LOCATEE

LOCAL AUTHORITIES TACKLING ENERGY POVERTY IN PRIVATE MULTI-APARTMENT BUILDINGS

Understanding energy poverty at the local level and the role of multi-apartment buildings

[30/09/2025]

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Co-funded by the European Union under n°101167621. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them. This work has been co-funded by the Green Fund (GRFU).

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Project Acronym:	LIFE23-CET-LOCATEE
Project full name:	LOCal Authorities to Tackle Energy povErty in private multi-apartment buildings
Grant Agreement No.:	101167621
Project URL:	https://ibs.org.pl/en/research/locatee-local-authorities-tackling-energy-poverty-in-private-multi-apartment-buildings/
EU Project Officer:	Vinicius Valente
Project Coordinator:	Institute for Structural Research (IBS)
Deliverable:	[D2.1 - Understanding energy poverty at the local level]
Work Package:	[WP2 - Setting up the ground for regional and local strategies development]
Date of Submission:	30 September 2025
Dissemination Level:	Public
Lead Beneficiary:	TEESlab - UPRC
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About LOCATEE

LOCATEE aims to support local municipalities in addressing energy poverty through the renovation of private multi-apartment buildings for vulnerable residents. LOCATEE will achieve this goal by providing a toolkit for identifying energy-vulnerable households, matching tailored interventions to their needs, and integrating energy poverty alleviation activities into long-term strategies of municipalities, such as Sustainable Energy and Climate Action Plans. LOCATEE will use administrative data to create household and building typologies to identify priority intervention locations. This process will help authorities and social partners address local energy poverty through coordinated solutions, including contact points and focus groups with housing entities, to facilitate knowledge exchange on renovation programs and targeted solutions.

The evidence-based and collaborative approach will be implemented in three pilot municipalities in Central, Southern, and Southeastern Europe: Piraeus (Greece), Rumia (Poland), and Torres Vedras (Portugal), while ensuring the scaling up of the LOCATEE framework to more municipalities and regions across Europe.

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Executive Summary

This report, developed within the LOCATEE project, lays the conceptual foundation for addressing energy poverty in Europe, with particular attention to the challenges posed by private multi-apartment buildings (MABs). It reviews EU, national, and local policy frameworks, and highlights barriers such as poor building performance, fragmented ownership and decision-making, financing gaps, and limited municipal capacity that constrain effective energy poverty alleviation. A systematic review of 57 local initiatives across Europe illustrates both promising practices and persistent shortcomings, particularly the lack of robust monitoring and evaluation mechanisms. The analysis underscores the importance of multi-level governance and the critical role of municipalities, civil society organizations, and housing entities as intermediaries in linking policy objectives with on-the-ground delivery. By bringing together this knowledge, the Deliverable provides an important step in structuring the LOCATEE approach and toolkit, which will serve to strengthen local governance capacities and support evidence-based, inclusive, and context-sensitive solutions. This conceptual groundwork also sets the stage for the in-depth work to be carried out in the pilot municipalities in Portugal, Greece, and Poland, ensuring that subsequent project activities are firmly rooted in both European experience and local realities.

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List of abbreviations and acronyms

Full name	Abbreviation/ Acronym
Carbon dioxide	CO_2
Civil Society Organisation	CSO
Covenant of Mayors	CoM
Energy Efficiency Directive	EED
Energy performance certificate	EPC
Energy Performance of Buildings Directive	EPBD
Energy Poverty Advisory Hub	EPAH
Energy service company	ESCO
European Commission	EC
European Union	EU
Heating, Ventilation and Air-Conditioning	HVAC
Multi-apartment building	MAB
National Energy and Climate Plan	NECP
Non-governmental organisation	NGO
One-stop-shop	OSS
Private rented sector	PRS
Sustainable Energy and Climate Action Plan	SECAP
Work package	WP

1 Introduction

Energy poverty is generally described as "*a situation where households face the inability to secure materially, and socially, necessitated energy services required for essential activities like cooling, heating, cooking, lighting, and other vital tasks*" (Al Kez et al., 2024; Makridou et al., 2024; Palma et al., 2024; Papantonis et al., 2024). In this context the European Union (EU) points out that "*Energy poverty occurs when a household must reduce its energy consumption to a degree that negatively impacts the inhabitants' health and wellbeing*". Currently, over 69 million people across the EU are affected by energy poverty (more than 14% of the EU's population), highlighting the need for addressing this problem at the EU scale (Palma et al., 2024).

In its latest Recommendations on Energy Poverty (EU/2023/2407), the European Commission (EC) indicates energy poverty as a multidimensional phenomenon, primarily driven by three structural factors, namely **(i)**. *high energy costs relative to a household's budget*; **(ii)**. *low income levels*; and **(iii)**. *poor energy performance of buildings and appliances* (European Commission, 2023a). Additional contributing factors include climatic conditions, sociodemographic characteristics (e.g., presence of children, elderly members, persons with disabilities), gender, health, and household-specific energy and transportation needs (European Commission, 2023a; Makridou et al., 2024).

Recognising the socio-economic nature of the issue, the EU has introduced several initiatives and policy instruments to support Member States in addressing it. Most notable is the recently revised Energy Performance of Buildings Directive (EPBD), which entered into force in May 2024 (EU/2024/1275). EPBD includes explicit provisions for vulnerable groups and households, thereby linking improved energy efficiency directly to energy poverty mitigation (European Commission, 2024b).

In this context, zooming on the building level is essential, especially in multi-apartment buildings (MABs), which play a key role in energy poverty dynamics, as approximately 48% of the EU population lives in flats, thereby highlighting that MABs are an important segment of the building sector (Boza-Kiss et al., 2021; Eurostat, 2024). MABs are typically defined as residential complexes where multiple households live, either within a single building or across several interconnected units.

However, upgrading energy performance in privately owned MABs poses unique barriers and challenges. Many energy-related decisions, such as envelope insulation, heating systems, and collective retrofitting, lie beyond the control of individual owners (or tenants), and often require consensus within complex ownership or co-decision structures. Barriers such as split incentives, legal constraints on collective decision-making, and a lack of technical or financial support mechanisms severely limit the feasibility of implementing energy efficiency measures in these settings (Gerőházi et al., 2023).

Despite growing attention to energy poverty, when it comes to MABs, significant gaps persist in both scientific literature and practice (Briot-Arthur et al., 2024; Croon et al., 2023; Papantonis et al., 2022; Thomson et al., 2022). Methodological challenges include the lack of high-resolution data at the local and municipal levels (Coleman et al., 2024), limited integration of income and building energy performance indicators into local diagnostics (Jones & Reyes, 2023), along with the lack of local, community-based engagement in the policymaking process related to energy poverty at the local level (Creutzfeldt et al., 2020). **These limitations highlight the importance of strengthening local**

governance capacities, as municipalities and community actors are often best positioned to bridge data gaps and design context-specific interventions.

Building on this recognition, addressing energy poverty at the local level has gained increased importance within the EU policy framework. According to the Energy Poverty Advisory Hub (EPAH), effective local action planning often follows a circular approach comprising three key phases: (i) Diagnosis, (ii) Planning, and (iii) Implementation (European Commission, 2022). Aligned with these pillars, this report serves as one of the first conceptual foundations for the LOCATEE approach, which seeks to contribute across all three dimensions of local action.

Specifically, it aims to address relevant gaps by offering a comprehensive analysis of how energy poverty is currently approached and addressed at the local level. It does so by focusing on three key aspects:

(i). *The importance of addressing energy poverty at the local level*; **(ii)**. *The review of existing policies, mechanisms, and approaches for addressing energy poverty at the local level*; and **(iii)**. *The identification of barriers, opportunities and best practices for implementing energy efficiency upgrades, particularly in private MABs*.

To this end, an extensive desk-based literature review has been carried out to synthesise existing knowledge on energy poverty and local governance responses. The analysis highlights where current regional and local planning approaches may fall short by examining alleviation measures implemented through innovative policies, supportive schemes, and strategic frameworks such as the Sustainable Energy & Climate Action Plans (SECAPs). It also identifies the key barriers and challenges that hinder the development of effective local energy poverty strategies. Finally, the analysis points to solutions and implementation pathways, showcasing best practices that municipalities, housing entities, and other intermediaries can adopt to address energy poverty within their local contexts.

Overall, this Deliverable lays the foundation for subsequent LOCATEE activities, which focus on advancing energy efficiency upgrades in private MABs as a pathway to alleviating energy poverty at the local level. In doing so, it provides policymakers and other stakeholders with key insights and practical implications that, if effectively acted upon, can accelerate the deployment of energy efficiency measures and policies, thereby contributing to the reduction of energy poverty in MABs across the EU.

2 Methods

To provide readers with an up-to-date review of current knowledge and practice in energy poverty research and policy at the regional and local levels, this analysis adopts a multi-layered desk-based approach, as depicted in **Figure 1**. This approach is designed to capture the complexity of energy poverty alleviation strategies, focusing on key aspects such as policy frameworks, support schemes, energy efficiency measures, and specific challenges of private MABs.

We begin by identifying and reviewing relevant academic and policy literature across major scientific databases (e.g., ScienceDirect, Scopus) and institutional sources (e.g., European Commission, EPAH, national observatories). To do so, keywords like “energy poverty (at the local level)” OR “energy vulnerability” OR “energy justice” OR “multi-apartment buildings AND energy poverty” OR “energy poverty at the private rented sector” OR “energy poverty and local authorities” are used. Project partners contributed to a shared bibliographic database, covering literature sources that informed different sections of the report. While the initial database serves as a reference point, additional sources are integrated as the analysis evolves to ensure thematic coverage and accuracy.

Moreover, to analyse existing regional and local-level initiatives that address energy poverty, **57 policies and initiatives** focused on energy poverty/ energy efficiency at the local level across various EU countries are collected and documented, with an emphasis on the pilot countries: **Greece, Poland, and Portugal**. These initiatives are uploaded to a structured database that is later analysed quantitatively and qualitatively. Key metadata categories include:

- Target groups (e.g., low-income households, elderly, renters)
- Type of intervention (e.g., renovation, subsidies, capacity building)
- Implementation level (municipal, regional, national)
- Funding mechanism and governance arrangements

An additional layer of analysis focused on the **legal, institutional, and decision-making constraints** affecting the implementation of energy efficiency measures, particularly in privately owned MABs. This includes reviewing housing legislation, ownership models, and the presence of split incentives that complicate collective decision-making processes.

Building on the previous steps, we conduct a complementary analysis to identify key **barriers, constraints, best practices, and opportunities** for improving local responses to energy poverty, with a particular focus on **energy efficiency interventions in private MABs**. This analysis examines a broad set of challenges, financial, legal, technical, and governance-related, that hinder the implementation of such measures at the local and regional levels.

Special attention is given to the **Private Rented Sector (PRS)**, which is particularly prominent within the MAB stock in many European countries. Given the complex ownership structures, split incentives, and regulatory gaps that characterise the PRS, it represents a critical area for targeted policy intervention. Barriers specific to the PRS are analysed in detail, alongside those affecting multi-owner buildings more broadly.

In parallel, we review challenges encountered by **local authorities** in the design and implementation of energy poverty alleviation strategies, including limitations in institutional capacity, data availability, and community engagement.

Following the identification of barriers, we also explore **potential solutions and implementation strategies**, with emphasis on energy efficiency measures, **intermediary actors**, such as municipalities, in supporting policy coordination, facilitating access to funding, and integrating energy poverty objectives into local planning frameworks, along with enabling conditions, and **best practices**.

The identification and evaluation of best practices were guided by the following process:

Literature Review: LOCATEE Partners have gathered a list of existing resources about the best practices, which were reviewed. Additionally, resources from the European Energy Poverty Observatory, the European Commission, and the Organisation for Economic Co-operation and Development that provide a foundation for understanding the criteria necessary to evaluate good practices were considered.

Establishing Evaluation Criteria: Four primary criteria, to ensure a comprehensive and consistent evaluation framework, were used for assessing best practices:

- Scalability and replicability;
- Data-driven impact;
- Equity and social inclusion;
- Policy alignment.

Synthesis of Findings: Practices that met the evaluation criteria were analysed and are presented in this section, with a focus on their role in addressing energy poverty and the opportunities they present for broader implementation.

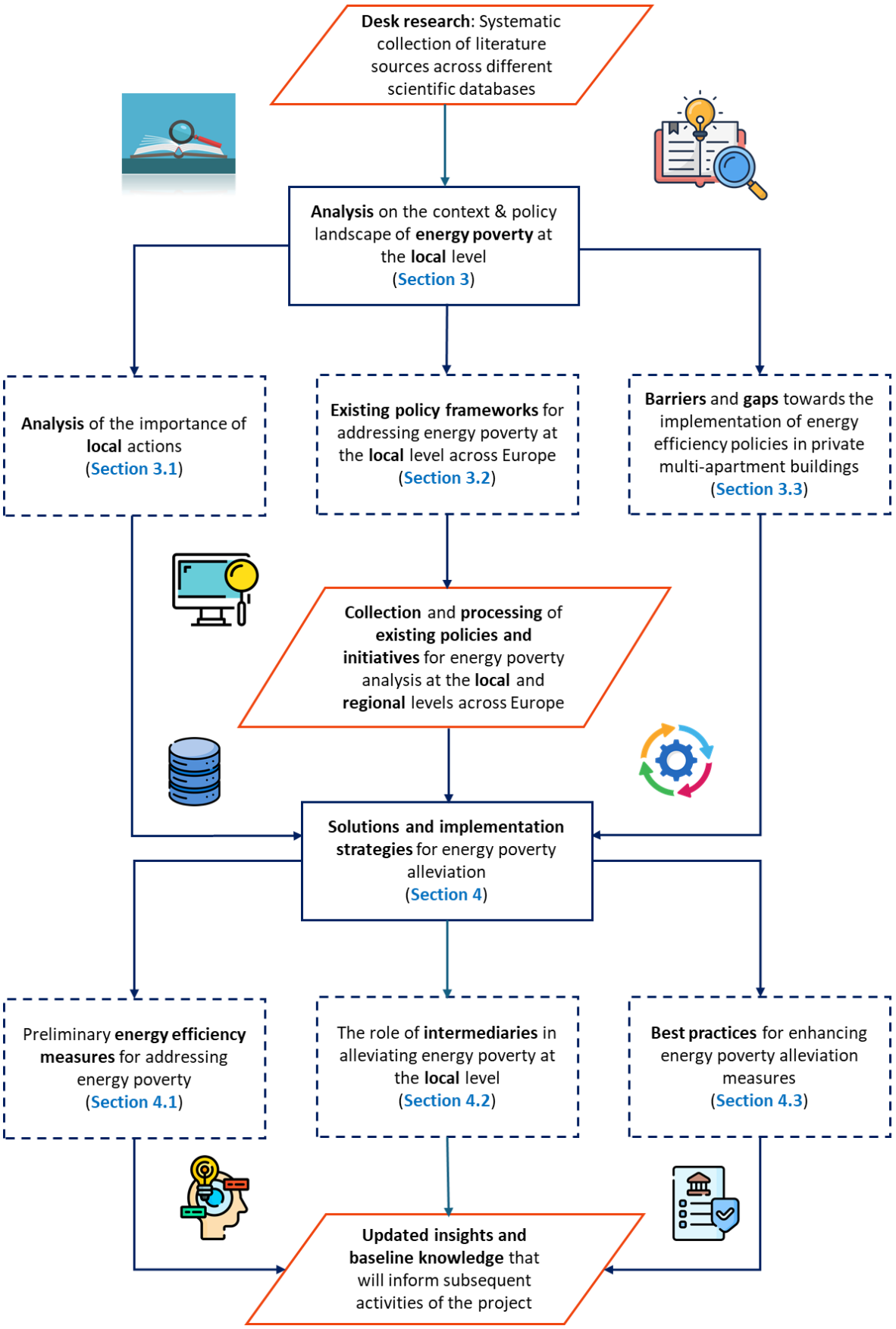

Figure 1. The methodological approach as followed in the context of this report.

3 Energy poverty at the local level: Context and policy landscape

This section explores the **policy and governance landscape** of energy poverty alleviation across Europe, with a particular focus on the **local level** and **private MABs**. It aims to identify emerging **trends, policy gaps**, and **institutional dynamics** that influence how energy poverty is addressed across different territorial scales.

The analysis begins by emphasising the importance of **local-level action**, where proximity to communities enables more responsive and context-sensitive policymaking. It then examines the **existing policy frameworks and initiatives** aimed at tackling energy poverty, including both **national-level strategies** and **local planning tools** such as **SECAPs**. In total, **57 initiatives** from various European countries are reviewed. A comparative analysis of policy frameworks across the **LOCATEE pilot areas** further enriches the understanding of regional differences and common challenges.

The section proceeds with a **thematic categorisation of barriers and constraints** to the implementation of energy poverty measures, particularly in the context of **private MABs**. Finally, it examines the **ownership, governance, and decision-making structures** that shape the feasibility and effectiveness of energy efficiency policies within these building typologies in the pilot municipalities, offering insights into the **institutional conditions** for policy delivery at the local level.

3.1. The importance of addressing energy poverty at the local level - the case of private multi-apartment buildings

Energy poverty reduction is recognised as an integral objective alongside decarbonisation, energy efficiency, and the clean energy transition, particularly within the Green Deal strategy and, more recently, the “Fit for 55” legislative package. The “Clean Energy for All Europeans” initiative, specifically Regulation 2018/1999, requires European member states to address energy poverty in their National Energy and Climate Plans (NECPs), assessing its scope and formulating strategies to mitigate this pressing social risk (European Commission, 2019a). Effective energy poverty mitigation demands comprehensive policies and targeted measures that tackle its multidimensional nature. Implementing diverse and impactful mitigation actions across different spatial scales -from national to local levels- is crucial to reaching vulnerable populations and enhancing the effectiveness of these strategies while accounting for regional variations and specific challenges. The European Commission emphasises the need for “cross-departmental and vertical collaboration across national, regional, and local government structures” in energy poverty governance systems, as well as for consultation and collaboration between a wide range of relevant stakeholders and social partners (European Commission, 2023c).

From a policy standpoint, regional and local authorities are well-positioned to identify and engage with vulnerable households, understand their specific needs, and provide tailored support. Their proximity to communities and direct connections with social and civil organisations allow them to gather detailed, up-to-date information on local populations, facilitating a more precise and timely identification of those affected by energy poverty. As a result, mitigation measures, diagnostic efforts, and policy impact assessments tend to be more effective when implemented at these levels.

Moreover, regional and local action plays a crucial role in bridging national commitments with the specific configurations of energy poverty and the diverse needs of populations across different territories. Addressing regional vulnerabilities remains a priority within the EU, as demonstrated by the Just Transition Mechanism, which requires Member States to develop plans identifying vulnerable regions and proposing targeted alleviation measures. Additionally, the EPAH supports European local governments in their efforts to eliminate energy poverty (European Commission, 2025a). In partnership with the Covenant of Mayors Europe (CoM), the EPAH promotes local-level initiatives, backing various innovative projects designed to reduce energy poverty vulnerability and provide direct assistance to energy-poor communities (European Commission, 2025b).

Local actors, working in collaboration with regional and national stakeholders and actors, are therefore paramount for mitigating energy poverty. Municipalities can protect vulnerable consumers from disconnection and ensure energy access through measures such as bill support. They can also facilitate the adoption of renewable energy systems and energy efficiency improvements for vulnerable households by offering subsidies and implementing dedicated energy renovations and energy efficiency upgrade programs. Local non-governmental organisations (NGOs) can contribute by assisting energy-poor households in managing their energy bills, providing guidance on energy efficiency and home renovations through one-stop shops, facilitating access to public and private funding schemes, and integrating households into renewable energy communities. Additionally, regional and local energy agencies can provide technical expertise to support these efforts. However, many of these organisations face significant challenges, including limited funding, human resources, technical capacity, time, and partnerships, which can hinder their ability to fully execute these roles (Sequeira et al., 2024).

The CoM signatories have committed to ensuring "*secure, sustainable, and affordable energy for all*", recognizing energy poverty alleviation as a key component of this goal (Covenant of Mayors, 2022). Research highlights the diverse configurations of energy poverty across regions within countries (Gouveia et al., 2019; Robinson, 2019), indicating that measurement methods and mitigation strategies must be tailored to specific local contexts. Addressing this diversity is essential for effective intervention. Many causes and effects of energy poverty are most apparent at the household and local levels, reinforcing the need for targeted, local-scale community-based solutions.

Regarding measuring energy poverty and determining the appropriate scale of analysis, national-level approaches play a crucial role in evaluating and monitoring the overall scope of the issue within a country. However, sub-national analyses can reveal localised vulnerabilities that may be overlooked in broader-scale indicators. Accurate measurement is essential for developing a comprehensive understanding of energy poverty, enabling the creation of more effective, evidence-based policies and ensuring proper monitoring of their real-world impacts. The European Commission underscores the importance of bottom-up approaches to complement national-level indicators, highlighting the vital role of regional and local authorities in driving a sustainable and equitable energy transition (European Commission, 2020a).

As part of its commitment to ensuring secure, sustainable, and affordable energy, the CoM has proposed a set of indicators to assess and monitor energy poverty at the local level (Covenant of Mayors, 2022). Regional and local assessments offer more nuanced insights, helping to identify specific drivers, contextual factors, and vulnerable groups that require targeted interventions. Various approaches have been developed to measure energy poverty at these scales (Martín-Consuegra et al.,

2020; Sanchez-Guevara et al., 2019; Walker et al., 2012), incorporating national-level EPAH indicators while also introducing alternative composite metrics based on diverse conceptual frameworks. Many of these methodologies stem from academic research advocating for different perspectives.

A significant challenge in subnational energy poverty studies is data availability. While scholars recognise the importance of measuring energy poverty at finer scales, they often contend with limited data, using what is accessible. Local authorities and agencies frequently rely on informally collected data from social services, information points, policy programs, and other community engagement mechanisms (Palma & Gouveia, 2022). This reliance on context-specific data makes standardisation and comparability across regions and countries particularly challenging (Espeland & Stevens, 1998; Sareen et al., 2020). Additionally, how energy poverty is measured directly influences mitigation efforts, as energy poverty geographies vary significantly depending on the indicators or metrics used (Fahmy et al., 2011). In parallel, as indicated in LOCATEE's Deliverable 3.1, ensuring methodological transparency and refining localised data collection processes is crucial to improving both measurement accuracy and policy effectiveness (Palma et al., 2025).

At the local level, private MABs are the home of a significant part of energy-poor households. Vulnerable groups, including renters, low-income families, and single-parent households (Middlemiss, 2022; Riva et al., 2021) often live in these building types. In Central and Eastern European countries, an estimated 33.3% of households experiencing hidden energy poverty reside in large apartment blocks (Karpinska & Śmiech, 2020). Poor energy efficiency is a key enabler of energy poverty in these buildings, as much of the housing stock is ageing, and inefficiencies in a single structure can impact multiple families.

Tenant-landlord dynamics further complicate the issue, mainly due to split incentives that hinder energy efficiency upgrades and other critical energy-related decisions. Renters, who typically have little control over structural improvements, often lack the agency to mitigate their vulnerability. Additionally, district heating systems and shared energy infrastructure can pose barriers to energy poverty alleviation, making it difficult to monitor and target individual energy use and potentially locking residents into inefficient and costly arrangements (Bouzarovski et al., 2016).

Given these specific challenges, targeted local-scale approaches are essential for accurately identifying vulnerable buildings and households. Designing and implementing tailored solutions that address these barriers can lead to more effective and impactful energy poverty reduction strategies, ultimately improving living conditions for affected communities.

3.2. Existing frameworks and policies for addressing energy poverty at the local level

This section presents an overview of the **existing policy frameworks** designed to address energy poverty at the **local level** across Europe. A particular focus is placed on **SECAPs**, which are analysed in depth to assess how effectively they incorporate energy poverty alleviation objectives.

In addition, the section examines **57 local and regional policies and initiatives** implemented across various European countries. These are analysed along several key dimensions, including: **target groups**, **types of measures implemented**, **mechanisms of public engagement**, **delivery methods**, and **channels used to reach beneficiaries**. Where possible, an evaluation of the policies' impact is included to provide

a comprehensive picture of the **European local policy landscape** on energy poverty and offer insights into promising practices and implementation challenges.

3.2.1. Sustainable Energy and Climate Action Plans

Following the need for energy poverty reduction strategies, key strategic frameworks, which are also analysed in this section, are the so-called SECAPs. SECAPs -previously known as Sustainable Energy Action Plans (without integrating the term "climate")- were introduced in 2008 through the CoM initiative to support fellow signatories to the CoM in aligning local climate actions with the EU directives' goals (Matak et al., 2016). While encouraging climate adaptation and mitigation pathways, as well as energy security and independence from external grids, they have the potential to facilitate local growth and resilience, tackling local challenges through inclusive citizen participation alongside vertical stakeholder engagement (Colocci et al., 2023).

Since the alleviation of energy poverty has been introduced as a new pillar of the commitments of the CoM in 2022, the CoM also offers specific support for local authorities to frame the issue and address on-ground needs. First, the CoM reporting document provides over 20 indicators grouped into five macro-areas: climate, housing, mobility, socio-economic aspects, and policy/awareness.

Indeed, it supports identifying households where energy efficiency interventions can have the most significant impact according to the requirements set out both in the Energy Efficiency Directive (EED) and in the EPBD through targeted actions for energy poor households in F, G, and H Energy Performance Certificate (EPC) bands. It also proposes indicators for households at risk of energy poverty that can support regional observations of structural issues, as approached through the Just Transition Mechanism. Second, these guidelines encourage setting measurable goals (e.g., percentage reduction in energy-poor households) and defining a target year and base year, in line with the EED and the Governance Regulation. By defining target populations and the required intervention types, SECAPs can: **(i).** support the EED's & EPBD's provisions on private and public building renovation by focusing on energy upgrades in social housing and other public facilities; **(ii).** align with the "Renovation Wave" initiative by tracking and promoting actions to decarbonise the building stock, especially for vulnerable groups; and **(iii).** promote community-focused projects that ensure an equitable energy transition, such as local energy generation and efficient public transport initiatives. Third, the indications provided by the CoM further address the need for data-driven monitoring and reporting: monitoring the percentage of households experiencing energy poverty, as well as tracking energy consumption concerning national averages. Lastly, the CoM guidelines are meant to encourage stakeholder engagement through community consultations and partnerships, as outlined in the Governance Regulation, the Social Climate Fund Regulation, and the Just Transition Mechanism.

Enablers and barriers towards SECAPs implementation

The cumulative experience of municipalities writing SECAPs across over 30 countries has been studied, leading practitioners to provide insights on what has been working so far in their implementation, and what has represented significant barriers to their execution.

Firstly, the establishment of collaborative frameworks, such as joint SECAPs or joint actions through them, allowing municipalities to pool their financial/ human resources, can push small municipalities to overcome individual resource constraints by removing administrative boundaries as well as facilitating knowledge transfer with mutual cooperation (Matak et al., 2016). This can be particularly

relevant in sharing from more advanced municipalities to less experienced ones (Colocci et al., 2023) as remarked by the positive impacts of energy communities as well (Di Paolo et al., 2023). When one of the main obstacles to sustainable action is the cost of developing the needed (infra)structure (Žičkienė et al., 2022), a collaborative strategy, both across horizontal and vertical governance levels, will benefit all stakeholders. In the LOCATEE project pilot cities, Rumia, regional collaboration examples like the NORDA Forum can show the positive pooling of resources and expertise for joint projects, including electricity and gas procurement, which reduces costs while strengthening the municipality's ability to implement sustainable solutions, as shown through the Low Emission Economy Plan and the Environmental Protection Programme. For Piraeus, the collaborative framework is already described at different levels thanks to the municipality's engagement in trans-European cooperation networks (Municipality of Piraeus, 2018), while also building on solid on-ground actions such as the Urban Accessibility Plan. In Torres Vedras, a SECAP is not available yet, but the municipality will benefit from the implementation of an expansive urban regeneration program covering areas with degraded housing, historic neighbourhoods, and socioeconomically challenged communities, coupled with a Local Housing Strategy that prioritises the renovation and rehabilitation of degraded housing stock and provides subsidised housing for vulnerable populations.

Also, the integration of SECAPs with other EU policies can provide methodologies, approaches, and strategies to meet emission reduction targets, so that local actions align with overarching EU neutrality goals (Colocci et al., 2023). For example, Torres Vedras has successfully leveraged funding programs, such as "Financial instruments for urban rehabilitation and revitalisation" and "Prohabita", to finance part of the urban regeneration and efficiency measures through the Local Housing Strategy. Conversely, the SECAPs' alignment with sustainability goals is strengthened by the strategic selection of indicators that bridge local and global goals: by employing both top-down and bottom-up approaches, municipalities can leverage publicly available data sources, such as Eurostat or DG Specific Datasets, to populate indicators relevant to energy consumption, emissions, and social equity, while tailoring additional metrics to local contexts. This dual approach not only enhances the comparability of SECAP initiatives across regions but also allows for greater specificity in addressing local challenges (Ibañez Iralde et al., 2024). Indeed, technical tools, like the SECAP-SSP, offer the opportunity to design tailored action plans through the incorporation of environmental, economic, and technical priorities, to create measures and approaches that are context-specific (Saad et al., 2019). In Rumia, the comprehensive energy and emissions inventories provide robust data to monitor progress, enabling informed decision-making and precise tracking of climate and energy goals through the Low Emission Economy Plan, which could also constitute a base for reporting for SECAPs, too. Differently, Piraeus municipality has established a clear organisational structure, with dedicated directorates for technical services, urban planning, and environmental management, ensuring focused efforts towards SECAP implementation, but the monitoring methods are made less clear, leaving space for improvements in future updates (Municipality of Piraeus, 2018).

Finally, engaging stakeholders, community involvement through workshops, public consultations, and citizen-driven initiatives are all more than essential to voice local concerns and transform them into local priorities, while also gaining public support (Colocci et al., 2023; Di Paolo et al., 2023). In Torres Vedras, public consultations and targeted community outreach under the housing and urban rehabilitation programs have fostered a sense of inclusivity for the design as well as the implementation of local climate actions. Learning from this, while institutional frameworks are robust

in the Piraeus Municipality, there is insufficient public awareness and engagement outlined in the available SECAP (Municipality of Piraeus, 2018).

Conversely, it is easy to understand how one of the primary barriers to the plans' effective implementation comes from resource limitations, particularly in smaller municipalities, with limited technical expertise and funding to independently develop and execute strategies (Colocci et al., 2023; Di Paolo et al., 2023; Saad et al., 2019). Indeed, while renewable energy projects and energy efficiency measures are indicated as a fundamental part of plan execution, their implementation is often constrained by high upfront costs or even the absence of energy storage solutions, making the overall effectiveness of these initiatives less transformative (Di Paolo et al., 2023; Saad et al., 2019; Žičkienė et al., 2022). Such limitations are evident in Rumia, as well as in Piraeus, where financial and technical resource constraints limit the municipality's capacity to execute large-scale renewable energy and energy efficiency projects, particularly in older infrastructure and residential sectors. In Torres Vedras, while funding mechanisms are accessible, the municipality's reliance on external funding sources introduces vulnerabilities, particularly for long-term initiatives with a sustained financial input, like in the urban regeneration program.

As such, significant challenges not only arise from the resource limitation, but also from data gaps, such as the absence of standardised methodologies for tracking energy consumption, carbon dioxide (CO_2) emissions, energy poverty level, and renovation efforts at the local level (Ibañez Iralde et al., 2024; Matak et al., 2016). Similarly, as is the case for Torres Vedras, despite the strength of individual initiatives, a lack of cohesive integration between urban rehabilitation, housing policies, and the SECAP creates fragmented implementation, reducing overall effectiveness. Besides, insufficient communication and a lack of awareness among citizens can hinder support for SECAP activities (Matak et al., 2016). In Torres Vedras, limited awareness of energy efficiency benefits and climate action opportunities among residents hinders participation in and support for SECAP initiatives, as pointed out in the Local Housing Strategy.

Lastly, the lack of integration between other climate action strategies and SECAP objectives is another sector-specific barrier (Matak et al., 2016). In Rumia, for instance, the reliance on coal and natural gas for district heating systems, also located outside the city, is a major obstacle to achieving emissions reduction targets of the Low Emission Economy Plan. Similar considerations are to be made for Piraeus, where the heavy reliance on traditional energy sources, including oil and natural gas, for residential and industrial heating remains a significant barrier to decarbonisation. But also, high population density and limited land availability challenge the expansion of green spaces and the development of large-scale renewable energy projects (Municipality of Piraeus, 2018).

3.2.2. Current state of energy efficiency and energy poverty policies at the local level across Europe

While SECAPs provide a structured framework for local governments to address energy and climate issues -as well as the energy poverty issue- it is crucial to go beyond SECAPs and conduct in-depth policy analyses at the local level, focusing on private MABs. Contextual, governance, socioeconomic, and implementation factors highlight the importance of tailored initiatives against energy poverty at the local level. For this reason, initiatives across Europe that focus on addressing energy poverty in private MABs at a local scale were collected, thereby forming a sample for further analysis.

In total, 57 initiatives from around the EU (plus the United Kingdom) were collected (**Table 7** in **Appendices**). Each initiative is presented with a brief description/ short summary alongside the operating country. In this section, we provide an overview and descriptive statistics of the sampled initiatives to present the current state of the policy landscape across Europe, and additionally highlight key trends across the dataset. Specifically, several aspects along with examples are analysed, i.e., the geographical and chronological extent of the analysed initiatives; the analysis of implementing authorities; the target groups (e.g., local authorities, property owners, landlords, tenants, etc.); the type of measures implemented (e.g., technical, financial, etc.); the different manifestations for public engagement; how beneficiaries are reached; the delivering measures; and how the policy impact assessment is taken place for each initiative.

Geographical and chronological extent of the analysed initiatives

Of the 57 initiatives collected, more than three quarters (**82.45%**) are originated from eight (8) Member States (i.e., Austria, Belgium, France, Greece, Italy, Poland, Portugal, and Spain) -three of which are LOCATEE partner countries (i.e., Greece, Poland, Portugal)- although, the majority of European countries along with the number of policies in each one of them are presented in **Figure 2**, and **Table 1**. Most of the analysed policies and initiatives are featured in Western, and Southern Europe, while it is noted that all of the analysed initiatives are (or were) implemented at a *local or regional scale* across the European countries.

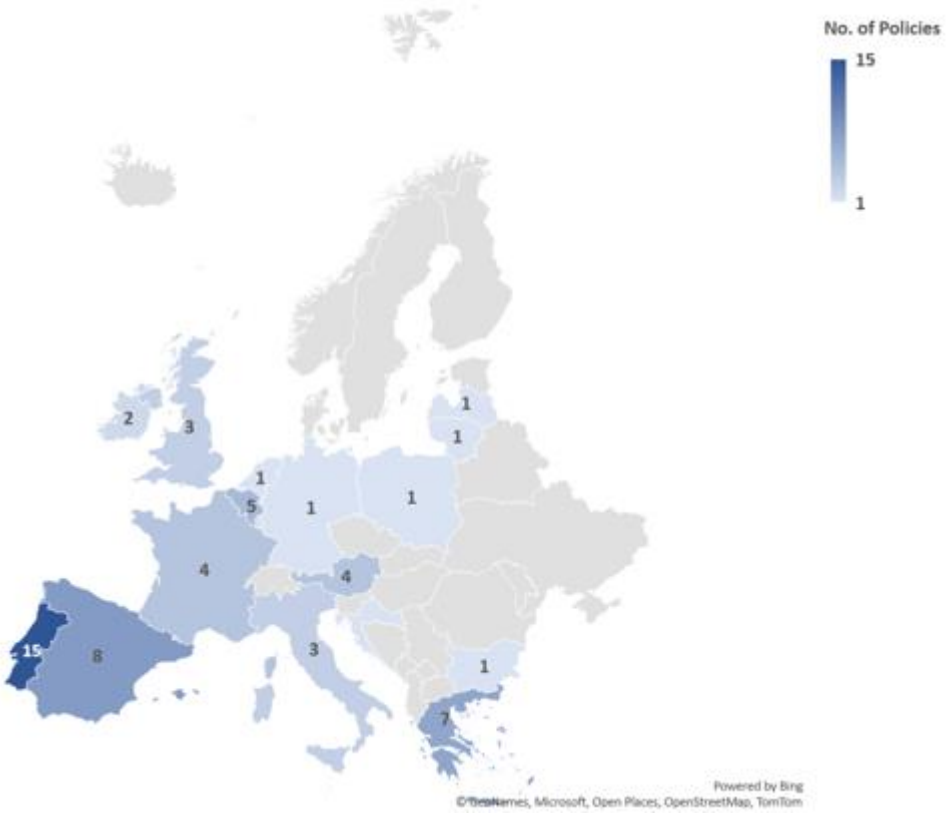

Figure 2. Screenshot of the LOCATEE policies and initiatives map demarcating the geographical coverage of the analysed policies and initiatives across Europe.

Table 1. Number of analysed policies and initiatives per European country.

Country	No. of Policies/ Initiatives
Portugal	15
Spain	8
Greece	7
Belgium	5
Austria	4
France	4
Italy	3
United Kingdom	3
Ireland	2
Bulgaria	1
Croatia	1
EU-wide	1
Poland	1
Germany	1
The Netherlands	1
Lithuania	1
Latvia	1

The chronological extent of the analysed initiatives varies, with the earliest implemented policy recorded as starting in **1999** ("*MEBAR II - Investment Aid (Energy for Low-income Households)*" in the Walloon Region of Belgium), while it is still ongoing. Also, six (6) of the most recently introduced policies and initiatives were started in **2025**. However, of the **4** policies and initiatives, the duration was not available online, while **35** initiatives are still ongoing, and **18** have been completed over the past years. This information is available in **Figure 3**, where the completion of policies for the alleviation of energy poverty at the local level is presented.

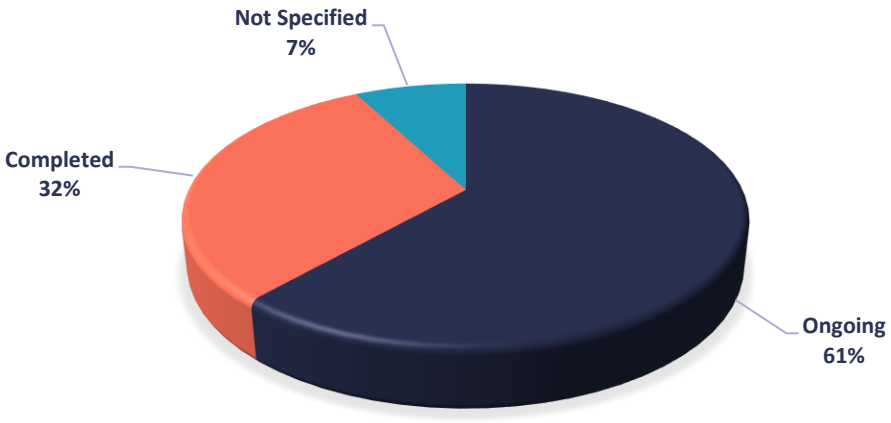

Figure 3. Completion of the analysed policies and initiatives across Europe.

Of the initiatives with a finite duration, the average implementation time was **2.7 years**, while for the ongoing initiatives, the respective average implementation time (considering the time that they have been in place) is **6.3 years**. Nevertheless, it is noteworthy that some of the analysed initiatives are iterations and improvements upon earlier initiatives; hence, some of the most recent initiatives have been in place for longer than the analysis accounts for.

Implementing bodies

The majority of implementing bodies are governmental, with most of them being municipalities or city councils like "*Barcelona City Council*", "*Valencia City Council*", "*Abruzzo region*" in Italy, or "*Walloon region", and "Flanders region*" in Belgium. Many of these authorities are forming partnerships with specialised NGOs, and local organisations to deliver the initiatives, or subcontracting local suppliers and providers to implement energy efficiency projects when it comes to building retrofits and installations. Such an example is the "*Dampoort KnapT OP! (Dampoort Renovates)"* initiative, which is organised by local authorities like the City (and Municipality) of Ghent in the Flemish region of Belgium, and delivered by contractors who carry out the renovation of buildings. Furthermore, some of the initiatives are implemented by local authorities. For example, "*Wijken Aardgasvrij Maken Amsterdam*", delivered by Dutch local authorities along with the Dutch national government, aims at transforming neighbourhoods of Amsterdam into natural-gas-free neighbourhoods.

Nevertheless, some of the initiatives are (or were) delivered by *NGOs or local community organisations*, such as "*Vale Conforto*", by AdEPORTO, a Portuguese private non-profit association with Public Utility -created in 2007 at the initiative of the Municipality of Porto- which has a main goal to promote innovation, thereby being a leader organisation in addressing energy issues in the municipal domain, contributing this way to the transition to more efficient and sustainable energy systems. Finally, other initiatives are implemented by *private companies*, such as the "*Local Energy Advice Partnership*", by AgilityEco, a British private company founded in 2013, which delivers energy efficiency programs across the United Kingdom.

Target groups

Of the 57 initiatives collected and analysed, **35%** target vulnerable (low-income) groups without further specifying the target group. Moreover, **38%** of the policies target both landlords and tenants without any income-related or social criteria; thus, every citizen can benefit from such initiatives.

However, only **11%** of the initiatives involve landlords. A representative example is the *"Anakainizo-Noikiazo"* ("Renovate-Rent") programme in Greece, which provides financial support to private property owners for renovating or repairing vacant homes or apartments, on the condition that these units will subsequently be offered for long-term leasing. Finally, it is noteworthy that **16%** of the example sample involves tenants as a target group, thereby indicating an important trend among the policies at the local level.

Such disparities highlight the need for policies that take into account several target groups, which may have different incentives when it comes to decision-making about implementing energy efficiency measures or actions against energy poverty in general, thereby alleviating energy poverty at the local level through a well-targeted framework. Lastly, as mentioned above, more than a third (**35%**) of the analysed initiatives generally target *low income* groups. Such policies are often available to groups whose income is lower than a predefined amount, or falling within categories of vulnerability, such as disability, covering in this way different categories of citizens through a more meritocratic framework, since citizens who belong to this target group are more likely to live in energy poverty. The abovementioned data are presented in **Figure 4**, right below.

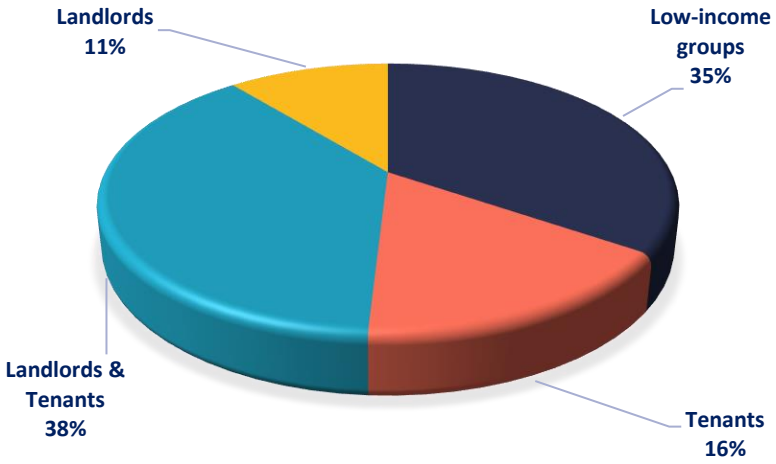

Figure 4. Breakdown of the analysed policies and initiatives based on their target groups.

Type of measures implemented

The analysed initiatives encompass a broad spectrum of technical and financial components aimed at supporting different target groups. Additionally, a certain degree of innovation and originality was observed in addressing energy poverty. More specifically, *more than half the initiatives (**56%**) included both technical, and financial measures, while almost a quarter (**23%**) are tackling technical aspects, and only a few (**7%**) included only financial measures without including any technical measure* (see **Figure 5** for a representation of these data).

Technical measures are often aimed at increasing the energy efficiency of existing buildings, and, thus, providing households and their residents with improved thermal comfort. Most of the policies aim at improving households' thermal performance through interventions like insulation upgrades, upgrades of the buildings' heating/ cooling systems (i.e., heat pumps, etc.), installation of energy efficient windows and doors, structural repairs, indoor ventilation, and in many cases integration of renewable energy technologies (i.e., solar panels, solar boilers, etc.). Moreover, smaller technical measures include more energy-efficient lighting, replacement of inefficient household appliances, and draught

excluders. Some of the technical measures are implemented to ensure that dwellings comply with specific energy performance standards. Such an example is the "*PEER - Porto Energy Elevator*" in Portugal, which, among other targets, also aims at improving the energy performance of buildings to comply with standards (which is also a Key Performance Indicator of the initiative).

Financial measures in policy packages were primarily available for financing the abovementioned technical measures. Such financial measures range from subsidies, and long-term loans to one-off payments. For example, such an initiative is the "*Maison de l'Habitat Energy Service Centre*" as provided by the City of Liege in Belgium, which provides mainly landlords of buildings with public loans for energy building retrofits. Another example is the "*Dampoort KnapT OP! (Dampoort Renovates)*" provided by the City of Ghent in Belgium, which provides low-income groups with grants of 30,000€ per household -repayable upon sale or rental of the property- to implement insulation improvements, elimination of moisture and fire hazards, and other energy efficiency measures.

Other financial measures aim to assist vulnerable households with their energy expenses. Such an example is the "*Wiener Energiebonus '23*" by the Municipality of Vienna, along with the Department of Energy Security, which provides a one-off bonus payment of 200€ to low-income groups under energy poverty with no legal entitlement. This subsidy is allocated per address, allocated to applicants meeting income and residency requirements. Another example is the "*Plateforme de lutte contre la précarité énergétique (Platform to Fight Energy Poverty)*" by the Community Social Action Centre of Grenoble in France, which provides financial aid to households under energy poverty based on individual needs. Lastly, another example is the "*Office for Combating Energy Poverty*" by the Municipality of Athens, which provides full exemption from municipal fees for low-income households living under energy poverty, while also providing access to an "energy benefit card" offering privileges and services to lower energy costs.

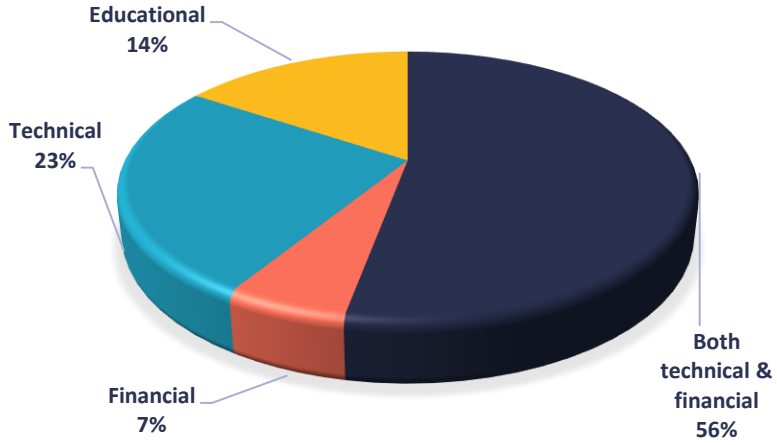

Figure 5. Categorisation of the analysed policies and initiatives based on the type of measures they include.

Moreover, **8** of the analysed initiatives (**14%**) are not categorised as involving technical or financial measures, but instead are classed as *primarily educational,* as can be observed in **Figure 5**. Such measures are mainly characterised by *providing advisory services or information on energy-related issues, like energy bills or energy-saving techniques to their target groups*. Initiatives that offer energy guidance to households typically provide information on modifying energy consumption behaviours to enhance energy efficiency and promote energy-conscious practices within the household. These

measures may include home visits or the complimentary provision and/ or installation of minor energy-saving equipment, such as LED or energy-efficient light bulbs, timers, and draught excluders. Such an example is the "*OV - Officina Verde (Green Office)*" implemented by the Valencia City Council in Spain, which guides energy-poor households for energy consumption habits, along with courses for providing such vulnerable groups with a better understanding of utility costs. Another similar example is the "*Energia in Periferia (Energy in the Suburbs)*" implemented by Banco dell' Energia (a non-profit organisation) in association with other organisations in Italy, which provides education to energy-poor and low-income households for their energy savings, as well as training for conscious energy consumption. Finally, another example is the "*Energie.Sozial.Grenzenlos*" implemented by the Regional Association of the Salzburg Lake District in collaboration with Energy Consulting Salzburg, and local municipalities in Austria. This initiative provides consultancy on energy audits, thermal insulation guidance, heating/ cooling systems optimisation, and renewable energy recommendations to households (landlords, tenants, property owners), and municipalities.

Measures aimed at enhancing consumer understanding of energy bills and various energy-related products are typically delivered through home visits, telephone calls, or face-to-face meetings with an advisor in an office. Additionally, guidance on consumer rights is provided to citizens at risk of disconnection, thus offering a form of empowerment for the public.

Public engagement manifestations

From the 57 analysed initiatives, more than three-quarters (**81%**) recorded some manifestation of public engagement, although this information was not recorded or publicly available for all policies. An important division between the policies that recorded some form of public engagement is the intervention point of public engagement, and more specifically, whether they recorded it before the measure is adopted, or during the delivery stages.

On the one hand, **51%** of the analysed policies and initiatives conduct public participation *during* the delivery stages (**Figure 6**), engaging the public through education, and information about energy poverty, empowerment, tenant rights, and opportunities to improve energy efficiency of their homes, and achieve energy cost savings through lowering the costs of their household bills. Such an example is the "*Plateforme de lutte contre la précarité énergétique (Platform to Fight Energy Poverty)*" in Grenoble of France, where beneficiaries (both landlords, and tenants) are actively participating during the delivery stages of the project by reporting issues, working with the platform on energy-saving strategies, and accessing available financial aid. Furthermore, another example is the "*TIGER - Triggered Investments in Grouping of Buildings for Energy Renovation*" implemented by the Abruzzo region in Italy, along with other non-profit organisations, where applicants (mainly tenants) are supported through helpdesks, training programs, communication campaigns, and tailored lease agreements to reflect energy cost reductions during the implementation of their project. Finally, another example is the "*EnerSHIFT*" implemented by the Liguria region in Italy, along with other organisations, where public engagement is achieved through unions like the Sindacato Unitario Nazionale Inquilini ed Assegnatari (National Tenants and Assignees Union), and awareness and training programs.

On the other hand, **30%** of the analysed policies are (or were) involving some manifestation of public engagement *before* the initiative is adopted, especially in the design stages (**Figure 6**). Such an example is the "*Ayudas del Programa de Rehabilitación de Viviendas para personas en situación de*

vulnerabilidad (Housing Renovation Programme for Vulnerable Households)" by the Barcelona City Council in Spain, where the engagement of citizens (mainly tenants) takes place through open application processes, and detailed socioeconomic assessments before their participation in the project. Another example is the "*Better Energy Warmer Homes Scheme*" implemented by the Sustainable Energy Authority of Ireland, where the participation of the public takes place before the implementation through community events, pre-retrofit consultations, surveys, and questionnaires. Lastly, another example is the "*Wijken Aardgasvrij Maken Amsterdam*" implemented by the Municipality of Amsterdam in the Netherlands, where applicants can decide on what refurbishment action they want to implement before the delivery stages of the project.

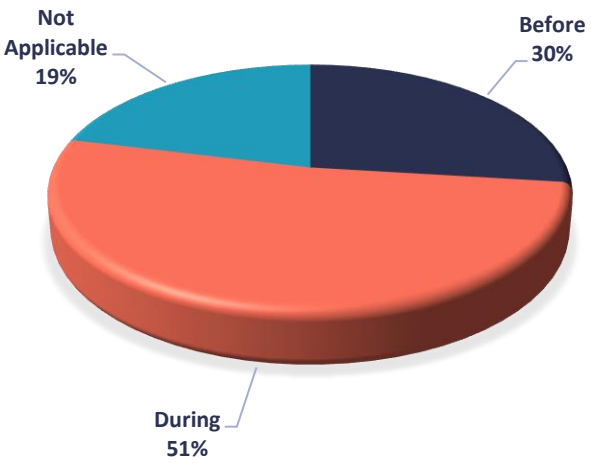

Figure 6. Public engagement on the analysed policies and initiatives based on the intervention point.

Nevertheless, **19%** of the analysed initiatives are largely top-down; hence, they *do not include any manifestation for public engagement* -particularly in the delivery stages of the projects (**Figure 6**). Such examples are the "*Frigorifico + Social*" implemented by the Porto Energy Agency in Portugal, along with a local association, namely SEMENTE, the "*Energy Loan*" initiative implemented by the Government of Flanders in Belgium, the "*RENOVAR.Coimbra*" implemented by the EC-funded LIFE project REVERTER, and the "*E-LAR*" initiative implemented by the Portuguese Government in Portugal.

Reaching out to beneficiaries

Based on the process for reaching out to beneficiaries, the analysed policies can more or less be divided into two categories. Specifically, *in the first category*, there are most of the analysed policies are found, **36** of them (**63%**), where *vulnerable groups have to self-refer their selves to participate in the respective initiative* (**Figure 7**). Such an example is the "*MEBAR II - Investment Aid (Energy for Low-Income Households)*" implemented by the Walloon Region Government in Belgium. To be enlisted and obtain the subsidy, applicants (all target groups) have to be self-referred to the Public Centre for Social Welfare of their municipality. The centre will check, on a case-by-case basis, the conditions of the grant and who will launch the procedure if the applicants meet the legal conditions. Another example is the "*Cascais Green Fund*" implemented by the Cascais Municipality in Portugal, where landlords and tenants have to be self-referred through applications, although application support is provided by the municipality.

On the other hand, *in the second category, there are the policies whose employment mechanism is characterised by a self-referral procedure for vulnerable households*, and, thus, they must contact the implementing authorities. This is achieved by submitting a request through a variety of communication channels, like traditional mail, e-mail, online platforms, telephone calls, or by personally visiting the responsible offices. *In the second category, there are policies that implement a referral procedure for vulnerable households through a specific entity,* like local councils, charities, social welfare organisations, energy suppliers, and citizens' advice groups.

The reaching process can be time-intensive for applicants, particularly within self-referral schemes, and for tenants. In certain cases, households are required to obtain permission from their landlord, contact the municipality -where their application is assessed for legal compliance and eligibility- and undergo a home visit by a consultant before approval for the proposed interventions can be granted. This complex process may discourage participation, particularly among individuals in vulnerable or marginal situations, from applying for schemes.

In the second category, there are **19** policies (one-third, **33.5%**, of the 57 analysed policies) (**Figure 7**). For example, the reaching process of the "*Energia in Periferia (Energy in the Suburbs)*" initiative belongs to this category since local non-profit organisations involved are identifying vulnerable (low-income) households in the spectrum of energy poverty to recruit them. Another example is the "*SustaiNAVility Navarra - A Region Supporting Sustainable Energy*" implemented by the regional government of Navarre in Spain, where vulnerable groups of citizens are reached through a One-Stop-Shop (OSS) managed by Nasuvinsa (a local authority in Pamplona), which engages communities through participation plans, informational meetings, and collaboration agreements. Finally, another example is the "*VERBUND - Stromhilfefonds der Caritas*", where the first contact with the vulnerable households occurs at a local social counselling centre of Caritas in Austria (an international non-profit NGO).

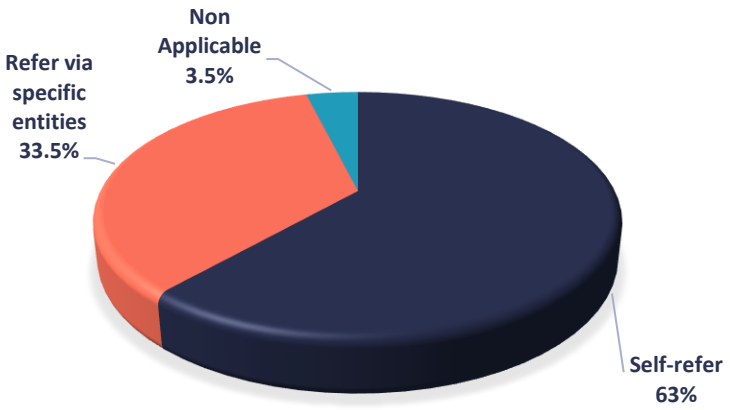

Figure 7. Categorisation of the analysed policies' and initiatives' enlistment mechanisms based on their referral procedures.

In conclusion, **2** out of the 57 analysed initiatives (**3.5%**) are characterised as "non-applicable" for the categorisation of their recruitment mechanisms since they are not mentioned explicitly. Specifically, these initiatives are the "*Áreas Urbanas Sustentáveis (Sustainable Urban Areas)*" in Portugal, and the "*Espaços Energia (Energy Spaces)*" implemented by the National Energy Agency in Portugal.

Delivering policy measures

In **37** initiatives (**65%**) of the sample, *the implementing authorities utilise registered local providers, and contractors to carry out the projects*, especially in the cases of energy building retrofits and installations (**Figure 8**), as is the case for the "*Energy Loan*" policy in Belgium where all works are assumed to be carried out by a contractor, so that there is also a contractor guarantee on the quality of the execution, or in the case of the "*Energetska obnova višestambenih zgrada (Energy Renovation of Multi-Apartment Buildings)*" in Croatia where the projects are executed by certified contractors. However, only in the case of roof or attic floor insulation, the borrower figures out how to do the work by themselves. For policies that impose broad regulatory requirements to enhance the energy efficiency of properties, *the responsibility typically falls on landlords or property owners to secure funding and motivation for upgrading their properties to meet the required standards*. Despite that, these regulations often include *extended compliance periods before they take full effect*, as seen in initiatives like the "*Île-de-France Énergies/ Energies POSIT'IF*" in France.

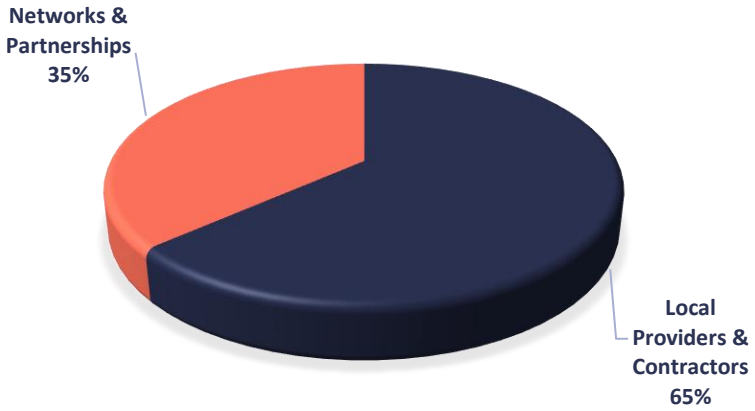

Figure 8. Categorisation of the analysed policies' and initiatives' delivery mechanisms based on their form of delivery.

Other forms of delivering policy measures of the initiatives (**20** of the sample -**35%**) are through *networks and partnerships established by the projects* (**Figure 8**). Such an example is the "*De Energiecentrale (The Energy Hub)*" initiative in Ghent, which is delivered through renovation coaches, energy experts, and partnerships with local organisations to offer services like guidance, technical advice, and group initiatives. Another example is the "*Energie.Sozial.Grenzenlos*" initiative in Austria, which is delivered by energy advisors through face-to-face consultations, online resources, and community workshops. Such community-based and cross-sectoral delivery approaches facilitate both public and private engagement with energy poverty issues. By leveraging broader networks, they enhance outreach to target groups, ultimately increasing the number of beneficiaries impacted by the policy.

Impact assessment

A considerable number of the sampled initiatives did not stipulate an impact assessment process. Specifically, **12** out of the 57 sampled initiatives (**21.05%**) do not include a clear policy impact assessment process. This is in part a result of many of the initiatives currently being in the delivery stages, and, thus, are still ongoing. But the case is not the same for the "*Vale Eficiência (Efficiency Voucher)*", which, although it has been considered completed since 2024, has not had a clear impact

assessment process to measure the results of the projects. For the rest 11 initiatives, the case is the same; hence, they are ongoing and still not completed.

A total of **45** policies documented either an impact assessment process or evidence of a completed evaluation. In some cases, impact assessment processes are implemented throughout the project, while in others, assessments occur only upon project completion. For policies with ongoing assessment mechanisms, the frequency of assessments varies. For example, in the Spanish "*OV - Officina Verde (Green Office)*" initiative, economic savings are tracked as the project progresses through invoices. The average family savings per year are around 215 €, with the whole project being evaluated at an average of 28,170 € annually, with 226 invoices being reviewed each year. For initiatives where impact assessment is conducted post-implementation, certain policies, such as the Italian "*EnerSHIFT*", assessments are carried out after the renovation projects. In this case, the Ligurian region, along with other organisations, oversees the impact assessment process to ensure the proper implementation of the prescribed measures. In this case, the prescribed measures are set in 14.5 GWh of energy savings each year, and improved living conditions across 240,000 m^2 of renovated area by the end of the initiative.

Finally, *annual reports* are also utilised as mechanisms of assessment throughout projects. For example, the "*Local Authority Retrofit Programme*" implemented collaboratively among several local authorities in Ireland has an assessment process where annual reports are submitted by local authorities to the Irish Department of Housing. Furthermore, independent audits of work may be undertaken, which also serve as an assessment or evaluation process.

3.3. Barriers, constraints, and gaps towards the implementation of energy efficiency policies in private multi-apartment buildings

Building on the insights from **Sections 3.1** and **3.2**, this section examines the **main barriers**, **constraints**, and **systemic gaps** that hinder the effective implementation of energy efficiency policies and energy poverty alleviation measures at the local level. Particular emphasis is placed on the challenges associated with private MABs, including the PRS, a **housing segment with distinct characteristics** and **significant prevalence** within private MABs (Filippidou et al., 2016).

These barriers and constraints stem from a variety of interrelated factors, including **insufficient funding**, **regulatory limitations**, **restricted legal authority** at the municipal level, and **split incentives** between owners or between landlords and tenants in the PRS. These challenges are frequently compounded by a **lack of granular**, **building-level data** on vulnerable households, which limits the ability of local authorities to identify, target, and support those most at risk of energy poverty (European Commission, 2024a).

Private MABs, whether rented or owner-occupied, pose **unique implementation difficulties**. In the PRS in particular, tenants typically lack decision-making power over structural renovations or energy-related investments, leading to inertia in upgrading shared infrastructures such as heating systems, insulation, or building envelopes. The nature and severity of these barriers often depend on tenure arrangements, ownership structures, and the technical complexity of required interventions.

In addition to identifying barriers, this section includes an overview of **ownership and decision-making structures** in private MABs across the project's **pilot municipalities**, offering insights into the governance and institutional conditions that influence the implementation of energy poverty and energy efficiency strategies.

3.3.1. Barriers identified when addressing energy poverty in private multi-apartment buildings at the local level

In this section, we examine barriers to addressing energy poverty in private MABs from different angles, aiming for a holistic perspective. We start with barriers that affect private MABs in general, as these reflect structural challenges common across the housing sector. We then zoom into the PRS, a segment with a high share of MABs and unique characteristics that make barriers particularly pronounced. Finally, we consider the perspective of local authorities, whose role in addressing energy poverty is critical, yet often constrained by limited jurisdiction, insufficient data, and a lack of tailored financing tools.

The approach is illustrated in **Figure 9**: starting from the general barriers to energy poverty alleviation in private MABs, the analysis narrows to the PRS and landlords -both considered subsets of MABs- and then turns to the barriers faced by local authorities.

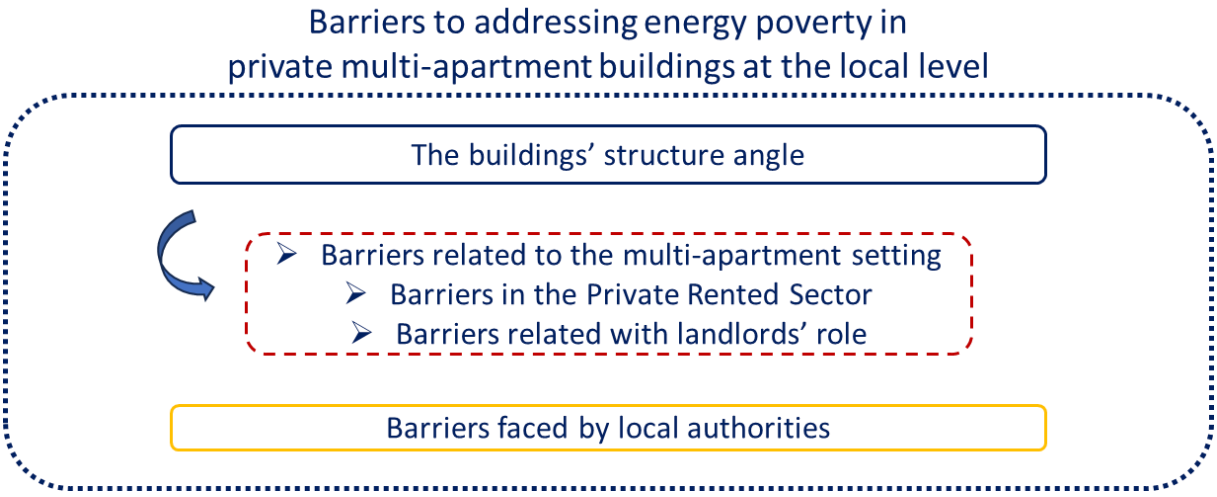

Figure 9. Barriers to addressing energy poverty in private multi-apartment buildings at the local level.

Barriers identified in private multi-apartment buildings

Within the context of barriers encountered in private MABs, and drawing from the existing scientific literature, the identified challenges are predominantly classified into three main categories, namely: **(i).** *financial*; **(ii).** *regulatory*; and **(iii).** *technical* (Moeller & Bauer, 2022; Riva et al., 2024; Singhal et al., 2025). This categorisation facilitates a more structured analysis of the complexities surrounding the implementation of energy efficiency and energy poverty alleviation measures in this housing segment. Each type of barrier reflects distinct yet interrelated dimensions of the problem, revealing the need for integrated and context-sensitive policy responses.

Building retrofits such as insulation, window replacements, and heating system upgrades often entail high upfront costs, requiring significant capital investments that are widely considered unaffordable, regardless of the type of housing actor involved (Moeller & Bauer, 2022). Even when subsidies or grants

are available, co-financing requirements frequently remain a burden, particularly for low-income groups (Vrantsis & Özgüneş, 2022). In addition, limited access to funding constitutes another major financial barrier, as actors in private MABs often struggle to secure renovation loans due to factors such as low creditworthiness or complex ownership structures -challenges especially prevalent in this housing segment (Riva et al., 2024). "*Vale Eficiência II*" initiative in Portugal is an example that aims to help households overcome such financial burdens by providing a voucher to vulnerable populations living in energy poverty up to 3,900€ plus Value Added Tax.

Furthermore, regulatory barriers also hinder the implementation of energy efficiency measures in private MABs. Renovation efforts often require consensus among multiple housing actors, such as different property owners, which can lead to delays, cancellations, or even prevent planned measures from being initiated (Elgendy et al., 2024). As noted in **Section 3.2.2**, the policy landscape across Europe faces several obstacles in addressing energy poverty in private MABs. Many initiatives target low-income groups in general without distinguishing between categories of actors (e.g., tenants), which can exacerbate conflicts and widen gaps between stakeholders. In addition, the absence of strict and reliable energy performance standards in some regions reduces incentives for retrofits, particularly for landlords and property owners, who carry the main responsibility for compliance with legal requirements (Singhal et al., 2025).

Lastly, technical barriers also hinder efforts to improve energy efficiency in private MABs. Access can be difficult, as contacting occupants is often challenging, and in some cases, entry to buildings is restricted (Riva et al., 2024). In addition, deep retrofits in older buildings frequently require complex interventions that demand advanced technical expertise and specialised knowledge, further limiting implementation. "*Porto Energy HUB*" initiative in northern Portugal is an example that provides technical support and assistance to every target group and works as an OSS in the metropolitan area of Porto, thereby helping households to overcome some technical barriers regarding building energy renovation.

Table 2 summarises barriers to the implementation of energy efficiency measures in **private MABs**.

Table 2. Key categories of barriers hindering the implementation of energy efficiency measures in private multi-apartment buildings.

Categories	Barriers
Financial	High upfront costs (involving all housing actors).
	Limited access to funding (involving all housing actors).
	Hard to meet co-financing requirements even when there is subsidisation or a grant (involving especially vulnerable groups).
Regulatory	Consensus among multiple housing actors may be required (involving all housing actors).
	Lack of specific group targeting in ongoing policies (involving all housing actors).

Technical	Lack of strict and accurate energy performance standards for private MABs (involving especially landlords and property owners).
	Some MABs are considered historical buildings which make renovations more difficult (involving all housing actors).
	Hard to contact tenants in private MABs (involving especially tenants).
	Lack of technological knowledge when it comes to deep energy building retrofits, especially for older MABs (involving all housing actors).

Sources: Moeller & Bauer (2022); Riva, Debanné, et al. (2024); Singhal et al. (2025).

Barriers identified in the Private Rented Sector

The PRS constitutes a key housing segment within private MABs, where energy poverty is particularly prevalent. This is partly due to the typically poor energy performance of the stock, combined with tenants' limited agency over energy-related decisions and their lack of control over investments in energy efficiency improvements (Papantonis et al., 2022). With the term PRS, we generally refer to households renting properties at market rate from private landlords (Bouzarovski et al., 2023). PRS has grown significantly in recent years. According to Jones Lang LaSalle (2024), the PRS in the EU and the United Kingdom has expanded by 14% over the past decade. In the LOCATEE project's pilot countries, the proportion of privately rented dwellings within private MABs is also notable: 20.86% in Poland, 30.84% in Greece, and 30.96% in Portugal (European Commission, 2020b). These figures, combined with the sector's structural vulnerabilities, underline the necessity of separately identifying and analysing PRS-specific barriers, which not only mirror but also compound the wider challenges of tackling energy poverty in private MABs.

Scientific literature categorises these barriers into four main groups (Burbidge et al., 2021; Castellazzi et al., 2017; Matraeva et al., 2022; Papantonis et al., 2022; Sareen et al., 2020): **(i).** financial, **(ii).** social, **(iii).** political/regulatory, and **(iv).** technical.

A key overarching barrier with implications across multiple categories is the issue of split incentives. In the PRS, this refers to situations where landlords bear the cost of energy efficiency upgrades, while the benefits -such as reduced utility bills and improved thermal comfort- accrue to tenants (Bird & Hernández, 2012; Melvin, 2018; Papantonis et al., 2022).

Financial barriers

While efficiency upgrades in the PRS can generate significant benefits for tenants, such as reduced energy bills and improved thermal comfort, they may also indirectly contribute to rent increases. This occurs when investments raise property values, making dwellings more attractive in the rental market and pushing rents upward, even as ongoing energy costs decline (Lambin et al., 2023). High upfront costs remain a central barrier, as landlords often shoulder the initial financial burden, while tenants, who benefit from the savings, have limited power to initiate upgrades. Limited access to affordable credit and subsidies further complicates investment decisions, particularly for small-scale landlords.

Social barriers

Social vulnerability adds another layer of complexity. Low-income, elderly, and marginalised groups often face structural disadvantages that restrict their ability to benefit from or advocate for energy efficiency upgrades. In the PRS, where tenants lack decision-making power, this vulnerability translates into heightened risks of both energy poverty and displacement (Burbidge et al., 2021). For such households, immediate needs such as rent, food, or healthcare frequently take precedence over long-term efficiency improvements.

Mistrust of government policies further undermines action. Landlords, especially small-scale ones, often perceive efficiency policies as burdensome, citing shifting standards, rising compliance costs, and bureaucratic complexity (Burbidge et al., 2021). Tenants, meanwhile, may fear "renoviction", whereby landlords use efficiency upgrades as a pretext to evict tenants and re-let properties at higher rents, fuelling insecurity and distrust (Szemző et al., 2024).

Political and regulatory barriers

Political invisibility of energy-poor tenants constitutes another barrier. Compared to homeowners, tenant voices remain underrepresented in policymaking, reflected in the limited presence of tenant organisations across Europe (Chisholm et al., 2020). Vulnerable groups such as low-income, migrant, and socially excluded tenants often face legal or procedural restrictions in participating in building-level decisions. These imbalances extend to data collection, which often focuses on landlords' perspectives, leaving tenants' challenges under-documented. The result is a fragmented, non-standardised picture of efficiency gaps in rental housing across the EU (Sareen et al., 2020).

Technical barriers

Finally, technical barriers also constrain efficiency improvements in the PRS. Deep retrofits, particularly in older buildings, frequently involve complex interventions that require specialised expertise and advanced technical knowledge. Inadequate technical capacity can therefore delay or prevent implementation, even when financial and regulatory conditions are favourable (Matraeva et al., 2022; Papantonis et al., 2022).

Table 3 presents four key categories of barriers that hinder the implementation of energy efficiency measures in private MABs within the PRS across Europe, along with examples illustrating each category.

Table 3. Key categories of barriers hindering the implementation of energy efficiency measures in the PRS across Europe.

Categories	Barriers
Financial	Split incentives (involving both landlords and tenants).
	High upfront costs/ unaffordability (involving especially landlords).
	Increased rent (which in many cases exceeds the overall energy savings) (involving especially tenants).
Social	Broader social vulnerability in the sector/ social exclusion (involving all housing actors).

	Tenants' and landlords' mistrust of governmental policies (involving both landlords and tenants).
Political/ Regulatory	Political invisibility/ lack of energy poverty data among tenants (involving especially tenants).
Technical	Lack of information (involving all housing actors).
	Lack of technological knowledge for implementing effective solutions (involving all housing actors).
	Energy consumption patterns/ rebound effect (involving especially tenants).
	Inadequacy of the built environment (involving all housing actors).

Sources: Ambrose & McCarthy (2019); Burbidge et al. (2021); Matraeva et al. (2022); Papantonis et al. (2022); Szemző et al. (2024).

Barriers identified for landlords

Building on the identification of systemic barriers in the PRS, it is essential to examine the specific role of landlords, who remain central actors in decisions about energy efficiency interventions in private MABs. While PRS-level barriers reveal structural issues such as tenure insecurity, regulatory fragmentation, and tenants' limited agency, focusing on landlords provides a more granular understanding of the constraints shaping retrofit implementation.

Ambrose & McCarthy (2019) highlight the key dimensions of landlord decision-making by developing four typologies: **(i)**. *non-joiners*, who minimise expenditure and perceive efficiency measures as drivers of rent increases; **(ii).** *passive actors*, who recognise the benefits of energy efficiency but believe costs cannot be recovered; **(iii).** *active landlords*, who support efficiency improvements but seek low-cost options; and **(iv).** *pro-active landlords*, who actively pursue energy efficiency measures. This typology illustrates the heterogeneity of landlord attitudes and the resulting variability in retrofit uptake.

In contrast, tenants have limited scope for direct action, as they depend on landlords' willingness to invest. Their ability to reduce energy costs is often confined to behavioural adjustments (Kearns et al., 2019). Moreover, tenants are typically reluctant to invest themselves, as they do not own the property, which further limits motivation for action (Pelenur & Cruickshank, 2012).

"*Cascais Green Fund*" in Portugal is an example that provides tenants (apart from landlords) with the capability to apply for municipal fund that subsidises a priori low-income and mid-income families for implementing energy efficiency and renewable energy interventions in their homes. Specifically, 100% subsidisation can be provided to low-income families for their needs, while also 80% subsidisation can be provided to mid-income families.

Figure 10 presents a summary of barriers that hinder **landlords** from investing in energy efficiency measures.

Figure 10. Influential factors that affect landlords' decision-making towards energy efficiency, and thermal performance upgrading investments, as identified from the international literature.

Adapted from: Ambrose & McCarthy (2019).

Recent work has also broadened the focus by examining how landlord and tenant dynamics intersect with structural vulnerabilities. Tozer et al. (2024) propose a vulnerability-based framework that categorises barriers into three dimensions: **(i).** *affordability* – high energy bills and upfront retrofit costs that exacerbate financial hardship and restrict opportunities for low-income households (Biswas et al., 2022; Cong et al., 2022; Fernández et al., 2022; Hernández, 2016), **(ii).** *adequacy of the built environment*, where older, poorly insulated buildings demand costly and technically complex interventions (Thomson et al., 2017) and **(iii).** *social exclusion* - which highlights the marginalisation of vulnerable groups, including tenants in private MABs, who often face language barriers, a lack of information, and limited eligibility for retrofit programs.

Together, these insights show that the barriers discouraging landlords from undertaking energy efficiency measures are multidimensional, extending beyond financial constraints to include a wide range of factors (e.g., technical, social). Addressing them requires integrated policy approaches that create effective incentives, improve financial accessibility, and account for the broader socioeconomic vulnerabilities shaping decision-making in the PRS.

Barriers identified for local authorities

Building on insights from **Section 3.1**, local authorities play a pivotal role in addressing energy poverty. Their proximity to citizens makes them essential actors in policy implementation, yet they face a range of barriers that complicate the design and delivery of robust local strategies. Here, we examine these barriers, drawing on the literature and aligning them with the categories most often cited in research: financial, awareness and access, geographical/spatial, and regulatory.

Al Kez et al. (2024) emphasise that local contexts matter in energy poverty alleviation, noting that differences in geography, household preferences, and cultural practices shape outcomes. Their study highlights financial barriers, such as low incomes among vulnerable households and elevated energy prices, alongside technical challenges linked to poor building conditions. These findings echo the EU

Recommendation on Energy Poverty (European Commission, 2020a), which recognises both structural and socioeconomic obstacles. Sociopolitical barriers are also identified, reflecting the difficulty of translating national targets into effective local action.

According to Tahsildoost & Zomorodian (2020), barriers that local authorities face when addressing energy poverty can be categorised into four main categories, namely: **(i)**. *financial barriers*, **(ii)**. *awareness and access barriers*, **(iii)**. *geographical/ spatial barriers*, and **(iv)**. *regulatory barriers*.

Financial barriers

Lack of funding from national initiatives and institutional bodies restricts the capacity of municipalities to provide adequate support, discouraging households from pursuing energy efficiency measures and contributing to poor thermal conditions (Blomqvist et al., 2022; Kaya et al., 2021). Local financial conditions also matter: low household incomes and unemployment constrain demand for retrofits, while inadequate tax incentives reduce the effectiveness of support mechanisms for low-income groups, who already contribute little in direct taxation (Kaya et al., 2021).

Awareness and access barriers

Citizens' education and awareness levels strongly influence decision-making about energy efficiency. Limited knowledge of energy poverty, combined with scepticism about available resources, often reduces participation in support schemes (Blomqvist et al., 2022; MacDonald et al., 2020). As noted in **Section 3.2.2**, 17% of policy measures analysed across Europe focused primarily on education, highlighting its relevance. Other relevant barriers to access include lack of time or competing priorities -especially in rural areas- and poor access to marketing channels, which can limit awareness of available programs (Winner et al., 2015). Finally, lack of available data for identifying the most vulnerable households can be also a barrier observed in this category. This lack of available data is particularly observable when it comes to vulnerable citizens living in private MABs (Palma et al., 2025).

Geographical and spatial barriers

Geographic isolation is a key factor that affects local authorities' ability to deal with energy poverty issues (Korkmaz & Senyel Kurkcuoglu, 2025). Households in remote municipalities often face limited access to financing, incentives, and professional services (Shoemaker et al., 2018).. A shortage of local contractors and energy professionals further restricts retrofit activity, while limited institutional capacity within municipalities can slow program delivery (Grossmann et al., 2021). These challenges are particularly visible in rural areas, though urban authorities are not exempt.

Regulatory barriers

Policy fragmentation and inconsistent frameworks also hinder local action. Policymakers often prioritise larger municipalities, leaving smaller ones with less supportive and less consistent settings (Free Choices, 2012). This is reflected in our policy analysis (**Section 3.2.2**), which indicates that 63% of initiatives included time-intensive recruitment processes, creating barriers particularly for tenants within self-referral schemes. Broader shortcomings include the weak integration of national and regional frameworks into local governance (Phillips, 2019) and mistrust of government policies at the citizen level, which can limit acceptance of local initiatives.

A short summary of these barriers that **local authorities** face in the context of combating energy poverty is presented in **Table 4**, right below.

Table 4. Categorisation of barriers local authorities have to overcome in order to form robust policies towards energy poverty alleviation in their localities.

Categories	Barriers
Financial	Lack of funding from financial institutions or national bodies.
	Poor income of local citizens/ unemployment rates in their municipality.
	Inadequate tax incentives for local citizens.
Awareness and Access Barriers	Local citizens' lower education level regarding energy poverty aspects.
	Lack of available data for identifying the most vulnerable households, especially those in private housing.
	Lack of awareness or scepticism towards energy efficiency measures (also a barrier related to the educational aspects of local citizens).
	Lack of time or other priorities for local citizens (especially in rural municipalities).
	Lack of access to local marketing channels for local citizens (related also to limited access to a reliable internet connection).
Geographical/ Spatial	Geographic isolation of some municipalities.
	Shortage of local energy efficiency workers or trusted contractors.
	Lack of dedicated agencies/ insufficient institutional capacity.
Regulatory	Unsupportive and inconsistent policy setting for smaller municipalities.
	Lack of robust sub-national territorial frameworks.
	Insufficient integration of policies with regional, and local policymaking processes.
	Mistrust of local citizens towards local government policies.

Adapted from: Blomqvist et al. (2022); Grossmann et al. (2021); Kaya et al. (2021); MacDonald et al. (2020); Phillips (2019).

3.3.2. Legal and regulatory framework for addressing energy poverty in private multi-apartment buildings and unmet needs

Having examined barriers from the perspective of different actors (tenants, landlords, and local authorities), it is equally important to analyse the broader legal and regulatory frameworks that shape the conditions under which energy poverty is addressed in private MABs. These frameworks operate

at multiple levels - EU, national, and local - and while they provide opportunities for progress, they also introduce constraints and unmet needs that affect the scope and effectiveness of interventions.

EU-level frameworks

The EU has introduced several regulations aimed at increasing the energy efficiency of buildings. The European Green Deal provides the overarching framework, targeting a 55% reduction of greenhouse gas emissions by 2030 compared to 1990 levels, thereby contributing to making the EU climate neutral. It also sets the ground for improving energy efficiency in buildings by 11.7% by 2030 (European Commission, 2019b; Hallik et al., 2024). More recently, the revised EPBD has reinforced this direction. In line with the "Energy Efficiency first" principle (European Commission, 2023b), the EPBD emphasises reducing energy consumption, increasing energy efficiency and the use of energy from within the building sector. These measures are seen as crucial not only for decarbonising the building stock but also for tackling energy poverty (European Commission, 2024b).

To align with these objectives, Member States are required to integrate relevant targets into their national regulations and strategies, such as their NECPs. These targets must be tailored to each country's specific context, taking into account national building stock characteristics, socio-economic conditions and existing governance structures. However, the translation of EU goals into national action is shaped by diverse building stocks, socioeconomic conditions, and governance structures -and several legal and regulatory barriers remain.

One frequently cited challenge is the lack *of a unified definition for energy poverty* across the EU. While this allows Member States to adapt definitions in local realities, it also generates inconsistencies in energy poverty diagnosis and response across Europe (European Commission, 2023a; Fragkos et al., 2023; Kyprianou et al., 2019). This lack of consistency can lead to fragmented protection, with vulnerable households receiving different levels of support depending on where they live, weakening the overall impact of EU-wide renovation strategies (Tenhunen, 2021).

Competition rules also play a role. While EU law permits targeted support to vulnerable groups, market liberalisation rules limit certain types of direct subsidies, price controls, or incentives that could make renovations more attractive (European Union Agency for the Cooperation of Energy Regulators, 2024). Legal uncertainty surrounding renovation obligations creates further complications. For example, the EPBD requires upgrades, but in some contexts, tenant rights and fragmented ownership structures delay implementation -an issue particularly evident in parts of Eastern Europe. Finally, funding instruments such as the Just Transition Fund often prioritise industrial transformation over direct household support, leaving gaps in financing for energy-poor households (Mehl, 2025).

National-level analysis in the LOCATEE pilot countries

Poland

Poland already possesses a formal legal definition of energy poverty in Energy Law (Sokołowski, 2023). It can be also said that the policy is recognised in national energy and climate strategies. However, there are transitional (as of September 2025) financial and managerial problems with financing crucial, long-term programmes: "Clean Air Priority Programme" (for single-family owners) and "Thermo-modernisation and Renovation Fund" (for multi-apartment building owners: mostly housing cooperatives and homeowners' associations). Until the Social Climate Fund is launched, two nationwide, universal and relatively straightforward programmes to support energy efficiency and

address the infrastructural dimension of energy poverty will probably remain stagnant. In the absence of these measures, the state continues the policy of freezing electricity prices for households. Also, it plans to introduce financial support through a heating voucher (targeted at households using district heating -the majority of Polish multi-apartment buildings) since Autumn 2025. The measure is intended to mitigate the price increase resulting from the unfreezing of heat and gas tariffs, which were first introduced in response to rising inflation and subsequently to the energy crisis triggered by Russia's aggression against Ukraine (Sokołowski et al., 2021). Support in the form of reduced tariffs for specific groups is essentially absent. In addition, various regional funds exist; however, the distribution of resources for energy efficiency is uneven (Frankowski et al., 2023), and only a very limited number of local government initiatives support thermal modernisation measures other than heating source replacement. Similarly, comprehensive policies to tackle energy poverty at the municipal level remain rare.

Greece

In Greece, fragmented support schemes sometimes create challenges for vulnerable households. The "Social Tariff Scheme" provides reduced rates, but complex eligibility criteria and application processes can exclude households at risk (Hinsch et al., 2022). Similarly, previous and ongoing energy efficiency programs like "Exoikonomo" face bureaucratic hurdles and co-financing requirements that deter participation. Legal gaps are also present: for example, the absence of specific legislation on Building Energy Management Systems slows the adoption of efficient technologies (Bagaini et al., 2020), while the lack of a framework to address split incentives in the PRS hampers renovations in private MABs. Collective initiatives face their own obstacles. At the municipal level, the absence of commitments on action against energy poverty in local SECAPs further constrains action: as of 2023, only 25% of municipalities had made commitments on energy poverty through the Covenant of Mayors, and only a fraction had translated these into concrete actions (Kanellou et al., 2023).

Portugal

Portugal has advanced with a dedicated long-term strategy (ELPPE), but until December 2024, its NECP lacked a specific focus on energy poverty, revealing gaps in mainstreaming the issue (Kanellou et al., 2023). Nevertheless, since January 2024 Portugal has published a dedicated long term energy poverty mitigation strategy, which proposes the first official definition of energy poverty, identical to the EED definition (Direção-Geral de Energia e Geologia, 2025). The National Energy Poverty Action Plan has also been developed and is currently in public consultation. A National Observatory has also been created, aiming to join a comprehensive group of stakeholders and promote exchange and collaboration for informing national strategies and plans on this topic. Energy efficiency programs such as "Vale Eficiência I and II" provide important opportunities, yet administrative burdens and regulatory delays limit participation, particularly among vulnerable households. Fragmentation and conflicting guidance within governance structures further constrain implementation (Koengkan et al., 2023). Finally, while legal provisions exist for renewable self-consumption and energy communities, the absence of clear mechanisms for collective financing and bureaucratic constraints restricts community ownership models that could otherwise help reduce energy poverty (Kanellou et al., 2023). Telheiras Renewable Energy Community is an innovative project stemming from a partnership between a local association and the local government, which produces local renewable electricity, including and supporting vulnerable families.

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Overall, legal and regulatory frameworks significantly shape how energy poverty is addressed in private MABs. At the EU level, fragmented definitions, competition rules, and funding priorities create uneven conditions. At the national level, Greece, Poland, and Portugal face common challenges: bureaucratic hurdles, limited targeting of vulnerable households, and regulatory gaps in supporting collective or PRS-specific solutions. At the local level, SECAPs offer potential but remain inconsistently applied and constrained by limited resources.

3.3.3. Ownership and decision-making structures in private multi-apartment buildings

Another critical dimension in addressing energy poverty in private MABs relates to governance models and ownership structures. These frameworks determine how collective decisions are made, how responsibilities are shared, and how challenges such as split incentives are managed. In this section, we analyse governance and ownership structures in the pilot areas of the LOCATEE project (Greece, Poland, Portugal), focusing on how they shape the feasibility of energy efficiency upgrades. We also highlight the limitations of existing tenant-landlord laws and decision-making procedures that influence the uptake of building renovations.

Poland

In Poland, private MABs are predominantly organised as housing cooperatives or housing associations (Królikowska, 2024; Sikorska-Lewandowska, 2021). Housing cooperatives are collective entities in which members own, choose the representation (board) which manage the buildings, mostly large-scale estates. In contrast, housing associations consist of individual apartment owners who directly decide on the management of their shared property (mostly: one building and its common areas). It is also often the case that housing associations choose the commercial housing administrator who handles everyday work in the building and coordinates the investments. In housing cooperatives, key decisions are made by the cooperative's governing bodies (such as the annual general assembly), which are made by most members present (Milewska-Wilk, 2023). In contrast, in housing communities, decisions are taken by all property owners through a vote, with most resolutions requiring a simple majority of ownership shares. There are almost 3,500 housing cooperatives (Frankowski et al., 2025) and 194,000 registered housing associations (Statistics Poland, 2024) in Poland; also, some private MABs belong to the individual owners or have disputed ownership.

While this governance model provides formal mechanisms for decision-making, achieving consensus is often difficult due to diverse financial capacities, interests, and awareness levels among owners. This situation is especially popular in larger cities, where the rental market is bigger, and the ownership of apartments is more differentiated. As noted in **Table 2**, collective decision-making barriers frequently delay or prevent necessary improvements.

Polish tenancy laws provide general protections for tenants but do not contain explicit mechanisms to encourage or mandate energy efficiency measures. Landlords may hesitate to invest, as opportunities to recover costs through rent increases are limited. Although rent controls are largely absent from the private sector, certain tenant protection provisions and market sensitivities constrain the ability of landlords to raise rents significantly (Kalmet, 2025). This creates a structural limitation on financing renovations in private MABs.

Greece

In Greece, most private MABs operate under the horizontal property regime, established by Law No. 3741/1929 and further detailed in the Civil Code (Ministerial Decree No. 456/1984) (Hellenic Republic, 2025; International Labour Organisation, 2025). Under this system, individual apartments are privately owned, while common areas (e.g., stairwells, roofs) are jointly owned by all co-owners. Decisions regarding these common areas are made collectively through an assembly of owners (Triantafyllopoulos, 2024).

Unlike Poland, Greece has little tradition of housing cooperatives or community associations, which limits collective organisational capacity. Decision-making is complicated by the large number of co-owners: the average building may have 32 owners, with some exceeding 120 (Triantafyllopoulos, 2024). This fragmentation makes consensus difficult, especially for high-cost interventions like energy efficiency retrofits. Differences in financial capacity, legal status, and priorities among owners further exacerbate delays.

Legal frameworks intensify these barriers. For many types of building works, Greek law requires unanimity or qualified majorities among co-owners. Where disagreement occurs, legal proceedings are often necessary, creating significant delays and deterring investment (Triantafyllopoulos, 2024). The absence of systematic data on tenants per building complicates assessments of who is affected, limiting the ability to design targeted support. In addition, regulatory gaps persist: while properties leased by public entities must meet minimum energy efficiency standards (Class B), no comparable requirements exist for the private rental sector (International Energy Agency, 2023; Roussanoglou, 2020). This contributes to the persistence of inefficient buildings in the private market.

Portugal

Portugal also follows a horizontal property regime similar to Greece, where individual units are privately owned and common areas are jointly owned. For apartment-level interventions that do not impact several occupants there is no need for communal approval (e.g., windows upgrades). However, for financially intensive building retrofits that also impact several occupants of a MAB (e.g., building façade/central heating system), a two-thirds majority is generally required, while simpler measures - such as installing micro-generation units- may be approved with a simple majority (Economidou et al., 2018). As in Greece, these requirements can delay decision-making. Divergent financial capacities and interests among owners make it difficult to reach consensus, particularly for large-scale retrofits at the building scale. The split incentive problem further discourages landlords from investing, as tenants receive most of the benefits. Housing cooperatives and communities exist only marginally in Portugal and play little role in managing private MABs, leaving horizontal ownership as the dominant model.

4 Solutions and implementation strategies for energy poverty alleviation

Addressing energy poverty requires a multifaceted and integrated approach that goes beyond direct financial assistance to include structural, behavioural, and governance-oriented interventions. This section explores how preliminary energy efficiency measures, best practices, and the mobilisation of key local actors can contribute to lasting solutions. While EU directives and national frameworks set the overarching policy environment, the success of alleviation efforts often depends on actions at the local and community levels, where interventions can be tailored to the specific needs of households and neighbourhoods.

The first part reviews **preliminary energy efficiency measures** that are relevant for the pilot areas of this project. These measures, which include basic insulation upgrades, replacement of outdated heating systems, and integration of renewable energy technologies, represent cost-effective and scalable entry points. By reducing energy demand at its source, they not only lower household energy bills but also improve thermal comfort and health outcomes, particularly for vulnerable populations.

The second part highlights **best practices for enhancing energy poverty alleviation**, structured around three main implementing actors: **(i).** municipalities, **(ii).** civil society organisations (CSOs), and **(iii).** housing entities. Municipalities, as the closest level of government to citizens, can design and deliver targeted interventions while coordinating resources across stakeholders. CSOs help bridge gaps between institutions and communities, ensuring the inclusion of marginalised groups and fostering trust through grassroots engagement. Housing entities are essential for building-level interventions, facilitating collective investment, and overcoming coordination barriers among co-owners.

The third part examines **the role of intermediaries** in linking policy objectives and funding mechanisms with the everyday realities of energy-poor households. It considers the specific governance challenges of MABs, where collective action for renovations is often difficult, and analyses how municipalities, CSOs, and housing entities can act as connectors by coordinating technical, financial, and social support services.

4.1. Preliminary energy efficiency measures for addressing energy poverty

Building on the policy landscape described in the previous sections, this part identifies preliminary energy efficiency measures that are relevant for the LOCATEE pilot areas (Greece, Poland, Portugal). These measures are understood as entry-level, cost-effective interventions that can reduce household energy needs and costs, improve living conditions, and support vulnerable groups. They include technical, financial, and social components that will be further assessed during subsequent phases of the project for their feasibility and potential impact.

The EU has introduced a series of directives and strategies that provide the framework for energy efficiency in the building sector (European Commission, 2020c, 2020a, 2023b, 2023a, 2024b). These provisions establish a baseline for action across Member States, but their practical impact depends on national and local adaptation. Key elements include: **(i).** *Minimum energy performance standards* for existing buildings undergoing major renovations, with requirements for improved insulation, efficient

heating/cooling systems (e.g. heat pumps), and high-performance building materials; **(ii).** *Nearly-zero energy requirements for new buildings*, relying largely on renewable energy sources, **(iii).** *Long-term renovation strategies*, to decarbonise the building stock by 2050 while prioritising vulnerable households; **(iv).** *Promotion of smart technologies*, such as smart meters and intelligent heating/cooling controls, supported by the Smart Readiness Indicator, **(iv).** *Phase-out of fossil fuel heating*, in favour of renewable and efficient alternatives, **(v).** *Socioeconomic support measures*, including targeted financial incentives through instruments such as the EU Renovation Wave and the Social Climate Fund, and **(vi).** *Attention to indoor environmental quality*, with an emphasis on air quality, lighting, and noise reduction, in addition to thermal performance.

National frameworks in pilot areas

Each of the LOCATEE pilot countries has adopted measures that align with EU objectives, while tailoring them to national conditions.

The goal adopted in a recent project of Polish NECP (July 2025) is a downward trend in the level of energy poverty not exceeding the EU average by 2035, and the complete elimination of energy poverty by 2050 (Polish Ministry of Climate and Environment, 2025). Key instruments devoted to MABs during this decade include the "*Thermo-modernisation and Renovation Fund*", which has supported more than 30,000 building investments (Habitat for Humanity Poland, 2025; Janikowska et al., 2024), and the "*Warm Apartment*" programme (a programme for small housing communities' buildings, a response for multi-apartment buildings to the popular "*Clean Air*" programme for single-family houses), focused on upgrading heating systems and insulation in MABs (Janikowska et al., 2024)[1]. Crisis measures such as the "*Government Energy Shield*" provided temporary protection to households during the energy price shocks of 2021–22 (Service of the Republic of Poland, 2023), while the "*ASSIST in Poland*" initiative trained local advisors to support vulnerable consumers (Consumer Federation of Poland, 2024). In addition, more innovative approaches such as the "*Consumer Stock Ownership Plan*" have been piloted to encourage community participation in renewable projects, though their application remains limited (Lowitzsch, 2019). Since 2025, there will be a dedicated heating voucher for district heating users affected by energy poverty, and since 2026, a differentiated set of interventions under the Social Climate Fund, including direct support and many renovation schemes (although support for housing associations and cooperatives will be limited).

As for the case of Greece, the revised Greek NECP (2024) sets targets for reducing primary energy use in residential buildings by up to 22% by 2035, alongside energy poverty reduction goals of 50% by 2025 and 75% by 2030 (compared to 2016 levels) (Hellenic Republic, 2024). The "*National Action Plan to Combat Energy Poverty*" (2021) defines households at risk and outlines retrofit support. Another program aimed at increasing energy efficiency of buildings is the "*Exoikonomo*", which subsidises insulation, heating and cooling upgrades, solar boilers, and smart systems, with higher support rates for low-income households. In 2025, a new €434 million "*Exoikonomo*" scheme was launched to fund

[1] In August 2025, Bank Gospodarstwa Krajowego (Polish State Bank) announced the exhaustion of available funds in the Thermo-modernisation and Renovation Fund account under the limit for thermo-modernisation and renovation; in the case of the "Warm Apartment" program, expenditures on approved investments will be possible under this scheme until the end of 2025. As a result, for multi-apartment buildings, preferential loans are available in most regions for improving energy efficiency from cohesion policy funds and the RES Grant from the Recovery and Resilience Facility, offering 50% non-repayable support for installing renewable energy systems in multi-apartment buildings.

improvements in at least 11,500 dwellings, targeting a minimum 30% energy reduction per household (Ministry of Environment & Energy, 2023, 2025).

Finally, in Portugal, the updated NECP (2024) and the "*National Long-term Strategy to Combat Energy Poverty*" set progressive targets for improving thermal comfort in homes by 2030, 2040, and 2050 (European Commission, 2024c; Ministry for Environment and Spatial Planning, 2024). Measures include replacing inefficient heating and cooling systems with solar thermal, heat pumps, or geothermal solutions, and scaling up solar photovoltaics for local generation. The new version of "*Energy Efficiency program for vulnerable groups (Vale Eficiência II)*" programme provides three vouchers of 3,900€ to vulnerable households for window replacement, insulation, and renewable installations, aiming for 100,000 vouchers by 2025 (though uptake has so far been slower than expected), with an available allocation of €104 million in this 2nd phase, which will be distributed across approximately 80,000 "Efficiency Vouchers" (Perista, 2024). Complementary schemes included "*Edifícios Mais Sustentáveis*" (finished programme), supporting solar panels and efficiency upgrades, while also providing support for building envelop retrofits (windows, walls, roofs) as well as equipment (biomass, heat pumps), and the "*E-Home (E-Lar)*" programme to be launched by October 2025, which finances energy-efficient appliances (just for cooking and water heating), promoting electrification and recycling (Oliveira, 2025). The programme "*Bairros + Sustentáveis*" provides subsidies for building renovation (windows, walls, floor, shading, ventilation, green roofs), Heating, Ventilation and Air-Conditioning (HVAC) systems, renewable energy systems and energy certification (Fundo Ambiental, 2025).

A summary of the promoted energy efficiency measures for all the pilot areas of the project is presented in **Table 5** below.

Table 5. Preliminary energy efficiency measures promoted by the EU and pilot areas that focus on implementing them.

Preliminary Energy Efficiency Measures	Pilot Areas
Improvement (or installation) of building thermal insulation	Greece, Poland, Portugal
Replacement of old doors and windows with new energy-efficient ones	Greece, Poland, Portugal
Integration of energy-efficient heating systems (e.g., heat pumps)	Greece, Poland, Portugal
Integration of energy-efficient cooling systems (e.g., air conditioners with high energy performance grade)	Greece, Portugal
Utilisation of high-energy performance building materials, biomaterials, recycled materials and other nature-based solutions	Portugal
Installation of renewable technologies for electricity generation (e.g., solar photovoltaics)	Greece, Poland, Portugal
Installation of renewable technologies for domestic hot water (e.g., solar boilers)	Greece, Portugal

Adoption of smart technologies and automations (e.g., smart meters)	Greece
Enhancement of indoor environmental quality (e.g., air quality, lighting, noise reduction)	Limited or no attention is given to this measure (same for all pilot areas)
Removal of outdated solid fuel stoves and replace it by cleaner heating source	Poland
Utilisation of awareness campaigns on energy-saving strategies	Poland
Recycling of old electric and electronic equipment	Portugal

Across Greece, Poland, and Portugal, energy poverty is increasingly recognised as both a social and environmental challenge, reflected in the development of targeted initiatives to improve energy efficiency in buildings. While all three pilot areas prioritise measures such as thermal insulation, other actions promoted at the EU level -notably the use of advanced high-performance building materials- receive comparatively limited attention, highlighting a persistent gap. Similarly, indoor environmental quality aspects, including air quality, lighting, and noise reduction, remain underexplored despite their relevance to overall well-being. The effectiveness of these initiatives will therefore depend not only on the level of available funding but also on simplifying access for households, strengthening local governance capacities, and establishing robust monitoring mechanisms to ensure measurable improvements in both living conditions and energy savings.

4.2. The role of intermediaries in alleviating energy poverty at the local level

The role of intermediaries (e.g., municipalities, CSOs, housing entities, etc.) on addressing energy poverty at the local level will be defined in this section, to provide readers with a compact knowledge about the characteristics and challenges of addressing energy poverty at the local level. Furthermore, definitions and analyses of different housing entity types (i.e., public housing entities, private housing entities, non-profit housing entities, and cooperative housing entities) involved in MABs are also provided in this section.

4.2.1. Definitions and analysis of entities in multi-apartment building housing

Entities in MAB housing refer to organisations, agencies, or institutions -whether public, private, or non-profit- that are responsible for the planning, development, financing, management and regulation of residential housing, especially in MABs. These entities play a crucial role in meeting housing market demands through policy development, decision-making, and the oversight of housing systems. Moreover, such entities are key actors in promoting energy efficiency in buildings, thereby contributing to the alleviation of energy poverty.

These entities can be categorised based on their ownership structure (public, private, non-profit, or cooperative), their primary function (managing, developing, financing, etc.), and their funding sources (e.g., state budgets, municipal budgets, EU funds, private capital, or tenant fees, etc.) The abovementioned, along with their definitions, are presented in **Table 6**, right below.

Table 6. Housing entity types along with their definitions, functions, and funding sources.

Housing Entity Type	Definition	Functions	Funding Sources
Public Housing Entities	Government or municipal bodies managing residential housing (including social housing)	Regulating and overseeing the housing market; developing, financing, and managing housing infrastructure; setting housing policies and standards; providing and maintaining public housing (including affordable and market-rate rental housing); promoting urban development and energy-efficient housing projects; ensuring housing availability and accessibility for different income groups.	Government budgets, EU funds, and local taxes.
Private Housing Entities	For-profit companies or developers that can build, manage, or sell housing for the private market.	Constructing, selling, and renting residential units for market-based housing; investing in housing projects; improving housing infrastructure; and adopting energy efficiency solutions as part of market strategies.	Private capital, loans, and investor funding.
Non-Profit Housing Entities	Organisations focused on housing solutions.	Providing affordable or social housing; advocating for tenant rights; securing funding for energy-efficient housing solutions; assisting vulnerable populations with housing needs; and offering community-based housing support.	Donations, grants, EU funds, and philanthropic contributions.
Cooperative Housing Entities	Member-owned organisations offering shared ownership or affordable rental housing.	Managing collectively owned housing; ensuring long-term affordability; maintaining properties through member contributions; and promoting sustainable and energy-efficient housing solutions.	Membership fees, loans, and state subsidies.

4.2.2. The role of municipalities

Municipalities play a pivotal role in addressing energy poverty in private MABs by acting as crucial intermediaries between residents, financial institutions, national governments, and technical experts. Their involvement is essential in overcoming financial, technical, and community-related barriers that prevent large-scale energy-efficient renovations in privately owned residential buildings (Gerőházi et al., 2023). While their level of engagement depends on national legislation and available resources, municipalities can influence energy poverty alleviation through various mechanisms.

Municipalities can educate and support stakeholders by providing training, awareness campaigns, and technical guidance to homeowners and building managers. This ensures they are well-equipped to navigate subsidy programs and renovation planning, where municipalities facilitate communication through newsletters and forums.

They often manage local or national subsidy programs, helping homeowners access funds for energy-efficient renovations. In Bulgaria, municipalities oversee applications and project implementation, while in Lithuania, they collaborate with renovation agencies and district heating companies to facilitate financial support. Beyond national subsidies, municipalities can offer local incentives, such as co-financing, grants, or operational support for resource centres (One-Stop-Shops). The Burgas municipality's Energy Office is a strong example, assisting residents with financial navigation and reducing burdens through cost-covered technical assessments.

Municipalities help build trust among residents and stakeholders, facilitating meetings and ensuring transparency in renovation projects. Their participation in homeowners' meetings improves the likelihood of project success by fostering consensus and informed decision-making (Gerőházi et al., 2023). They also advocate for regulatory improvements that support energy-efficient renovations, working to simplify administrative procedures, ensure fair subsidy distribution, and protect vulnerable households through legal provisions such as disconnection protections or mandatory energy performance improvements in rental properties.

By leveraging their administrative capacity and local expertise, municipalities help bridge the gap between policy and implementation, ultimately making energy-efficient renovations more accessible and feasible, particularly for vulnerable residents**.**

4.2.3. The role of Civil Society Organisations

CSOs play a crucial role in tackling energy poverty by acting as intermediaries between vulnerable households, policymakers, energy providers, and financial institutions. Their engagement is essential in bridging gaps in awareness, advocacy, and access to energy efficiency programs, particularly for marginalised communities that may struggle to navigate complex support systems. As part of the broader civic energy sector, CSOs contribute to emerging local perspectives on energy justice, ensuring that energy transitions are not only technologically but also socially inclusive.

CSOs provide direct assistance to energy-poor households through advisory services, financial guidance, and technical support. Many organisations, such as consumer rights groups and social service NGOs, run energy counselling programs that educate residents on energy-saving practices, access to subsidies, and available financial aid for energy-efficient home improvements. These efforts empower households to make informed decisions and reduce their energy costs in the long run.

In addition to awareness campaigns, CSOs advocate for policy changes and systemic improvements that address the structural causes of energy poverty. They work to ensure that subsidy programs, energy efficiency initiatives, and tenant protection laws are designed with inclusivity in mind. For example, in Austria, organisations such as Caritas and Volkshilfe actively engage in national debates, pushing for stronger regulatory frameworks that prevent energy disconnections for low-income households. Similarly, research on the civic energy sector in Bristol has demonstrated that intermediary organisations are instrumental in facilitating local engagement with low-carbon energy transitions, ensuring that energy justice principles are embedded in local governance structures (Lacey-Barnacle & Bird, 2018).

A notable initiative addressing energy poverty in Austria is the WOHNSCHIRM Energie program, which is implemented by major social NGOs like Caritas, Diakonie, Volkshilfe, and the Red Cross. This program provides emergency financial assistance for overdue energy bills, preventing disconnections and ensuring that vulnerable households maintain access to essential heating and electricity. Through personalised financial counselling, WOHNSCHIRM Energie also helps individuals assess their energy costs, explore provider options, and navigate additional support mechanisms. By offering direct intervention in crises, this initiative exemplifies how CSOs act as supporters for energy-poor households while advocating for broader systemic change.

CSOs also facilitate cooperation between different stakeholders by creating platforms for dialogue and collaboration. They organise community outreach programs, stakeholder roundtables, and multi-actor

partnerships that enhance coordination between municipal authorities, utility companies, and social welfare agencies. Some CSOs act as mediators in cases where energy suppliers and households face conflicts over unpaid bills, helping to negotiate payment plans and prevent forced disconnections. In Bristol's civic energy sector, CSOs have been shown to act as a bridge between local low-carbon initiatives and deprived communities, helping to raise awareness of funding opportunities and localising the economic benefits of the energy transition (Lacey-Barnacle & Bird, 2018). Programs like WOHNSCHIRM Energie mirror this approach by ensuring that state assistance reaches those who need it most while maintaining strong ties between local governance and civil society.

In many cases, CSOs operate OSSs, offering holistic support by combining social assistance with energy advisory services. These centres help households apply for grants, navigate bureaucratic requirements, and receive practical guidance on improving their energy efficiency. Such integrated services are particularly relevant in times of economic hardship, as highlighted by the expansion of WOHNSCHIRM Energie to address rising energy costs in Austria. The initiative, backed by €134 million in state funds for 2023-2024, reflects growing recognition that targeted, community-based interventions are crucial for alleviating energy poverty.

By leveraging their grassroots reach and advocacy expertise, CSOs play a vital role in shaping a fair and inclusive energy transition. Their ability to directly engage with affected communities, influence policy frameworks, and bridge the gap between residents and institutions makes them indispensable actors in the fight against energy poverty (in private MABs). However, as research on intermediaries in energy justice highlights, CSOs also face limitations, particularly under conditions of austerity, where financial constraints may reduce their ability to scale up initiatives or sustain long-term engagement with marginalised groups. Addressing these challenges will require stronger collaboration between CSOs, policymakers, and energy sector stakeholders to build resilient and just energy systems (Lacey-Barnacle & Bird, 2018).

4.2.4. The role of housing entities

Housing entities, encompassing public, cooperative, and social housing providers, play a central role in mitigating energy poverty by acting as intermediaries between residents, policymakers, and energy providers. Their unique position enables them to implement energy efficiency measures, advocate for tenant rights, and facilitate access to financial assistance, thereby enhancing the living conditions of vulnerable populations.

Housing entities are instrumental in upgrading residential properties to improve energy efficiency. By investing in renovations such as insulation, efficient heating systems, and renewable energy installations, they reduce energy consumption and lower utility costs for residents. According to Housing Europe, large-scale building renovations supported by EU funding have significantly improved energy efficiency in the social housing sector, ensuring lower costs for tenants without increasing financial burdens. The Renovation Wave initiative, strongly backed by Housing Europe, aims to energy retrofit millions of homes across Europe, prioritising low-income households at risk of energy poverty.

Beyond physical improvements, housing entities actively engage in policy advocacy to address the systemic causes of energy poverty. Housing Europe, which represents a network of public, cooperative, and social housing providers, works to influence housing policies that promote affordability and sustainability. By participating in EU policy dialogues and research initiatives, housing entities ensure that the needs of low-income households are reflected in energy and housing legislation. Similarly, the

Energy Poverty Advisory Hub collaborates with housing entities to develop policy recommendations that enhance tenant protections, prevent energy disconnections, and improve access to energy efficiency programs.

Housing entities assist residents in accessing financial support for energy efficiency improvements. Different initiatives demonstrated how housing entities secure funding for large-scale energy retrofits, thereby reducing energy costs for tenants. Housing entities act as financial intermediaries, navigating EU funds, national subsidies, and municipal grants to ensure that energy efficiency measures reach those most in need. This financial mediation prevents "renoviction" -where tenants are displaced due to unaffordable rent hikes following energy efficiency upgrades.

Housing entities can also engage with communities to raise awareness about energy-saving practices. By organising workshops, providing educational materials, and offering personalised advice, they can empower residents to adopt energy-saving behaviours, contributing to long-term reductions in energy consumption and costs. Housing Europe emphasises tenant engagement as a core component of energy-efficient housing policies, ensuring that communities actively participate in the energy transition rather than merely being affected by it.

Housing entities function as crucial intermediaries in the fight against energy poverty. Through infrastructure improvements, policy advocacy, financial facilitation, and community engagement, they ensure energy-efficient and affordable housing remains accessible to low-income residents. Their role in bridging social housing needs with climate action goals makes them key facilitators in the transition to a just and inclusive energy system.

However, housing entities also face challenges in fulfilling their intermediary role effectively. Financial constraints, regulatory barriers, and administrative burdens can slow down large-scale renovations and energy efficiency measures, particularly when funding is inconsistent or overly bureaucratic. Additionally, balancing affordability with necessary energy upgrades remains a persistent challenge, as rental costs must be kept low while ensuring investments in sustainability. Addressing these barriers requires stronger public funding commitments, streamlined regulatory frameworks, and enhanced collaboration between housing entities, policymakers, and financial institutions to ensure long-term impact.

4.3. Best practices for enhancing energy poverty alleviation measures

While key challenges regarding the barriers and regulatory constraints towards energy efficiency were discussed in **Section 3.3,** key challenges may also include "positive aspects" of the energy poverty issue, like best practices and opportunities. Such best practices and opportunities in the context of energy poverty alleviation are discussed in this section.

Energy poverty remains a pressing issue that impacts millions of households across Europe, demanding targeted action at multiple levels. As the above section demonstrates, addressing energy poverty at the local level is particularly effective, especially in the context of private MABs, where tackling energy poverty both at the household and building levels plays a crucial role (Gerőházi et al., 2023).

Listing good practices in addressing energy poverty at the local level is essential to bridge the gap between policy aspirations and implementation on the ground. By showcasing proven solutions, this section provides actionable insights that local actors, such as municipalities, NGOs, and housing

entities, can use to design effective interventions. It focuses on presenting best practices that address energy poverty of the private MABs at the local level, with an emphasis on their scalability, replicability, impact, and alignment with broader policy objectives.

The identification and evaluation of best practices were guided by the process described in the methodology part of this deliverable (**Section 2**).

In addition to identifying best practices, this section highlights the critical role of intermediaries -such as municipalities, social NGOs, housing entities, and associations- in implementing and scaling these practices. These actors serve as vital connectors between policy objectives and practical solutions, ensuring that interventions are both effective and equitable.

4.3.1. Best Practices - that municipalities can implement

Comprehensive Energy Poverty Mitigation Planning

A structured approach to energy poverty mitigation requires municipalities to develop comprehensive strategies that address both short-term relief and long-term solutions. This involves data collection through energy audits, integrating financial support mechanisms, implementing targeted energy efficiency programs, and community engagement. Evidence-based planning to identify households in need and tailor interventions accordingly is crucial. A well-rounded strategy should combine financial assistance, technical improvements, community engagement, and awareness campaigns to ensure that vulnerable groups receive the necessary support to transition towards sustainable energy use.

Incorporating Energy Poverty Alleviation Measures into Local Strategies

Municipalities play a vital role in embedding energy poverty alleviation measures within broader local development policies. By aligning these measures with housing, social welfare, and environmental programs, local governments can create synergies that enhance the effectiveness of interventions. For instance, linking social housing renovation programs with energy efficiency upgrades can maximise impact while ensuring that low-income households benefit from reduced energy costs. Additionally, establishing partnerships with NGOs, community groups, and private sector actors can help secure funding and expertise to implement tailored solutions for energy-poor households.

Setting up One-Stop-Shops / Resource Centres

OSSs or Resource Centres serve as crucial institutions for promoting energy efficiency and engaging communities at the local level. These centres provide a wide range of services, including consultancy, financial guidance for low-income households, training, and hands-on advice on energy efficiency improvements. Municipalities are well-positioned to operate OSS, leveraging their existing housing and social programs to ensure a holistic approach to energy transition and energy poverty alleviation. However, successful implementation depends on sustainable financing, with public subsidies playing a key role in maintaining the long-term operations of OSS. In cases where public financing is limited, partnerships with private, non-profit, and cooperative housing entities can provide alternative models for OSS operations. These centres enhance outreach, making energy efficiency programs more accessible, especially for vulnerable households, and ensuring long-term sustainability in tackling energy poverty.

Energy Audits of Energy-Poor Households

Energy audits are essential tools for identifying inefficiencies in energy-poor households and guiding targeted renovation efforts. Moreover, it is of utmost importance to collect data for vulnerable households to enhance the effective identification of these vulnerable citizen groups. Conducted in collaboration with social workers or healthcare professionals, audits help reach vulnerable groups and provide actionable recommendations for improving building performance. By offering tailored advice on energy-saving measures, audits ensure that resources are allocated efficiently, and such energy-poor households receive practical guidance to reduce energy consumption and costs.

Protecting Vulnerable Consumers from Energy Disconnection

Disconnection protection policies safeguard vulnerable households from being cut off from energy supplies, particularly during harsh winter months, due to unpaid bills. These measures provide a crucial safety net for low-income, elderly, or disabled individuals who may struggle to pay energy bills. While disconnection protections do not directly promote energy efficiency, they ensure that basic energy needs are met, preventing severe hardship and allowing households to focus on long-term solutions for energy security (Friedman, 2022).

Capacity-Building Activities for Key Stakeholders – Information and Awareness Measures

Raising awareness and building capacity among stakeholders is essential for fostering energy efficiency and reducing energy poverty. Information campaigns and training initiatives equip key actors, such as residents, with the knowledge to implement energy-saving measures, for instance. Awareness measures are particularly important because they complement technical and financial solutions, ensuring that people understand how their daily behaviours can contribute to reducing energy consumption. Simple actions -such as adjusting heating settings, improving ventilation practices, or using other appliances efficiently- can lead to significant energy savings, especially in low-income households where financial resources for renovations may be limited. By integrating awareness-raising activities into local strategies, municipalities can ensure that energy efficiency measures are widely understood and accessible, leading to long-term behavioural shifts that contribute to sustainable energy consumption.

Indicative Examples

From January 2025, all CoM signatories will be required to report on energy poverty in their SECAPs or monitoring reports. This obligation mainstreams energy poverty objectives, indicators, and measures into the local climate-energy planning cycle, reinforcing the need for municipalities to embed such practices in their strategies.

Several municipalities across Europe already provide practical illustrations of these approaches. In Athens, the "Office for Combating Energy Poverty (GAEF)" -established in May 2024- identifies energy-vulnerable households and delivers tailored services such as exemptions from municipal fees, personalised advisory, energy profiling, and preparation for appliance upgrades and building interventions.

In Ghent, the long-running "De Energiecentrale" functions as a one-stop advisory and support service, guiding vulnerable households through tailored renovation pathways, financing options, and energy efficiency measures, while embedding energy poverty alleviation across the city's climate and social policy frameworks.

Similarly, in Barcelona, the municipal "Energy Advice Points (PAE)" provide accessible energy audits, personalised advice, and rights-based support to households, helping to reduce energy poverty while promoting efficiency and social inclusion.

4.3.2. Best Practices - that Civil Society Organisations can implement

Community-Based Energy Advice for Vulnerable Households

CSOs play a key role in supporting low-income households by providing community-based energy counselling services that focus on practical, immediate solutions to reduce energy costs. Unlike large-scale energy renovation programs, these initiatives prioritise behavioural changes, minor efficiency improvements, and personalised financial guidance. Trained advisors -often with backgrounds in social work and energy consulting- offer on-site visits, direct energy-saving recommendations, and tailored support to help households manage their energy consumption more effectively.

Many energy-poor households face disconnection risks or difficulties understanding their energy bills, making targeted counselling essential. CSOs act as trusted intermediaries, helping individuals navigate energy contracts, optimise heating settings, and identify potential financial aid for overdue payments. Additionally, low-threshold, peer-driven outreach models -including multilingual advisors and partnerships with social services- ensure that marginalised communities, such as elderly individuals or migrant populations, receive accessible support.

A proven practical **example** of this is the "Soziale Energieberatung" (social energy advice) from Austria. Soziale Energieberatung is not a direct counselling service but a specialised training program under the Klimaaktiv initiative in Austria. It is designed to equip social workers from organisations such as Caritas, Volkshilfe, Diakonie, and the Red Cross with in-depth knowledge of energy topics. This further education enables them to provide low-threshold, accessible energy advice to vulnerable households.

Unlike traditional energy consulting -which often focuses on large-scale renovations and technical interventions – this training aims to empower social workers to guide low-income households in optimising their energy consumption through behavioural adjustments, minor technical tweaks, and practical financial advice. After completing the program, these professionals are well prepared to explain energy usage, interpret meter readings, suggest simple adjustments to heating systems, and offer guidance on managing high utility bills. They can also assist households facing challenges such as overdue payments or the risk of disconnection by referring them to appropriate support services and emergency assistance programs.

A key element of the "Soziale Energieberatung" training is its proactive, community-based approach. Aware that many vulnerable households may not actively seek energy advice, the program emphasises trust-based outreach. Social workers learn to engage through peer networks, offer multilingual support, and collaborate closely with local social services, ensuring that even the most marginalised groups have access to the necessary information and resources.

In summary, while the "Soziale Energieberatung" programme itself does not provide direct counselling services, it plays a crucial role by training social workers to become effective intermediaries. These trained professionals, in turn, empower low-income households to reduce energy costs, improve living conditions, and connect with broader social and financial support networks, thereby contributing to a just and inclusive energy transition.

Integrated Counselling and Appliance Replacement Initiatives

Another effective approach used by CSOs involves integrating energy advice with appliance replacement programs. Low-income households often rely on outdated, inefficient appliances, which increase energy expenses and contribute to financial hardship. By combining energy-saving advice with direct access to efficient household devices, CSOs ensure that vulnerable families benefit from immediate cost reductions and long-term energy savings.

This model operates through targeted financial assistance for energy-efficient appliance exchanges, where CSOs assess household needs, recommend replacements, and coordinate delivery, installation, and disposal of old appliances. To ensure equitable access, CSOs work with municipalities, private donors, and public funding sources to secure resources for appliance upgrades. In doing so, these initiatives enhance both financial stability and living conditions for households facing energy poverty. There is also a proven practical example of this in the form of a funding program from Austria.

An **example** is the "Energy Saving in Households - Counselling & Appliance Replacement" which is a pilot program in Austria, initiated by the Climate and Energy Fund in cooperation with Caritas and Volkshilfe. The program targets low-income households, providing personalised energy-saving consultations and financial support for replacing outdated, high-energy-consuming appliances.

Rising energy prices disproportionately affect vulnerable populations, who often rely on old, inefficient appliances due to financial constraints. This initiative combines tailored energy counselling with a subsidised appliance exchange, ensuring that households not only receive guidance on reducing consumption but also have access to energy-efficient household devices. The CSOs act as intermediaries, identifying eligible households, facilitating consultations, and assisting with applications. The replacement of appliances is only approved following an on-site energy consultation, ensuring a targeted approach that maximises energy savings. In the first 1.5 years of the program, a total of about 9,500 initial consultations were carried out in social centres, followed by 7700 energy-saving advice sessions in energy-poor households. In a total of 85 % of households that received energy advice, at least one appliance was replaced with a new efficient appliance. On average, around 1.6 appliances per household were replaced, which equated to a total of 10,400 by September 2024.

By covering the full cost of counselling and appliance replacement, the program helps reduce household energy expenses, improve living conditions, and further strengthen resilience to fluctuating energy prices. This initiative highlights the essential role of CSOs in delivering practical energy-saving solutions while supporting Austria's transition to a more climate-friendly and socially inclusive energy system.

4.3.3. Best Practices - that housing entities can implement

Energy-Efficient Renovations in Affordable and Social Housing

Housing entities play a critical role in implementing large-scale renovation projects to improve the energy efficiency of residential buildings. Retrofitting older housing stock with insulation, upgraded heating systems, and renewable energy installations not only reduces energy consumption but also lowers costs for tenants.

To ensure affordability, housing entities often leverage funding from national subsidies, EU grants, or public-private partnerships to implement these measures. One example is the EU-funded Social Green Project, which supports energy-efficient refurbishments in social housing across several European regions, ensuring that renovations do not lead to rent increases for vulnerable tenants.

Moreover, a particularly innovative approach to large-scale retrofitting is the Energiesprong model, which has been successfully implemented in the Netherlands, France, and Germany. Energiesprong is a net-zero energy renovation method that pre-fabricates insulation panels and renewable energy systems off-site, enabling quick installation with minimal disruption for residents. The model ensures that housing renovations are completed in days rather than months, reducing tenant displacement and improving affordability. Housing entities adopting this model benefit from long-term energy cost reductions, with savings offsetting renovation expenses through performance-based funding mechanisms.

Affordable and Sustainable Energy Supply Models

MAB housing entities can facilitate access to affordable, sustainable energy solutions by integrating district heating, decentralised renewable energy systems, or cooperative energy purchasing agreements into their housing management strategies. These solutions help stabilise energy costs and protect low-income households from market fluctuations.

One successful model is district heating integration, where multi-apartment housing complexes connect to centralised heating systems that use biomass, solar thermal energy, or waste heat recovery. For example, in Denmark, about two-thirds of households benefit from district heating systems, significantly reducing individual energy costs while ensuring a stable and sustainable energy supply.

MAB housing entities can also partner with local energy cooperatives to enable tenants to access lower-cost electricity generated from community-owned solar or wind projects. This model enhances energy autonomy and fosters local engagement in energy management.

Integrated Financial Assistance for Energy Efficiency Upgrades

Many low-income tenants lack the financial means to invest in energy efficiency improvements. Housing entities can act as financial intermediaries, securing grants, subsidies, and low-interest loans to cover the costs of energy upgrades while ensuring that costs are not passed on to tenants.

A key strategy involves blending public and private funding sources to make energy efficiency improvements accessible.

Housing entities can also streamline access to financial aid through OSSs that assist tenants and homeowners in applying for funding. By simplifying administrative procedures and offering direct support, these initiatives help ensure that financial assistance reaches those most in need.

Tenant Engagement and Energy Awareness Initiatives

Beyond physical upgrades, housing entities can promote energy-conscious behaviours among tenants through awareness campaigns and training programs. Educating residents on energy-saving practices, such as efficient heating use, appliance management, and ventilation techniques, can lead to long-term reductions in household energy consumption.

Pilot projects in Europe -as documented in Tools of Change's (2020) "Europe's Energy Neighbourhoods" report- have shown that community-driven energy-saving competitions can reduce household energy consumption by up to 10 % without requiring major financial investments. In addition, incorporating smart energy monitoring tools, such as real-time consumption trackers, can further empower residents to make informed decisions about their energy use.

Indicative Examples

Several initiatives across Europe demonstrate how housing entities can implement these practices in real contexts. In Portugal, the **"**Bairros + Sustentáveis (More Sustainable Neighbourhoods)**"** programme provides 100% non-refundable subsidies for retrofits, HVAC systems, renewable electricity production, water efficiency, and energy certification in vulnerable communities, including social housing neighbourhoods. This illustrates how large-scale, publicly funded renovation schemes can advance energy-efficient upgrades in affordable housing.

In the UK, Nottingham's **"**The Courts**"** programme integrates a private-wire microgrid with communal heating for social housing blocks, offering insights into the regulatory and consumer protection considerations of sustainable energy supply models.

Meanwhile, in France, the **"**Habiter Mieux (Better Living)**"** programme supports private flat owners with insulation and heating system upgrades through a combination of state subsidies and contributions from energy providers under the Energy Savings Certificates framework. This blended-finance model highlights how integrated financial assistance can be structured and could be adapted for social housing contexts as well.

5 Conclusions

This report provides an up-to-date review of knowledge and practice in energy poverty research and policy at the regional and local levels, with the aim of strengthening understanding of this multifaceted issue. Through a comprehensive approach, it identifies needs, challenges, and methodologies for integrating energy poverty alleviation into regional and local long-term strategies (e.g., SECAPs). Although energy poverty has diverse forms and drivers, the LOCATEE project focuses primarily on private MABs. The importance of addressing energy poverty at the local scale -and particularly within MABs- has been emphasised throughout this Deliverable.

Building on this focus, the report has carried out a gap assessment comparing existing policy frameworks with unmet needs. Barriers and constraints were examined from multiple perspectives: within MABs, in the PRS, and among local authorities responsible for the design and implementation of energy poverty alleviation measures. Special attention was given to ownership and decision-making structures in private MABs, which strongly influence the feasibility of interventions. In addition, the report reviewed best practices from municipalities, CSOs, and housing entities, highlighting how different actors can strengthen implementation capacity, while also defining and analysing the role of intermediaries in linking policy frameworks with practical delivery.

Within the built environment, poor energy performance, particularly in older MABs, emerges as a central driver of energy poverty. Inefficient building envelopes and systems increase household energy costs and reduce comfort, with cumulative impacts across many residents. This challenge is further compounded by the fact that ownership and decision-making structures are often fragmented, especially in contexts such as Greece and Portugal, where a single building may have numerous co-owners. Divergent financial capacities, legal statuses, and priorities among these owners complicate collective decision-making, while supermajority or unanimity requirements frequently delay or block upgrades.

To complement this assessment, the report reviewed **57 local initiatives across Europe** to identify both best practices and persistent gaps. A recurring weakness across many initiatives is the absence of systematic monitoring and impact evaluation frameworks. This underlines the importance of embedding assessment mechanisms from the outset, ensuring that policies can be adjusted over time and that their long-term effectiveness can be measured. **In this regard, the LOCATEE toolkit, developed as a core outcome of the project, will provide municipalities with practical tools to measure and monitor energy poverty at the local level, thereby helping to close this critical gap.**

The PRS presents an additional layer of complexity, particularly where it overlaps with MABs. Here, fragmented ownership is compounded by the split incentive problem: landlords have little incentive to invest in efficiency upgrades when tenants bear energy costs, while tenants are legally and practically unable to initiate improvements. This dual barrier not only delays renovations but entrenches underinvestment in housing stock that is already inefficient. Linking rental contracts to building energy performance has been discussed as a possible solution, but regulatory frameworks across Europe remain inconsistent, leaving PRS challenges only partially addressed.

Such findings underscore that alleviating energy poverty cannot be addressed through isolated stand-alone measures. Instead, it requires robust multi-level governance that connects national and regional frameworks with local delivery. Based on this report's best practices analysis, municipalities can design

comprehensive mitigation plans aligned with SECAP objectives, establish OSS to provide advice, conduct targeted energy audits for vulnerable households, safeguard against disconnections, and run awareness and capacity-building campaigns. CSOs can reinforce these efforts through community-based counselling, energy advice, and appliance replacement schemes. Housing entities- particularly those managing social or affordable housing- can lead retrofit programs, promote sustainable energy supply models, mobilise financial assistance for efficiency upgrades, and encourage energy-conscious behaviours among tenants.

These coordinated practices, supported by transparent indicators, targeted local action, cross-sector collaboration, and systematic impact assessment, can create the conditions for meaningful reductions in energy poverty and tangible improvements in the well-being and resilience of affected households, both within the three LOCATEE pilot areas and in diverse European contexts.

Overall, the findings will inform the next phases of LOCATEE (WP3, WP4, and WP5), which aim to address existing deficiencies and develop inclusive, sustainable, energy-conscious regional and local tools, methodologies, and strategies. By strengthening the alignment of planning frameworks, particularly the energy poverty pillar of local and regional strategies, with practical interventions, these efforts will help ensure that energy poverty alleviation measures are evidence-based, well-integrated, and tailored to the specific conditions of each regional and local context.

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Appendices

This appendix presents a full list of the **57 analysed initiatives** across Europe, with details of the initiative name, country of operation, and a short description.

Table 7. List of the analysed policies across Europe along with their short description.

Country	Name of the Initiative	Short Policy Description
AT	Energy Bonus '23	Disbursement of bonuses to low-income households.
AT	VERBUND-Stromhilfefonds der Caritas	The support offered by this program is built on three pillars: 1. Immediate financial relief and helping clients establish long-term payment schemes with their energy provider; 2. Energy consultancy, including two energy visits to the households to ensure that information and support are tailored for each situation; 3. Replacing broken, old, or energy-inefficient household appliances.
AT	Wiener Energiebonus '23	A €200 subsidy provided by the State of Vienna to support residents in managing increased energy costs and inflation. The measure specifically targets households in Vienna, ensuring access to essential energy services.
AT	Social Energy Without Limits (Energie.Sozial.Grenzenlos)	An energy advisory initiative that provides free consultations on energy efficiency, energy savings, and financing options for energy-related renovations. The initiative educates individuals about available financial support and best practices for reducing energy consumption.
BE	Dampoort KnapT OP! (Dampoort Renovates!)	A project targeting "captive owners" living in poorly insulated housing by offering €30,000 grants for renovations to improve safety and energy efficiency, focused on the Dampoort neighborhood in Ghent.
BE	Investment Aid - Energy for Low-Income Households (MEBAR II)	A subsidy provided by the Walloon Region to low-income households for energy-efficient home improvements, such as insulation, boiler installations, and stoves.
BE	Energy Loan (Belgium)	The Flanders region provides zero-interest loans up to 15,000 euros to be repaid over 10 years to certain vulnerable households to fund energy efficiency improvements.
BE	De Energiecentrale (The Energy Hub)	A one-stop shop established by the City of Ghent to provide advice and guidance for energy-efficient renovations, promoting affordability, sustainability, and climate-proof homes.

BE	Maison de l'Habitat Energy Service Centre	A central service point for energy retrofits and financial aid guidance, increasing retrofit measures and public awareness through effective communication in Liège.
BG	State conceived one-stop shops in Bulgaria	Establishment of Local Energy Poverty Alleviation Offices acting as one-stop shops to provide information and support to energy-poor households. Supported under Bulgaria's National Recovery and Resilience Plan (NRRP) to pilot and scale up the initiative.
EL	Ampelokipi-Menemeni - EPAH Technical Assistance	The project focused on strengthening the municipality's internal capacity for energy poverty diagnosis. It aimed to help municipal staff and Process Energy Design Laboratory researchers identify an effective methodological approach using qualitative and quantitative indicators tailored to local needs.
EL	Office for Combating Energy Poverty (GAEF)	Established in May 2024 by the Municipality of Athens, GAEF operates as an OSS to identify energy-vulnerable households and deliver tailored services: exemption from municipal fees, energy profiling, personalised advisory, and preparation for appliance upgrade and energy interventions.
EL	Climate Piraeus	A municipality-led pilot platform funded under the European Regional Development Fund (ERDF, ESPA 2014-2020), intended as a data-driven tool and awareness mechanism that supports decision-making related to adaptation and mitigation in the urban environment of Piraeus. It combines open geospatial data infrastructure, real-time environmental monitoring, indicator dashboards, public guides, strategies, and news/outreach channels.
EL	Energy upgrade of residential buildings of energy-poor households and promotion of RES installations to meet their energy needs	A long-term intervention targeting the energy upgrading of dwellings of energy-poor households through comprehensive renovations, efficient heating/cooling systems, and installation of renewable energy systems (mainly self-consumption PV), aiming to cover their energy needs cost-effectively.
EL	Provision of incentives through existing mechanisms for actions targeting energy-poor households in Just Transition Areas	A targeted measure supporting the energy upgrading of buildings of energy-poor households located in the Just Transition Regions (areas affected by coal phase-out), through energy efficiency renovations and renewable energy systems, with higher financial support.
EL	"Anakainizo-Noikiazo" (Renovate-Renting)	A government-subsidised program whereby private property owners (or usufruct holders) are provided financial aid for renovating or repairing vacant homes or apartments,

		conditioning the grant on their subsequent long-term leasing.
ES	Energy Advisory Points (EAP)	One-stop shops that focus on guaranteeing energy rights.
ES	OV - Oficina verde (Green Office)	An initiative aimed at empowering citizens with knowledge about energy efficiency, the electric market, energy prices and strategies to reduce energy costs.
ES	EFFyPE - Financial Education and Tackle Energy Poverty for Families (Educación Financiera Familiar y Pobreza Energética)	A program focused on the economic empowerment of families, promoting income management, responsible consumption, and the use of clean energy to alleviate energy poverty.
ES	Energy Advice Points (EAPs)	A municipal service in Barcelona providing energy advice, tackling energy poverty, ensuring energy rights, and promoting energy efficiency and social inclusion.
ES	EPIU - Energy Poverty Intelligence Unit (EPIU Getafe. Healthy Homes)	A project under the Urban Innovative Actions program aimed at identifying and addressing energy poverty using big data analytics and tailored solutions in Getafe, Spain.
ES	Housing Renovation Programme for Vulnerable Households (Ayudas del Programa de Rehabilitación de Viviendas para personas en situación de vulnerabilidad)	A grant-based program in Barcelona that supports vulnerable households to renovate homes, improve energy efficiency, and address structural, safety, and accessibility issues.
ES	SustaiNAVility Navarra - A Region Supporting Sustainable Energy	A project to promote energy efficiency and renewable energy in Navarra, supporting low-income households, public entities, and enterprises through energy rehabilitation, innovative financial models, and citizen engagement.
ES	State Housing Plan	Aims to increase the rental housing stock and promote urban and rural renewal with emphasis on energy efficiency.
EU	Territorial Just Transition Plan	The Territorial Just Transition Plan allows territories most vulnerable to the energy transition to access funds to deliver to various aspects related to the energy transition, one of these being energy poverty.
FR	Île-de-France Énergies/Energies POSIT'IF	A program created to promote, organise, support, and implement the energy transition of the Île-de-France region.
FR	Plateforme de lutte contre la précarité énergétique (Platform to Fight Energy Poverty)	OSS in the Grenoble metropolitan area to tackle energy poverty by bringing together multiple actors to offer tailored support for energy-related challenges.

FR	Hauts-de-France Pass Renovation	Supports landlords and homeowners with energy-efficient upgrades, including technical and financial advice.
FR	Habiter Mieux (Better Living)	A state aid and advisory scheme that accompanies and co-finances global energy renovations of primary residences of modest households, historically under Habiter Mieux Sérénité, now within MaPrimeRénov' with an accompanied pathway and the Mon Accompagnateur Rénov' service.
HR	Energetska obnova višestambenih zgrada (Energy Renovation of Multi-Apartment Buildings)	A national energy renovation program providing non-repayable financial support for improving the energy efficiency of MABs, reducing energy consumption, and enhancing seismic resilience, fire safety, and indoor climate conditions.
IR	Local Authority Retrofit Programme	Aimed at improving the energy performance of local authority housing in Ireland.
IR	Better Energy Warmer Homes Scheme	Provides free energy efficiency upgrades to eligible low-income households.
IT	TIGER - Triggered Investments in Grouping of Buildings for Energy Renovation	A project to improve energy efficiency in 1,529 public housing units across 126 buildings in 58 municipalities in the Abruzzo Region through innovative financing and energy requalification.
IT	Energia in Periferia (Energy in the Suburbs)	A project supporting energy-poor households in suburban areas by paying energy bills, providing energy savings education, and collecting data on energy poverty conditions.
IT	EnerSHIFT	A project under Horizon 2020 aimed at renovating 76 public housing buildings in Liguria to improve energy efficiency and living conditions using innovative financing models such as EPCs.
LT	Lithuanian Modernisation Fund - Apartment Building Modernisation Program (JESSICA II)	A revolving loan fund providing preferential loans (3% interest, 20-year maturity) combined with grants to support energy-efficient renovations of MABs. The program covers up to 30% of renovation costs through grants and offers additional subsidies for project preparation, administration, and new heating systems. Since 2018, European Investment Bank guarantees have allowed private banks to finance further renovations.
LV	Latvian Baltic Energy Efficiency Facility (LABEEF) - EBRD/Accelerate SUNSHINE	A financial mechanism supporting energy service companies (ESCOs) involved in renovating MABs to improve energy efficiency in Latvia. LABEEF buys 80% of long-term EPC receivables from ESCOs, allowing them to reinvest in further renovations. After 20 years, residents have fully benefited from energy cost savings.

NL	Wijken Aardgasvrij Maken Amsterdam (WAM)	This measure aims to transform Amsterdam neighbourhoods to be natural gas-free.
PL	EnPover - Municipal Low-Cost Energy Efficiency Measures to Alleviate Energy Poverty	An international project engaging municipal actors in alleviating energy poverty by equipping them with tools for implementing low-cost energy efficiency measures in vulnerable households.
PT	PEER - Porto Energy Elevator	A project targeting energy poverty reduction and energy efficiency improvement through housing rehabilitation, renewable energy integration, and innovative financing mechanisms.
PT	Cascais Green Fund	Municipal fund subsidises a priori low and mid-income families in energy efficiency and renewable energy interventions, up to 100% and 80% of the total cost, respectively.
PT	Vale Eficiência (Efficiency Voucher)	Energy efficiency voucher given to the vulnerable population (beneficiaries of electricity social tariff or other social benefits) up to 3900€+Value Added Tax.
PT	Ponto Transição (Transition Point)	Mobile physical OSS aimed to bring homeowners' awareness to energy efficiency and thermal comfort in their dwellings, with energy-poor families as the targeted audience.
PT	Municipal program to tackle energy poverty	Energy efficiency voucher given to the vulnerable population in Braga municipality (beneficiaries of the electricity social tariff or other social benefits) up to 2500€.
PT	Vale Conforto (Comfort Voucher)	Energy efficiency voucher given to the vulnerable population in the metropolitan area of Porto (Northern Portugal) up to 2000€.
PT	Frigorifico + Social (More social fridge)	Attribution on a fridge to the population with an electricity social tariff.
PT	E-LAR	Replacement of inefficient equipment with efficient equipment. Targeted at vulnerable families (beneficiaries of the electricity social tariff).
PT	Bairros + Sustentáveis (More Sustainable Neighbourhoods)	Public program providing 100% non-refundable subsidies to municipalities, other public entities, residents' associations, and third sector entities for building retrofit, HVAC systems, renewable electricity production systems, water efficiency and energy certification promotion within vulnerable communities, such as social housing neighbourhoods or historic districts.
PT	Porto Energy HUB	A project establishing a HUB of physical OSS in the metropolitan area of Porto, in northern

		Portugal. The services offered include technical support for home renovation measures and assistance in applying for financing options.
PT	EVA - Energy Virtual Assistant	OSS working in an advice model, both in physical and virtual formats, is promoted by the Portuguese Association for Consumer Protection.
PT	Espaços Energia (Energy Spaces)	Physical OSS to support citizens in energy efficiency, renewable energy, and sustainable practices.
PT	RENOVAR.Coimbra (One-stop energy shop)	The project focused on strengthening the municipality's internal capacity for energy poverty diagnosis. It aimed to help municipal staff and Process Energy Design Laboratory researchers identify an effective methodological approach using qualitative and quantitative indicators tailored to local needs.
PT	+Energia (Região Autónoma da Madeira)	A Portugal's Recovery & Resilience Plan/ REPowerEU-backed incentive scheme that subsidises the production and storage of renewable energy for self-consumption, plus solar thermal, heat-pump and biomass-based heat, with the objective of accelerating decarbonisation, reducing import dependence and tackling energy poverty in Madeira.
PT	Reabilitar Madeira	A financial support programme for building-rehabilitation works to improve energy performance and enable predominantly residential use of the building.
UK	Local Energy Advice Partnership	A program that offers free energy advice, home energy efficiency improvements, and practical support to low-income and vulnerable households across the UK.
UK	The Courts	An operational pilot retrofit across four low-rise blocks (94 flats) creating independent private-network microgrids that combine communal solar photovoltaics, communal battery storage, and communal heat to deliver dual-fuel (electricity + heat) service and reduce tenants' bills.
UK	Warm Homes for Less	A project by South East London Community Energy (SELCE) to help individuals and communities reduce energy bills, keep homes warm, and increase energy efficiency.

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Co-funded by the European Union under n°101167621. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them. This work has been co-funded by the Green Fund (GRFU).