CEESEN-BENDER

Building intErventions in vulNerable Districts against Energy poveRty

Deliverable 5.1

Building renovation roadmaps in 5 pilot areas

Pilot area roadmap for Alba Iulia municipality (Romania)

WP5 - Creating roadmaps and support services for building energy renovations for vulnerable districts

Dissemination Level: Public

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Contents

1.Introduction

The current state of multi-apartment buildings (MAB) in Romania underscores the need for energy renovation, especially in the context of climate adaptation objectives and rising energy costs. A significant portion of the country's building stock, particularly those constructed between 1950 and 1990, lacks modern energy efficiency standards, leading to energy losses, high utility expenses, and low comfort levels for occupants.

In Romania, the residential sector accounts for approximately 81% of the total energy consumption within the building sector. Notably, about 80% of these buildings require renovation to mitigate heat losses and reduce energy consumption[1]. The energy savings potential in the residential buildings sector is estimated to be as high as 40-50% of current energy consumption[2].

Recognizing these challenges, Alba Iulia Municipality prioritizes the renovation of multi-apartment buildings enhancing energy efficiency and promoting social equity by improving living conditions and lowering energy expenses for vulnerable populations.

The reduction of energy costs and consumption, along with the improvement of energy performance in buildings are among the central goals of the public administration of Alba Iulia Municipality. Energy efficiency is understood as one of the main drivers for sustainable economic growth, with wider implications for urban transformation. In the context of public, residential, and private buildings, energy efficiency refers not only to reducing energy demand and promoting rational energy use, but also to ensuring adequate thermal comfort, indoor air quality, and compliant lighting in accordance with current technical regulations[3].

Alba Iulia, as part of its Sustainable Energy Action Plan (SEAP), the city set out to retrofit 2,147 apartments across 30 MABs[4]. These renovations encompass enhancements in insulation, upgrades to heating systems, and the integration of renewable energy solutions.

Accelerating the renovation of MABs not only contributes to social well-being, environmental sustainability but also stimulates local economic development. By outlining the necessary steps for a scalable renovation process, this roadmap seeks to guide Alba Iulia Municipality and building owners in making

[1]Energy efficiency in the Romanian residential building stock: A literature review Adina Ana Muresan, Shady Attia
[2] Energy efficiency in the Romanian residential sector – Romania Energy Center
[3] SIDU Alba Iulia
[4] buildingefficiencyaccelerator.org/bea-cities/alba_iulia

informed decisions that foster a healthier and more sustainable built environment.

2.Vision of the roadmap

In line with Alba Iulia`s commitment this roadmap envisions a trajectory where every MAB occupant lives in a modern, comfortable, and energy-efficient home, contributing to a smart, healthy, and sustainable urban community. Through the renovation of its aging MABs, the city seeks to reduce energy consumption, lower household utility bills costs, enhance energy performance, and enhance indoor living conditions thus improving the quality of life for its residents—especially for the most vulnerable. This roadmap serves as an instrument to guide these efforts and goals in alignment with local development objectives, climate commitments, principles of social inclusion and environmental responsibility.

3.Objectives of the roadmap

The roadmap aims to:

- Provide an overview of the current energy status and future direction of the energy rehabilitation of multi-apartment buildings in Alba Iulia.
- Increase understanding among authorities and other stakeholders of the most appropriate energy rehabilitation approach of MABs to:
    - Improve Energy Efficiency of multi-apartment buildings - retrofit at least 80% of Alba Iulia's outdated multi-apartment buildings by 2030 to meet modern energy efficiency standards, reducing heating energy consumption by 40–50%.
    - Reduce Energy Poverty and Improve Living Conditions - prioritize the renovation of buildings housing vulnerable and low-income residents to ensure equitable access to comfortable, healthy, and affordable housing.
    - Maximize the use of available European and Romanian funding to finance renovation efforts.
- Articulate actions to support the development of MAB energy retrofit works in the city.
- Be a guide to accelerate the energy rehabilitation of MABs in municipalities

4.The status of legislative and regulatory frameworks for building renovation

4.1 EU directives (other policy instruments) that are set for building renovation

The renovation of multi-apartment buildings in Romania, including initiatives such as those in Alba Iulia, is driven by EU policy instruments on energy performance, decarbonization, and sustainability. Among these, several directives have significantly influenced Romania's national legislation and regulatory frameworks.

1. Energy Performance of Buildings Directive (EPBD – Directive (EU) 2010/31/EU, revised in 2018 and proposed revision in 2021)

Romania has transposed the EPBD through national laws such as Law No. 372/2005 on the energy performance of buildings (updated to align with the revised EPBD) and has developed a National Long-Term Renovation Strategy, outlining steps to renovate residential and public buildings, especially pre-1989 multi-apartment blocks.

2. Energy Efficiency Directive (EED – Directive 2012/27/EU, revised by Directive (EU) 2018/2002 and the 2023 recast)

Romania adopted Government Decision No. 122/2015 and Law No. 121/2014 on energy efficiency, setting frameworks for public building renovations and encouraging energy service companies (ESCOs) in housing renovations.

3. Renovation Wave Strategy (2020)

Romania's National Recovery and Resilience Plan (NRRP) and other funding instruments now reflect the Strategy`s aim to double the annual energy renovation rate by 2030, with a strong emphasis on addressing energy poverty and stimulating green job creation.

4. European Climate Law (Regulation (EU) 2021/1119)

Romania must align its renovation efforts with the target of climate neutrality by 2050 and at least 55% greenhouse gas reductions by 2030, increasing building renovations, especially in high-energy-use residential sectors.

These directives provide the legal and financial frameworks that enables Romanian municipalities like Alba Iulia to plan and implement multi-apartment building renovations. They also influence national funding mechanisms,

technical standards, and policy planning in support of long-term urban sustainability goals.

4.2 National laws/regulation that set the ground (just mention) linking their influence on local level

1. Law No. 372/2005 on the energy performance of buildings
   - Establishes minimum energy performance standards for buildings
   - Mandates nearly zero-energy building (NZEB) targets for new constructions
   - Requires energy performance certificates for buildings
2. Law No. 121/2014 on energy efficiency
   - Sets national energy efficiency targets
   - Requires annual renovation of 3% of the total floor area of government-owned buildings
   - Promotes energy services and audits
3. Government Decision No. 122/2015:
   - Approves the National Energy Efficiency Action Plan (PNAEE), outlining measures to achieve energy efficiency targets.
4. The National Long-Term Renovation Strategy (LTRS)
   - Aims to double the annual energy renovation rate by 2030
   - Focuses on tackling energy poverty and creating green jobs

4.3 Accreditation / certification of construction professionals

Romania has a system for the accreditation and certification of construction professionals that are essential for maintaining the quality and safety of construction projects throughout Romania - Regulatory Accreditation for Construction Professionals

In Romania, certain construction roles require mandatory authorization to ensure compliance with national building standards:

- Site Managers: The State Inspectorate for Construction oversees the authorization of site managers, including their periodic re-certification. This process ensures that site managers are qualified to supervise construction projects in accordance with Romanian laws and regulations[5].
- Technical Experts and Project Verifiers: Professionals responsible for verifying project designs and technical documentation must obtain

[5] https://isc.gov.ro/cod_deontologic_diriginti_en.html

certifications that validate their expertise in ensuring construction quality and safety[6].

There are also other voluntary programs aimed at promoting sustainable construction practices offered by academic organisations or other programs launched by professionals.

4.4 Labelling of construction materials (related to building renovation and energy efficiency)

Romania has established a legal framework for the labelling and certification of construction materials, concerning also building renovation and energy efficiency by aligning with EU directives. This framework aims to ensure that materials contribute to energy efficiency goals and meet performance standards.

Thus, while there is no specific national labelling system exclusively for construction materials, Romania adheres to EU-wide labelling schemes:

- CE Marking: Construction products must bear the CE mark, indicating conformity with EU safety, health, and environmental protection standards.
- Energy Labels for Products: Energy-related products, such as windows, insulation materials, and HVAC systems, must display energy labels indicating their efficiency class, ranging from A (most efficient) to G (least efficient).

Green Building Certifications: Voluntary certifications like the Green Building Professional (GBP) program, initiated by the Romania Green Building Council, promote sustainable construction practices and the use of energy-efficient materials.

5.Energy poverty in Alba Iulia pilot area

5.1 National context regarding energy poverty and specifically MABs

Energy poverty in Romania remains a structurally under-addressed issue due to the absence of a clear legal definition and standardized indicators or methodological regulations. This regulatory gap limits the ability of local authorities and financing institutions to identify and prioritize vulnerable households effectively in energy renovation programs. As a result, renovation efforts for Multi-Apartment Buildings (MABs) have largely failed to incorporate targeted support measures for energy-poor or vulnerable consumers, thereby missing a critical opportunity to alleviate hardship and promote equity through energy efficiency upgrades.[7]

[6] https://isc.gov.ro/cod_deontologic_diriginti_en.html
[7] CEESEN BENDER National Policy brief (T.3.2)

Challenges specific to heating of MABs:

Collective Heating Systems: almost all MABs from Alba Iulia Pilot area rely on individual gas heating (with only a small number of dwellings using electricity for heating). This is usually causing increased localized air pollution in the Pilot Area neighborhoods during the cold winter months and an increased risk of explosion inside all MABs due to potential methane accumulations, a higher maintenance and system verification cost compared to centralized heating, with natural gas piping outside and inside the buildings that require many methane sensors and specialized periodic revisions and the dependence on electricity for each individual heating systems (running water pump, exhaust fan, system start-up sequence).

Poor Thermal Performance: Most MABs that were built before 1990 had minimal insulation, resulting in significant heat loss (average energy class C or D).

Statistics:

- Over 15.2% of Romanian households (higher than the EU average of 9.3% in 2022) struggle to afford adequate heating.

5.2 Energy poverty situation at local level

Energy poverty in Alba Iulia, as in the rest of Romania, is characterized by households' inability to meet basic energy needs due to low incomes and other key factors:

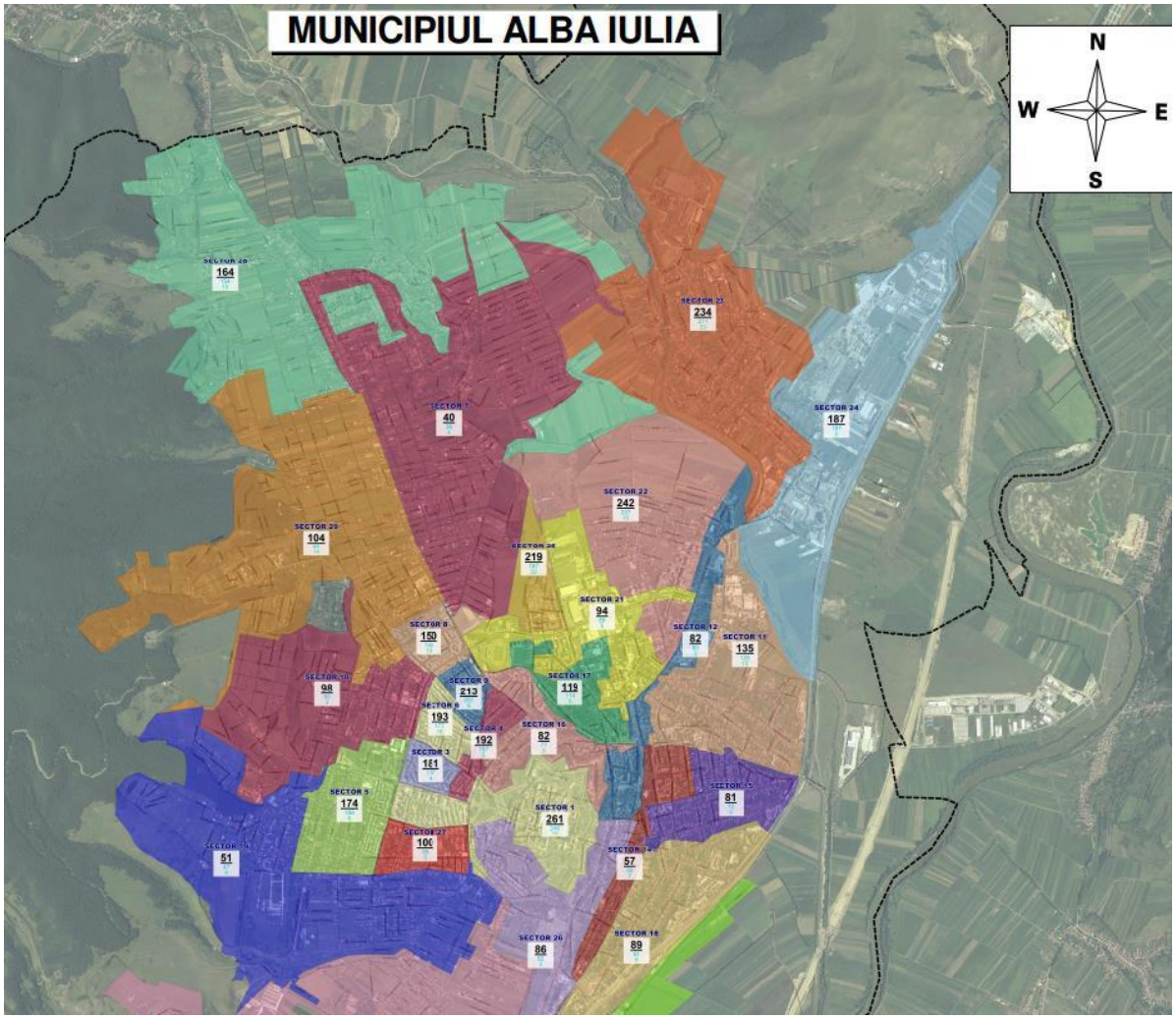
- Low energy efficiency: most residential buildings (especially older ones) have poor insulation, high energy consumption, and outdated heating systems.
- High energy costs: rising electricity and gas prices put higher burden on vulnerable households such as low-income families, elderly residents, and single-parent households who are affected in a disproportionate manner.

In the reference year 2021, the Romanian Government distributed energy assistance cards to households with incomes below 400 euros per person. In Alba Iulia Municipality, with a total population of 64,227 (according to the 2021 census), 4,538 people (or 7.06%) received these energy aid cards. However, based on national estimates, approximately 14% of the population is affected by energy poverty, suggesting that many eligible individuals may not have received support[8].
The following vulnerable groups were eligible for this measure:

[8] Study on the issue of energy poverty and energy efficiency in the municipality of Alba Iulia, SERVELECT

- Pensioners aged 60 or older with monthly incomes of € 400 or less
- Invalid pensioners and people with severe, moderate, or accentuated disabilities
- Families receiving child support allowances, under Law no. 277/2010
- Individuals or families receiving social assistance under Law no. 416/2001, which governs the guaranteed minimum income.

A map accompanying the data illustrates the distribution of energy support cards by postal code zones across the city, identifying areas with higher concentrations of vulnerable populations.



Zonal distribution of government aid for paying energy bills Source DOITSMARTER Project, Innovation Norway Alba Iulia

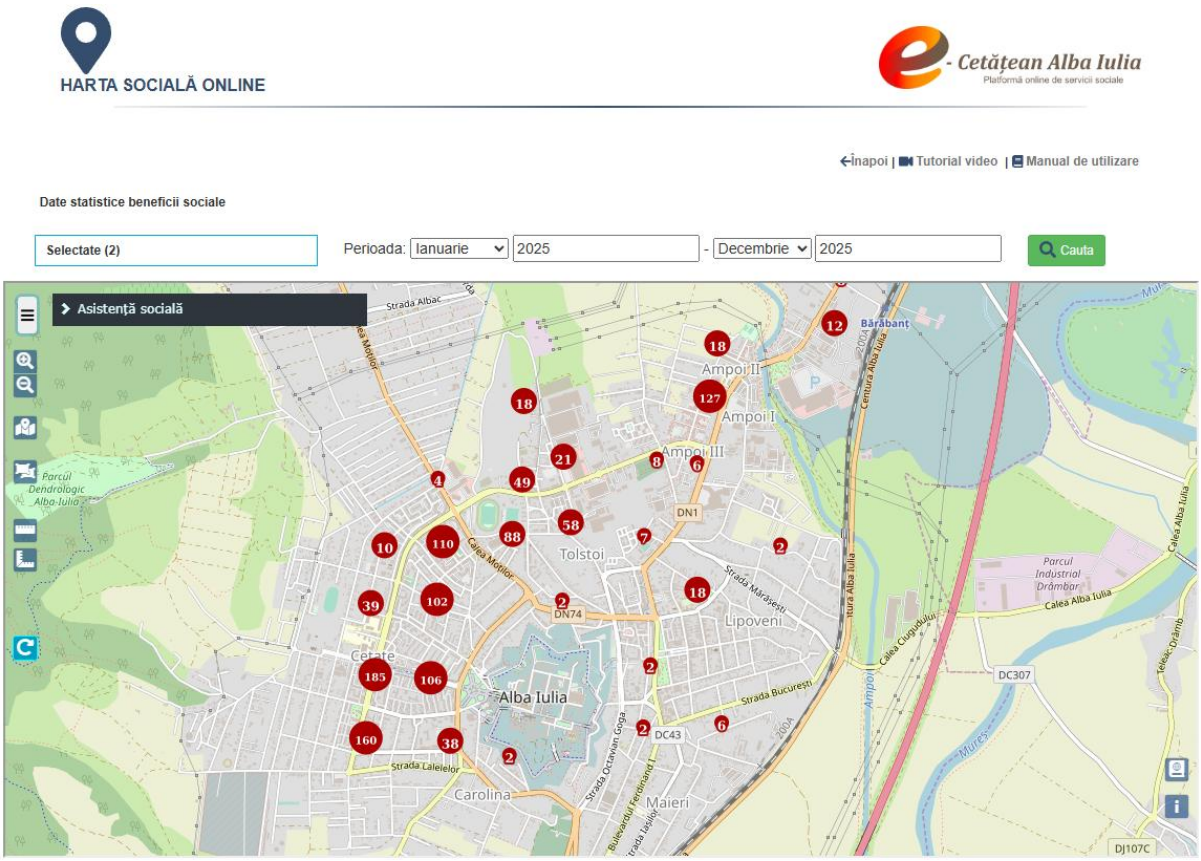
Energy poverty in Alba Iulia is thus driven by inefficient buildings, high costs, and socioeconomic disparities. MABs are a critical focus due to their high energy consumption and collective ownership challenges. While progress has been made through EU-funded renovations, sustained efforts—including

deeper retrofits, fair billing systems, and targeted subsidies—are needed to alleviate energy poverty.

There is a significant data gap on the involvement of energy-poor households in renovation programmes. Without clear data, it is difficult to assess the impact and benefits for these households. The absence of standardized criteria for defining energy-poor households suggests a lack of targeted policy measures. Clear definitions are essential for effectively identifying and supporting the most energy vulnerable citizens. The lack of specific grants or financial allocations for energy-poor households indicates potential inequities in the design and implementation of programmes. Ensuring targeted support for these households is crucial for maximising the social impact of energy renovation programmes.

Alba Iulia municipality developed an interactive map of the local distribution of energy subsidies (aids) granted from the local municipal budget for vulnerable energy consumers (citizens) was created to better analyze the causes and possible solutions to mitigate a worrying phenomenon, that of energy poverty, were identified, a phenomenon that has become widespread in Romania in recent years, with the increase in energy prices. Then, the Municipality of Alba Iulia became an affiliated participant in the Energy Poverty Advice Centre established by the European Commission, proposing to develop a local advice centre for citizens on energy poverty issues.[9]

[9] CEESEN BENDER National Policy brief (T.3.2)



Map of social municipal energy aids for electricity and natural gas in 2025 (online.directiadeasistentasocialaalbaiulia.ro)

Number of applications for social aid for energy and heating in Alba Iulia Municipality submitted by vulnerable energy consumers					
Subsidy type	**2021**	**2022**	**2023**	**2024**	**2025**
Electricity	9	15	10	11	13
Natural gas (heating)	654	1969	1760	1057	1251
Total applications submitted	663	1984	1770	1068	1264
Data source: online.directiadeasistentasocialaalbaiulia.ro					

In 2025 for example, social aid from the municipal budget for electricity and heating (natural gas) was granted to citizens whose income were below €270 net/family member, month in the case of families, respectively below €400 net/month in the case of single people. Subsidies were able to reach, depending on the income level, a maximum of €100/month for electricity per household, respectively a maximum of €50/month per household in the case of natural gas.

In addition to local social assistance, the government provides subsidies for electricity and natural gas. For example, in 2025, people classified as social cases due to low income received a monthly aid of approximately €10 per

month to cover their costs with the electricity bill. Now (January 2026), a Government Emergency Ordinance (OUG No. 27/2022) is in force until the end of March 2026 to subsidize the natural gas tariff billed to all household consumers. It is proposed that from 2026 the subsidy formula for natural gas to be modified, with the subsidy being applied in the form of a monthly social aid during the cold season (October-March) of approximately €20/month only to eligible beneficiaries (social cases).

6.MAB renovation in Alba Iulia pilot area

6.1 National/regional/local programmes

The following table provides information on the main financing grants that provide funding for MABs renovation. Data provided is not specific to MAB renovation projects, except for the last table row. An estimate is provided for MAB renovation projects where data was available:

Public Program / Plan	Total Value (available financial resources)	Maximum and minimum grant amounts that can be awarded to an individual project	Number of applied projects that were approved	Number of projects applied to the Call
National Recovery and Resilience Plan (2022-2026)	€ 23,8 billion	€ 100K - € 5M	13.000 contracts signed ~**2.000** MAB renovation projects	More than 20.000 ~**2.800** MAB renovation projects
"Centru" Regional Operational Program (2014-2020)	€ 766,77 million	mSMEs: €25K - €200K SMEs: €200K - €1M Public infr: up to €5M	1.191 in Centru Development Region ~**70** MAB renovation projects	2.333 in Centru Development Region ~**120** MAB renovation projects
Centru Region Programme (2021-2027)	€ 1,38 billion	mSMEs: €15K - €200K SMEs: €250K - €1,5M Public infr: up to €5M	186 in Centru Development Region	1.368 projects
Multi-annual National Program for Improving the Energy Performance of Apartment Blocks (2019-2021)	€ 60 million	no fixed cap	200	500
Data source: CEESEN BENDER National Policy brief (T.3.2), google.ro, regiocentru.ro				

6.2 MAB context

1. Homeowner Structure

In Romania, multi-apartment buildings (blocks) are typically owned through a **condominium association (Asociație de Proprietari - AS)**. Each apartment owner holds a share of the common spaces (stairwells, roofs, basements, etc.). Decision-making for renovations requires a **majority vote** (usually 50% +1 of owners), which can be challenging due to:

- **Fragmented ownership** – Many owners are elderly, low-income, or absentee landlords.
- **Lack of financial resources** – Owners often cannot afford major renovations.
- **Disputes over priorities** – Some prioritize facade repairs, while others focus on heating or plumbing.

2. Role and Involvement of Building Managers (Administrators)

- **Administrators** (either private companies or elected representatives) manage maintenance, utilities, and minor repairs.
- **Responsibilities include:**
  - Collecting maintenance fees.
  - Organizing general assemblies for decision-making.
  - Supervising small repairs (e.g., elevator maintenance, lighting).
- **Challenges:**
  - Limited authority to enforce major renovations.
  - Some administrators lack expertise in energy efficiency.
  - Corruption risks in contracting repairs.

3. Vulnerability of Residents at Risk of Energy Poverty

- **High energy costs vs. low incomes:** Many Romanians spend **20-40% of their income** on heating and electricity.
- **Inefficient heating systems:** Many multi-apartment buildings rely on individual gas boilers or centralized district heating, with poor insulation leading to high heat losses.
- **Aging population:** Pensioners and low-income families struggle to pay bills, leading to **self-disconnection** (turning off heating to save money).
- **Renters & social housing tenants** have little influence on renovation decisions.

4. Technical Characteristics of Romanian Apartment Buildings

- **Construction Period:**

  - **Communist-era (1960s–1980s):** Prefabricated reinforced concrete panels ("blocuri"), poor insulation, single-pane windows.
  - **Pre-1960s:** Brick or stone buildings, often with no insulation.
  - **Post-2000s:** Newer buildings have better insulation but represent a small fraction of the stock.
- **Common Issues:**
  - **No thermal insulation** (walls, roofs, basements).
  - **Inefficient windows** (single-glazed, metal frames).
  - **Old heating systems** (leaky pipes, lack of thermostatic valves).
  - **Ventilation and indoor air quality problems** (mold, dampness due to poor airflow).

5. Technical Requirements for Renovation

To improve energy efficiency, Romanian buildings often need:

- **Thermal insulation:**
  - External wall insulation (ETICS).
  - Roof/attic insulation.
  - Basement/floor insulation.
- **Window replacement:** Double/triple glazing with thermal breaks.
- **Heating system upgrades:**
  - Individual heat cost allocators.
  - Modern boilers (condensing gas or heat pumps).
  - District heating system improvements.
- **Ventilation improvements:** Mechanical ventilation with heat recovery (MVHR) where possible.
- **Renewable energy sources integration:** Solar thermal panels or PV systems (for common areas).

Challenges in Renovation:

- **Financing barriers:** Many rely on EU funds (e.g., **Casa Verde, PNRR**), but bureaucracy slows implementation.
- **Split incentives:** Landlords may avoid investing if tenants pay utilities.
- **Lack of technical expertise:** Some contractors do low-quality work.

Conclusion

Romania's multi-apartment buildings face **structural, financial, and social challenges** in renovation. While programs for financing renovation works like **Regional Operational Programme/Centru Region Programme** and **PNRR (National Recovery and Resilience Plan)** funds are helping, the pace of renovation remains slow due to fragmented ownership and economic

constraints. A **holistic approach** (combining financial aid, stricter regulations, and awareness campaigns) is needed to improve living conditions and reduce energy poverty.

Structurally, MABs in Alba Iulia have a relatively small footprint and built area compared to their total floor space and typically feature more 4 to 10 floors. This vertical layout presents distinct energy-related characteristics.
Shared spaces require minimum energy provisions including central heating systems, ventilation, and lighting installations. The absence of such systems can affect the building's overall energy consumption, as these areas are often essential for accessing private apartments.

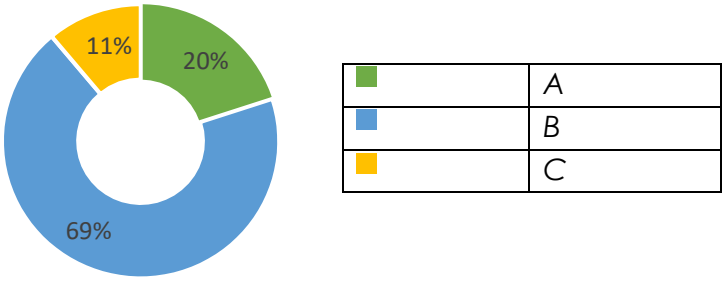
As for energy consumption management, it is important to coordinate both individual apartment energy use and that of the common areas efficiently. Decisions regarding heating levels and other energy aspects impact all residential units, highlighting the need for collective energy governance.

When it comes to Energy Efficiency Investments improvements such as façade insulation, heating system upgrades, or centralized heating sources require joint agreements and funding from all apartment owners. The benefits of such measures are widespread but can only be fully realized when implemented across the entire building.
Collective housing structures offer opportunities for integrating renewable energy sources, such as rooftop solar panels or cogeneration systems that can serve multiple units within a building.

Local Energy Performance Analysis in Alba Iulia:

An analysis of 90 energy performance certificates in Alba Iulia revealed that 62 of the buildings are classified as Energy Class B according to the national grading scale. This class reflects a medium level of energy consumption, ranging between 125 and 201 kWh/m²/year. The findings indicate room for improvement toward higher energy efficiency classes[10].

[10] Study on the issue of energy poverty and energy efficiency in the municipality of Alba Iulia, SERVELECT



Distribution of energy classes for collective residential buildings studied at the municipality level. source: Source: Data from the Alba Iulia Urban Planning Directorate

6.3 Stakeholder involvement in the renovation of MAB sector in the pilot area

The involvement of stakeholders is a key aspect for the success of the renovation projects implementation in Alba Iulia Pilot Area. During the CEESEN-BENDER project, ALEA evaluated the communication requirements between various stakeholders at local level that are involved in the development, implementation and awareness raising related to the mab renovation:

- Alba Iulia municipality (renovation projects coordinator)
- Homeowner associations from MABs (beneficiaries)
- MABs inhabitants (beneficiaries)
- Regional development agency (financing body)
- Alba Local Energy Agency (facilitator)

Based on the meetings that ALEA has organized in the framework of CEESEN-BENDER project – involving stakeholders from the groups mentioned above, it was concluded that Homeowner Associations (HAs) in Alba Iulia Pilot Area are inconsistent in terms of administrative area that are covering, varying form HAs that have hundreds of dwelling owners from multiple MABs - to HAs that could have about 10 MAB owners from one staircase in a MAB - where a singe MAB can have multiple HAs inside the same building. This often results in inconsistencies regarding the addressing of HAs across different MABs that are in need of renovation, as well as a more complicated process in getting the owners of dwellings to agree to the renovation works and to be more actively involved in the decision-making process relevant to their building.

Stakeholder involvement in the renovation of MAB sector in the pilot area and recommendations based on local findings		
Stakeholder (type)	**Role in MAB renovation**	**Recommendations**
Homeowner associations from MABs	Administrative beneficiaries	Increase communication level, number of channels and frequency with final beneficiaries of the MABs renovation works, on the topic of renovation options, benefits and future improvements
Municipality (Alba Iulia)	Renovation projects coordinator (applicant)	Continuously improve MABs renovation projects submitted for financing by testing new solutions and equipment; increase local replication of best practices available at EU level on MABs renovations; use available tools for preliminary evaluations of renovation projects*
MABs inhabitants (dwelling owners)	Final beneficiaries	Reduce the knowledge and involvement gap by accessing information resources and regularly contacting other stakeholders involved in MABs renovation process
Centru Regional development agency (POR/PRC programme is based on ERDF fund)	Financing body	Increase communication level and number of channels with administrative beneficiaries and final beneficiaries about funding availability and eligibility criterion that are specific to MABs renovation projects. Current demand for MABs renovation in Romania is much higher compared to the available grants for this purpose – a gap that must be clearly communicated to possible beneficiaries and for which adapted solutions must be identified
Ministry of Investments and European Projects (MIPE) (PNRR programme is based on EU Recovery and Resilience Fund)		
Local Energy Agency (ALEA)	Facilitator	Increase internal capacity related to MABs renovation in terms of stakeholders networking, data collection and planning, in relation with existing local energy poverty
*available tools to assist the applicants with MAB renovation projects feasibility and impact in terms of energy poverty alleviation such as Simple return of investment calculator and MABs renovation prioritization tool, made available in the framework of CEESEN-BENDER project		

Based on CEESEN-BENDER project activities it was concluded that in Alba Iulia pilot area there is room for improvement in the context of enhancing stakeholders' communication and the transparency of the decision-making process related to the renovation of buildings, so that final beneficiaries can better understand the reasons behind a complicated process that is the implementation of renovation works from public funds. In the future we hope that other financing institutions such as banks or ESCOs will also be involved in supporting MABs renovation, as the public funding for MAB renovation might become limited, a scenario in which loans and other private financing schemes could still support this objective.

6.4 Main drivers of the MAB renovation process

Available financial instruments

- EU funds (see table in chapter 6.1)
- National funds (see table in chapter 6.1)
- Loans (rarely used for whole MAB renovations)

Availability of experts / specialized certified companies needed in the renovation:

- Lack of skilled workers is the most highlighted human capital barrier[11]

6.5 Main difficulties of the MAB renovation process

MAB renovation process is slowly progressing, but critical barriers persist across legislation, funding mechanisms, institutional coordination, and implementation practices such as[12]:

1. Incomplete Building and Social Data

- No comprehensive, up-to-date inventory of the national building stock.
- Lack of granular data on low-income and energy-poor households limits effective targeting.
- Ad-hoc allocation of funds undermines renovation prioritization.

2. Inadequate Financial Mechanisms

- Current funding tools are insufficient for low-income households.
- No access to low-interest loans tailored to vulnerable owners.
- Renovation rates remain low due to vast outdated housing stock.

3. Uneven and Uncoordinated Fund Allocation

- Rehabilitation funds are distributed based on municipal requests, not strategic needs.
- No national-level equity criteria lead to regional disparities in renovation access.

4. Weak Legal Support for Local Energy Governance

- Lack of recognition and legal support for Energy Communities and homeowner associations.
- These groups are crucial for initiating collective renovation and renewable energy projects.

[11] CEESEN BENDER National Policy brief (T.3.2)
[12] CEESEN BENDER Deliverable 3.1 Report on building renovation barriers in regulatory framework in Romania:Policy brief

5. Absence of Energy Poverty-Based Prioritization

- No legal framework or intervention model exists for prioritizing projects based on energy poverty indicators.
- Vulnerable neighbourhoods and households are not systematically supported.

6. Inconsistent Municipal Selection Methodologies

- No standard selection criteria from managing authorities.
- Municipalities follow inconsistent procedures, weakening national cohesion and energy poverty targeting.

7. Insufficient Monitoring and Energy Poverty Integration

- Lack of local-level energy poverty data prevents effective tracking of social impacts.
- Energy poverty criteria are not systematically used in financing decisions.

8. Outdated Norms and Missing Indoor Air Quality Standards

- Renovation codes do not require indoor air quality (IAQ) monitoring.
- Risks from radon, CO_2, and humidity go untracked, potentially harming occupant health.

9. Low Engagement of Social Stakeholders and Limited Use of Renewables

- Weak participation from NGOs, social actors, and community organizations.
- Minimal implementation of solar PV or other renewables in MAB renovation projects.

Moreover, difficulties related to public calls further hinders energy renovations of MABs[13]:

- **Transparency Deficits:** Programs lack clear, publicly available data on finances, application success rates, and energy saving outcomes.
- **Legal Hurdles for Renewables:** No regulatory support for shared use of PV systems; inconsistent program criteria block many eligible buildings.
- **Administrative Bottlenecks:** Application timelines are vague, and centralized control through municipalities slows delivery.
- **Consent Threshold Challenges:** High co-owner approval requirements inhibit project initiation, especially in mixed-income buildings.

[13] CEESEN BENDER Deliverable 3.1 Report on building renovation barriers in regulatory framework in Romania:Policy brief

- **Exclusion of Vulnerable Groups:** Missing data and funding streams for energy-poor households compromise equity in renovation outcomes.

Lack of sufficient financial mechanisms[14]:

- renovation grants limited availability
- loans availability (e.g., banks are not usually giving big loans for MABs renovation, rather many apartment owners do unauthorized partial MABs renovations using personal needs loans)
- lack of funds from owners/occupants
- lack of innovative financial solutions at regional/local level

Lack of experts needed in the renovation:

Ownership of apartments/ MABs:

One of the most distinctive features of the Romanian real estate landscape is its exceptionally high rate of private home ownership—over 96%, the highest in Europe—which is a direct legacy of the rapid post-1989 privatization policies where former state tenants were able to purchase their apartments for nominal sums, sometimes equivalent to a single monthly salary. This widespread ownership has created a specific legal structure known as a condominium, where individuals hold exclusive title to their specific apartment but share a "forced and indivisible" co-ownership of common elements like the land, roof, stairwells, and structural walls.

To manage these shared responsibilities, Romanian law mandates the creation of Homeowners' Association a non-profit legal entity that possesses the authority to sign contracts for utilities and repairs yet does not own the building itself. While this structure democratized property wealth, it has inadvertently created a "fragmented ownership" challenge; major refurbishments (such as energy efficiency upgrades) are often difficult to execute because they require achieving financial and logistical consensus among dozens of individual owners with vastly different economic means.

Attitude of the homeowners/landlords towards renovation process is generally positive but the agreement of a majority of dwelling owners from a MAB is required for the renovation of the building. As in Romania and Alba Iulia most of the dwellings are owned by the residents, the socio-economic variation is high in the same MAB. Total household income can vary by a **factor of 5** in 2 dwellings next to each other in the same building. There is often the case that dwelling owners that have a low income (living alone, retired elderly) can not

[14] CEESEN BENDER National Policy brief (T.3.2)

financially support the cost of MAB renovation due to energy poverty combined with food poverty.

Average net income per household in Alba Iulia in the same MAB	
Low income (elderly, living alone, retired)	€ 300 – 500
Medium income (1 inhabitants working)	€ 500 – 1.000
High income (2 inhabitants working)	€ 1.000 – 2.000
Based on local income statistics data and anonymised data from homeowner associations	

6.6 MABs in need for renovation works

Ranking the Multi Apartment Buildings was done as part of Task 4.1 in CEESEN-BENDER project: **Digital tool for prioritizing buildings for renovation**. The purpose of the ranking tool is to prioritize MABs in need of renovation from Alba Iulia pilot area, considering socio-economic indicators and the energy consumption profile specific to each of these MABs. Data collection process for **29 unrenovated MABs** was performed by ALEA for Alba Iulia pilot area in 2025. Based on existing energy labels (certificates) data and anonymized socio-economic data collected with the help of homeowners associations for 6 pilot MABs (unrenovated) from Alba Iulia, pilot buildings that were already part of CEESEN-BENDER project, ALEA developed key average indicators that were then applied for 24 more unrenovated MABs, for which socio-economic and energy consumption profiles were not available. The estimates for these 24 buildings were calculated based on MABs constructive areas and the location of these buildings.

To rank the buildings for renovation, **a software raking tool was developed** (coding in R) and the following methodology was applied:

- **Correlation analysis** showed which independent variables correlate with each other only one should be included
- 16 **Multiple Linear Regression** (MLR) models were tested to identify which factors are consistently significant across all the models
- **LASSO** model was used to double check the results of OLS. When many predictors are involved, LASSO identifies the most important from them.

Ranking of buildings in the order of the need to be renovated first from Alba Iulia Pilot Area			
Prioritization result	**Order in the Initial list**	**MAB ID**	**Address of the MAB and year of construction** (end)
Pilot area: Alba Iulia (Romania)			
1	13	BL.A3-A8	AMPOIULUI 9-17 (1984)
2	27	BL.C1-C7	ORIZONTULUI 1-13 (1983)
3	12	BL.11 AB	V.GOLDIȘ 26 (1975/'76)
4	6	BL.46 CAMIN*	LIVEZII 46 ALBA IULIA (1979)
5	21	BL.3 EFG	TRANSILVANIEI 27 (1977)
6	5	BL.B1-B5*	ORIZONTULUI 8-16 ALBA IULIA (1983)
7	14	BL.C1-C3	GH. ȘINCAI 17-21 (1981/'82)
8	**17**	**BL.G80** REN	**TARGULUI 1** (1977)
9	25	BL.7 ABCD	V.GOLDIȘ 14-14A (1974)
10	24	BL.6 ABCD	V.GOLDIȘ 12-12A (1973)
11	26	BL.8 ABCD	V.GOLDIȘ 16-16A (1974)
12	11	BL.13 A	TRANSILVANIEI 23B (1975)
13	30	BL.8 ABCD**	LIVEZII 49 ALBA IULIA (1978)
14	18	BL.3 ABCDE	CLOȘCA 8 (1983)
15	23	BL.5 ABCD	V.GOLDIȘ 10-10A (1973)
16	**1**	**BL.G5-G6*** REN	**A.I. CUZA 16 ALBA IULIA** (1975)
17	19	BL.C2	CLOȘCA 1 (1969)
18	4	BL.71-72-73*	GH. ȘINCAI 27-31 ALBA IULIA (1986)
19	**16**	**BL.A1-A2** REN	**ORIZONTULUI 4-6** (1984)
20	20	BL.19 AB	CLOȘCA 5-7 (1982)
21	**3**	**BL.26-27*** REN	**TRANSILVANIEI 8-10 ALBA I.** (1971)
22	15	BL.M1-M2	GH. ȘINCAI 23-25 (1982)
23	22	BL.32 AB	T.VLADIMIRESCU 34 (1989)
24	7	BL.23	TRANSILVANIEI 2A (1971)
25	8	BL.24	TRANSILVANIEI 4 (1971)
26	9	BL.25	TRANSILVANIEI 6 (1971)
27	28	BL.22	V.ALECSANDRI 76 (1988)
28	29	BL.45 AB	CRAVIEI 2-4 (1988)
29	2	BL.2 CDEF*	CLOSCA 10 ALBA IULIA (1983)
30	10	BL.28	TRANSILVANIEI 14 (1967)
REN MABs with a **submitted renovation financing application** in 2025 by Alba Iulia Municipality			
***pilot MABs (unrenovated) and ** model MAB (renovated) selected in CEESEN-BENDER project			
****provided building energy profile is from **before renovation** for model MAB (renovated)			

Important note: Digital tool for prioritizing buildings for renovation developed in CEESEN-BENDER project, does not take into consideration other critical constructive details such as MAB roof and façade degradation, cracked walls, mold formation and high humidity inside dwellings, water infiltration, aspects that must be also taken into consideration when a renovation decision is made.

Note: **Digital tool for prioritizing buildings for renovation** developed in CEESEN-BENDER project (T4.1) is using an open-source software called **R Studio** (r-project.org). Based on the availability of input datasets (tables), the software can generate a ranking of buildings using a statistical calculation profile code (conditions) that can be further updated to suit the local requirements for future MAB rankings.

For the elaboration of the ranking, the digital tool for prioritizing buildings for renovation used the following indicators (collected by ALEA for Alba Iulia Pilot area in 2025):

- Year of construction (end) for the MAB;
- Number of (mostly) empty dwellings with no residents (not permanently living there);
- Unemployed (%) of adults 18-60 of age living inside the MAB;
- Percentage of dwellings with residents receiving social assistance;
- Percentage of dwellings with children below 18 of age;
- Average monthly salary per building (€ gross) derived from individual households data;
- Average annual heating costs per building (€) derived from individual households data;
- Conditioned area - heated (m^2);
- Other socioeconomic indicators.

6.7 MAB renovation role in achieving national targets

The energy renovation of MABs plays a critical role in helping Romania meet its national targets in the areas of energy poverty reduction, energy consumption, and CO_2 emissions reduction.

Reducing Energy Poverty - Over 30% of Romanian households are affected by energy poverty, with residents in MABs being disproportionately impacted due to poor insulation, outdated heating systems, and inefficient building designs.

MAB renovation in terms of upgrades such as thermal insulation, window replacement, heating system modernization, and solar integration reduce household energy bills, reduce health risks (e.g., mold, cold exposure) and improve quality of life due to better indoor comfort

Renovating MABs directly supports Romania's obligations under the EU Social Climate Fund and contributes to a just energy transition.

Reducing National Energy Consumption - the residential sector is responsible for over 40% of Romania's final energy use, with MABs being the largest sub-

sector due to their outdated energy performance. Deep renovations can lead to 40–60% reductions in heating energy use per building.

Renovating MABs supports Romania's targets under the National Energy and Climate Plan (NECP) to reduce primary energy consumption by 45.1% by 2030.

Reducing CO_2 Emissions - Buildings contribute to a high level of CO_2 emissions as many MABs rely on fossil-fuel-based heating systems (gas, coal, or outdated district heating). Reduced energy demand directly leads to fewer emissions from heating. Moreover, **r**enovations can integrate renewable energy sources (e.g., rooftop PV, heat pumps).

Renovating MABs contributes to Romania's compliance with the EU Effort Sharing Regulation, and the national commitment to the 55% GHG reduction target by 2030 and climate neutrality by 2050.

6.8 Financial solutions

CEESEN-BENDER project consortium has developed a tool as part of Task 4.2 to assist beneficiaries before implementing a MAB renovation project considering a project cost structure for an investment in MAB renovation. The tool is called **Return of Investment calculator**. ALEA proposed the initial structure for calculation that was on a spreadsheet format called Simple Return of Investment Calculator. The final form or the **ROI** tool was publicized by MAE considering the feedback form the CEESEN-BENDER project partners.

The ROI tool has 4 main sections for data inputs:

- Building information and energy profile
- Cost savings related to energy savings and RES
- Renovation project costs
- Contribution to the real estate market value increase

The result is a yearly percentage from total cost amortization (meaning the number of years after renovation project implementation required for initial project cost amortization). The tool can also consider cost reduction as a result of RES integration (green energy production) a case in which ROI will depend also on energy market and a overvaluation of energy price is therefore recommended in the project development phase.

ROI tool and guidebooks can be accessed here:
https://ceesen.org/renovation-roi-calculator-tool/

A simulation for a renovation project for a MAB in Alba Iulia with 64 dwellings 1 ground floor + 3 upper floors (4.736 sqm total conditioned area) and a total renovation project cost estimation of € 1 million, results in a ROI of 3,24% (or 30,9 years) for project cost amortization. This simulation does not include on-site RES.

ROI simulation shows that generally MAB renovations are large, long-term investments, that will also generate separate yearly maintenance costs, especially if RES equipment, mechanical ventilation or heat pumps are part of the renovation project. For the simulated building, the cost per dwelling is around € 20.000 if RES equipment would also be included in the renovation project. The increase in market value of a dwelling after project implementation is estimated at € 5.000 resulting in an investment of about € 15.000 per dwelling.

Except EU funds and some low-volume national financing schemes, in Romania there are no low-interest loans, ESCO services or other financial solutions aimed specifically at large MAB renovation projects, that would spread the initial project cost over a large period. Some apartment owners implement partial renovation of MABs, often resulting in constructive issues after a certain period, due to inconsistencies in façade weight support, wind pressure and rainwater ingress in the partial building envelope structure. If some apartment owners have implemented partial renovation projects, they are required to strip-down the partial envelope taking an investment risk, if a full MAB renovation is implemented afterwards.

Considering the output of the Digital tool for prioritizing buildings for renovation developed in CEESEN-BENDER project presented in the previous table, the following table will show an estimate of the financial investment required for the energy renovation of the top three worst-performing buildings as ranked by the tool:

Estimate of the financial investment required for the top ranked MABs in need of renovation works from Alba Iulia Pilot Area						
Prio-rity	**MAB ID**	**Address of the MAB** (Alba Iulia) and year of construction	**MAB conditioned area** [m²]*	**Envelope renovation** (€210/m²)	**RES system & mechanical ventilation system** (€105/m²)	**Total invest. require-ments**
1	**BL. A3-A8**	AMPOIULUI 9-17 (1984)	13.163	€ 2,7 mil.	€ 1,3 mil.	€ 4 mil.
2	**BL. C1-C7**	ORIZONTULUI 1-13 (1983)	7.401	€ 1,5 mil.	€ 0,7 mil.	€ 2,2 mil.
3	**BL. 11 AB**	V.GOLDIȘ 26 (1975/'76)	6.417	€ 1,3 mil.	€ 0,6 mil.	€ 1,9 mil.
*for reference, the model MAB from Alba Iulia Pilot Area selected in CEESEN-BENDER (renovated) has a total conditioned area of 4.736 m² required an investment of €1 million for the envelope only (including roof renovation), with an estimated of additional €0.2 million for RES equipment (not implemented) and another €0.3 million for the mechanical ventilation system (not implemented)						

For estimating the required financial investment of the three worst-performing buildings as ranked by the Digital tool for prioritizing buildings for renovation developed in CEESEN-BENDER project, we used the model MAB from Alba Iulia Pilot Area selected in CEESEN-BENDER (renovated). For this building we know that the renovation works for building envelope and roof renovation has a total cost of €1 million. Considering that the model building has a conditioned area of 4.736 m^2 and the building geometry and constructive characteristics are similar with most of the MABs requiring renovation from Alba Iulia Pilot Area, we can estimate an investment value proportional with the conditioned area of the top three worst-performing buildings. The evaluation is included in the table above.

Alba Iulia municipality submitted energy efficiency renovation projects for four unrenovated MABs from the Pilot area in 2025. The application was submitted within the call "Centru Region Programme 2021-2027 - CRP" (that was known before 2020 as "Regional Operational Programme – ROP") specifically *PRC/165/PRC_P3/OP2/RSO2.1/PRC_A25 - Action 3.1 Energy efficiency in residential buildings* that is operated by **Centru Regional Development Agency**. Co-financing rate for this programme is **2%** and is paid by the municipality. The funding for this programme is based on **European Regional Development Fund** (ERDF). The beneficiary MABs are also marked with **REN** in the table ***Ranking of buildings in the order of the need to be renovated first from Alba Iulia Pilot Area***. The following table contains more specific data on the financing for these four MABs:

Financial investment for MAB renovation projects for unrenovated MABs from Alba Iulia Pilot Area as evaluated in the top ranked MABs in need of renovation						
Prio-rity	**MAB ID**	**Address of the MAB** (Alba Iulia) and year of construction	**MAB conditioned area** [m^2]**	**Eligible costs (CRP-ERDF)**	**Co-financing (2%) + other ineligible costs**	**Total renova-tion costs**
8	**BL. G80**	TARGULUI 1 (1977)	3.826 (GFA) 3.313 (CA)	€ 0,627 mil.	€ 0,247 mil.	€ 0,874 mil.
16	**BL. G5-G6***	A.I. CUZA 16 (1975)	2.725 (GFA) 2.359 (CA)	€ 0,596 mil.	€ 0,173 mil.	€ 0,769 mil.
19	**BL. A1-A2**	ORIZONTULUI 4-6 (1984)	3.430 (GFA) 2.970 (CA)	€ 0,751 mil.	€ 0,217 mil.	€ 0,968 mil.
21	**BL. 26-27***	TRANSILVANIEI 8-10 (1973/'67)	5.100 (GFA) 4.416 (CA)	€ 0,821 mil.	€ 0,323 mil.	€ 1,144 mil.
*MABs found on pilot MABs list selected in CEESEN-BENDER project (unrenovated) **conditioned (heated) floor area is estimated at 86,6% from Gross Floor Area (GFA) of the MAB						

7. Best practice cases in the pilot area

a) Renovation of a 64 dwellings Multi-Apartment Building in Alba Iulia
(documented in CEESEN-BENDER project)

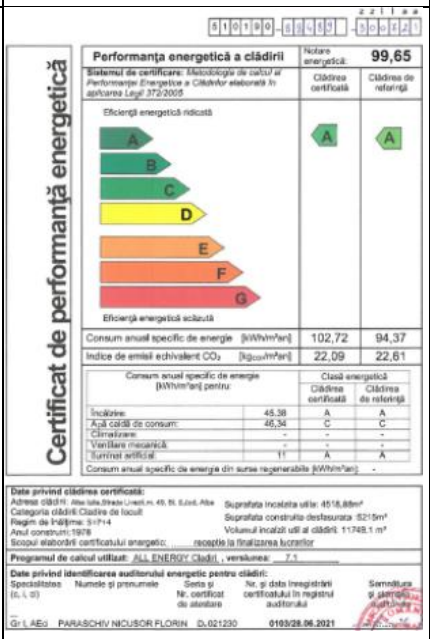
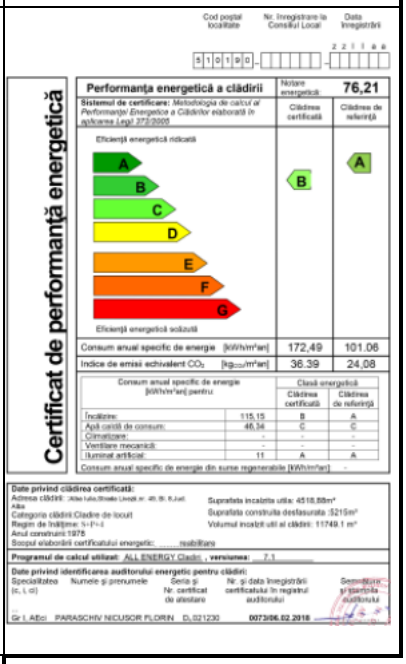
In Alba Iulia more than 50 MABs were renovated since EU funds became available for our country. Alba Iulia Municipality is the main actor that is implementing the renovation works by coordinating the process starting with the selection of buildings (mainly the MAB selection prioritized the older MABs first) and then implementing the renovation works. Tender books development, renovation project contracting by public procurement are key steps implemented by municipalities that compete for the available EU grants financing decarbonization and energy efficiency.

Bloc 8 photo – model (reference) building form Alba Iulia in CEESEN-BENDER project © ALEA

Energy poverty data - after the MAB was renovated		Data before MAB renovation
Number of vulnerable residents at risk of energy poverty	≃40%	≃60%

Types of vulnerable residents	-low-income residents -elderly/retired -single living -persons with chronic diseases -persons with disabilities	

Technical characteristics of the building and energy profile		
Year of construction	1978	
Gross building area (m2)	5215	
Conditioned floor area (m2)	4518	
Conditioned volume (m3)	11749	
Number of floors	4	
Number of apartments	64	
Average apartment area	70	
Heating system (individual, central, district) - on apartment and building level	Individual boilers, natural gas	
Type of energy carrier/s (natural gas, coal, wood, etc.)	Natural gas (for heating) + electricity	
Data after the MAB was renovated		**Data before MAB renovation**
Energy consumption (electrical, heating and DHW) *(if available)* - on apartment and building level	-heating **45,38** kWh/m2,yr -hot water **46,34** kWh/m2,yr -electricity **11** kWh/m2,yr	-heating **115,15** kWh/m2,yr -hot water **46,34** kWh/m2,yr -electricity **11** kWh/m2,yr

Specific energy consumption (energy audit)	**102,72** kWh/m2,yr	**172,49** kWh/m2,yr
Specific emissions (energy audit)	**22,09** kgCO2/m2,yr	**36,39** kgCO2/m2,yr
Energy efficiency class (*if available*)	**A** (energy audit, 2021)	**B** (energy audit, 2018)
Building energy label (certificate) snapshot		
Information on previous renovations (year, implemented measures)	Partial renovation works made by some apartment owners (not certified)	

Estimated energy savings per building (kWh/year)	315.221
Estimated energy savings per apartment (kWh/year)	4.925
Estimated cost reduction per building (EUR/year)	19.544
Estimated cost reduction per apartment (EUR/year)	**305**

Note: *Estimated cost reduction will change based on actual energy prices*
Data source: CEESEN-BENDER project T2.5 Analysis of demonstration buildings

b) Air quality monitoring in 15 dwellings across 7 CEESEN-BENDER pilot Multi-Apartment Buildings form Alba Iulia (funded by CEESEN-BENDER project)

ALEA, with the support of the Alba Iulia municipality - both organizations part of CEESEN-BENDER project consortium, measured air quality parameters in 15

dwellings across 7 multi-apartment buildings from Alba Iulia: 6 unrenovated MABs and one renovated MAB (model building).

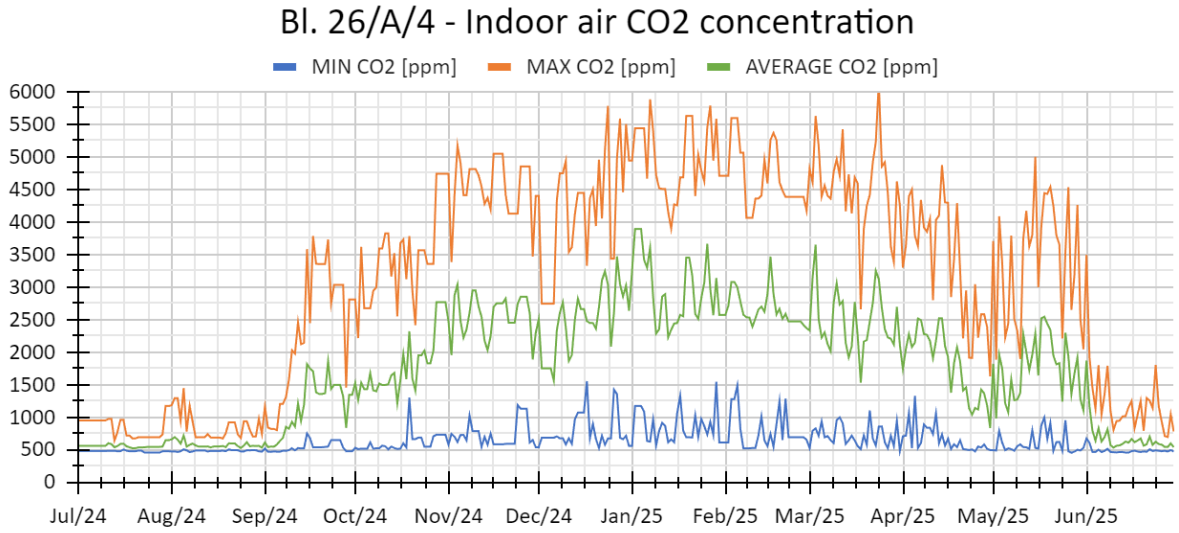
This activity aimed to identify developments regarding air quality (temperature, relative humidity, CO_2 level), results as a result of the implementation of thermal rehabilitation works (building envelope) that will be / are already carried out at the level of these buildings in which it was considered that there is a risk of energy poverty, social, medical and constructive risks (families with low income, single living persons, people with difficulties in correctly managing heating systems, water infiltration and the appearance of mold, etc.).

ALEA HomeMonitor device showing live CO_2 concentration, air temperature and relative humidity

The monitoring of air quality parameters was carried out through the ANERGO Energy Observatory with the help of **ALEA HomeMonitor devices** assembled by ALEA, having an integrated air quality sensor (Sensirion SCD30) . According to the project, the monitoring of these parameters was carried out for a period of at least 12 months between July 2024 and June 2025. ALEA HomeMonitor devices and the accessories provided with them will become the property of the beneficiaries (the owners of the selected apartments) after the initial monitoring period of at least 12 months. This was used as an incentive for the apartment owners to accept their participation in the monitoring activity,

along with an agreement on data anonymization signed bilaterally by each apartment owner and ALEA.

The conclusions obtained from the measurements that were carried out at the level of these buildings, together with other findings, are included in the recommendations below and in the Building-Level Roadmaps and investment strategies – developed within CEESEN-BENDER the project.



In the diagram above we can see the usual case in which, except for summer months where a window was kept open during the night, the daily maximum CO_2 concentration is peaking at 5000 ppm and above during the night. In the morning, after the windows are opened the CO_2 returns to acceptable levels (below 2000 ppm). This shows that in order to maintain good air quality indoors throughout the entire year, **mechanical ventilation systems (with heat recovery) are required**. This is the case especially in apartments where more than 2 residents are sleeping and air quality is degrading fast if all windows are closed.

8. Priority areas and recommendations in the pilot area

8.1 Priority area 1 – Mapping energy poverty in MABs

Actions:

1 Data collection system on current living conditions in MABs that are not renovated
2 Local study/research on MABs occupancy level and residents' income
3 Development of local databases/interactive platforms focused on current MABs situation and issues (constructive, social, energy and administrative)
4 Increase local level cooperation and best practices between homeowners' associations

8.2 Priority area 2 – Energy Efficiency Improvement in MABs

Actions:

1 Updated energy audits for MABs that are not renovated
2 Pilot buildings testing RES systems
3 Promoting the creation of Energy Communities in MABs
4 Information campaigns in MABs implemented by homeowners' associations

8.3 General recommendations related to the renovation works in the pilot area

MAB renovation work in the pilot area must be a data-driven process so that the investment in renovation works will be effective in attenuating energy poverty at local level. As general recommendations we have the following:

- Developing and implementing a local improvement process/plan/roadmap for MAB renovation in Alba Iulia pilot area requiring up-to-date data collection and constructive evaluations for the existing building stock (also in correlation with existing local data such as energy subsidy beneficiaries map)
- Local MAB renovation order should be prioritized by 1. Constructive hazards 2. Socio-economic risks 3. Energy poverty risk and 4. Energy consumption profile
- Implementing a local framework for exchange of best practices between existing and future beneficiaries: type of materials/technologies used in other renovation projects should be up for debate as part of the renovation process - currently the final beneficiaries (eg. apartment owners) are not included in their MAB renovation project development phase and cannot propose changes to the renovation project beforehand
- Bringing-in smart buildings solutions providers to the local renovation process: regular consultations/meetings between municipality, homeowner associations representatives and smart solution providers for buildings (eg. BEMS providers, RES equipment providers, construction materials providers) that will drive the innovation, improve living conditions and lower the cost of renovation project implementation and energy cost
- Encouraging alternative financing schemes for MAB renovation, also considering permanently or temporary moving the residents to newer buildings where the building structure is to old/affected, including the integration of complementary structures such as external reinforcements for increased structural solidity or installing elevators for increased accessibility of elderly people. This process must be based on Return of Investment (ROI) calculation, current indoor living conditions and also on building inhabitants profile (age, income, health and mobility issues)

Background of the CEESEN-BENDER project

The main goal of the project "Building intErventions in vulNerable Districts against Energy poveRty" (i.e. CEESEN-BENDER), launched on September 1 2023, is **to empower and support vulnerable homeowners and tenants living in buildings built after the Second World War and before 1990's in 5 CEE countries**: Croatia, Slovenia, Estonia, Poland, and Romania. The project will help them through the renovation process by identifying the main obstacles and creating trustworthy support services that include homeowners, their associations, and building managers.

Coordinated by Society for Sustainable Development Design (DOOR), the project CEESEN-BENDER brings together leading European researchers and experts in field from six countries: **Croatia** (Society for Sustainable Development Design / DOOR, Medjimurje Energy Agency Ltd. / MENEA, EUROLAND Ltd. / Euroland, GP STANORAD Ltd. / GP STANORAD), **Estonia** (University of Tartu / UTARTU, Tartu Regional Energy Agency / TREA, The Estonian Union of Co-operative Housing Associations / EKYL), **Slovenia** (Local Energy Agency Spodnje Podravje / LEASP), **Romania** (Alba Local Energy Agency / ALEA, Municipality of Alba Iulia / ALBA IULIA), **Poland** (Mazovia Energy Agency / MAE, Housing Cooperative Warszawska Spółdzielnia Mieszkaniowa - The Warsaw Housing Cooperative / WSM), **Germany** (Climate Alliance) in addition to **Central Eastern European Sustainable Energy Network** (CEESEN).

The project CEESEN-BENDER is carried out from September 2023 until August 2026 and has a total budget of €1,85 million, of which €1,75 million is funded from the European Union's Programme for the Environment and Climate Action (LIFE 2021-2027) under grant agreement n° LIFE 101120994.

As stated, the **main objective** of CEESEN-BENDER is to empower and support vulnerable homeowners and renters living in multiapartment buildings (MABs) through the renovation process by identifying the main obstacles, and creating trustworthy support services that include homeowners, their associations, and building managers.

Therefore, the **detailed objectives** for CEESEN-BENDER are stated below:

- The project will analyse the ownership structure and physical characteristics of buildings in the pilot sites in targeted regions to comprehensively understand the obstacles that impede or halt homeowner associations, landlords, and property managers from pursuing energy renovations.
- Project partners will identify both legislation and financial, and technical administrative obstacles for the renovation in pilot countries. The identification of obstacles from the homeowners' perspective will help the creation of tailor-made solutions not only for homeowners but also for building managers, landlords, municipalities and other relevant stakeholders involved in the renovation process.
- Through the project, methods and tools that can be used to address different aspects of energy poverty will be developed. This includes:

  - Data gathering on energy poverty in the pilot sites;
  - A digital tool identifying buildings with high levels of energy poor households in the greatest need of renovation;
  - A model of potential savings in buildings undergoing renovation, and a tool for calculating the return on investment for energy renovations.

- 5 Pilot area roadmaps will be developed that prioritize building renovation based on their potential for maximizing emissions reduction via energy savings as well as an increase of quality of life and wellbeing for vulnerable homeowners.
- Within the 5 pilot areas, at least 30 building-level roadmaps will be created that specify the technical details for renovations. These pilot buildings will be supported in the entire pre-construction phase, drawing of plans, applying for permits, audits or other requirements and for financing. Plans will call for the decarbonization of the heating and cooling supply and integration of renewable energy sources (RES), to produce energy to cover its own consumption.
- Also, a support system for homeowners, municipalities, and other large owners of multiapartment buildings (MABs) in targeted regions will be created to speed up the renovation process, by:
  - Advising at least 3.500 homeowners, landlords and building managers on legal, financial, technical and other aspects of energy renovations.
  - Advocating for changes of regulatory requirements and policies to lower the costs and time needed for the preparatory phase of projects.
  - Train at least 30 energy professionals on energy poverty and related topics.

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