



ComActivate

Enabling community action for energy sufficiency

D3.5 ROADMAPS FOR ENERGETIC UPGRADING OF DISTRICTS IN SELECTED NEIGHBOURHOOD

BURGAS

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List of abbreviations

EU	European Union
HOAs	Homeowners Associations
HVAC	Heating, Ventilation and Air Conditioning
MFABs	Multi-Family Apartment Buildings
NESR	Neighbourhood Energy Sufficiency Roadmap
NGOs	Non-Governmental Organisations
PV	Photovoltaic
RC	Resource Centre
RES	Renewable Energy Systems

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1 INTRODUCTION

The ComActivate project, funded by the EU LIFE research programme, is a strategic initiative designed to respond to growing issue of energy poverty across Central and Eastern European countries. The ComActivate project continues the efforts of the ComAct project, implemented between 2020-2024, aiming to improve building energy efficiency as a major driver of energy poverty and climate change¹. With rising energy prices and widening economic disparities, vulnerable populations are increasingly at risk of becoming unable to afford adequate heating, cooling and electricity.

The project is being implemented in **four selected municipalities across three countries** to pilot innovative and community-based solutions:

- Bulgaria: Burgas Municipality
- Hungary: Józsefváros Municipality (District 8 of Budapest)
- Lithuania: Kaišiadorys Municipality and Elektrėnai Municipality.

These municipalities and their pilot areas were selected due to the substantial energy inefficiency of buildings and the deteriorated condition of many structures, making them priority targets for improvements.

Bulgaria, Hungary and Lithuania are dealing with the consequences of old, energy inefficient building stock, especially in multi-family apartment buildings (in further text MFABs). Renovation rates remain slow, driven by the high upfront cost of refurbishment and complex decision-making procedures. A lack of strong community engagement further delays progress, as homeowners struggle to organise and agree on collective renovation actions. Furthermore, low energy efficiency² is largely driven by a widespread lack of knowledge about energy consumption, combined with limited funds to carry out necessary repairs or purchase energy-efficient appliances. This is further reinforced by the legacy of the previous system in all three countries, where people were accustomed to relying on the state for all solutions, leading to a persistent reluctance to take personal initiative. Another challenge in MFABs stem from coordinating the interests of numerous households. Generally, a typical building accommodates more than 50 households³, whose residents have diverse social, economic and educational backgrounds, which makes reaching consensus difficult. Because of this wide range of circumstances, coupled with a lack of understanding energy efficiency, energy sufficiency and available renovation options, especially among vulnerable population such as seniors or low-income families, building consensus becomes difficult.

Through targeted interventions, stakeholder engagement and capacity building, ComActivate aims to empower these municipalities in reducing energy poverty, improving energy efficiency and energy sufficiency in MFABs and providing pathways for renovation strategies that integrate renewable energy solutions.

This document, ***the Neighbourhood Energy Sufficiency Roadmap(s)*** (in further text NESR), is one of the key deliverables of the ComActivate project. It is developed for each participating pilot municipalities. The primary focus of this document is MFABs, although NESRs could be applied to a wide range of building types in the future, including public and commercial buildings.

¹ EU and National Level Policy Analysis and Monitoring, ComActivate, January 2024

² Source: <https://www.odyssee-mure.eu/publications/efficiency-trends-policies-profiles/>

³ Baseline Report on the State of the Art of Resource Centres in the Demonstration Sites, ComActivate, April 2024



2 OBJECTIVE OF THE ROADMAP

The NESR provides a comprehensive, context-sensitive plan integrating local socio-economic conditions and housing stock characteristics. It delivers practical guidance tailored to the specific needs and realities of each of pilot municipalities.

The primary objective of the NESRs is to define a clear and coherent vision for each pilot area, outlining concrete steps, activities and measures required to address energy poverty and strengthen resilience. It serves as a strategic tool to facilitate cooperation among key stakeholders through a structured and results-oriented approach. The approach also reflects European Union (in further text EU) requirements, such as those in the Energy Performance of Buildings Directive (EU) 2024/175, so that each pilot area aligns with the broader strategic goal of achieving a highly-efficient and decarbonised buildings stock. This ensures consistency in implementation and enables measurable progress over time.

Energy efficiency is a key component of the EU's strategy to reduce energy consumption, lower costs and achieve climate neutrality by 2050. It involves using less energy to provide the same output or service, thereby minimizing energy waste, reducing energy costs and environmental impacts.

Key efficiency measures include:

- Upgrading high-consumption products such as HVAC⁴ systems and water heaters
- Installing energy-efficient windows to prevent heat loss and air leaks
- Improving wall insulation to enhance thermal performance and reduce heating and cooling demand
- Implementing smart thermostats to automatically optimize temperature settings
- Installing solar photovoltaic (PV) systems to generate clean, renewable energy and reduce dependence on the grid.

Energy sufficiency. While energy efficiency reduces energy per unit of service, the continuous growth in global energy demand requires complementary strategies like energy sufficiency. The concept of energy sufficiency focuses on moderating energy demand and promoting equitable access, particularly for vulnerable or marginalized populations.

Although energy sufficiency has not been formally adopted as a standalone directive or policy at the EU level, it appears in many guidance documents, analytical frameworks and academic literature. Across these sources⁵, definitions tend to emphasize shifts in everyday social practices that reduce energy use while avoiding negative social or environmental consequences compared with the status quo.

Building on this understanding, the ComActivate Project has developed a comprehensive interpretation based on the following principles:

- Equitable Distribution: Reduce energy demand among high consumers while ensuring adequate energy access for vulnerable households.
- Behavioural Change: Promote energy-saving habits and discourage unnecessary energy use.

⁴ HVAC – Heating, Ventilation and Air Conditioning

⁵ Source: <https://journal-buildingscities.org/articles/10.5334/bc.458>; https://enr-network.org/wp-content/uploads/Bohnenberger_EnergySufficiency_18.pdf

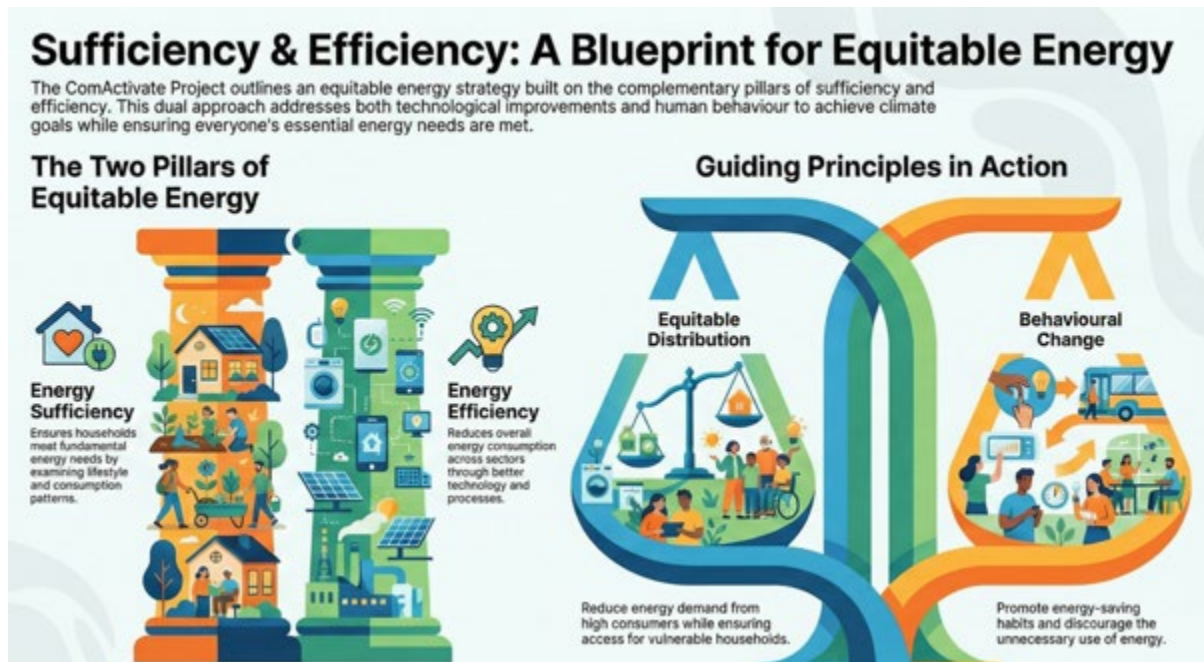


Figure 1: Principles of Equitable Energy Sufficiency, created with assistance of AI-based software

Together:

- Energy sufficiency ensures households meet their fundamental energy needs while examining lifestyle patterns and consumption needs.
- Energy efficiency reduce overall energy consumption across various sectors.

This dual approach recognize that effective energy policy must simultaneously address climate goals and human well-being.

The housing stock is at the core of this NESR, while sectors like mobility, energy, public and green spaces are outlined in Chapter Roadmap Development Framework, which provides guiding steps on developing roadmaps for each.

While each NESR is customized to reflect the unique circumstances of its respective pilot area, the methodologies and approaches proposed are transferable. As such, they serve as a valuable tool for replication and adaptation in other regions across the EU that face similar energy-related challenges. By sharing best practices and adaptable solutions, the ComActivate project aims to contribute to a fair and inclusive energy transition.

3 INSTITUTIONAL PLACEMENT OF THE ROADMAP

The Energy Efficiency Directive (EU) 2023/1791 mandates that Member States must establish a supportive framework for market actors, such as one-stop-shops, that would provide residents reliable information, individual technical assistance and guidance on available financial schemes for energy efficient renovations. Additionally, the Directive on Energy Performance Buildings (EU) 2024/1275 mandates inclusive one-stop shops providing technical assistance to all actors involved in building renovations, including owners, administrative, financial and economic actors, SMEs, etc. By streamlining the renovation process and coordinating both technical and financial support, these **one-**

stop-shops or Resource centres, help to overcome major obstacles, such as a lack of understanding, high upfront costs and complicated administrative procedures.

Their core role is to assist households throughout the renovation journey by offering accessible and tailored services that make energy-saving improvements easier to implement.

The key benefits of establishing a Resource centre for community members (residents), including vulnerable people, and property managers are presented in Table 1. While the benefits for community members also apply for vulnerable people, they require additional attention and tailored support, as highlighted in the table.

Table 1: Key benefits of Resource centre for community members (residents)

Community members	Vulnerable people
• Main point of contact • Based on clear and reliable renovation advice, residents can make informed decisions • Professional guidance improves the quality of renovations • Informed access to funding • Renovations enhance comfort and living conditions • Raising awareness • Active citizen participation in neighbourhood projects	• Reduced mental load • Overcoming information barriers (using understandable language at appropriate literacy levels) • Resource centre is perceived as a trusted intermediary • Prevention of exploitation (protection from high-interest loans or unnecessary work) • Home visits by default • Ensure renovations meet accessibility needs • Identification of households that need wider support (connection to other social services)

Beyond individual support, Resource centres also help implement NESR by engaging residents, providing guidance and translating neighbourhood-level energy strategies into practical actions for all households, including vulnerable people.

While NESR provide the strategic vision for neighbourhood transformation, the Resource centres offer the infrastructure required to realize the vision through trusted relationships, tailored support and community organizing.

Resource Centre Burgas

The Burgas Municipality established its Energy office (hereafter referred to as the Resource Centre for the purposes of this project) at the beginning of 2023 as an integral component of its administrative framework. The premises are located at the heart of the city in a building owned and managed by the Burgas Municipality. The Resource Centre (in further text RC) is readily accessible via public transport, pedestrian routes and bicycle paths.

The primary beneficiaries of the RC include citizens, households facing energy poverty and homeowners' associations in Burgas.

The core services provided by the RC are:

- Details regarding financing support schemes for energy efficiency and PV system installations
- Assistance with the compilation of documents required for financing application
- Organizing training sessions and informational days on energy efficiency, energy saving and enhancing the quality of living in MFABs.

The RC operates from Monday to Friday, between 08:30 and 17:15. Services are delivered in person, by phone and e-mail. The RC is currently staffed by one full-time employee. As of April 2024, a show room for insulation materials and windows has been established at the RC.

Since its establishment, the RC was visited by more than 5000 people. A significant majority, 70% of them indicated a preference for building renovation, while 20 % were interested in replacing old wood stoves with air conditioners and 10 % in PV system installations.

The operation of the RC is directly linked to Burgas Strategy for Sustainable Energy and Climate 2021 – 2030 (SECAP) and contributes to the implementation of the following priorities and measures:

- Priority 1: Decarbonisation of municipal building infrastructure and municipal facilities
 - Measure: Conducting campaigns to change the behaviour of citizens with a focus on energy-efficient heating / cooling with energy efficient heating appliances and use of RES.
 - Measure: Develop municipal mechanism to support energy poor households.
- Priority 4: Support for changing energy behaviour
 - Measure: Organise and implement info campaigns.

When financial resources are available for measures like energy efficiency improvements and PV systems installation, the RC prove to be extremely valuable. It is common for individuals and homeowners' association to struggle with interpreting guidelines and assembling required materials, including application forms and budgets and this is where the RC plays a crucial supportive role. The RC Burgas is recognized nationally and has been chosen by various ministries to host informational events for energy efficiency programs.

One of the main challenges this RC has faced is recruiting suitable qualified staff⁶, despite offering salaries slightly above the average. The role requires proactive, initiative-driven individuals who actively engage citizens, identify their needs and propose relevant trainings and other events tailored to address those needs.

Home-owners Associations

The Condominium Management Act⁷ regulates the establishment and operation of home owners associations (HOAs) in Bulgaria. Under the law, an HOA is established automatically once a building is completed and contains at least three separate units (such as apartments or offices) owned by more than one person. In such case, the property is legally considered to be under condominium ownership. No explicit consent from the owners is required, as the status is defined by the law. Regardless of the chosen management structure, registration of the HOA in the local municipality is mandatory.

Forms of Management. Owners can choose between two types of structures:

1. General Assembly: This is a standard form where owners make decisions and delegate the execution of those decisions to a Building Manager or a Managing Board.
2. Association of Owners: A legal entity created primarily for applying for European projects or energy efficiency renovations.

Cooperation between HOAs and RC:

HOAs are the main beneficiaries of the services provided by the RC. National and EU programmes are available to HOAs for the purpose of renovating MFABs and installing renewable energy systems. The RC's main responsibility involves providing information and administrative assistance for the preparation of applications to EE programmes. Since businesses⁸ generally have greater financial and administrative capacity, they usually approach the RC only to obtain information about the open calls. After that, they independently prepare the required project documentation, often by hiring external

⁶ The RC faced challenges in engaging a suitable employee, as the candidates, despite their strong qualifications, did not fully meet the RC's established performance expectations.

⁷ Source: <https://lex.bg/laws/ldoc/2135614516>

⁸ HOAs refers not only to homeowners but also to the owners of commercial or business premises, as some buildings may include such spaces alongside residential units.

consultants. Unlike private companies, residents living in condominiums typically do not have financial resources to hire a consulting company to prepare project proposal and documentation. Given that, they rely on the services of the RC for this support.

4 LOCAL CONTEXT

Burgas is the second largest city on the Bulgarian Black Sea Coast and the fourth-largest city in Bulgaria after Sofia, Plovdiv, and Varna. The city is the capital of Burgas Province and an important industrial, transport, cultural and tourist centre.

The Municipality of Burgas covers 14 towns and villages. The administrative centre of the municipality is Burgas city⁹.



Figure 2: Overview of Bulgaria and ComActivate project municipality

Population. The overall Burgas population stands at 198,593 residents, consisting of 93,792 (47.2%) men and 104,801 women (52.8%), indicating a slightly larger female population. The 25-54 age group makes up the largest share of the age structure at 43.4%, which represents the working-age population. Among older residents 12.7% are aged 55-64 years, 11.7% are 65-74 years and 7.3% are 75 years and above.

The economically active population totals 87,689, with men accounting for 51.9% and women 48.1%. Unemployment is relatively low. The total number of unemployed is 2,082 with 1,129 men and 953 women.

Education. In Burgas, there are five universities with a total of 6,088 students, of whom 2,352 are men and 3,736 women. As one of the few Bulgarian municipalities that have implemented steady educational program development policy, Burgas has been recognized in the national competition for several consecutive years for being one of the leading municipalities in the field of knowledge¹⁰.

Business landscape. In Bulgaria, Burgas stands out economically due to its key role as an industrial and logistics hub, boasting the country's largest port and a thriving tourism sector.

Key economic sectors are:

⁹ Source: https://papers.iafor.org/wp-content/uploads/papers/iice2022/IICE2022_62027.pdf

¹⁰ https://papers.iafor.org/wp-content/uploads/papers/iice2022/IICE2022_62027.pdf

- **Logistics and Transport:** The Port of Burgas serves as a key centre for international trade. Burgas Airport serves the southeastern region of Bulgaria, facilitating tourism and trade.
- **Industry and Manufacturing:** The region hosts heavy industry, most notably LUKOIL Neftohim, which stands as the largest oil refinery on the Balkan Peninsula. Other significant sectors include chemical fiber production, mechanical engineering, and fish processing.
- **IT and Innovation:** While still developing, the tech sector is growing through initiatives like the ICT Cluster Burgas. The city is also investing in a new scientific campus with guidance from the European Investment Bank.
- **Tourism and Services:** Burgas leads the country in tourism revenue, though the sector remains highly seasonal.
- **Industrial Zones:** The city offers modernized sites such as the Industrial and Logistic Park Burgas, providing "ready-to-go" solutions for small and medium-sized enterprises.
- **Financial Stability:** The municipality maintains high financial independence, and investment activity per capita remains well above the national average.
- **Tax System:** Businesses benefit from Bulgaria's favorable 10% flat corporate tax rate, although local taxes in Burgas are slightly higher compared to other regions.

Housing stock. The building stock in Burgas consists of about 1,500 buildings, with 91,258 apartments. A substantial majority, i.e. 80% of them are built before 1990. These buildings have poor energy performance (energy classes E, F and G) and face multiple challenges, including:

- physical deterioration of certain building elements (such as connections at balcony railings, roof panels, etc.) due to the lack of systematic technical maintenance over the years;
- poor condition of buildings' elements, including roofs, damaged waterproofing and drainage system, deteriorated facades, old window frames and glazing, etc.

There is a direct correlation between general poverty and energy poverty. The country has high levels of inequality, poverty and limited budgetary opportunities. On average, Bulgarian households spend more than 75% of their income on food and energy, compared to an EU average of 45%. This predetermines the lack of investments for professional maintenance of the building, implementation of integrated and complete energy efficiency measures on the building, replacing heating and cooling systems at home.

Another reason for low energy efficiency is the lack of awareness on energy consumption, combined with insufficient financial resources to carry out the necessary repairs or invest in efficient heating appliances. Additionally, there is often reluctance to take action, as a persistent perception remains that the state should bear primary responsibility for such improvements. Furthermore, consumers are generally unable to monitor their energy consumption in real time, receiving information only at the end of the month when the utility bill is issued.

5 HOUSING

Construction Periods of Multi-Family Apartment Buildings. The building stock in the district consists of about 1,500 buildings, with 91,258 apartments. A significant majority, i.e. 80% of them were built before 1990.

Energy Efficiency Status. The buildings have poor energy performance, falling within energy classes E, F and G. This indicates low energy efficiency, higher operational costs and greater environmental impacts.

Recent Renovations on Energy Efficiency. Between 2018 and 2022, 88 households in eight MFABs in different streets¹¹ underwent full refurbishment, including façade and roof insulation, replacement of windows and doors, installation of energy-efficient internal lighting and insulation of basement ceilings. Energy performance improved in all buildings, with most upgraded from E to B class, while others improved from E to C and from D to C, reflecting a significant enhancement in overall energy efficiency. Nevertheless, many people implement energy efficiency measures in their apartments, such as wall insulation, windows replacement, yet these activities are not reported and registered.

Subsidies for Renovations. Currently, the following programs for financing EE measures and PV installation are available to MFABs and households:

- **Renovation of MFABs**

Since 2016, the government in cooperation with the municipalities and HOAs invested about 5 billion leva (approx. EUR 2,56 billion) for renovation of MFABs. Grants are 100% and cover the implementation of energy efficiency measures for the whole building, including facade insulation, windows replacement, roof repair and insulations, replacement of lightning in shared areas. The implementation of these measures results in MFABs achieving energy class B and A. With more than 300 completely renovated private MFABs, Burgas holds the top position in the country.

- **Replacement of coal/wood heating stoves with energy-efficient heat pumps/ pellet stoves.**

Since 2022, Burgas Municipality has undertaken initiatives, funded by several EU projects, to substitute outdated heating devices with new energy-efficient air conditioners or pellet stoves. To date, approx. 2,800 outdated heating devices have been replaced and another 4,250 households will have their devices replaced by the end of 2028.

In 2024, a program¹² for installation of PVs for households, financed by Bulgaria National Recovery and Resilience Plan was opened¹³.

Bulgaria's Social Climate Fund is anticipated to launch in the second half of 2026. The budget allocated for this is EUR 2,28 billion, of which EUR 1 billion will be available for implementation of energy efficiency measures, with emphasis on energy poor households¹⁴.

¹¹ The renovations were carried out at the following streets: Han Krum No.11 and No. 13; Slivnitsa No. 20; Sheynovo No.12 and 29; Sveti Kliment Ohridski No. 25; Gladston No. 52; and Sveti Patriarh Evtimii No. 76.

¹² Since citizens applied directly to the respective institution, the total number of households covered by the programme is unknown.

¹³ <https://build-up.ec.europa.eu/en/news-and-events/news/eur-123-million-make-bulgarian-homes-more-energy-efficient/>

¹⁴ <https://www.rescoop.eu/policy/financing-tracker/social-climate-fund/bulgaria-socialclimatefund/>

6 PILOT AREA

The pilot area, Vazrazhdane, is a neighbourhood in Burgas, located quite close to the city centre. The district is bordered by major roads, near transport hubs (bus lines, railway), making it very well connected. The city overall has a humid subtropical climate with maritime influence plus some continental traits. Summers are long (mid-May to late September), warm to hot, mild winters, snow is rare and doesn't last.

The central part of the city and the Vazrazhdane residential district are characterized by predominantly low- and medium-rise buildings. There are many old buildings dating back to the city's founding, most of which are cultural monuments. However, in addition to the historic part of the centre, the area has many apartment buildings (5-6 stories) from the last 20 years, which has significantly densified the urban structure and resulted in a high population density.

In terms of the built environment, the area consists of older panel and brick buildings as well as newer residential complexes. This area is well-equipped with schools, kindergartens, shops, restaurants and cultural institutions (opera, theatre, youth centre etc.) However, it is heavily urbanized and lacks of parking spaces and green areas.

Compared to peripheral areas, this area has relatively high property prices especially for newer/renovated housing. The neighbourhood is desirable for people who want to be near central Burgas but still in a quieter, residential environment.



Figure 3: Delineation of the pilot area



Figure 4: Overview of the pilot area and its surroundings, with selected buildings highlighted in beige, orange and red

7 FINDINGS FROM THE TECHNICAL SURVEY OF THE PILOT AREA

Target neighbourhood in Bulgaria, part of Vazrazhdane district, is part of Burgas, measuring approximately 1.00 by 0.50 km and covering area of approximately 0.60 km². It includes 738 residential buildings, most of which are smaller MFAB, closely packed side-by-side and sharing outer walls, with small inner yards or gardens and narrow streets between them. Beside such buildings, there are few dozens of large residential buildings (residential blocks) with several entrances each, separated from other buildings by parks, sport terrains and parking spaces.

Table 2: Overview of buildingstock, Burgas, current state

Buildings	-	738
Heated area, total	m ²	718,049
Heated area, average per building	m ²	973
Heat required for heating, total	kWh/a	58,251,437
Heat required for heating, average per m ²	kWh/m ² a	81.12
Small buildings (≤500 m ²)	-	162 (22%)
	m ²	61,104 (9%)
	kWh/a	6,404,173
	kWh/m ² a	104.81
	tCO ₂ /a	861.78
	tCO ₂ /m ² a	0.014

Mid-sized buildings (500-2,000 m ²)	-	531 (72%)
	m ²	498,625 (69%)
	kWh/a	42,612,058
	kWh/m ² a	85.46
	tCO ₂ /a	5,934.76
	tCO ₂ /m ² a	0.012
Large buildings (≥2,000 m ²)	-	45 (6%)
	m ²	158,320 (22%)
	kWh/a	9,235,206
	kWh/m ² a	58.33
	tCO ₂ /a	2,546.89
	tCO ₂ /m ² a	0.016

Consequently to mild climate and hot summers, apartments and, in some cases, entire buildings are heated and cooled by using split and multi-split air conditioners. They are used to heat or cool individual rooms and spaces inside apartments, while common spaces within buildings remain without conditioning. For small buildings outside units are in inner yards, on terraces and balconies or, sometimes, on roofs. Several brand-new buildings are heated/cooled by using heat pumps. Energy source in all these cases is electricity, and almost all air conditioners are inverters. According to information collected during site visits, district heating is available but not extensively used. The system is old, partially refurbished, and consumption is paid per energy spent, but on the building level, i.e. there are no measurements at the apartment level. Electricity is used for lighting of residential and common spaces in buildings, as well as for preparation of domestic hot water and all appliances.

Implementation of any renewable energy sources measures makes sense only if buildings are fully insulated, i.e. with wall, ceiling/roof and floor/basement insulation, as well as with new windows and doors.

Table 3: Overview of buildingstock, Burgas, after implementation of energy efficiency measures

Heat required for heating, total	kWh/a	29,286,018
Heat required for heating, average	kWh/m ² a	40.78
Small buildings (≤500 m ²)	kWh/a	3,106,504
	kWh/m ² a	50.84
	reduction %	51.50
	tCO ₂ /a	419.84
	tCO ₂ /m ² a	0.007
Mid-sized buildings (500-2,000 m ²)	kWh/a	20,754,665
	kWh/m ² a	41.62
	reduction %	51.30
	tCO ₂ /a	2,893.84
	tCO ₂ /m ² a	0.006
Large buildings (≥2,000 m ²)	kWh/a	4,424,850
	kWh/m ² a	34.27
	reduction %	41.26
	tCO ₂ /a	1,491.65
	tCO ₂ /m ² a	0.009

In the Reports on possibilities for energy production from renewable sources needed for energy self-sufficiency of target districts, various renewable sources have been analysed and considered to achieve sustainable and independent energy supply after implementation of energy efficiency measures, instead of currently used natural gas and fossil-fuel based electricity. It has been suggested to keep current ways of heating by inverter split-system air conditioners and heat pumps. Through installation of PV panels on rooftops and inverters within the buildings, with the average utilization of relatively modest 25% of the roof area, there would be possible to achieve energy sustainability for the entire target neighbourhood.

Considering that baseline assessment and proposed energy efficiency measures are already covered and included in Buildingstock (with all details), the next step would be prioritisation and selection criteria. Based on numbers presented in Tables 2 and 3, it would be reasonable to start implementation from mid-sized buildings. Largest by number and heated area, and accommodating most residents, they would provide great start. In addition, many of these buildings are built in rows along the streets, therefore effectively reducing investment. Smaller buildings would require smaller investment, but the expected impact would be smaller too, involving less residents. On the other side, due to possible legal reasons in conjunction with large number of residents, implementation on large buildings could be somewhat problematic. Hence, latter two could be included in later stages of renovation.

It is hard to give implementation timeline, as it includes many mutually connected and intertwined steps. Preparation could take 6 to 12 months, and include coordination with HOAs and verification of legal documentation and ownership. Residents should acknowledge that implementation of the RES measures makes sense only if all the EE measures are implemented. Technical documentation and procurement procedures could be made in stages. Implementation of measures, i.e. actual works on buildings, could take up to 5 years to complete, considering number of buildings and available resources, weather and other influencing factors.

There are many key actors to be involved in this process, some of them being HOAs, Municipality of Burgas (technical assistance, social programmes and co-funding support), construction companies and electricity distributor/operator (for PV grid connection). With their joint work and assistance to residents, financing plan and analysis can be made, including municipal and EU-funded subsidies, “green” and other loans or other co-financing programmes.

After implementation of measures, monitoring and verification should last at least 10 years.

8 VISION FOR THE PILOT AREA

Burgas Municipality signed the Covenant of Mayors initiative in 2009 and in 2020, joined the Global Covenant of Mayors for Climate and Energy. This initiative brings together local authorities in the EU in a voluntary commitment to implement measures and projects promoting sustainable energy development and combating climate change. Its objectives include improving energy efficiency, increasing the share of renewable energy and reducing greenhouse gas emissions by 2050, as defined by the Paris Agreement.

The main objectives of the initiative are:

- reducing greenhouse gas emissions,
- increasing resilience and adapting to and mitigating the adverse impacts of climate change, and
- combating energy poverty as a key action to ensure a just transition.

In order to achieve the commitments made by Burgas Municipality, the local administration has identified energy efficiency and the implementation of renewable energy sources as key priorities. To a

large extent, these priorities have been achieved regarding public buildings. On the other hand, the administration, well aware of the needs of its citizens, is trying to provide full institutional support to the citizens of Burgas who are willing and eager to improve the energy efficiency of the buildings in which they live.

Taking into account the pace of renovation of MFABs over the years, as well as the political commitments of the Bulgarian state, Burgas Municipality has set the following goals for the Vazrazhdane neighborhood:

By 2050, 50% of buildings are expected to achieve energy class A, reflecting a significant improvement in overall energy performance and building efficiency standards. In parallel, 70% of electricity consumption is projected to be supplied from RES, supporting the transition toward a low-carbon and more sustainable system.

8.1 Goals for the pilot area

- **Energy efficiency in buildings**
 - Complete renovation of 20 MFABs to achieve energy class A by year 2030
 - Complete renovation of 200 MFABs to achieve energy class A by year 2040
 - Complete renovation of 500 MFABs to achieve energy class A by year 2050.
- **Photovoltaic installations**
 - 500 MW photovoltaic installations built by 2030
 - 1,5 GW photovoltaic installations built by 2040
 - 3 GW photovoltaic installations built by 2050.

A detailed overview of defined activities has been presented in Table 4.

Table 4: Overview of defined activities and responsibilities

Objective	Activities	Lead actors	Supporting actors	Target group	Timeline (years)
Energy Efficiency in Buildings					
Financing and Incentives	Gather and prepare comprehensive information regarding funding opportunities and subsidy schemes available to residents	RC HOAs	Burgas Municipality	Residents	1 year
	Secure funding through EU and other program	RC	Burgas Municipality	Residents	1 year
	Organize informational days regarding funding opportunities and energy efficiency and energy saving	RC	HOAs Burgas Municipality	Residents	Continuously
Energy Audit and Assessment	Conduct energy audits of MFABs to identify the most effective renovation measures	External experts	RC Burgas Municipality	-	1 year
Dissemination of information¹⁵	Inform residents about the audits findings	RC	HOAs External experts	Residents	1 year
Renovation plans	Develop building-specific renovation plans	External experts	RC Burgas Municipality	Residents	2 year

¹⁵ To ensure accessibility for vulnerable groups, particularly those with chronic illnesses or mobility impairments, information should be provided through multiple communication channels.



Objective	Activities	Lead actors	Supporting actors	Target group	Timeline (years)
Communicate renovation proposals	Presentation of renovation proposals including plans, budgets and timelines	RC	External experts Burgas Municipality	Residents	2 year
Increase residents' awareness and knowledge on energy-efficient practices	Conduct workshops for residents on energy saving and provide guidance on energy-efficient lifestyles	RC HOAs	Burgas Municipality	Residents	Continuously
Evaluate renovation proposals	Review renovation proposals (planned measures) and gather residents feedback and address concerns	HOAs	RC	Residents	2 year
Outline the project scope	Specify technical requirements, standards, set timeline and budget expectations	HOAs	RC	-	2 year
Identify potential contractors	Review portfolios, past projects and experience	HOAs	RC	-	2 year
Evaluate proposals	Review contractors' proposals, check licences and certifications, assess methodology and work plan	HOAs	RC	-	2 year
Negotiate and Finalize Contract	Agree on scope, price, timeline; define payment terms and penalties	HOAs	RC Burgas Municipality	-	2 year
Implementation of Renovations	Carry out planned renovations (façade, roof and basement insulation)	Contractor(s)	Construction supervisor (RC)	-	3 year

Objective	Activities	Lead actors	Supporting actors	Target group	Timeline (years)
	Install energy-efficient lighting and smart meters	Contractor(s)	Construction supervisor (RC)	-	3 year
Monitoring	Monitor energy performance post-renovation	External experts	RC	-	4 year
Certification	Certify buildings as energy class A	External experts	RC	-	4 year
Photovoltaic Installations					
Site Assessment and Feasibility Studies	Identify suitable MFABs (rooftops)	External experts	HOAs RC	-	1 year
Access to financial support opportunities	Gather and prepare comprehensive information regarding funding opportunities and subsidy schemes available to residents	RC HOAs	Burgas Municipality	-	1 year
	Organize informational days regarding funding opportunities	RC HOAs	Burgas Municipality	-	Continuously
Financial Support	Apply for government or EU funding	HOAs	RC Burgas Municipality	Residents	1 year
Dissemination of information	Inform residents about the studies results	External experts RC	HOAs	Residents	1 year

Objective	Activities	Lead actors	Supporting actors	Target group	Timeline (years)
Outline the project scope	Specify technical requirements, standards, set timeline and budget expectations	HOAs	RC Burgas Municipality	-	2 year
Identify potential contractors/suppliers	Review portfolios, past projects and experience	HOAs	RC Burgas Municipality	-	2 year
Evaluate proposals	Review proposals and gather residents feedback and address concerns	HOAs	RC	-	2 year
Negotiate and Finalize Contract	Agree on scope, price, timeline; define payment terms and penalties; technical specifications, warranties; installation and safety standards	HOAs	RC Burgas Municipality	-	2 year
Planning and Permitting	Obtain necessary permits and approvals	Contractor	RC	-	3 year
Installation	Install rooftop PV systems; Integrate battery storage where feasible	Contractor	HOAs RC	-	3 year
Grid Integration and Smart Management	Connect PV systems to the local grid	Contractor	HOAs RC	-	3 year
	Install smart inverters and energy management systems to optimize systems	Contractor	HOAs RC	-	3 year

Objective	Activities	Lead actors	Supporting actors	Target group	Timeline (years)
Monitoring and Maintenance	Monitor system performance and ensure reliability	Contractor	HOAs RC	-	3 year



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9 ROADMAP DEVELOPMENT FRAMEWORK

The following section provide guidance for developing sector-specific roadmaps. It outlines a structured approach for developing effective strategies in mobility, energy, public and green spaces. This guidance should not be seen as comprehensive, but may need to be adapted, supplemented or updated to reflect shifting priorities or sector-specific requirements.

Key steps for developing a neighbourhood roadmap include, but are not limited to:

- **Establish governance and responsibilities** (define roles and responsibilities for roadmap development)
- **Define resources and funding** (public budget, EU funds, etc.)
- **Define the scope** (what does energy efficiency and energy sufficiency mean in the context of neighbourhood)
- **Develop goals** (by using SMART criteria)¹⁶
- **Analyse the current situation to establish a baseline for the sector:**
 - Neighbourhood area (geographic and infrastructural characteristics)
 - Population (demographics, income, education, gender, vulnerable groups, etc.)
 - Relevant national and EU policies
- **Identify stakeholders** (residents, public institutions, businesses, local NGOs, vulnerable groups, etc.)
- **Conduct stakeholders engagement** (take into account their comments and suggestions when defining vision, objectives and goals), refer to Annex
- **Identify priority actions and develop an action plan** (sequence into phases e.g., 2026-2028)
- **Define responsible actors and cost estimates for each action**
- **Inform stakeholders and strengthen long-term commitment**
- **Define key performance indicators**
- **Assign reporting responsibilities.**

This guidance is structured around three key dimensions: **energy efficiency, energy sufficiency and social equity**. Each aspect provides a set of targeted questions to provide information and assist in creating a roadmap. Through a systematic approach to the three dimensions, the guidance helps identify challenges, set priorities and design strategies that are both sustainable and inclusive.

¹⁶ Formulate the goals in SMART criteria: Specific (targeting a particular area for improvement); measurable (quantifying, or at least suggesting, an indicator of progress); assignable (defining responsibility clearly); realistic (outlining attainable results with available resources); time-related (including a timeline for expected results)

9.1 Energy

Table 5: Guiding questions for developing a roadmap for energy efficiency and energy sufficiency in mobility

Energy Efficiency	Energy Sufficiency	Social Equity
Conceptual Framework What is our energy vision for energy efficiency and energy sufficiency for the neighbourhood area?		
- Define a vision of energy efficiency for the neighbourhood area <u>Guiding questions:</u> - What is the current energy mix in the neighbourhood? - What is the potential for energy renewable generation? - What are the technical, financial or legal barriers for implementing renewable energy?	- Define a vision of energy sufficiency for the neighbourhood area <u>Guiding questions:</u> - What is the minimum energy requirement for each household for basic services, health and comfort? - What are the main energy uses (heating, cooling, appliances)?	- Define a vision for the neighbourhood area that is inclusive of all residents, including vulnerable people: <u>Guiding questions:</u> - Which households currently experience energy poverty or insufficient access? - Could planned interventions increase energy costs for vulnerable people?
Establish Baseline		
<u>Guiding questions:</u> - What is the total energy consumption for the sector? - How does consumption vary by season and time of day? - Which energy equipment is most energy-intensive?	<u>Guiding questions:</u> - What is the average living/working space per person? - Are there opportunities for shared spaces or multi-functional use? - How many devices are left on the standby mode?	<u>Guiding questions:</u> - What population groups are overconsuming energy? - What % of households income do vulnerable people spend on energy? - How many households must choose between heating/cooling and other basic needs (e.g. food, medicine, etc.)?



Energy Efficiency	Energy Sufficiency	Social Equity
• Are there frequent energy shortages and blackouts? • Are there any energy audits or monitoring systems already in place?	• What behaviours contribute most to energy use (leaving appliances in standby mode, long showers, etc.)? • How much energy demand could be shifted, reduced and eliminated? • What natural resources are underutilized (daylight, natural ventilation, etc.)? • Which sufficiency measures would have the greatest impact with the least impact on wellbeing? • How can energy sufficiency be promoted through local generation and reduced consumption?	• How does energy poverty affect mental health and social isolation? • Are households using potentially dangerous equipment/appliances (e.g. portable gas heaters, etc.)? • What social protection mechanism exist (e.g. energy subsidies)? • Do vulnerable people experience discrimination in accessing energy services? • What is the level of energy literacy among vulnerable people (e.g. familiarity with energy efficiency, knowing their rights, etc.)? Stakeholder Engagement • Have vulnerable people been consulted about their energy needs and challenges? • What energy needs do vulnerable people see as most urgent? • What community organizations work with vulnerable people on energy issues? • Which methods (digital platforms, surveys, etc.) should be used to collect and incorporate feedback from residents and other stakeholders?

9.2 Mobility

Table 6: Guiding questions for developing a roadmap for energy efficiency and energy sufficiency in mobility

Energy Efficiency	Energy Sufficiency	Social Equity
Conceptual Framework		
What is our mobility vision for energy efficiency and energy sufficiency for the neighbourhood area?		
Define a vision of energy efficiency for the neighbourhood area <u>Guiding questions:</u> - How can the neighbourhood improve energy efficiency in transport (e.g. use less energy-intensive modes of transport per kilometer such as walking, cycling, shared mobility etc.)? - What are the main challenges in shifting to energy-efficient transport? - What legal, financial or organizational barriers exist?	Define a vision of energy sufficiency for the neighbourhood area <u>Guiding questions:</u> What measures could reduce overall energy demand (e.g. reduce total distance travelled and reduce use of motorized transport)?	Define a mobility vision for the neighbourhood area that is inclusive of all residents, including vulnerable people: <u>Guiding questions:</u> - What is our mobility vision for the neighbourhood area with regard to vulnerable people? - What are the mobility needs of the Elektrėnai population? - How can mobility contribute to social equity and quality of life in the neighbourhood? - How mobility improvements benefit vulnerable people and address transport poverty?
Establish Baseline		
<u>Guiding questions:</u> How is local transportation currently organized in the pilot area?	<u>Guiding questions:</u> What activities are being undertaken by stakeholders (local businesses, schools, community groups, NGOs, etc.) to promote	<u>Guiding questions:</u> Do specific population groups experience unequal impacts from energy-intensive

Energy Efficiency	Energy Sufficiency	Social Equity
• What is the energy demand of each transport mode in the neighbourhood and which modes could be replaced with less energy-intensive alternatives? • What are the current travel patterns, energy use and accessibility gaps? • Who travels how much and why (disaggregated by gender, age, income, etc.)? • What targeted programs or subsidies are available for vulnerable groups, such as reduced fares or accessible transport options?	and support sustainable mobility (e.g. walking, cycling)? • What infrastructure is needed to make walking and cycling more attractive? • What obstacles or safety concerns hinder sustainable mobility, and how do they affect travel behaviour?	travel needs (e.g. obliged to rely on private cars due to lack of public transport)? • Who lacks adequate access to essential destinations? • Are there barriers such as poor infrastructure or unsafe routes that force specific groups to rely on costly and energy-intensive modes of transport? • Are transport cost a barrier to reaching essential destinations such as work, school, healthcare, etc.? • Do safety or infrastructure issues (e.g. unsafe streets, lack of sidewalks, poor visibility, etc.) prevent certain population groups from using sustainable transport (e.g. walking, cycling, car sharing, etc.)? • How would a new vision for sustainable mobility affect residents' daily activities and what measures are needed to ensure that all population groups (e.g. elderly, people with disabilities, caregivers, etc.) can access essential services and destinations? Stakeholder Engagement • Who are the key stakeholders in local transport? • How can residents be engaged in shaping mobility solutions? • Which methods (digital platforms, surveys, etc.) should be used to collect and

Energy Efficiency	Energy Sufficiency	Social Equity
		incorporate feedback from residents and other stakeholders in transportation planning? How does transport planning consider and accommodate vulnerable groups such as people with disabilities, low-income households, etc.?

9.3 Public and Green Spaces

Table 7: Guiding questions for developing a roadmap for energy efficiency and energy sufficiency in public and green spaces

Energy Efficiency	Energy Sufficiency	Social Equity
Conceptual Framework		
What is our vision for energy efficiency and energy sufficiency for the neighbourhood area?		
Define the vision of energy efficiency for the neighbourhood area	Define the vision of energy sufficiency for the neighbourhood area	Define the vision for the neighbourhood area with regard to vulnerable people:
<u>Guiding questions:</u> - How can public and green spaces contribute to energy efficiency? - What are we trying to achieve (carbon neutrality, cost savings, resilience, etc.)? - What are barriers to implementing green space or water saving initiatives (e.g. resources, maintenance, etc.)?	<u>Guiding questions:</u> - Which services and amenities¹⁷ are truly essential for achieving our vision? - Can we shift from energy-intensive to passive solutions (natural cooling, daylighting, etc.)? - How can we design spaces that require less energy? - Which nature-based solutions can help reduce the neighbourhood's energy dependence?	<u>Guiding questions:</u> - How do we ensure planned changes don't disproportionately affect vulnerable groups? - How to balance energy goals with other objectives (safety, accessibility, recreation)? - Could interventions unintentionally increase inequalities and how can this be prevented? - What demographic or usage pattern changes should we anticipate?
Establish Baseline		
<u>Guiding questions:</u> What amenities, facilities and services currently exist across public and green	<u>Guiding questions:</u> Which amenities, facilities and services could be redesigned to require less energy,	<u>Guiding questions:</u> Who are the most vulnerable populations in our context (e.g. elderly populations, single-

¹⁷ There are many different types of amenities that can be provided to support recreation, social interaction and community life, such as playgrounds, sports facilities, outdoor gyms, picnic and sitting areas, fountains, gardens, performance spaces, markets and other similar features.



Energy Efficiency	Energy Sufficiency	Social Equity
spaces in the neighbourhood (e.g. lighting, pools, fountains, sports field lighting, gardens, etc.)? - What energy sources are currently used (grid electricity, gas, renewable sources)? - What is neighbourhood total energy consumption across all public and green spaces (by type, location, season)? - Which amenities/facilities are the most energy-intensive and why? - How much energy is consumed when facilities are closed or unoccupied? - What maintenance activities consume energy (e.g. blowing leaves, mowing lawns, trimming edges, irrigation, etc.)	while still ensuring sufficient energy for their proper functioning? - What maintenance and operational practices can reduce overall energy consumption without compromising service standards? - How can underutilized facilities or areas be optimized or combined with other functions to reduce unnecessary energy consumption?	headed households, people with disabilities, refugees, single parents, ethnic minorities, etc.)? - What is the actual visitor/user number for each facility/amenity? - What do users value about green spaces beyond amenities (nature connection, quiet, beauty, etc.) - Are energy-intensive amenities used equally across all demographic groups? - Are there populations dependent on specific services (e.g. accessible facilities)? - Which population groups are overrepresented or underrepresented as users? - Do elderly or disabled populations depend on specific features (e.g. accessible restrooms, climate-controlled spaces, etc.)? - Would reduced maintenance (lighting, cleaning, safety) create disproportionate risks and for whom? - Are there population groups for whom public spaces are essential, not optional? - Are public spaces critical for physical activity for those who can't afford gyms or lack safe outdoor space?

Energy Efficiency	Energy Sufficiency	Social Equity
		- Do elderly, young or medically vulnerable populations depend on specific amenities? - Are there population groups for whom well-maintained public spaces provide safety from domestic or neighbourhood violence? - Do facilities host culturally important gatherings, celebrations or practices? - Are there intersecting vulnerabilities (e.g. elderly + low income + language barrier)? Stakeholder Engagement - What kind of engagement process should we have to reach diverse communities (language access, meeting times, locations, formats)? - Which community groups, NGOs, businesses, etc. should be engaged? - How to ensure that voices of vulnerable people are not absent or ignored? - What challenges exist in engaging residents in public and green space management (e.g. lack of interest and understanding, lack of skills and time, institutional barriers, etc.)

10 ANNEX

STAKEHOLDER ENGAGEMENT CHECKLIST

Activities	Comment
<u>Identify stakeholders</u> ☐ MFAB owners ☐ MFAB tenants ☐ Vulnerable groups (elderly, single-head families, women, etc.) ☐ Community organizations ☐ NGOs ☐ Other _____ (please specify)	
<u>Stakeholder mapping</u> ☐ Classify stakeholders (high influence, low interest, vulnerable population) ☐ Identify potential supporters (agents of change) ☐ Identify potential resistance points	
<u>Engagement plan</u> ☐ Choose methods tailored to social groups ¹⁸ : info sessions, workshops, door to door visits, etc. ☐ Tailor communication for vulnerable people ¹⁹ ☐ Materials preparation (leaflets, FAQs, list of participants, etc.)	
<u>Communication strategy</u> ☐ Explain renovation goals and expected benefits ☐ Provide timeline with key milestones ☐ Explain MFABs tenants rights and financing (subsidies, incentives, cost-sharing, administration rules, etc.) ☐ Provide information in multiple formats: printed, website, meetings, community organizations ☐ Provide contact information (phone, e-mail address, mail address, etc.) ☐ Record concerns and needs (specially of vulnerable people)	

¹⁸ To effectively inform and engage, communication and engagement method should be tailored to the characteristics, preferences and needs of each social group.

¹⁹ Use language that is neutral, factual and respectful.



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