental impact. The level of awareness of public building users is significantly affected by the achievement of the desired savings.

On the other hand, after the implementation of an energy renovation project, often the desired and required energy savings are not being achieved. The reason can be found in a lack of knowledge of public buildings maintainers. Since the overall energy conditions after a renovation are changed, it would be extremely useful to conduct such trainings to the maintaining staff of public buildings.

1.2 Target indicators

The main indicators for this action will be:

- Number of involved consumers (households);
- Energy savings based on carried out workshops, trainings, leaflets, brochures, etc.;
- Financial investments into measures for improving energy efficiency of households and the use of RES.

Table 1: indicators and measurement methods.

Objective	Target indicator	Method of measurement and validation
Involved consumers	<ul style="list-style-type: none"> • Nr. of involved consumers 	<ul style="list-style-type: none"> • Attendance lists, checklists, etc.
Energy saving	<ul style="list-style-type: none"> • kWh of savings per directly involved consumer (trainings, workshop) 	<ul style="list-style-type: none"> • calculated based on national methodology for calculation of savings
Energy saving	<ul style="list-style-type: none"> • kWh of savings per indirectly involved consumer (brochures, leaflets) 	<ul style="list-style-type: none"> • calculated based on national methodology for calculation of savings
Financial investment	<ul style="list-style-type: none"> • Nr. of applications for subsidies for energy renovation 	<ul style="list-style-type: none"> • Number of submitted applications/year

2 Implementation strategy

2.1 Step by step description

This action is divided into 2 areas:

Activities for Households:

- Energy advising to households (in Energy advisory offices) – Advisory activities are intended to inform people about the possibilities of obtaining grants from the ECO Fund, energy efficient renovation of buildings, etc.
- Energy advising workshops – such events are particularly appropriate in the time before the start of the heating season, where citizens can be given useful advices on setting up their heating systems for the optimum operation. This is an organizational or so-called soft action, which usually does not require an investment and can generate high savings.

Activities for the Public sector are intended for:

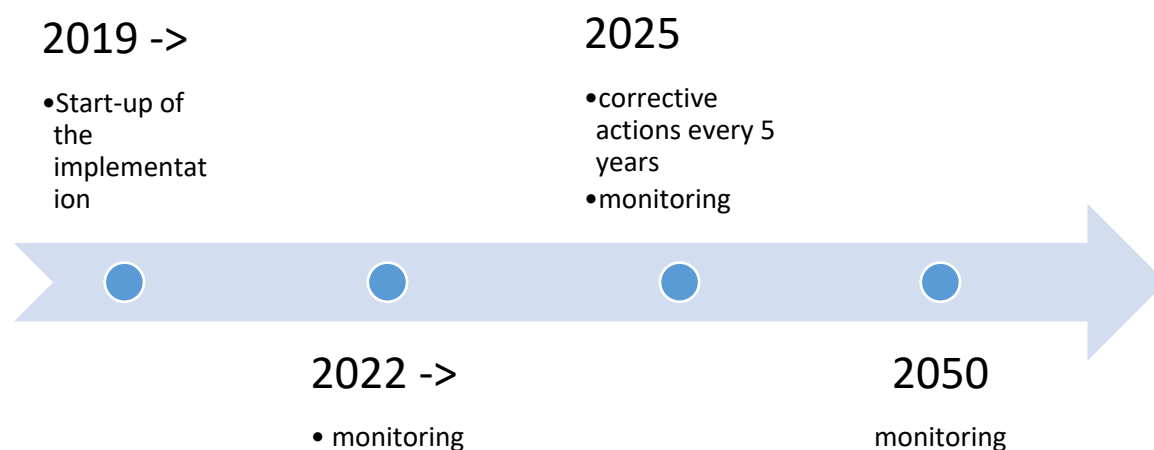
- Public building users - There is a lack of education and awareness of the importance and relevance of energy efficiency in public buildings. With non-investment measures in the field of organization and operation of existing energy systems, which enable the use of the available energy saving potential in a particular building, it is possible to achieve a 5-10% reduction in energy consumption.
- Maintainers for public buildings - after the implementation of an energy renovation project, often the desired and required energy savings are not being achieved. The reason can be found in a lack of knowledge of public buildings maintainers. Since the overall energy conditions after a renovation are changed, it would be extremely useful to conduct such trainings to the maintaining staff of public buildings.

2.2 Time schedule

2019 -> Promotion of energy efficiency and the use of renewable energy sources is a continuous measure.

2020 -> the monitoring of the impacts will be regular with an annual report.

The implementation will require a constant check of available funding mechanisms and technology and to modify the training and workshop materials according to the current situation.



2.3 Budget and resources needed

Activities of the promotion of energy efficiency and the use of renewable sources can be promoted through EU programs like Interreg, Horizon 2020 and other. Advisory actions are currently being financed through the ECO Fund, which offers also subsidies for energy efficiency measures, use of RES, protection and efficient use of water and waste prevention. Beside subsidies the ECO Fund offers also favorable loans.

3 Collaboration with stakeholders

Main stakeholders involved into this action are:

- ECO Fund of Slovenia;
- LEA Spodnje Podravje;
- Municipalities of the Podravje region.

Roles and responsibilities of different actors for Action Plan implementation

In the table below are listed the main stakeholders involved, their role and involvement in this action.

Table 2: Stakeholder involvement

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Lea Spodnje Podravje	Responsible for trainings to public building users and their maintainers, households.	Involvement into the action – trainings for public bodies. Phone/email/personal meetings.
Political decision-makers	Municipalities in the region (over 40 municipalities)	Important for possible financing of measures at the local level.	Involvement in trainings. Phone/email/personal meetings.
Political decision-makers	Ministry of infrastructure	Important for possible financing of the action.	Phone/email.
Possible financers	ECO Fund	Financer of existing measures.	Phone/email/personal meetings.
Implementing parties	ENSVET – network of energy advisers	Energy advising network under the ECO Fund. Will be involved into the training activities.	Involvement into the action – advising to households. Phone/email/personal meetings.

4 Monitoring Strategy

The results of this action will be monitored constantly and evaluated each year separately in order to elaborate the annual impact. The workshop and other promotional activities in a larger group will be monitored by attendance sheets and by surveys. The impact of energy advising to households will be elaborated based on data obtained when visiting the Energy advisory office.

Regular monitoring of achieved results allows us to immediately perform corrective measures if needed.

5 Risk management

Table3: Description of possible risks and according mitigation measures.

Risk	Probability of realizing	Mitigation measure
Describe the risk and how it might affect the reaching of the objective	High/ medium/ low	Describe mitigation measures with clear responsibilities
Risk of low interest for funding of this Action.	medium	In the case that there will be no funding at the EU or national level, the local communities and other relevant stakeholders will be engaged for funding.
Low interest of energy consumers.	medium	In the case of low interest of energy consumers (households, public sector), additional efforts will be needed to show the importance of this measures. In this efforts, examples of good practices could be very helpful.
Low interest of Energy advisers.	medium	In case of low interest the cooperation with energy advisers will be strengthen.

6 Contact

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

Regional charging network for e-vehicles

English version

prepared by
LEA Spodnje Podravje

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: October 2018



CENTRAL EASTERN EUROPEAN
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Sustainable mobility

Title: Regional charging network for e-vehicles

1 Objective

The basis of e-mobility are electrically powered vehicles, which are mainly being used for personal transport. In addition to cars, motorcycles belong to this group, as well as smaller freight vehicles that use electric power instead of fossil fuels.

The number of electric cars in Europe and Slovenia is steadily increasing. This, of course, requires the development and construction of the entire supply infrastructure, from the distribution network to the installation of electro charging stations.

1.1 Objective scope and targets values

Due to the fact that in Slovenia the most journeys are carried out at a distance of up to 30 kilometers, gives a great potential for the use of e-cars. A prerequisite for success in introducing e-mobility is a well-developed electro charging network. In Podravje we have a relatively well developed charging network in bigger city centers like Maribor and major transport links, while smaller municipalities are largely without charging stations. The aim of this action is to ensure a sufficient coverage of the electro charging network throughout the region.

1.2 Target indicators

The main indicators for this action will be:

- Number of new installed electro charging stations.
- Financial investments into the installations of electro charging stations.

Table 1: indicators and measurement methods

Objective	Target indicator	Method of measurement and validation
Installed stations	<ul style="list-style-type: none">• 30 new installed electro charging stations.	<ul style="list-style-type: none">• Based on the nr. of installations.
Financial investment	<ul style="list-style-type: none">• 300.000 EUR of investments into the charging network.	<ul style="list-style-type: none">• calculated based on the nr. of installations and the costs of

		each charging station.
Charging statistics	<ul style="list-style-type: none"> • kWh of electricity. • nr. of chargings. 	<ul style="list-style-type: none"> • calculated based on data from the charging station.

2 Implementation strategy

2.1 Step by step description

This action is divided into several steps:

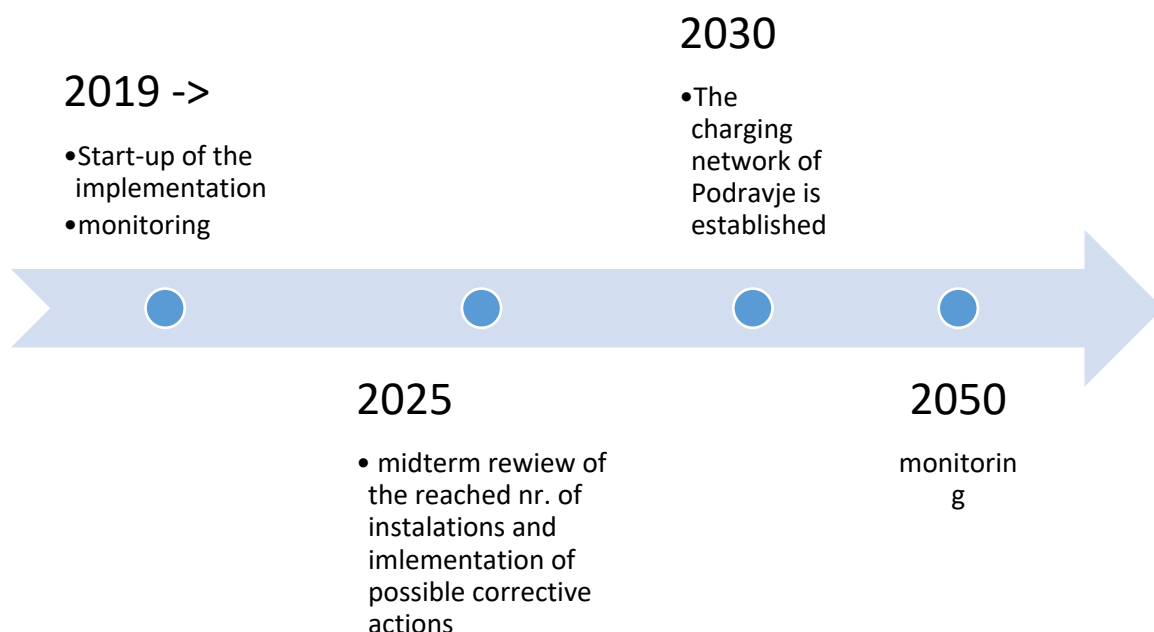
- The elaboration of optimal locations of charging stations with an emphasis on the integrated regional network.
- Preparation of all necessary documentations, such an application for co-funding, implementation plans and the selection of the contractor.
- Installation of the electro charging stations.
- Mapping the charging stations to provide a map of stations or including them into existing maps like: <http://www.polni.si/>.
- Monitoring.

2.2 Time schedule

2019 -> Start-up of the implementation and start of monitoring this action.

2025 -> Corrective actions in terms of seeking new financing possibilities.

2030 – the Charging network is established.



2.3 Budget and resources needed

According to some calculations and data from past implementations of electro charging stations, the total costs of installing an electro charging station are around 9000 EUR.

Currently the ECO Fund non-refundable financial incentives to establish an infrastructure (new charging stations) for electric vehicles designed to promote electrical mobility as an important element of sustainable mobility in protected areas of nature and Natura 2000 sites.

The aim is to promote the sustainable mobility to residents and employees and to regulate the appropriate infrastructure to visit these areas. This will help in the long run to reduce greenhouse gas emissions, to improve air quality, to make an environmentally friendly visit to these areas and, consequently, to conserve nature. At the same time, the coverage of protected areas or areas of nature conservation will be ensured with the infrastructure of charging stations for electric vehicles, which will be one of the foundations for the further development of sustainable mobility.

The applicant municipality, which has a share of the territory in the Natura 2000 sites or the share of the territory in the protected areas, may acquire the right to a non-refundable financial incentive to purchase new charging stations.

3 Collaboration with stakeholders

Main stakeholders involved into this action are:

- ECO Fund of Slovenia;
- Municipalities of Podravje;
- LEA Spodnje Podravje.

Roles and responsibilities of different actors for Action Plan implementation

In the table below are listed the main stakeholders involved, their role and involvement in this action.

Table 2: Stakeholder involvement

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Lea Spodnje Podravje	Responsible for seeking of suitable locations for the installation. Seeking for financing possibilities.	Involvement into the action. Phone/email/personal meetings.
Political decision-makers	Municipalities in the region (over 40 municipalities)	Applicants.	Involvement into the action. Phone/email/personal meetings.
Possible financers	ECO Fund	Possible Co-financer.	Phone/email/personal meetings.

4 Monitoring Strategy

The results of this action will be monitored constantly and evaluated each year separately in order to elaborate the annual impact. The impact will be evaluated based on the annual data collection and presented as statistical data like: nr. of chargings and the use of energy in kWh.

5 Risk management

Table3: Description of possible risks and according mitigation measures.

Risk	Probability of realizing	Mitigation measure
Describe the risk and how it might affect the reaching of the objective	High/ medium/ low	Describe mitigation measures with clear responsibilities
Risk of low interest for funding of this Action.	medium	In the case that there will be no funding at the EU or national level, the local communities and other relevant stakeholders will be engaged for funding.
Low interest of municipalities.	medium	In the case of low interest of municipalities, additional efforts will be needed to show the importance of this measures. In this efforts, examples of good practices could be very helpful.

6 Contact

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

Renovation of public buildings in Podravje and the mobilization of investors

English version

prepared by
LEA Spodnje Podravje

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: October 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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Energy efficiency and RES in public buildings and households

Title: Renovation of public buildings in Podravje and the mobilization of investors

1 Objective

In the period from 2008 to 2014, many public buildings were renovated in Slovenia, mainly due to favourable conditions for co-financing. In the first perspective, 100 % co-financing could be obtained for energy renovations, while in the second period it was 85 % of eligible costs. At present, a 40 % subsidy is available for the renovation of public buildings, with additional conditions to be met such as the minimum size of investment (at least 500.000 EUR). As a result, municipalities form consortiums in order to provide bigger projects (more public buildings in one project) to achieve the minimum required investment amount. Because in most cases their funding share cannot be covered, they decide to take the option of a public-private partnership.

1.1 Objective scope and targets values

In spite of the numerous renovations of public buildings, many of them still need to be energy renovated. The current national strategy and operational program for the restoration of public buildings and the utilization of cohesion funds covers the period up to 2020 (2023). Currently it is hard to say if the co-financing programs will continue at the end of this period.

Therefore, with this action, we are committed to encouraging municipalities to carry out as much energy projects as they can for their buildings and to connect with potential investors in public-private partnerships.

1.2 Target indicators

The main indicators for this action will be:

- Energy savings in kWh;
- CO₂ savings.

Table 1: indicators and measurement methods.

Objective	Target indicator	Method of measurement and validation
Energy saving	<ul style="list-style-type: none">• kWh of savings through	<ul style="list-style-type: none">• calculated based on annual use of

	implemented measures.	electricity and energy for heating compared with the baseline values.
CO2 reduction	<ul style="list-style-type: none"> Tons of CO2 reduction per year. 	<ul style="list-style-type: none"> Calculated based on the annual use of electricity and energy for heating.
Financial investment	<ul style="list-style-type: none"> Nr. of applications for subsidies for energy renovation. 	<ul style="list-style-type: none"> Number of submitted applications/year.

2 Implementation strategy

2.1 Step by step description

If a municipality decides for an energy renovation project, following steps are to be carried out:

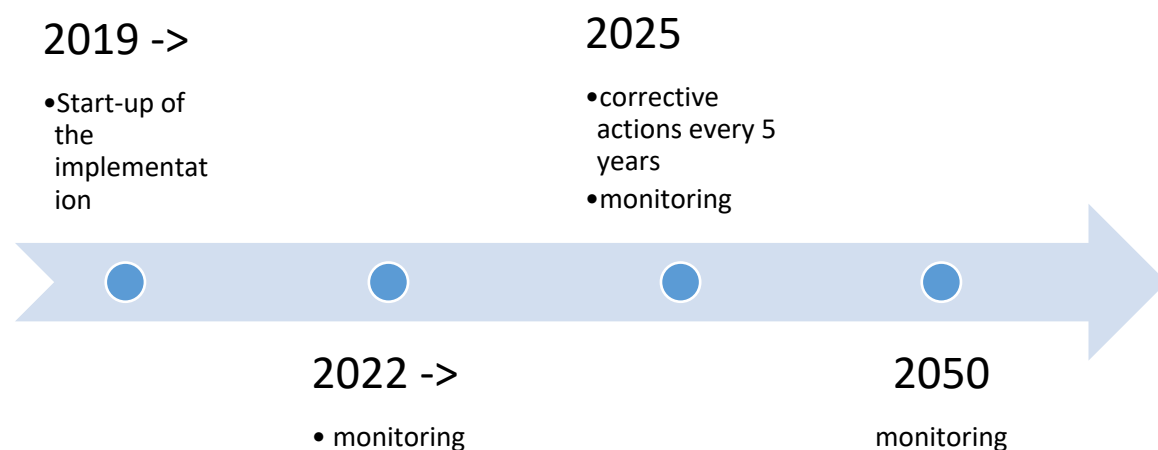
- an initial analysis of the current situation of a building. Usually, an energy certificate shows if there is a need for implementing measures to increase the energy efficiency of a building;
- In-depth analysis. The second step is a more in-depth analysis, which is done with the energy audit of the building. With an energy audit, the use of energy and the efficiency of existing energy systems are being analysed. The aim is to provide economically and technically justified measures to improve the energy efficiency of buildings and the use of renewable resources;
- After an energy renovation has shown feasible, all necessary documents have to be prepared – Application for funding (if the project is applying for a call for a grant), implementation plans, permits for implementation – if needed;
- the execution of a public contract procedure (for the selection of the contractor), or the implementation of a public-private partnership procedure;
- implementation of renovation works;
- monitoring of results.

LEA Spodnje Podravje carries out energy bookkeeping for 140 buildings from 17 municipalities from Spodnje Podravje and therefore has a good overview of the “energy” condition of public buildings in the region. LEA Spodnje Podravje informs municipalities, that still have public buildings that have not been renovated yet, about open calls for financing of energy renovations. If a municipality shows interest, all necessary steps (described above) are being carried out.

LEA Spodnje Podravje has a well-developed network of stakeholders and therefore acts as a link between the private and public sector which is important for connecting different actors into public private partnerships.

2.2 Time schedule

Until 2023 – the duration of the current energy renovations financial perspective. In the case that after this period there will be no new financial programs for energy renewal projects, new investors will have to be mobilized according to the principle of public-private partnerships.



2.3 Budget and resources needed

At the moment funding is ensured through different EU funding mechanisms, like the Cohesion fund, rural development programme, and other EU programmes like Interreg and Horizon 2020. These programmes are mainly intended for the public sector and to some extent to the Industry. Citizens can apply for subsidies for individual energy projects from the ECO Fund.

1. Cohesion funds

According to the Operational programme for implementing European cohesion policy, Slovenia has available more than 3,2 billion euros from the European structural funds and the Cohesion fund. There are various national tenders available, mainly aimed at:

- Energy renovation of public buildings.
- Renovation of old or construction of new District heating systems on RES.

At the moment there are no exact predictions for the period after 2020.

2. ECO Fund

Eco Fund's main purpose is to promote development in the field of environmental protection. It is the only specialised institution in Slovenia that provides financial supports for environmental projects. The financial assistance is offered mainly through soft loans from revolving funds and since the year 2008 through grants. In comparison with commercial banks, Eco Fund's principal advantages in the market for environmental financing are that it provides soft loans at lower interest rates than prevailing commercial market rates and it is able to lend for significantly longer periods than commercial banks. For citizens ECO fund offers subsidies which are covering in average 20 % of the investment into RES or energy efficiency projects. ECO Fund also supports the purchase of electric vehicles for public bodies and also for citizens. Financial resources for the implementation of programs for increasing the use of RES are guaranteed by all final customers with the addition to the price of heat or to the price of fuels for increasing the energy efficiency that they are obliged to pay to the heat supplier or the supplier of fuels.

Additional to national funding opportunities, other possibilities for funding will be searched. In this area, public-private partnerships have proved as an excellent opportunity when it comes to energy renovations.

3 Collaboration with stakeholders

Main stakeholders involved into this action are:

- ECO Fund of Slovenia;
- Local Energy Agency Spodnje Podravje;
- Municipalities of Podravje;
- ESCO companies.

Roles and responsibilities of different actors for Action Plan implementation

In the table below are listed the main stakeholders involved, their role and involvement in this action.

Table 2: Stakeholder involvement

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Lea Spodnje Podravje	Carrying out energy audits and other needed analysis. Preparation of the application for grants.	Involvement into the action in all steps. Phone/email/personal meetings.

		Preparation of implementation plans. Supervision of implementation works. Monitoring and reporting.	
Public building owners	Municipalities in the region (over 40 municipalities)	Owners.	Involvement into the action in all steps. Phone/email/personal meetings.
Political decision-makers	Ministry of infrastructure;	Important for possible financing of the action.	Phone/email.
Possible financers	ECO Fund	Co-financer of energy renovation measures.	Phone/email/personal meetings.
Possible financers	ESCO companies	Co-financer of energy renovation measures.	Phone/email/personal meetings.

4 Monitoring Strategy

After the implementation of renovation works the monitoring phase will start. According to the national requirements (if the project is co-financed by the Ministry of Infrastructure) there is a 5 year reporting period of achieved energy savings. Once a year, it is necessary to report on energy consumption and the costs of energy and the calculations of achieved indicators for the previous year. The basis for the calculation of the savings will be the average consumptions and the price of heat and electricity from 3 baseline years (usually 3 full years before the implementation of renovation works). The energy manager is responsible for reporting on achieved savings to the Ministry of Infrastructure.

5 Risk management

Table3: Description of possible risks and according mitigation measures.

Risk	Probability of realizing	Mitigation measure
Describe the risk and how it might affect the reaching of the objective	High/ medium/ low	Describe mitigation measures with clear responsibilities
Risk of low interest for funding of this Action.	medium	In the case that there will be no funding at the EU or national level, the local communities and other relevant stakeholders will be engaged for funding.
Low interest of energy consumers.	medium	In the case of low interest of municipalities, additional efforts will be needed to show the importance of this measures. In this efforts, examples of good practices could be very helpful.

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SUSTAINABLE ENERGY NETWORK

ACTION PLAN

Energy renovation of School buildings

English version

prepared by
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Energy efficiency of public buildings and households

Title: Energy renovation of School buildings

1 Objective

In the past years, Municipalities in the Podravje region have already renovated most of their school buildings but there are still some left that need to be energy renovated in order to ensure favourable conditions for pupils and students in terms of the education and training process. This action plan is presenting two projects that could be implemented in the near future and the responsible bodies have already show great interest for this projects and already started the planning phase. The approach of this projects, especially the financing part, could be easily transferred into other such projects across the region.

1.1 Objective scope and targets values

The Municipality of Ptuj has already renovated most of the primary school and kindergarten buildings and there is only one primary school building left not being renovated yet. On the other hand, none of the secondary school buildings have been renovated. The main reason is the ownership of this buildings, since they are not owned by the municipality but by the Ministry of Education, Science and Sport. However, not only the positive results in terms of energy and costs savings from previous renovations but also the poor state of the buildings that have not been renovated yet gave the needed push for the main actors involved to decide for energy renovation of those buildings.

The implementation of the action is divided into 2 energy renovation projects:

- Primary School Mladika building, owned by the municipality;
- Secondary School Centre of Ptuj buildings, owned by the Ministry.

Primary School Mladika

Due to the poor energy state of the school building and because of other planned investment projects for the building (the reconstruction of the kitchen and the construction of a new dining room), the municipality of Ptuj is thinking about approaching a comprehensive energy renovation. At this stage initial analyses have been carried out to express the need of the renovation and possible positive results not only in terms of energy and cost savings but also in improving the conditions for teachers and pupils.

This project foresees the implementation of measures to increase the energy efficiency in the building (replacement of windows, insulation of the façade, floor and the ceiling) and to change the heating system from fossil fuels to RES. Currently the building is heated on heating oil and with the implementation of this action it will move to the use of wood

biomass, the use of a pellet boiler in a micro district heating system with other surrounding public buildings.

The costs of this action are estimated at approximately 352.132 EUR. The energy savings for heating are estimated at 120.400 kWh/year and the reduction of CO₂ of about 53,9 tons/CO₂ per year.

Secondary School Centre of Ptuj

Due to the poor state of buildings, high operating costs, non-optimal working and living conditions, which was previously recognized in the current management and maintenance of facilities, the School Centre, the Student dormitory and the Gymnasium of Ptuj aim to eliminate the identified problems and to implement other possible improvements. They have joined the project of a comprehensive energy renovation of buildings that, after preliminary analyses, have been identified as a priority for the implementation of a complete energy renovation:

- buildings of the Ptuj School Centre, Volkmerjeva 19 (central building, sport hall and workshops);
- School Centre building on Vičava 1;
- Gymnasium, Volkmerjeva 15;
- Student dormitory, Arbajterjeva 6,

At the initial stage, the School Centre, the Gymnasium and the Student dormitory have approached a more detailed analysis of the energy state of the buildings and made suggestions for its improvement. In 2014, within the framework of a public tender for secondary schools, the School Centre ordered the production of energy certificates for all buildings, and in 2016 commissioned a more in-depth analysis in the framework of making extended energy audits of these facilities. On the basis of the analyses, implementation plans with different scenarios were developed to help to find an investor as a private partner. Measures were proposed that include comprehensive energy renovation of buildings and include the implementation of thermal insulation or additional thermal protection of the external walls, ceiling and attic, the installation of more efficient building furniture, the replacement or reconstruction of heat sub-stations, the replacement of lighting with more energy efficient, the reconstruction of the boiler room at the location Vičava with the passage to the district heating on wood biomass, the reconstruction of ventilation systems, and certain organizational measures.

This energy renovation project foresees the implementation of measures on the building envelope (facade, ceiling, window replacement), replacement of lighting, renovation of the ventilation system and the replacement/renovation of the heating system. The provision of renewable resources is envisaged with the renovation of district heating of the Municipality of Ptuj (described in the Action 1) or by the installation of heat pumps.

It is planned that the renovation will be partly carried out through a public-private partnership and partly through a public contract. The costs of the energy renovation are

estimated at 4.150161 EUR + VAT. With the project, total savings of 1.531.979 kWh per year are expected.

1.2 Target indicators

The main indicators for this action will be:

- Energy savings in kWh;
- CO2 savings.

Table 1: indicators and measurement methods.

Objective	Target indicator	Method of measurement and validation
Energy saving	<ul style="list-style-type: none">• 120.400 kWh of savings through implemented measures in Primary School Mladika	<ul style="list-style-type: none">• calculated based on annual use of electricity and energy for heating compared with the baseline values.
Energy saving	<ul style="list-style-type: none">• 1.531.979kWh of savings through implemented measures in School Centre of Ptuj	<ul style="list-style-type: none">• calculated based on annual use of electricity and energy for heating compared with the baseline values.
CO2 reduction	<ul style="list-style-type: none">• Tons of CO2 reduction per year	<ul style="list-style-type: none">• Calculated based on the annual use of electricity and energy for heating.

2 Implementation strategy

2.1 Step by step description

Primary School Mladika

As already described some of the initial analyses have already been carried out and they have proved the feasibility of this action. The phase that follows will be the preparation of all necessary documents (implementation plans, permits if needed, application for a subsidy) that are required for implementation of the project. After this work is done the

implementation of works will start and will be divided into two phases: the construction works (expansion of school premises) and the energy renovation works.

Secondary School Centre of Ptuj

After all necessary documentation is obtained the implementation works will start. The renovation works are foreseen to start in March 2020 and will be finished in September 2020. The approach of implementing this action is partly through the model of a public-private partnership and partly through a public contract.

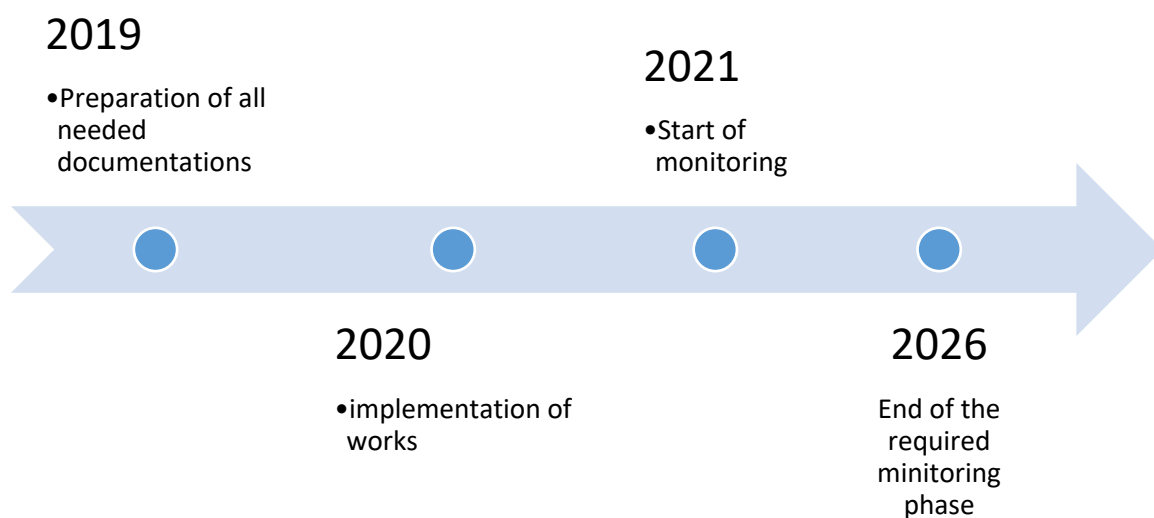
This projects are presenting two different approaches of implementation: public contract and public-private partnership. This approaches could be transferred into other school buildings across the region of Podravje.

2.2 Time schedule

Most of the preparation works and necessary feasibility studies and analyses have already been undertaken. In the years between 2016 and 2018 have already been performed energy audits of all buildings, eligibility assessments, implementation plans and the call for a private partner (in the case of the secondary school buildings).

In following months, the actions will be submitted for a call for funds from the Cohesion Fund.

In 2019 all necessary documents will be prepared and the start of the implementation works is planned for March 2020 and should be finished in the same year. The monitoring phase starts in 2021 and lasts for 5 years. As can be seen such a project could be completed, together with the monitoring phase, in 7 years.



2.3 Budget and resources needed

According to the Operational programme for implementing European cohesion policy, Slovenia has available more than 3,2 billion euros from the European structural funds and the Cohesion fund. There are various national tenders available, mainly aimed at:

- Energy renovation of public buildings;
- Renovation of old or construction of new District heating systems on RES.

Primary School Mladika

The project will be submitted to the public tender for co-financing energy renovation of buildings owned and used by municipalities in the years 2018, 2019 and 2020. The project will be implemented according to the model of a public contract. The projected financial structure of the project is as follows:

Public contract – 352.132 EUR + VAT

- Subsidy – 40 %;
- Owner (Municipality of Ptuj) - 60 %.

Secondary School Centre of Ptuj

The project will be submitted to the public invitations to the intermediary bodies for the submission of "Applicant's application for the submission of a proposal for the operation of energy renovation of buildings of the wider public sector in 2018, 2019 and 2020". The project will be partly implemented according to the model of public-private partnership and partly as a public contract. The projected financial structure of the project is as follows:

1. Public-private partnership – 3.527.637 EUR + VAT

- Subsidy – 40 %;
- Private partner - 50 %;
- Public partner (owner – Ministry of School) - 10 %.

2. Public contract – 622.524 EUR + VAT

- Subsidy – 40 %;
- Owner (Ministry of School) - 60 %.

3 Collaboration with stakeholders

Main stakeholders involved into this action are:

- Ministry of Education, Science and Sport;
- Municipality of Ptuj;
- Municipalities in the Podravje region;
- School Centre of Ptuj;
- Gymnasium Ptuj;
- Student dormitory Ptuj;
- Petrol d.d.

Roles and responsibilities of different actors for Action Plan implementation

In the table below are listed the main stakeholders involved, their role and involvement in this action.

Table 2: Stakeholder involvement

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Political decision makers	Ministry of Education, Science and Sport	Owner of secondary buildings.	Involved in the application to the tender for cohesion funds. Involved through personal meetings, e-mail and phone calls.
Political decision makers	Municipality of Ptuj	Owner.	Involved in all stages of the project. Involved through personal meetings, e-mail and phone calls.
Political decision makers	Municipalities in the Podravje region	Owner of primary school and kindergarten buildings.	Involved into the action plan. Involved through personal meetings, e-mail and phone calls.
Implementing parties	School Centre of Ptuj	User of buildings.	Involved in the preparation of all needed documentations for

			<p>the energy renewable project.</p> <p>Involved through personal meetings, e-mail and phone calls.</p>
Implementing parties	Gymnasium Ptuj	User of buildings.	<p>Involved in the preparation of all needed documentations for the energy renewable project.</p> <p>Involved through personal meetings, e-mail and phone calls.</p>
Implementing parties	Student dormitory Ptuj	User of buildings.	<p>Involved in the preparation of all needed documentations for the energy renewable project.</p> <p>Involved through personal meetings, e-mail and phone calls.</p>
Implementing parties	Petrol d.d.	Private partner in this project.	Involved through personal meetings, e-mail and phone calls.
Implementing parties	LEA Spodnje Podravje	<p>Preparation of the application documents for tender.</p> <p>Preparation of the implementation documents.</p>	<p>Involved in the preparation of all needed documentations for the energy renewable project.</p> <p>Involved through personal meetings, e-mail and phone calls.</p>

4 Monitoring Strategy

After the implementation of renovation works the monitoring phase will start. According to the national requirements there is a 5 year reporting period of achieved energy savings. Once a year, it is necessary to report on energy consumption and the costs of energy and the calculations of achieved indicators for the previous year. The basis for the calculation of the savings will be the average price of heat and electricity from 2013, 2014 and 2015. The energy manager is responsible for reporting on achieved savings to the Ministry of Infrastructure.

5 Risk management

Table3: Description of possible risks and according mitigation measures.

Risk	Probability of realizing	Mitigation measure
Describe the risk and how it might affect the reaching of the objective	High/ medium/ low	Describe mitigation measures with clear responsibilities
A private investor will lose interest in the energy renewal project.	low	Additional efforts must be undertaken to keep the investor involved and to show him the benefits of this project.
The co-financing funds will not be available anymore.	medium	Since a part of the projects is planned to be financed with cohesion funds, it will be necessary to ensure that all necessary steps are taken in a timely manner.
Works will not be finished in time.	low	Because the co-financing depend on the on-time finished works it will be important to be in regular communication with the contractors and have good supervision of the works.

6 Contact

LEA Spodnje Podravje, Prešernova ulica 18

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The focus of LEASP lies in enhancing sustainable energy development of Spodnje Podravje. The LEASP acts as a mediator among various stakeholders such as public entities, universities, institutes, companies and potential others. Strong cooperation is also established between other Slovenian LEAs, Energy Directorate at the Slovenian government, companies, research organizations and others.

Local Energy Agency Spodnje Podravje is energy manager for the Spodnje Podravje municipalities. Main activities of the agency are: developing local energy concepts, energy management, energy bookkeeping, energy auditing of the buildings and lighting systems, developing feasibility studies for investments in public sector (energy renovation of buildings, public lighting systems, implementation of renewable energy sources) and energy certification. All activities are performed within 26 municipalities on the market principle.

Dr. Janez Petek is the Director LEA of Spodnje Podravje, Director of Steng - National Centre for Cleaner Production Ltd., the leader of the research group at the Institute for Sanitary Engineering and head of the research group Eco Design. He has 24 years of experience in the industry and the public sector in the field of cleaner production, preventive environmental protection, energy efficiency and renewable energy sources.

Roman Kekec, has graduated at the University of Civil Engineering in Maribor. Since 2014 he is working in the field of energy, and carries out energy audits, elaboration of building performance, cooperation in design, preparation of the documentation for energy renovation projects. He is also experienced in EU funded projects (Interreg, Horizon 2020).



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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

RES for heating of public buildings

English version

prepared by
LEA Spodnje Podravje

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: October 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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RES for heat and electricity production

Title: RES for heating of public buildings

1 Objective

In the past years, municipalities have done a great work in terms of energy renovation of public buildings. One of the main reasons have been favourable conditions of co-financing of such measures. However, these renovations often included only measures to increase the overall energy efficiency of a building, like the insulation of the façade, ceiling, replacement of windows and others, but in many cases, the heating system was not replaced. So most of these buildings still have old in-efficient heating systems on fossil fuels. This Action will closely present a project that addresses this particular issue and provides a solution in the form of a district heating system on wood biomass. Such a project could serve as a good practice, in terms of implementation and financing and could be transferred into other local environments in the region of Podravje.

1.1 Objective scope and targets values

Public buildings of the municipality of Ormož are heated with individual heating systems on natural gas. With the desire to replace the fossil fuelled heating systems and switch to renewable energy sources in 14 public buildings, Ormož has approached the planning of a district heating system on wood biomass.

This project includes the construction of a biomass boiler room and a hot water network for connecting 14 public buildings with the possibility of additional connection of residential buildings. The buildings involved into this action and average annual energy consumptions and costs of energy for heating are listed in the table below.

Table 1: Public buildings in the Municipality of Ormož.

Building	Consumption per year (kWh)	Costs in EUR with VAT
Health Centre	324.707	17.336,55
Library	47.803	3.502,25
Cultural Centre	108.767	7.129,91
Folk school	32.479	2.286,34
Retirement home	738.000	44.093,01
Municipal building	305.233	22.166,99
Grajska pristava-Castle	203.244	11.628,30
Primary school Stanko Vraz	186.909	11.468,68

Kindergarten Ormož	125.283	8.418,39
Primary school Ormož	578.500	41.217,93
Gymnasium Ormož	498.078	29.804,88
Hospital	946.803	59.897,49
Police station Ormož	200.408	11.313,55
Castle	243.558	15.033,88
TOTAL	4.539.771	285.298

As can be seen in the table, 14 municipal buildings are consuming in average 4.539.771 kWh/year. The total costs of heating are around 285.298 EUR per year. According to this baseline average values from the years 2014 - 2017 and by considering the value of the emission factor for NG – 0,2 kg/kWh the CO₂ reduction would be 908 tons CO₂/year.

The total costs of the construction of a boiler house together with the installation of a wood chip boiler and all needed equipment and the construction of a hot water network are estimated at 3,5 million EUR. Other important factor of the project will also be the local supply of wood chips, what will have a positive impact on the local economy.

1.2 Target indicators

This action represents an implementing measure, which means that it will be measurable with clear indicators at all stages of the implementation and later in operation. In order to achieve the objectives of the action plan, it will be important to measure the effects after the project is implemented when the district heating system is in operation. The main indicator will be the annual energy production and the CO₂ reduction.

Table 1: indicators and measurement methods

Objective	Target indicator	Method of measurement and validation
Heat produced from RES	<ul style="list-style-type: none"> 4.500 MWh/year 	<ul style="list-style-type: none"> annual energy bills. Measurements from the central control system.
CO ₂ reduction	<ul style="list-style-type: none"> 900 ton CO₂/year 	<ul style="list-style-type: none"> Calculated based on the energy production.

2 Implementation strategy

2.1 Step by step description

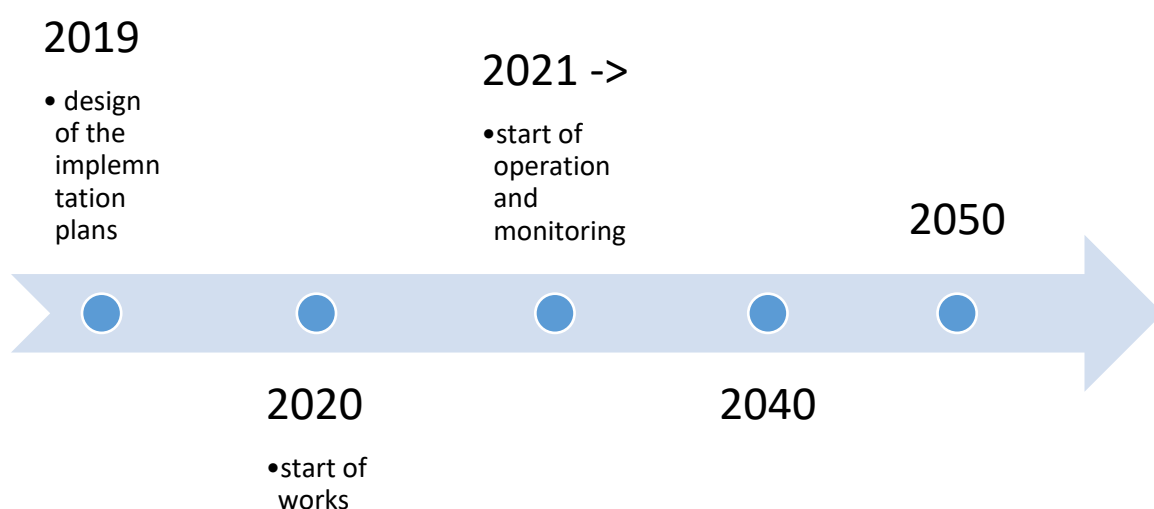
LEA Spodnje Podravje has already carried out a preliminary analysis that has shown that the construction of a district heating on wood biomass in Ormož is feasible. At this stage an application for Cohesion funds is being prepared and the next step will be the design of implementation plans and obtaining all necessary permits for construction.

The district heating construction consists of 2 steps; the construction of a boiler house and about 3,3 km of hot water network.

In terms of implementation and financing, this project could be transferred into other municipalities of the Podravje region.

2.2 Time schedule

- 2019 – Implementation plans are being prepared;
- 2020 – Start of the construction;
- 2021 – Start of the operation. The indicators will be measured and analysed in order to monitor the achievements.



2.3 Budget and resources needed

According to the Operational programme for implementing European cohesion policy, Slovenia has available more than 3,2 billion euros from the European structural funds and the Cohesion fund. There are various national tenders available, mainly aimed at:

- Energy renovation of public buildings;
- Renovation of old or construction of new District heating systems on RES.

The costs of the renovation of the district heating system with the transition to RES are estimated at 3.5 million EUR and the project will be applied for a public tender for co-financing of district heating on renewable energy sources 2017 - 2020. The project will be implemented through a public-private partnership and the funds will be ensured as follows:

- Cohesion funds - 40 %;
- Private investor 60 %.

3 Collaboration with stakeholders

Main stakeholders involved into this action are:

- Municipality of Ormož
- LEA Spodnje Podravje
- Municipalities of the Podravje region

Roles and responsibilities of different actors for Action Plan implementation

In the table below are listed the main stakeholders involved, their role and involvement in this action.

Table 2: Stakeholder involvement

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Political decision-makers	Municipality of Ormož	The local decision maker	Involved into the project preparation. In regular communication (phone/email/meetings).
Target groups	Users of the public buildings	Heat buyers	/
Etc.	LEA Spodnje Podravje	Project planner	Involved into the project preparation. In regular communication (phone/email/meetings).
Implementing parties/Political decision makers	Municipalities of the Podravje region	Local decision makers and potential investors and implementing parties of district heating systems.	Involved into potential district heating projects (phone/email/meetings).

4 Monitoring Strategy

After the project will be implemented the heat production and the new parameters will be monitored constantly. When a project is granted by national or EU funds, usually a monitoring period in order to report on achieved results is required. This is usually at least a 5 years' period and the reporting is performed once per year. The operation of district heating system is supported by a central control system that among others also measures and records the energy production so the data on achieved results will be always available.

5 Risk management

Table3: Description of possible risks and according mitigation measures.

Risk	Probability of realizing	Mitigation measure
Describe the risk and how it might affect the reaching of the objective	High/ medium/ low	Describe mitigation measures with clear responsibilities
New elected local government will stop or hinder the project implementation.	medium	Additional communication efforts to keep them involved and to show them the importance of the project.
The co-financing funds will not be available anymore.	medium	It will be necessary to ensure that all necessary steps are taken in a timely manner.
The private investor will lose interest.	low	Additional communication efforts to keep them involved and to show them the benefits of the project.

6 Contact

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Henrik Glatz, Researcher and Energy designer. Henrik is a designer of mechanical installations and hardware for demanding, less demanding and simple structures, He has experiences in the development of project ideas in the field of energy efficiency, renewables integration and other topics in the field of energy, he performs energy audits, energy renovation projects and energy certificates. He is a member of the Board of Directors of the parent section of Mechanical Engineers at the Chamber of engineers of Slovenia.



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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

The implementation of RES in existing district heating systems

English version

prepared by
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RES for heat and electricity production

Title: The implementation of RES in existing district heating systems

1 Objective

This Action plan will closely present the renovation project of the district heating system of Ptuj, with the implementation of RES. With this project, Municipality of Ptuj aims to switch from fossil fuels to renewable sources. A reduction of 2.016 tons of CO₂ emissions per year is foreseen, which is a 60 % reduction comparing to the current situation. The project implementation and the financing will serve as a good practice for other existing district systems in the Podravje region and could be easily transferred.

1.1 Objective scope and targets values

Municipality of Ptuj aims to renovate and upgrade the local district heating system with the transition to renewable sources. Because of the decline in the heat consumption due to the renovation of buildings connected to the district heating system, the expansion of the network has been shown to be economically justified. With the reconstruction of the district heating on natural gas an additional wood chip boiler will be installed in order to meet the requirements of the Energy Act of Slovenia, which imposes at least 50 % of heat generated from renewable sources or waste heat, or 75 % of heat produced from CHP or 75 % as a combination of all above.

The district heating system today:

55 % of heat is provided from 3 natural gas boilers (3 x 7 MW, 1985) and 45 % from the combined heat and power plant – CHP (2,3 MW)

The district heating system includes 44 heat substations:

- 27 apartment blocks (103.729 m²);
- 2 single house buildings (300 m²);
- 15 non-residential buildings (54.086 m²).

The total installed capacity of the heat substations is 22.576 kW. The annual average of the delivery of heat energy is 10.932 MWh.

The project is divided into 2 phases:

1. Renovation of the boiler house with the transition to RES. Upgrading and reconstructing the existing district heating system which is using only natural gas, with a wood biomass boiler. The planned wood chip boiler with the power of 2,3 MW will be able to produce 9,2 GWh of heat (together with heat storage tanks). The peak needs will be covered by one of the existing natural gas boilers.
2. Upgrade of the heating network. Because of the decline in the heat consumption due to the energy renovations of buildings connected to the district heating system, the expansion of the network was shown to be economically justified.

1.2 Target indicators

This action represents an implementing measure, which means that it will be measurable with clear indicators at all stages of the implementation and later in operation. In order to achieve the objectives of the action plan, it will be important to measure the effects after the project is implemented when the district heating system is in operation. The main indicator will be the annual energy production and the CO2 reduction.

Table 1: indicators and measurement methods.

Objective	Target indicator	Method of measurement and validation
Heat produced from RES	<ul style="list-style-type: none">• 9.200 MWh/year	<ul style="list-style-type: none">• annual energy bills.• Measurements from the central control system.
CO2 reduction	<ul style="list-style-type: none">• 2.000 tons CO2/year	<ul style="list-style-type: none">• Calculated based on the energy production.

2 Implementation strategy

2.1 Step by step description

As already described above the implementation of the Action will be divided into 2 phases:

1. Renovation of the boiler house. In this phase all necessary construction and installation works will be carried out in order to renovate the boiler house and to move to the use of renewable sources. The construction works are covering the construction of wood chip

storage facility and all necessary works in the boiler room that are needed for the new boiler. The installation works are covering the installation of a wood chip boiler, the wood chip transport system, the storage tanks, cleaning system for exhaust gases and other necessary works.

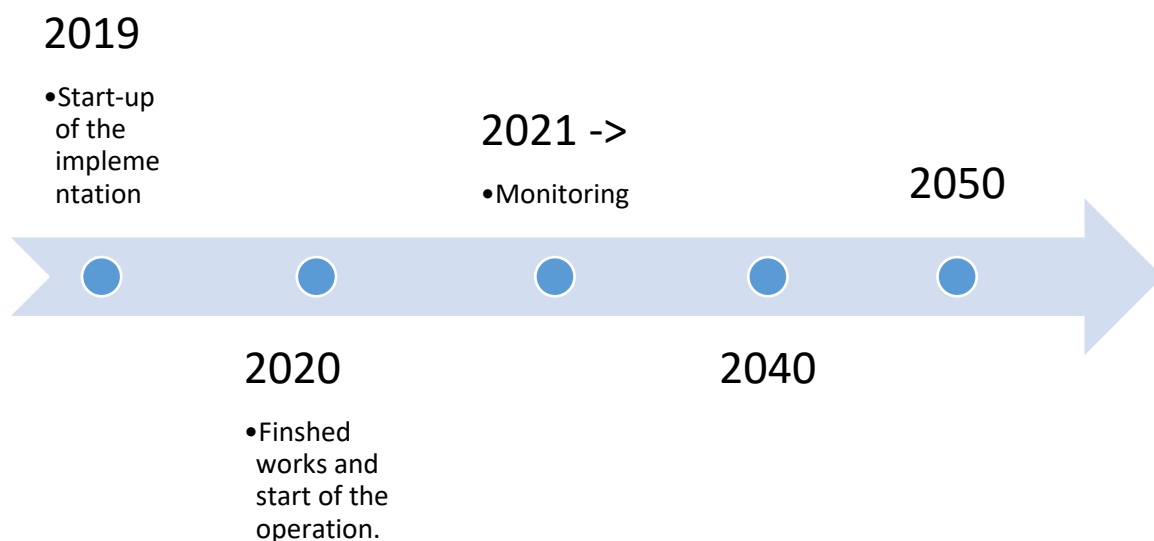
2. Upgrade of the heating network. At this stage, all parts of the expansion of the heating network will be carried out. With this project an extension of the network by approximately 3.000 meters is planned. The total heating area will increase from 157.815 m² to 218.154 m².

The project is designed so that this 2 phases can be implemented completely independently. After the 1st phase is finished it can be put in operation, but in order to achieve the full success of the project and its indicators it is recommended that the 2nd phase is carried out in parallel.

The project implementation and the financing could serve as a good practice for other existing district systems in the Podravje region and could be easily transferred.

2.2 Time schedule

- 2019 – all necessary permissions are obtained and the start of the construction works can begin. Project is designed so that the 1. Phase can be finished and already put in operation independent from the 2. Phase.
- 2020 – the system will be put into operation.
- From 2021 on – the indicators will be measured and analyzed in order to monitor the achievements.



2.3 Budget and resources needed

According to the Operational programme for implementing European cohesion policy, Slovenia has available more than 3,2 billion euros from the European structural funds and the Cohesion fund. There are various national tenders available, mainly aimed at:

- Energy renovation of public buildings.
- Renovation of old or construction of new District heating systems on RES.

The costs of the renovation of the district heating system with the transition to RES are estimated at 2,9 million EUR and the project will be applied for a public tender for co-financing of district heating on renewable energy sources 2017 - 2020.

3 Collaboration with stakeholders

Main stakeholders involved into this action are:

- Municipality of Ptuj
- Javne Službe Ptuj
- LEA Spodnje Podravje
- Municipalities of the Podravje region

Roles and responsibilities of different actors for Action Plan implementation

In the table below are listed the main stakeholders involved, their role and involvement in this action.

Table 2: Stakeholder involvement

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	Javne Službe Ptuj	Local heat supplier, DH system operator and investor in the planned project.	Involved into the project preparation. In regular communication (phone/email/meetings).
Political decision-makers	Municipality of Ptuj	Owner of the DH system and the local decision maker.	Involved into the project preparation. In regular communication (phone/email/meetings).
Target groups	Public bodies (School centre of Ptuj, General	Heat buyers.	/

	hospital Ptuj, etc.) Owners of apartments and apartment blocks, Company for housing services Ptuj		
Etc.	LEA Spodnje Podravje	Project planner.	Involved into the project preparation. In regular communication (phone/email/meetings) with Municipality of Ptuj and Javne službe Ptuj.
Implementing parties/Political decision makers	Municipalities of the Podravje region	Local decision makers, owners and potential investors and implementing parties of district heating systems.	Involved into potential district heating projects (phone/email/meetings).

4 Monitoring Strategy

After the project will be implemented the heat production and the new parameters will be monitored constantly. When a project is granted by national or EU funds, usually a monitoring period in order to report on achieved results is required. This is usually at least a 5 years' period and the reporting is performed once per year. The operation of district heating system is supported by a central control system that among others also measures and records the energy production so the data on achieved results will be always available.

5 Risk management

Table3: Description of possible risks and according mitigation measures.

Risk	Probability of realizing	Mitigation measure
Describe the risk and how it might affect the reaching of the objective	High/ medium/ low	Describe mitigation measures with clear responsibilities
New elected local government will stop or hinder the project implementation.	medium	Additional communication efforts to keep them involved and to show them the importance of the project.
The co-financing funds will not be available anymore.	medium	It will be necessary to ensure that all necessary steps are taken in a timely manner.

6 Contact

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CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

ACTION PLAN

Solar roofs in Podravje

English version

prepared by
LEA Spodnje Podravje

PANEL 2050 – Partnership for New Energy Leadership 2050
Deliverable 3.7

Date: October 2018



CENTRAL EASTERN EUROPEAN
SUSTAINABLE ENERGY NETWORK

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RES for heat and electricity production

Title: Solar roofs in Podravje

1 Objective

From the year 2020 on, every new constructed building or comprehensive renovated building will have to be near zero energy building. Reaching the target will require not only good insulation of the building and the use of renewable sources for heating, but it will demand also on spot electricity production. This will be a great opportunity for the regional economy. The NET-METRING system has been developed and the conditions for the production of electricity for the needs of self-supply are in place. In this sense conditions are provided for the exploitation of the potential of individual buildings and their roof surfaces for the installation of solar PV.

1.1 Objective scope and targets values

At present, the coverage with solar power plants of less than 10 kWp is very low, which is only 0.8 W/per capita. With a more intensive introduction of solar power plants the calculated value of possible annual savings is expected to be just under 60 % of the Slovenian nuclear power plant electricity production (approximately 2.9 TWh).

In Podravje, about 500 permissions for construction of residential buildings is being issued each year (in 2015 - 535 permissions, data from the Statistical office of Slovenia), which presents a great potential for solar PV installations.

1.2 Target indicators

This action represents an implementing measure, which means that it will be measurable with clear indicators at all stages of the implementation and later in operation. In order to achieve the objectives of the action plan, it will be important to measure the effects after the project is implemented when the installed photovoltaics are in operation. The main indicator will be the annual energy production.

Table 1: indicators and measurement methods.

Objective	Target indicator	Method of measurement and validation
Electricity produced from RES	<ul style="list-style-type: none">MWh/year	<ul style="list-style-type: none">annual energy data from utility

		company.
CO2 reduction	<ul style="list-style-type: none"> • CO2/year 	<ul style="list-style-type: none"> • Calculated based on the energy production.

2 Implementation strategy

2.1 Step by step description

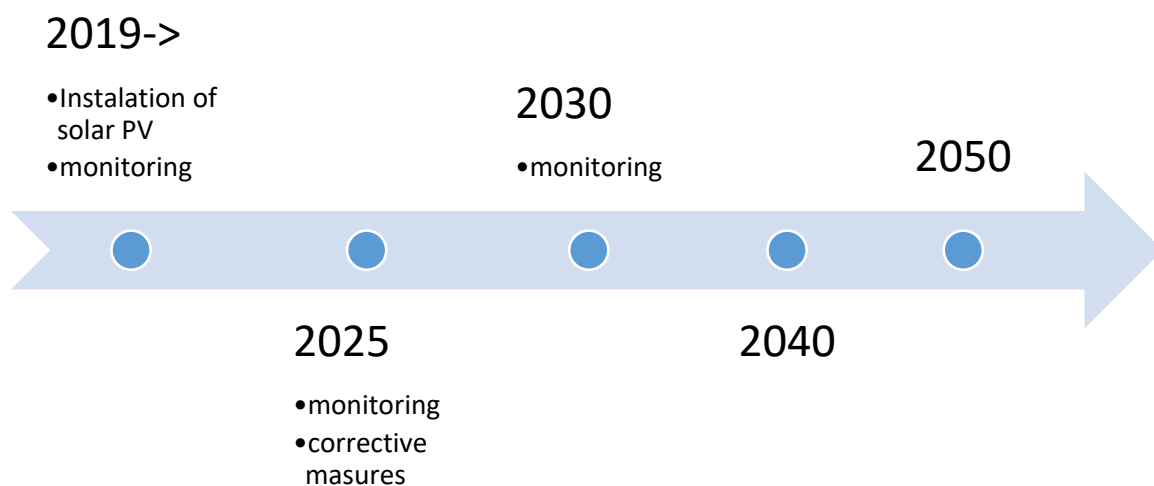
The action plan for near zero energy buildings requires the construction of new residential buildings in the near zero energy standard from 2020 on and the construction of public buildings since the end of 2018. Comprehensive energy renovations must follow the same requirements.

Some of our internal analyses have shown that reaching this target will be hard or in some cases impossible if only energy efficiency measures and the use of RES for heating will be approached. In most cases individual electricity production will be needed to bring the energy balance to the near zero point. Since Slovenia has set up the ground for NET MEETERING, the individual electricity production for self-supply purposes has already become a common situation in Slovenia. It is to expect that the future requirements will have an additional positive effect on individual electricity production.

The implementation of solar PV has become an easy to do project, since the market offers many producers and sellers of Photovoltaics that offer a complete service, from the preparation of all necessary documents, the purchase and the installation of modules, the start of the operation of the power plant and the maintenance. On the other hand, ESCO companies offer the installation of a solar power plant with favourable conditions of energy contracting.

2.2 Time schedule

- 2019 – All new constructed or comprehensive renovated public buildings will have to be near zero energy. At this point, the use of solar PV will be promoted through public buildings.
- End of 2020 – the same requirement will be there for residential buildings.
- 2025 – monitoring of the results and the number of PV systems installed. Corrective measures may be necessary at this point.
- 2030, 2040, 2050 – checkpoints for measuring the result of the action.



2.3 Budget and resources needed

ECO Fund offers a subsidy for the purchase and the installation of Photovoltaics. Currently 180 EUR/1kWp is possible to obtain. By considering the subsidy, the price of 1kWp of Photovoltaics is around 1200 EUR, together with all needed devices, mounting material, costs of installation and 1 year of free maintenance.

Slovenian ESCO companies are offering the installation of solar PV at favourable conditions of financing. After a consumer decides to install solar PV on his roof, the company checks the "potential" of the roof in terms of the roof surface, slope and orientation, the average electricity consumptions and costs of electricity. After the initial analyses a calculation of the size of the installation size is made and the financial conditions are agreed and the contract is signed. In practice, usually a contract over 7 years for financing is signed. In this period the consumer pays the approximately the amount as it was the bill for electricity before the PV installation and the ESCO is covering the investment with this savings. After the agreed period the solar PV installation becomes the property of the user/consumer.

3 Collaboration with stakeholders

Main stakeholders involved into this action are:

- LEA Spodnje Podravje;
- ECO Fund;
- Municipalities in the Podravje region;
- ESCO companies.

Roles and responsibilities of different actors for Action Plan implementation

In the table below are listed the main stakeholders involved, their role and involvement in this action.

Table 2: Stakeholder involvement

Stakeholder groups		Role and responsibility	Involvement and communication strategy
Implementing parties	LEA Spodnje Podravje	Involved in the preparation of all needed steps of the action.	Directly involved into the action (phone/email/meetings).
Political decision-makers	Municipalities of Podravje	Owner of public buildings. Local decision makers.	Directly involved into the action (phone/email/meetings).
	ECO Fund	Co-financers.	(phone/email).
	ESCO companies	Possible financers.	(phone/email/meetings).

4 Monitoring Strategy

After the project will be implemented the electricity production and the new parameters will be measured constantly by the energy distribution companies. Annual reports will show the impact of this action.

5 Risk management

Table3: Description of possible risks and according mitigation measures.

Risk	Probability of realizing	Mitigation measure
Describe the risk and how it might affect the reaching of the objective	High/ medium/ low	Describe mitigation measures with clear responsibilities
Subsidies will not be available anymore	low	<p>The installation of the solar PV for self-supply is still in the promotion phase and it is to expect that the co-financing will be available for the next years.</p> <p>If there will be any changes additional efforts for seeking and promoting other financing possibilities.</p>

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