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Project Partners

- ✦ Habitat for Humanity Macedonia
- ✦ Association of Business and Consultancy KREACIJA

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Abbreviations

BUS	Build Up Skills Initiative
BPIE	Buildings Performance Institute Europe
BM	Business Model
EGD	European Green Deal
EEA	European Environment Agency
EED	Energy Efficiency Directive
EU	European Union
EC	European Commission
EPBD	Energy Performance of Buildings Directive
EPC	Energy Performance Certificate
ESCOs	Energy Savings Companies
H&C	Heating and cooling
HVAC	Heating Ventilation Airconditioning and Climatization
IEA	International Energy Agency
IHRs	Integrated Home Renovation Services
LTRS	Long Term Renovation Strategies
MHB	Multihome Buildings
MFF	Multiannual Financial Framework
NECPs	National Energy and Climate Plans
NGEU	NextGenerationEU
nZEB	nearly Zero Energy Building
OSS	One-stop shop
RW	Renovation Wave
SHB	Single Home Building
SME	Small and Medium Enterprises
RFF	Recovery and Resilience Facility
RRPs	Recovery and Resilience Plans

Executive Summary

This report presents a comprehensive overview of the status and potential of the Integrated Home renovation Services in North Macedonia. It first presents a brief state-of-the-art of the European IHRS services, following their evolution from their beginning to present, especially focused on identifying good practice examples and success stories and to clearly enlighten the most common barriers and challenges. The document also gives a review of EU funded projects on home renovation services as a relevant example of the preceded actions, in order to identify the lessons learnt from these projects. One group of projects are the projects from Build Up Skills initiative, especially run in North Macedonia (BUS BEET, <https://beet.mk>, TRAINEE project, <http://trainee-mk.eu/>, SEetheSkills, <https://seetheskills.eu>) that were focused on upskilling and certification of building workers and professionals as well as introduction of BIM tools, as relevant for the quality of renovation and availability of certified companies and workers. The second group of projects are related to energy poverty and involvement of municipalities in EU Horizon projects (ComAct, Excite, EMeasures) for enabling tailored actions for tackling mitigation Energy Poverty.

These findings are the baseline to scope the available services for renovation to homeowners and building owners in North Macedonia, in order to conduct a profound analysis of the national market assessment. This research is categorized for analysis in following way:

- ◆ technical and social diagnosis;
- ◆ building analysis/energy audits: renovation roadmap/project design;
- ◆ coordination of renovation works (permits, contracting for work, supervision and quality assurance);
- ◆ financing; subsidies and guarantee.

Finally, a recommendation based on the gap analysis are driven, on how to best correspond to the national needs for home renovation and offer a whole scope of services for the home owners, through the entire renovation journey.

1. Introduction

1.1 Project description

Overall project objective is to develop and implemented integrated services for EE renovation in buildings and houses supported by available financing products and subsidies as the annual renovation rates of existing buildings' stock can be increased in North Macedonia by piloting integrated services in three cities (Skopje, Kumanovo and Kochani).

Specific objectives (SO) are:

SO1 - Developing of package of integrated services for single and multi-family buildings in the private residential sector.

Develop integrated services for renovation for minimum Energy performance standards and shift to RET for the private residential sector, and expanding its scope towards new business processes reflecting the new reality and advances of construction and renovation sector.

SO2 – Establishing on-stop shop Habitat with standardized procedures for implementation of services for ambitious buildings renovation across the countries.

Introduce a standardized comprehensive procedure for ambitious buildings renovations supported by dedicated financial products as to respond to the new market needs of the final beneficiaries for energy investments and addressing the necessary skills development activities related to new business processes.

SO3 - Stimulating market values of OSS services through sustainable business model

Increase the inclusiveness and attractiveness of the integrated home renovation services and made it more affordable for targeted final beneficiaries, to be achieved by introducing novel business processes and digital tools. Implementation of business model on the market and to provide sustainability and replicability in other cities as brand OSS Habitat.

This document is Deliverable # 2.1, which results out of Task 2.1 Exploring and analysis of available services for renovation and shift to RET for minimum Energy performance standards and identified EU practices of OSS. The document represents the Market assessment report on available services compared to EU OSS practices with recommendation to overcome gaps in national context [D.2.1].

1.2 Methodology used for preparation of the document

The objective of this document **Market assessment report on available services compared to EU OSS practices with recommendation to overcome gaps in national context**, covers three different topics:

- Reviewed successful EU OSS initiatives for private building renovations.
- Mapped North Macedonia's existing services for building renovation.
- Formulated recommendations to address gaps within the national context.

The methodology to achieve these goals is structured in a way that enables consecutive approach to build upon the findings and conclusions from the previous steps.

The first step considers the **Analysis of successful OSS initiatives in EU**, which is conducted through a deep desk research, analysis, comparison, SWOT analysis of the successful OSS cases in EU, including comparative analysis of the different approaches and different financial set-up of available OSS, and identifying benefits and challenges in OSS.

Mapping available services for building renovation in North Macedonia is the following step, based on initial desk research and data mining, searching through available registers, working advertising, official tendering applications etc. in order to identify available building renovation services, companies and individual professionals. Further, the insight into the existing legal framework for enabling home renovation and the existing financing instruments is given, based on the deep review of the existing financial support and subsidies for building renovation. To identify the gaps in the national renovation work offer, besides the conducted analysis a small scale on-line survey is conducted and the findings are presented as part of this report.

As a final part of this report a **Recommendations for overcoming gaps in national context** are given, targeting the identifying gaps of the national training offer and proposing measures for overcoming the shortcomings and proposal for the best approach when establishing a One-stop shop for renovation services in North Macedonia.

1.3 Key facts of the existing EU building stock

The most common and explanatory definition for the buildings is related to their basic purpose to protect people from the effects of climate change, including extreme heat and cold weather, both of which entail higher energy consumption for heating or cooling. Buildings and construction are closely linked to the economy, local employment and quality of life.

Europe is known as the old continent and it has many old cities with old buildings. Its building stock is also getting older and many old buildings are not built for efficient use of energy or a warmer climate. And this aspect is today even more important almost equally as the primary aspect of the buildings- to serve as human shelter.

Since the human awaking related to the human impact on the climate change, there are considerable actions undertaken to mitigate as much as possible the negative human effects on the environment and the planet. Energy, industry, transport, buildings, agriculture and land use are among the main sectors causing greenhouse gases. As a response, Europe has projected the European Green Deal [1], in order to transform the EU into a modern, resource-efficient and competitive economy, ensuring:

- no net emissions of greenhouse gases by 2050
- economic growth decoupled from resource use
- no person and no place left behind

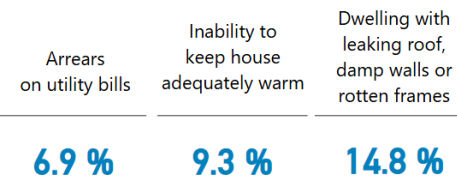
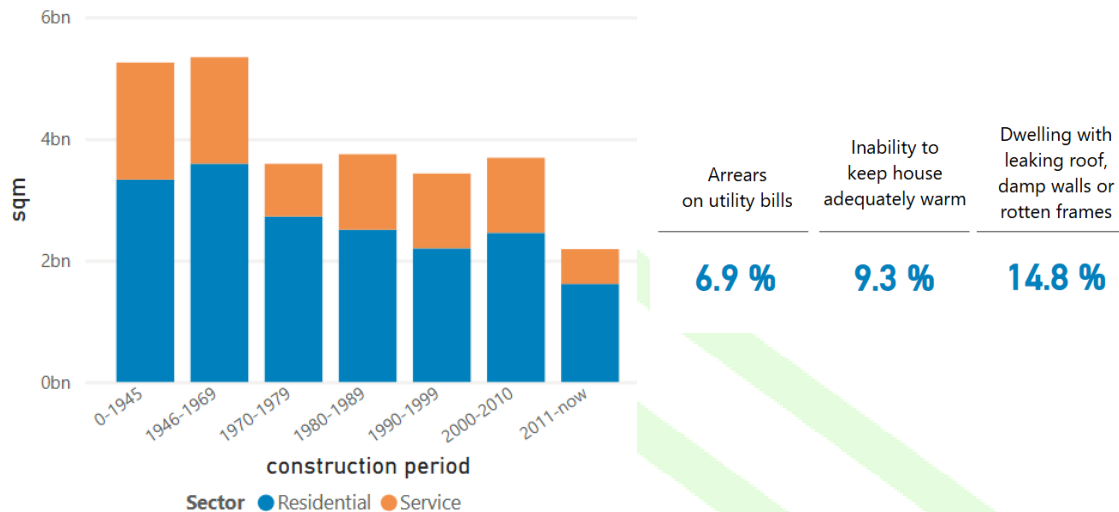
Following the inevitable Green Deal actions, the EU aimed to decrease greenhouse gas (GHG) emissions by 20% by 2020 compared to 1990 levels. In parallel, renewable energy sources (RES) production was expected to increase by 20%, along with a 20% overall efficiency upgrade. By 2030, EU intends to decrease domestic emissions of GHG by 40% relative to 1990 levels [2]. National policies are designed to permanently improve energy efficiency (EE) and increase the energy produced with RES to 27% [3]. In order to achieve the 2050 targets, the EU must pursue further efforts. The EU member states have declared a goal of decreasing GHG emissions in Europe by 80–95% relative to 1990 levels by 2050. Primary energy demand in the EU amounted to about 1800 Mtoe/y in 2010, principally attributed to different heating and cooling (H&C) applications (almost 900 Mtoe/y, accounting also for industrial heat). The use of buildings accounts for 42% of the total energy consumption and 35% of greenhouse gas emissions. And as the building sector is one of the most energy and CO₂ intensive, one of the key actions are targeting the buildings.

Between 2005 and 2022, existing policies and warmer winters indeed contributed to a 34% reduction in greenhouse gas emissions from buildings during their use phase. But with building use accounting

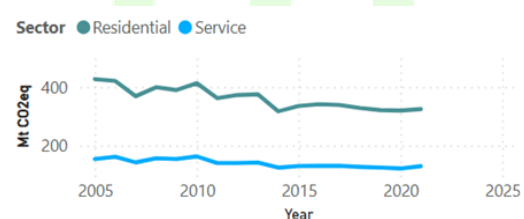
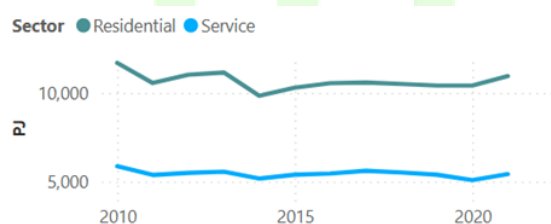
for 42% of annual EU energy consumption, improving buildings' sustainability plays a critical role in meeting EU climate change mitigation targets.

Almost 75% of the building stock is currently energy inefficient and more than 85% of today's buildings are likely to still be in use in 2050 [4]. Energy renovation of buildings is ongoing but at a very slow rate.

Europe has an ageing building stock. The key facts related to the age of the EU building stock are shown on the following figures, and are taken from the building stock observatory [5].



Related to the energy consumption of the building sector, in 2021 the final energy consumption was 10,941 PJ in the residential sector and 5,420 PJ in the service sector. The direct emissions due to the fossil fuel in 2021 were 324.74 Mt CO₂eq in the residential sector and 129.90 Mt CO₂eq in the service sector.



The classification of the construction periods according to Building stock observatory [5] has been defined as follows:

— Before 1945: buildings constructed before 1945 are generally classified as historic buildings. The historic building stock is highly inhomogeneous, making it difficult to apply a standardized assessment.

Nevertheless, certain characteristics may still be generalized, such as the use of massive construction methodologies for residential buildings;

- 1945-1969: buildings erected after World War II and before 1969 are generally characterized by nearly missing insulation and inefficient energy systems, caused by the choice of cheap construction materials and by short construction times. These results in higher final energy consumption;
- 1970-1979: buildings built between 1970 and 1979 present the first insulation applications;
- 1980-1989 and 1990-1999: buildings constructed during these two periods reflect the introduction of the first national thermal efficiency ordinances (around 1990);
- 2000-2010: buildings considered to be influenced by the impact of the EU Energy Performance of Buildings Directive (2002/91/EC and following recasts);
- After 2010: recently constructed buildings must be understood through the light of the impact of the economic crisis on Europe's construction branch.

Non-residential buildings account for 25% of the total stock in Europe and comprise a more complex and heterogeneous sector compared to the residential sector (figure 5) [6]. The retail and wholesale buildings comprise the largest portion of the non-residential stock while office buildings are the second biggest category with a floor space corresponding to one quarter of the total non-residential floor space. Variations in usage pattern (e.g. warehouse versus schools), energy intensity (e.g. surgery rooms in hospitals versus to storage rooms in retail), and construction techniques (e.g. supermarket versus office buildings) are some of the factors adding to the complexity of the sector.

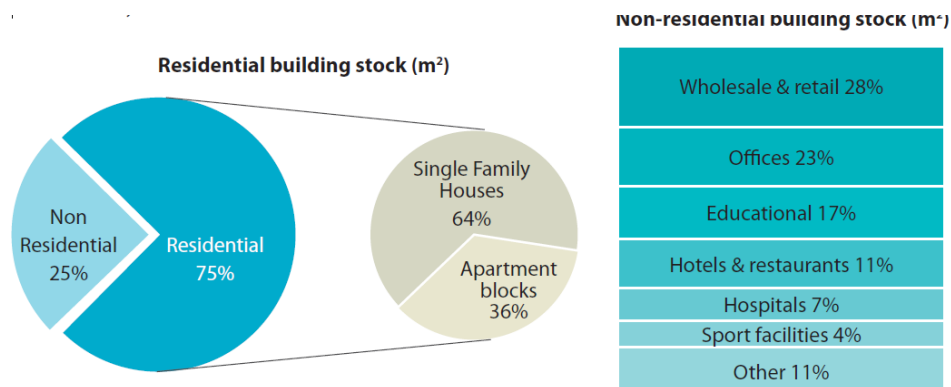


Figure 5 The share of residential vs non-residential building stock

The residential sector can be subdivided based on the following building typologies:

- Single-family houses (SFHs);
- Multi-family houses (MFHs);
- Apartment blocks (ABs – high-rise buildings that contain several dwellings and have more than four stories) [7].

Figure 6 is illustrating the fact that the number of single-family houses in EU residential building stock prevails over the multi-family houses and the apartment blocks.

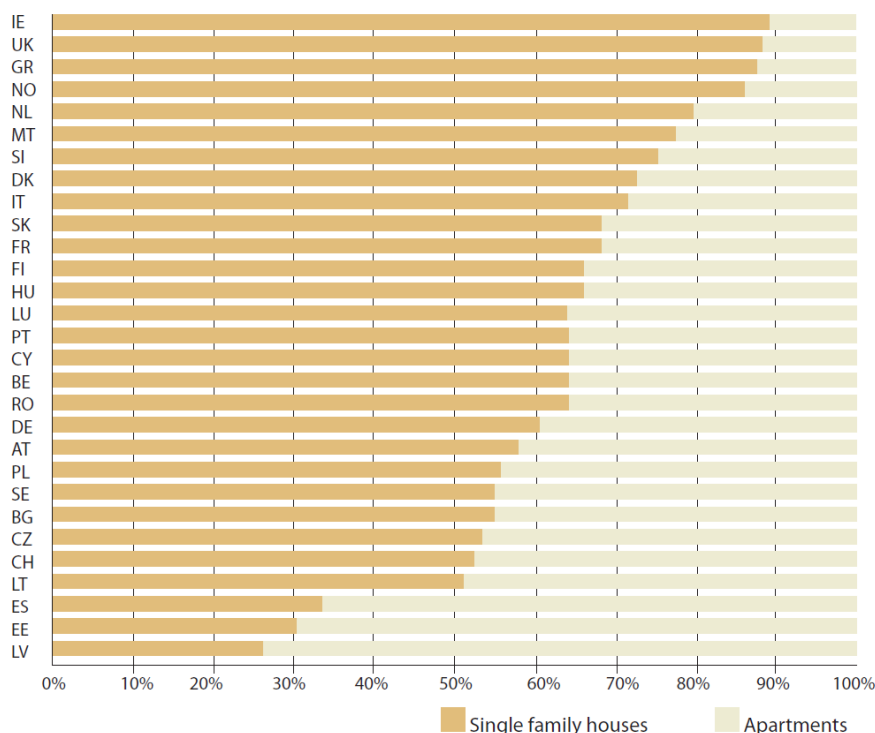


Figure 6 The share of single-family houses vs apartment buildings in EU member states

This fact is further connected with the conclusions about the decision-making holders' analysis, shown through the presentation of the ownership structure of the residential dwellings, shown on Figure 7. It reflects the current distribution of the ownership and thus locates the decision-making right, about the implementation of the eventual retrofitting and renovation measures in the hands of the home owners, mostly.

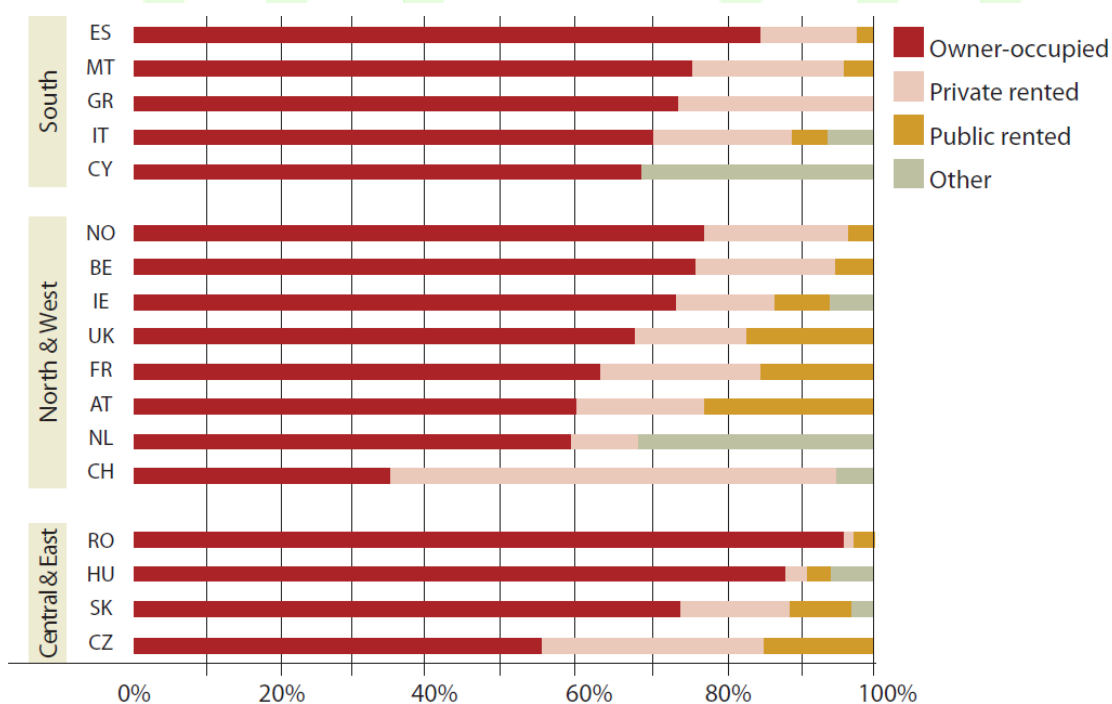


Figure 7 The ownership structure of the residential buildings in EU member states

1.4 The unquestionable need for renovation and retrofitting

Hence, the Europe's buildings are unique and diverse and reflect the culture of the continent, having many of them old, and inefficient. **The previous chapter informs that approximately 85% of the building stock, were built before 2001 expecting that most of them will still be standing in 2050.** So, building renovation is crucial to tackling their energy use and emissions, in order to meeting the EU's 2030 emission reduction target and to becoming climate neutral by 2050, as well to increase resilience to climate impacts.

In addition to its ecological benefits, building renovation creates local jobs and stimulates much-needed investments in our economy. The IEA's recent sustainable recovery report found that, **per euro invested, building renovation is our biggest job creator with 12-18 local jobs for every million invested.** The Commission estimates the potential for an additional 160 000 green jobs in the construction sector in the EU by 2030.

This is why building renovation is one of the flagships identified for the Recovery and Resilience Facility that will help us build our economy back better.

Improving the energy performance of buildings has significant macro-economic advantages and can considerably add to all three priorities of the EU 2050 roadmap targets: environmental, energy and climate. Society will benefit from macro-economic advantages and an increase in energy savings mainly through its favorable impact in terms of work and private capital, positive employment results and supporting education & research, energy services companies, and waste management. The government support is an important aspect that can trigger investments in these fields.

1.4.1 Different types of renovation

A home energy retrofit is work done to the existing building, to make it more comfortable, healthier and ultimately more energy efficient. Generally, it involves reducing the heat loss of the building fabric via increased insulation and air tightness, replacing fossil fuel heating systems with heat pumps or renewable energy systems, and other upgrades that improve the general quality, comfort, and energy efficiency of the building. The approaches to retrofit may be generally divided into two categories, deep or shallow renovation, depending to the extent of the refurbishment actions to the building [8].

A **deep retrofit** of a home is a whole house system approach where a number of energies saving measures are done at the same time to radically reduce energy use by between 30 and 70% and to increase comfort. A plan is created to make sure the house performs as one system and reaches the best possible performance targets. With deep retrofit, all aspects of the house from the fabric to ventilation and heating systems are considered within the same plan rather than treated separately. A deep retrofit is the best option for reducing CO2 emissions and living a sustainable lifestyle.

Maximizing energy efficiency and tackling a reliance on fossil fuel. That's a deep retrofit agenda. With their (almost) 100% efficiency rating, passive house renovations fit snugly into this category. Or, if the purse strings allow, we can indulge in adding centralized ambient controls.

Ideally, deep retrofits start with a whole-building evaluation, which identifies complete and complementary improvements. This provides 50-100% carbon and energy efficiency and is exactly what a spot of retro-commissioning can accomplish – the addition and calibration of, say, an HVAC or light and heat sensors to perfect the ambient comfort. This option is “more intrusive” and covers “upgrades such as external or internal wall insulation, airtightness and mechanical ventilation, renewable heating systems such as heat pumps” or solar heating. Also, photo-voltaic units for

electricity generation may be installed along with the batteries to store it in. In other words, investing in some pretty hefty hardware.

A shallow retrofit is a small-scale alteration where one or two energy saving measures are taken. This can include single measures such as insulation around pipes, changing boiler, changing windows or installing insulation in different parts of the home. A shallow retrofit can initially seem cost effective, although it can actually be less beneficial in the long run and more costly, if you have to redo the work in order to achieve further energy reductions which will be required by 2050. Therefore, any single measure should form part of a long-term plan for the home that can build step by step towards a deep energy retrofit without having to redo previous steps. It is worth getting advice on how you can do this from a qualified renovation advisor.

Shallow retrofits offer micro-solutions to individual problems, focusing on the minutiae of energy efficiency, rather than the complete building system. Low-impact examples that offer decent results include:

- Converting to more efficient lightbulbs.
- Draught exclusion – such as properly fitting doors.
- Cavity wall insulation.

Shallow upgrades are perfect for smaller budgets or buildings already on their way to net zero needing that extra tweak. Notably, they concentrate more on renewable energy creation than overall efficiency.

1.4.2 The potential of the EU Renovation Wave

The EU's renovation wave is initiated with a vision to play a key role in massively upgrading existing buildings in Europe. It will help make them more **energy efficient** and **adapted to climate change**. This will be an important element in achieving a climate-neutral EU by 2050.

Today, **renovation reduces energy consumption of the buildings by only 1% per year. Deep renovations that improve the energy performance of a building by at least 60% are annually carried out only in 0.2% of the building stock and in only a fifth of the cases, energy efficiency is significantly improved.** The Commissions' target is to at least double this rate by 2030, while increase the average gains in term of energy efficiency. This could lead to renovate 35 million buildings in the coming decade. This can trigger a virtuous cycle between higher demand for deeper renovation and falling costs for smarted and more sustainable products and simpler and faster renovation processes.

The EU building stock is estimated to include 220 million building units. The fact is that renovation projects are developing with certain pace, so that the EC projections for the Renovation wave [9] are reported to increase up to 1.2% a year in 2023-2025 as expected before stabilizing to at least 2% per year in 2026-2029. The rate of renovations that concern the change of heating equipment only will have to reach around 4% in 2026-2030 in both the residential and services sector. The progressive increase allows for the supply chain to adapt and for the proposed funding to be mobilized and absorbed. The increased rate of renovation will have to be maintained with increased depth also post-2030 in order to reach EU-wide climate neutrality by 2050. Doubling the energy renovation rate by 2030 is an important contribution to the proposed 55% emission reduction target for the EU. The 2030 Climate Target Plan points to energy efficiency as an essential component for action and identifies renovation as key to closing the energy efficiency gap and delivering further energy savings by 2030.

In line with a net 55% emission reduction target, the Commission expects the actions in the Renovation Wave to reduce buildings' greenhouse gas emissions by 60% (from 456 MtCO₂eq to 161 MtCO₂eq), their final energy consumption by 14% (from 374 MtCO₂eq to 321 MtCO₂eq) and energy consumption for heating and cooling by 18% (from 318 MtCO₂eq to 259 MtCO₂eq) as compared to 2015.

It is expected that the Renovation will face many challenges and obstacles and can be held back by barriers at different points in the renovation value chain – from the initial decision to engage in renovation, to financing and completion of the project. For instance, when considering a renovation, benefits from energy savings might be uncertain or poorly explained and understood, especially by the end-users. They can be difficult to measure and monetize. Renovating can also be costly, difficult to organize and lengthy to carry out. Mobilizing financing can be difficult, in particular at local and regional level. Public funds are frequently scarce and difficult to blend due to regulatory obstacles and lacking capacity in public administrations.

Building renovation is one of the sectors facing the largest investment gap in the EU. To achieve the proposed 55% climate target by 2030, around €275 billion of additional investment in building renovation is needed every year [10].

The Communication and the accompanying Staff Working Document provide detailed information and guidance for Member State authorities and stakeholders about the different funding possibilities. **These include direct EU budget support for quality building renovations, attracting private investment and stimulating green financing, supporting research and innovation, addressing market barriers and funding technical support services.**

The different types of market barriers are best addressed through a series of dedicated initiatives under different financial instruments. For example:

- The Recovery and Resilience Facility will provide funding for building renovations;
- Public guarantees to mobilize private investment will be assured under InvestEU;
- Assistance to regional and local authorities in designing and implementing their plans for building renovations is addressed in the cohesion policy funds under REACT-EU, or through ELENA (European Local Energy Assistance) for project development assistance;
- Dedicated support to the coal regions in transition for capacity building, upskilling and reskilling initiatives in the field of energy efficiency is foreseen under the Just Transition Mechanism;
- Horizon Europe will support innovation and development of new technologies, including a dedicated partnership on Sustainable Built Environment (Built4people).
- Removing market barriers for the uptake of technologies and new approaches to speed up renovation will be supported under the LIFE programme;
- The Commission is revising the General Block Exemption Regulation to simplify combining EU programmes and instruments, national funds and private funds for renovation projects.

The Renovation Wave will actively support renovation of worst-performing buildings and tackle energy poverty. The Commission will help national, regional and local authorities to use all available financial resources – including grants and subsidies – to focus upfront investments on the most vulnerable. To promote the smart neighborhood approach in 100 districts, the Commission will launch an Affordable Housing Initiative.

2. Current status of renovation in Europe

2.1. Barriers and challenges for building renovation

Improving the energy performance and carbon footprint of buildings is determined by the decisions of a large number of people. There are literally millions of building owners and also very large numbers of decision makers – managers, developers – who decide what happens in all buildings, but particularly in multi-family, commercial and public buildings. **What is important for policy making is to better understand the factors that affect those decisions in order to design and implement policies that will more effectively promote energy efficiency investments and actions.**

2.1.1. Barriers to embrace renovation

The BPIE survey [11] has identified numerous barriers that hinder the uptake of renovation measures. In simple economic terms, the fact that there is a large untapped cost-effective potential for improving the energy performance of buildings is evidence that consumers and investors, as well as society in general, are not keen on investing in energy saving. This human dimension combined with a variety of other factors that affect decisions need to be understood and addressed if an ambitious retrofit strategy is to be successful. It is a complex set of issues that impact all actors in the buildings chain.

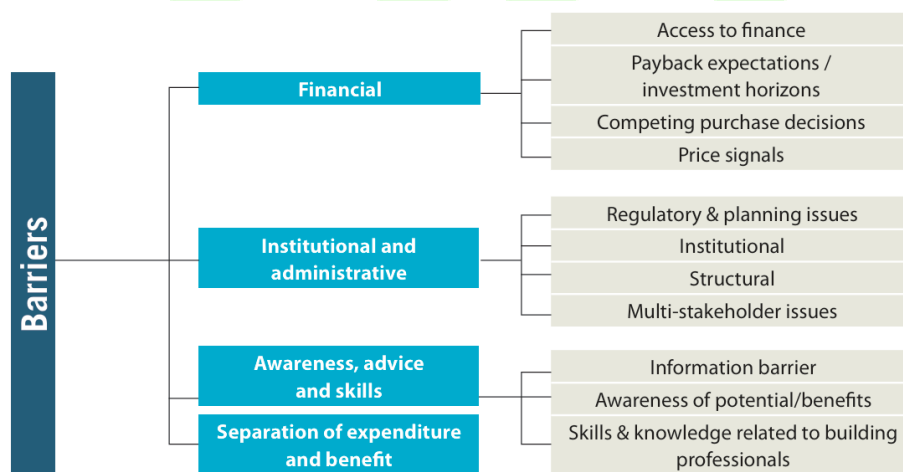


Figure 8 Classification of barriers as identified by the BPIE survey [11]

Financial barriers were one of the highest-ranking barrier categories in the majority of countries, with 21 giving it **a high priority (amongst the top three)**. Undoubtedly, any investment in renovation requires money. The most common underlying issues related to financing are:

- Lack of funds or access to finance
- Payback expectations/Investment horizons
- Competing purchase decisions
- Price signals

There is a wide range of barriers related to **institutional and administrative issues** that can have an effect on the rate and ambition of renovation. This category was considered the **third most important barrier category in the survey**, although second in terms of the highest priority.

- Regulatory & planning regimes
- Institutional

- Structural
- Multi-stakeholder issues

There are many barriers relating to **awareness, information and technical expertise**. This was the **second most identified barrier category**, with 15 of 26 countries giving this a high priority (amongst the top three) [11]. Undoubtedly, for the market to work well, correct and appropriate information is essential. Ambitious renovations comprise a major decision which can only work if the right energy advice to take action is available and that the energy efficiency service industries are capable of delivering those measures and ultimately that sufficient satisfaction levels can be guaranteed for the consumer. Current ESCO companies are not designed to deliver deep renovations where the complex process, small project size and multistakeholder involvement discourage ESCOs from having a real interest in deep renovation projects. Without the right combination of necessary conditions, the consumer may only choose to undertake renovation measures when it is absolutely necessary, as is the case for the replacement of equipment, having the following issues preventing extensive renovation:

- Lack of advice/information
- Awareness of energy savings potential
- Skills & knowledge related to building professionals

Separation of expenditure and benefit is probably the most complex and long-standing barrier relating to existing buildings, particularly in countries where there is a high share of rental accommodation in the residential sector, but also because of the structure of occupancy in the non-residential sector. This barrier has been known under various names throughout the years. Most recently it is known as the ‘split incentives barrier’ or the ‘landlord/tenant barrier’, the ‘investor/user barrier’ and the ‘principal/agent barrier’, to name the main ones. The problem originates from the fact that one person or organization owns a building and someone else uses it. For the owner, any investment has to bring a benefit which is not necessarily through energy savings, unless it is a situation where the landlord pays the energy bills (this may sometimes be the case). Since the tenant does not own the facility, any investment in lowering energy bills has to be seen as financially advantageous for both actors. This often leads to a stalemate with nothing happening.

2.1.2. Challenges for enhanced renovation

Almost none of the above barriers relate to market or technical issues. This is understandable since the lack of activity resulting from the financial, structural and other barriers have not allowed the market and technical barriers to emerge or become apparent. The barriers undoubtedly exist as latent risks. *If conditions were to change dramatically and demand for low energy renovations suddenly increased there would inevitably be issues regarding shortages of materials, components and human resources.* These issues are not permanent barriers because over time the market and the supply chain would respond to demand by building greater capacity and developing more efficient supply chains and delivery systems. The following figure represent some of the major challenges that have to be factored in developing a robust and comprehensive retrofit strategy.



Figure 9 Illustration of the main risks which need to be addressed for market uptake

Market and supply chains will certainly develop over time but short term we are facing risks. A significant shortage of material, components and suitably skilled labor could lead to renovation work not including low energy measures. Opportunities will be missed and low energy renovation projects may be abandoned because they cannot be delivered within a specific window of opportunity.

Another side-effect of a significant increase in demand could be the rapid growth of contractors offering to undertake low energy renovation work, which if not appropriately regulated or managed, could give rise to **poor workmanship** and even some serious short-term failures. Both these outcomes would generate negative feedback.

A similar and potentially more troubling concern that has been voiced by many in the industry is the **risk of building-in long term failure risks** that may not emerge for a decade or more. Whilst not a barrier in the short term, if such failures began to occur on a large scale in several years they could result in a massive loss of confidence and a halt in major renovation programs. Most new construction materials and more importantly construction techniques and processes go through a long period of testing and development before they gain approval for widespread application in new buildings. This would also be true of the materials being used in low energy renovations but not necessarily the construction techniques and processes. Many of these have had little testing and development. A major concern is the potential for building-in interstitial condensation risk when installing internal wall insulation.

Disturbance is another barrier that has yet to emerge is the practical issue of what happens to the building occupier when a major renovation is being undertaken. It is probably seen a barrier at the moment given that occupants may not want to entertain the disruption involved in a major building renovation. In most cases deep renovation can only be implemented in a vacant building which will involve practical and financial barriers associated with re-locating the occupant for the period of the retrofit (4-10 weeks).

2.2. Different renovation levels and rates

It is generally recognized that energy efficiency is the cheapest way of reducing carbon emissions. The EPBD Impact Assessment [12] identified the opportunities to improve the energy performance of buildings:

- Improving the thermal performance of the building fabric through insulation of walls, floors and roofs, and replacement and tightening of windows and doors.
- Improving the energy performance of heating, ventilation, air conditioning (HVAC) and lighting systems.
- Installation of renewable technologies such as photovoltaic panels, solar thermal collectors, biomass boilers, or heat pumps.
- Installation of building elements to manage solar heat gains.

2.2.1. Renovation levels

The term “renovation” has been used to describe a wide variety of improvements to an existing building or group of buildings. In the context of this report, “renovation” is taken to mean an upgrade to the energy performance, unless otherwise specified. Qualitatively, it can be seen that a renovation to a building facade (i.e. walls and windows) will provide a different level of energy saving than one

addressing all of the building envelope and its energy systems (HVAC, lighting etc.) as well as the installation of renewable technologies. There is therefore a need to categorize different levels of renovation.

At its most basic, the energy performance of a building can be improved by the implementation of a single measure, such as a new boiler plant or the insulation of the roof space. Typically, energy savings of up to 30% might be expected by the application of one to three low cost/easy to implement measures. At the other end of the scale, renovation might involve the wholesale replacement or upgrade of all elements which have a bearing on energy use, as well as the installation of renewable energy technologies in order to reduce energy consumption and carbon emission levels to close to zero, or, in the case of an “energy positive” building, to less than zero (i.e. a building that produces more energy from renewable sources than it consumes over an annual cycle). The reduction of the energy needs towards very low energy levels (i.e. passive house standards, below 15 kWh/m² a year) will lead to the avoidance of a traditional heating system. This is considered to be a break point where the ratio of the benefits (i.e. energy cost savings) to investment costs reaches a maximum. These renovations are considered as nearly Zero Energy Building (nZEB).

In between these two boundary examples the renovations are involving a number of upgrades. According to one of the classifications, the renovation can be subdivided into 4 levels, including the previously mentioned boundary levels and in-between the “Moderate”, involving 3-5 improvements resulting in energy reductions the range 30-60%, and “Deep” (60-90%). A deep renovation typically adopts a holistic approach, viewing the renovation as a package of measures working together. Table 1 summarizes the 4 categories of renovation, together with average total project costs for energy efficiency measures, expressed in €/m² floor area. The costs reflect the total installed costs of measures, i.e. materials, labor and professional fees, but do not include any costs not directly related to improving the energy performance of buildings.

Table 1 Renovation type and cost estimates according to BPIE [11]

Renovation type	Final energy saving (% reduction)	Indicative saving (modelled)	Average project cost (eur/m ²)
Minor	0-30 %	15 %	60
Moderate	30-60 %	45 %	140
Deep	60-90 %	75 %	330
nZEB	90 % +	95 %	580

2.2.2. Estimated renovation rates

In addition to a lack of comprehensive information on the costs and savings of building renovations, there is little data on the numbers of renovations being undertaken, their depth, or indeed trends in renovation rates. *Most estimates of renovation rates (other than those relating to single energy saving measures) are mainly between around 0.5% and 2.5% of the building stock per year.* These rates typically reflect the activity of the past few years which in some cases are linked to special circumstances during those years (e.g. the existence of a renovation program) and therefore may not be of normal practice. In this work, it is assumed that the current prevailing renovation rate across Europe is 1% 49. The generalized results from BPIE 2022 report and European Environment Agency [13] are provided in Table2.

Table 2 Current rates for building renovations and the levels required to meet EU climate targets

Annual renovation rate	Annual deep renovation rate	Annual investment (in euro €)	Annual investment (%)
Current: 1% (EU level, small national variations)	Current: 0.2% (EU level, small national variations)	Current: € 127 billion in total (€ 58 billion spent on medium and deep renovation)	Current: 66.3% shallow renovations, 28.3% medium, 5,4 deep
Needed for 2030 target: double the current rate to 2% (renovation wave)	Needed for 2030 target: 3% overall	Needed for 2050 target: € 243 billion needed annually to align building stock with climate neutrality	Needed for 2030 target: 70% of renovations to be deep

The three main variables that influence the pathways for building renovation are:

- **the rate of renovation**, expressed as a % of the building stock in a given year;
- **the depth of renovation**, according to the four previously described levels: minor, moderate, deep and nZEB; and
- **the cost of renovation**, which itself varies with depth. Cost reduction factors are applied, reflecting the impact of increasing renovation activity over the period to 2050. Higher factors are applied to the deeper renovation profiles, given that there is a steeper learning curve as the volume of activity increases, and the cost of buildings-integrated renewable technologies in particular come down with increasing market maturity. The impact is illustrated in Figure 10, with cost reductions ranging from 1% p.a. for minor renovations to 4% p.a. for nZEB renovations.

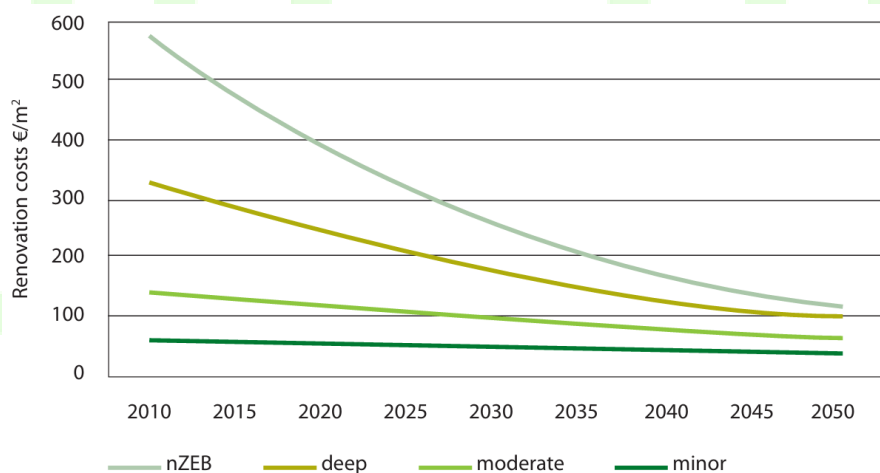


Figure 10 Cost reductions for different levels of renovation over time [11]

2.3. Deep renovation and its link with EU policy

The Renovation Wave put forward by the European Commission in October 2020 aims to at least double the annual energy renovation rate by 2030 as well as to foster deep energy renovation. If the EU wants to achieve its 2030 climate target and climate-neutrality by 2050, it must boost both the rate and the depth of renovation. According to BPIE calculations, this means the buildings sector greenhouse gas (GHG) emissions should decrease by 60% by 2030, and the annual deep energy renovation rate must be at 3% as soon as possible and no later than 2030.

Addressing the energy consumption of the building stock means drastically reducing its energy needs. *To that end, the EU needs to boost both the rate and the depth of building renovation.* Deep renovation should become the default approach to renovation, representing the majority of works undertaken. Existing buildings represent most of the building stock of the future – around 90% of today's buildings will still be standing in 2050, and a vast majority were built before 2001. Without a deep renovation of the existing building stock, the sector will not be fully decarbonized by 2050. For 2030, the Renovation Wave aims to at least double the annual energy renovation rate as well as to foster deep energy renovations.⁹ BPIE calculated that to contribute to the reduction of GHG emissions by at least 55% by 2030, GHG emissions from the buildings sector should decrease by 60% by 2030 compared to 2015. This means that the deep energy renovation rate should reach 3% per year as soon as possible before 2030 and be maintained up to 2050. By 2030, 70% of the renovations taking place should be deep (this modelling exercise used the metrics of 60-90% of energy savings to calculate the impacts of deep renovations on GHG emissions reduction). The remaining 30% of the renovation activities should result in medium-depth renovation, i.e., estimated at 40-60% energy savings in the modelling exercise. There is no room anymore for shallow/light renovations, estimated by the model to deliver less than 40% savings. Overall, all renovation scenarios should consider deep renovations to be the majority.

2.3.1. The benefits of deep renovation

There are some specific benefits of undertaking deep renovations compared to other types of renovations.

- The significantly higher achieved energy performance in deep renovations leads to more substantial energy savings and greater benefits compared to shallower renovations. It also holds the potential to avoid lock-in effects, as they tend to target many building elements simultaneously.
- Going for deep renovations enables building owners, occupants and society as a whole to reap more benefits over time, linked to the fact that some energy efficiency measures in the buildings sector, especially touching the building shell, have a long lifetime and bring energy savings for decades. This positive cumulative effect of deep renovation is especially important in fighting energy poverty.
- Deep renovations not only act against energy poverty, but also reduce air pollution and improving occupants' health. Deep renovation holds special benefits in terms of its contribution to a more effective decarbonization of the building stock.
- The integration of renewable energy sources become easier once energy needs of the building are reduced and additional flexibility given to the power sector. Reducing the energy needs of the buildings sector will reduce peak loads, making some infrastructure and related investments unnecessary.

- Finally, deep renovations can simultaneously address mitigation and adaptation concerns, as there are more opportunities to look at the different building elements in a holistic manner. Deep renovating the building stock means making it climate proof and resilient.
- Lastly, going for deep rather than shallow renovations will boost innovation and investment in the entire construction value chain. Deep(er) renovations imply a need for competence and technical knowledge of high efficiency solutions and processes. The demand for skilled workers, companies with experience and know-how in complex renovations, and high volumes of appropriate materials will increase.
- Increasing the rate of renovation might expand these markets but boosting the depth of renovation will transform them at the same time. This is an opportunity to develop industrialized solutions to renovation and to create even more high-quality jobs. The European Commission has identified this positive effect as a priority in the Renovation Wave strategy.

2.3.2. Various definition for deep renovation

The EU legal framework does not, to date, provide a definition of what qualifies as a deep renovation [14]. The EPBD, which is the main legislation at EU level on building performance, does not offer an official definition. Also, its specific provisions are no longer fit-for-purpose considering the current climate targets, and do not deliver on deep renovation.

The very first definition given by the Directive in 2010 defines is ‘major renovation’ as a *“renovation of a building where: (a) the total cost of the renovation relating to the building envelope or the technical building systems is higher than 25% of the value of the building, excluding the value of the land upon which the building is situated; or (b) more than 25% of the surface of the building envelope undergoes renovation.”*

While the EU framework does not provide a clear and legally binding answer to the question of what a deep renovation is, recent policy discussions and political context have become loaded with references to the concept. The European Commission refers to deep renovation in the Renovation Wave strategy, when setting the objectives for the buildings sector in the years to come. Both the European Parliament and the Council also address deep renovation in their latest official positions.

As deep renovation is a topic high on the political agenda, it is all the more important to better define it and draw implications of what it means for building renovation policies.

While the EU-level framework does not provide a clear or legally binding definition for deep renovation, some Member States have used the concept when elaborating their LTRS or defined “deeply renovated / highly energy performing buildings” in recent policy developments.

Following are some of the definitions for deep renovation set by the member states: Belgium: 75-100% energy consumption reduction; Czechia: EPC label A (107 kWh/m²/year) Denmark: 60% primary energy consumption reduction; Estonia: EPC label C (<150 kWh/m²/year); France: 80 kWh/m²/year; Luxembourg: Reference to renovation quality with EPC A/A to B/B and average 72% energy savings; Spain: Primary energy savings > 60% [15]. Other Member States such as Austria and the Netherlands [16] mention deep renovation several times in their LTRS, but do not provide a definition in the document itself. Finland refers to deep renovation, but only when describing which building components need to be addressed during a renovation (e.g. ventilation, domestic hot water, exterior walls, floors, etc.), and stating that when everything is implemented at once, it can be considered a

deep renovation. BPIE therefore adopted its own approach to deep renovation, both in terms of how to define it and how to deliver it [14].

Deep renovation is a process of capturing, in one or, when not possible, a few steps (maximum number to be defined), the full potential of a building to reduce its energy demand, based on its typology and climatic zone. It achieves the highest possible energy savings and leads to a very high energy performance, with the remaining minimal energy needs fully covered by renewable energy [14]. Deep renovation also delivers an optimal level of Indoor Environmental Quality to the building occupants. It ensures the building, at each step of the process, contributes its full potential to the achievement of the collective climate targets, and is on track to be climate-proofed, in line with climate-neutrality by 2050. Deep renovation considers key building elements to cover, and when it cannot be completed in one step, carefully plans renovation steps – for example by using Building Renovation Passports, which outline the selection of energy-saving measures and renewable energy installations to be executed, avoiding any lock-in, and can possibly be linked to progressive financial support. Deep renovation should lean towards a minimal carbon footprint for both operational and embodied emissions.

2.3.3. Necessary regulatory framework to support deep renovation

As described previously, *the annual deep renovation rate should be multiplied by a factor of 15 between now and 2030 (from 0.2% to 3%) and deep renovations should represent 70% of all renovations carried out in less than a decade from now.* At present, an estimated 97% of buildings in Europe are not energy efficient, and only 11% of the existing building stock undergoes some level of renovation each year. These renovations often fail to take energy savings into consideration. At this pace, it would take centuries to cut carbon emissions from the buildings sector to net-zero. What is needed is a massive upscaling of deep renovations in Europe, to ensure success of the Renovation Wave.

Beyond providing for a clear and legally binding definition, the EU regulatory framework should move towards introducing a ‘*deep renovation standard*’ which would fully guide policymaking, planning and investment decisions [17].

The key policy instrument for the EU buildings sector is the Energy Performance of Buildings Directive (EPBD) [18], which is being recast to help increase the rate and depth of renovation of Europe’s existing building stock. A vital component of the Renovation Wave Strategy, the revised EPBD upgrade the existing regulatory framework to reflect higher ambitions and more pressing needs concerning climate and social action, while providing Member States with the flexibility need to address the differences in the building stock across Europe [19].

In order to meet the goal of climate neutrality by 2050, as well as the 2030 climate targets, the buildings sector must vastly increase its investment to boost both the rate and depth of building renovations, as presented in Table 2. Policy will play a key role in the introduction of regulatory and enabling measures for private and public funders looking to channel investment more effectively into energy-efficiency projects.

The Energy Union strategy materialized into several key pieces of legislation, initiatives, and policy packages. The most important with regard to energy efficiency is the Clean Energy for All Europeans (Clean Energy) package, which was adopted in 2018. While the Clean Energy package comprises eight different pieces of legislation aimed at accelerating the energy transition in Europe, the main list of relevant directives and regulations for energy efficiency of buildings includes the Energy Performance of Buildings Directive (EPBD), the Energy Efficiency Directive (EED), the Renewable Energy Directive

(RED), and the Regulation on Governance. Figure 11 shows how European legislation, policy and plans fit in with the overall goal of climate neutrality by 2050.

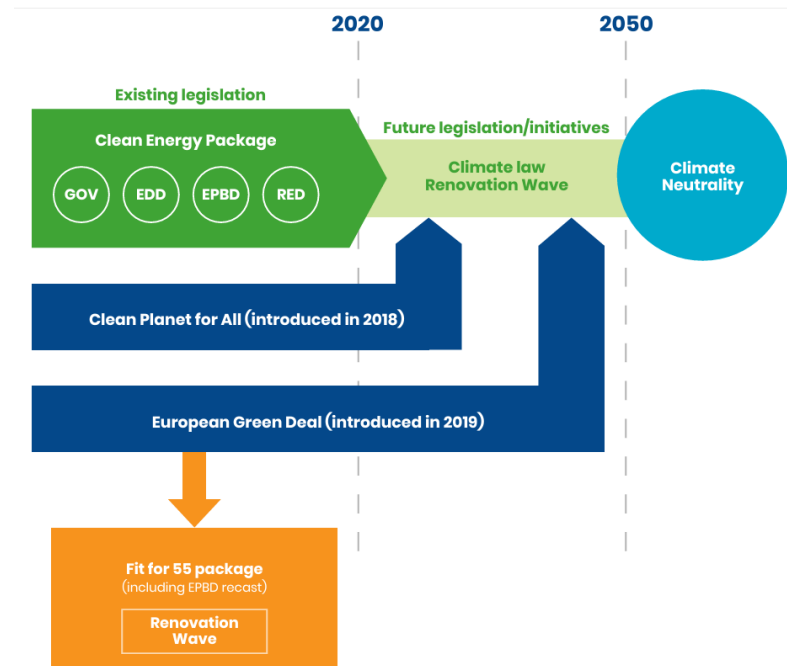


Figure 11 European climate and energy legislation and initiatives [17]

European legislation, policy and plans

- Governance and National Energy and Climate Plans (NECPs). The Regulation on Governance entered into force in December 2018. This regulation emphasizes the importance of meeting the EU's 2030 energy and climate targets and sets out how EU Member States and the European Commission should work together to achieve Energy Union goals. This governance mechanism is based on integrated national energy and climate plans (NECPs) covering ten-year periods, starting from 2021 to 2030, the EU and national long-term strategies, and on integrated reporting, monitoring and data publication. NECPs must outline, among other things, how a country intends to address energy efficiency, renewables and GHG emissions reductions and meet the relevant targets and national contributions.
- The Energy Efficiency Directive. The Energy Efficiency Directive (EED) is the overarching legal framework for energy-efficiency policy in the EU. The EED came into force in 2012, establishing measures to achieve a 20% energy-efficiency target by 2020. Revised first in 2018 and then in 2023 as part of the Fit for 55 package, the EED now sets an indicative EU-wide 32.5% non-binding energy-efficiency target for 2030 and extends the lifespan of one of its core binding provisions, the 'energy savings obligation,' beyond 2020 until 2030.
- Energy Performance of Buildings Directive. The Energy Performance of Buildings Directive (EPBD) is the cornerstone of European legislation for transforming the buildings sector. The EPBD was adopted in 2002, recast in 2010 and amended in 2018 (2018/844/EU). The 2018 amendments to the EPBD, which are part of the Clean Energy package, set a clear direction for the full decarbonization of Europe's building stock by 2050 while focusing on how to modernize the existing stock. A recast of the directive was launched in late 2021 and the

important breakthrough for the increased renovation is enabled with the latest revision of the EPBD adopted in 2024 [20].

- *National long-term renovation strategies (LTRS).* The Energy Performance of Buildings Directive (EPBD) requires Member States to develop national long-term renovation strategies (LTRS), which are policy instruments outlining how a country aims to transform its existing national buildings into a decarbonized and energy-efficient building stock by 2050.
- *European Green Deal.* The European Green Deal [21] introduced in 2019 by the European Commission, is a strategy for driving the EU towards a sustainable and climate-neutral economy. The overall target of the European Green Deal, later enshrined into legislation with the EU Climate Law, is to become a climate-neutral economy by 2050. The Green Deal covers nearly all broad aspects of European life, including health, transport, food, jobs and upskilling, and the economy. However, specific emphasis is placed on making a ‘just transition to a zero-carbon building stock’, which in turn leads to the Renovation Wave and associated initiatives.
- *Delivering the Green Deal - Fit for 55.* Delivering the Green Deal, commonly referred to as the Fit for 55 package, is an EU communication released in July 2021 accompanied by a set of legislative proposals outlining how the EU will deliver its interim targeted 55% reduction of GHG emissions by 2030. Central to building energy performance, the Fit for 55 package is a recast of the EPBD.
- *Renovation Wave.* The Renovation Wave [22] highlights key areas of intervention to boost the renovation of buildings in the 2021-2024 period. The goal of the Renovation Wave is to help meet the 2030 climate target and to decarbonize the building sector through a wide range of policies, measures and tools that must be put in place at all levels to overcome existing barriers and mobilize all actors, including citizens, local authorities, investors, and the construction value chain [23].

Budget and recovery initiatives

- *Multiannual Financial Framework (MFF) 2021-2027.* The Multiannual Financial Framework (MFF) is the seven-year framework for the EU budget. The current MFF runs from 2021-2027 and includes provisions for short-term economic recovery, while supporting a green and digital future for the EU. *An existing budget of € 1.211 trillion for this period [24] is combined with a further € 806.9 billion from the temporary recovery instrument.*
- *NextGenerationEU, for a total of EUR 2.018 trillion.* Given the importance of building renovation for the EU’s climate targets, the planned budget includes dedicated funds for building energy efficiency measures, outlined below.
- *InvestEU.* InvestEU is an investment support mechanism under the MFF for the 2021-2027 period. *This € 26.2 billion EU guarantee program is expected to mobilize another € 372 billion of investments. InvestEU supports four policy areas: i) Research, innovation and digitalization; ii) SMEs; iii) Social investments and skills; and iv) Sustainable infrastructure, which also includes energy efficiency, building renovation and the integration of buildings-connected energy sources [25].*
- *NextGenerationEU (NGEU).* NextGenerationEU is a temporary European recovery instrument with a budget of € 806.9 billion, intended to help fix the economic damage incurred during the coronavirus pandemic and to reinforce the EU MFF 2021-2027 budget.

- Recovery and Resilience Facility (RRF). The Recovery and Resilience Facility is the main NextGenerationEU program, making 90% of its total budget, € 723.8 billion, available in loans and grants to Member States for buildings renovation.
- Recovery and Resilience Plans (RRPs) To receive funding from the RRF, Member States must submit Recovery and Resilience Plans (RRPs) that are required to allocate at least 37% of RRF spending to climate-related investment and policy.

2.4. Generalized recommendations for boosting renovation of EU building sector

The EU Member States show considerable distinctions in terms of efforts, financial capacity, and market conditions. There are significant market frictions at the Member State level: the land lord-tenant issue, numerous stakeholders and decision-makers, conditionality in the renovation of specific buildings (i.e., historic structures, and so on), problems in accessing funding or un appealing interest rates, damaging aids for energy production and heating energy costs in some countries are simply some of the barriers.

The conclusions resulting from the comprehensive survey presented in the previous sections identify the actions needed to enhance the renovation and specifically deep renovation in EU.

2.4.1. Policy measures

At EU level, it is necessary to strengthen the existing legislation with binding measures and to *establish a roadmap for the renovation of the EU building stock*. The existing legislation insufficiently covers the substantial renovation of the EU building stock, and hence the potential development of affordable energy savings and financial growth is not sufficiently established.

The BPIE report in 2022 answered the question that the long-term renovation strategies (LTRS) of EU Member States were not in line with the EPBD requirements on total decarbonization of the EU building stock by 2050. Even full compliance with Article 2a of the EPBD was not sufficient to achieve climate neutrality by 2050. Therefore, the immediate recast of the EPBD was needed, and it was done in April 2024.

The renovation roadmap has to be built on a long-term basis with binding targets for energy efficient retrofit of the EU building stock by 2050. A renovation roadmap must have a clear monitoring and reporting plan with interim targets indicating the renovation rates and the renovation depths to be reached gradually each decade. The renovation targets may be integrated in the National Energy Efficiency Action Plans (NEEAPs) under the End-use Energy Efficiency and Energy Services Directive.

The EU legislation should call upon Member States to prepare detailed deep renovation plans comprising regulatory, financial, informational and training measures.

The process of adopting minimum energy saving regulations and energy labelling for heating and cooling equipment and construction materials under the Energy Labelling and Eco-design of the energy related products Framework Directives has to be strengthened and supported.

2.4.2. Financing

The success of deep renovation programs will depend on the creation of appropriate financing schemes, addressing all the categories of private and commercial real estate owners as well as

introducing measures using appropriate subsidies, low-interest and longer-term loan schemes and other financial incentive schemes.

The funding must be offered only for deep level renovation resulting in low energy standards. Such a fund will provide more monetary flexibility and additional flexibilities for investors. EU funds for the purpose of renovation should include the minimum requirements to implement procedures at cost-effective levels. Which should remain in line with the requirement for the Multiannual Financial Framework - MFF (2021-2027 long term EU budget).

A proper public financing approach may leverage considerable private capital as has been proven by several successful programs developed in some European countries. Attracting private capital to invest in building renovation is a key issue of any financing program that aims to stimulate the economy and to transform energy efficiency measures into a sustainable business activity.

Governments should draw up a balance sheet which calculates the costs of effective deep renovation incentive schemes against the increased tax revenue from a significant growth of the construction industry (e.g. through VAT, income tax, corporate tax, etc.).

Relevant national stakeholders need to improve their knowledge about the use of the EU Structural and Regional Funds and the EIB financing lines for improving the energy performance of the buildings stock. Investing in buildings means investing in the development of society.

The European Commission could also facilitate the development of innovative financial instruments at the Member State level by elaborating guidelines for financing, promoting best practices, stimulating the cooperation between the Member States for sharing experience, and implementing standard, harmonized regulatory measures for deep renovation.

2.4.3. Training and promotional activities

For implementing effective and good quality deep renovation it is necessary to improve the skills of the building professionals at the level of both basic professional education and long-life learning activities. Therefore, training and educational activities should be developed both in the construction sector and in the supply chain industries.

Promotional and dissemination activities must be an important part of the deep building renovation programs. Awareness raising and promotional activities should address the psychological barriers which exist concerning deep renovation. A discussion about societal values needs to address behavior change to support investment decisions in favor of sustainability rather than investment decisions driven by social status factors, or by short term return considerations.

The upcoming strategy for the sustainable competitiveness of the construction sector, which the European Commission planned, may provide a strong foundation for improving the knowledge level and the practice of renovation activities. To cultivate the deep renovation of the building stock, Member States need to develop long-term, extensive regulatory and monetary programs, as well as professional training, educational, and advertising programs dealing with macroeconomic benefits.

2.4.4. Revised Energy Performance of Buildings Directive

To boost the energy performance of buildings, the EU has established a legislative framework that includes the revised Energy Performance of Buildings Directive (EU/2024/1275) [26] and the revised Energy Efficiency Directive (EU/2023/1791) [27].

Together, the directives promote policies that will help

- achieve a highly energy efficient and decarbonized building stock by 2050
- create a stable environment for investment decisions
- enable consumers and businesses to make more informed choices to save energy

The revised Energy Performance of Buildings Directive (EU/2024/1275) entered into force in all EU countries on 28 May 2024 and helps increase the rate of renovation in the EU, particularly for the worst-performing buildings in each country.

It also supports better air quality, the digitalization of energy systems for buildings and the roll-out of infrastructure for sustainable mobility. Recognizing the differences across EU countries in factors such as the existing building stock, geography and climate, the directive allows governments to decide on the renovation measures best-suited to their specific national context. Countries can also exempt various categories of buildings from the rules including historical buildings and holiday homes.

Crucially, the revised directive facilitates more targeted financing to investments in the building sector, complementing other EU instruments and fighting energy poverty by supporting vulnerable consumers. EU countries also must ensure that there are safeguards for tenants, such as through rent support or caps on rent increases.

The directive contributes to the objective of reducing GHG emissions by at least 60% in the building sector by 2030 compared to 2015, and achieving a decarbonized, zero-emission building stock by 2050 (Figure 12). It works hand in hand with other European Green Deal policies such as the emissions trading system for fuels used in buildings, the revised Energy Efficiency Directive, the revised Renewable Energy Directive and the Alternative Fuels Infrastructure Regulation.



Figure 12 A key element of the revised EPBD from 2024 [26]

Other measures in the revised Energy Performance of Buildings Directive (EPBD) include:

- the gradual introduction of **minimum energy performance standards** for non-residential buildings based on national thresholds to trigger the renovation of buildings with the lowest energy performance
- a **binding target to increase the average energy performance** of the national residential building stock by 16% by 2030 in comparison to 2020, and by 20-22% by 2035, based on national trajectories
- an enhanced **standard for new buildings to be zero-emission** and the calculation of whole life-cycle carbon for new buildings
- enhanced long-term renovation strategies, to be renamed **national Building Renovation Plans**

- increased reliability, quality and digitalization of **Energy Performance Certificates** with energy performance classes to be based on common criteria
- the introduction of **building renovation passports** to guide building owners in their staged and deep energy renovations
- increased **deployment of solar technologies** on all new buildings and certain existing non-residential buildings where technically and economically feasible, and ensuring that new buildings are solar-ready (fit to host solar installations)
- a gradual phase-out of boilers powered by fossil fuels, starting with the end of subsidies to stand-alone boilers powered by fossil fuels from 1 January 2025
- **one-stop-shops for the energy renovations** of buildings for home-owners, small and medium-sized enterprises and other stakeholders
- further roll-out of **recharging points for electric vehicles in buildings**, removing barriers to their installation, enabling smart charging and introducing measures for bike parking in buildings
- data collection and sharing, to improve knowledge on the building stock and awareness on energy consumption in buildings

3. One-stop-shops for building renovation

3.1. Integrated Home Renovation Services-one of the targets of the revised EPBD

The effective implementation of the Renovation Wave represents an additional investment in building renovation of € 90 billion every year until 2050 [9]. For the residential sector, this means at least doubling the current rate of renovation, while significantly increasing the share of performing renovations and low energy renovations. Although technical solutions are known and available, intervention in the residential sector remains very complex, in particular due to the ownership structure of the building stock. 70 % of the EU population own the home they live in while the remaining 30 % live in rental housing (with large variations depending on Member States). Even for rental housing, the share of professional owners (housing companies, social housing operators) remains relatively small compared to individual owners. This means that, in the vast majority of cases, the decision to proceed with home energy renovation belongs to non-professional homeowners, who are usually insufficiently informed, unskilled for their role and/or lacking the time to manage an energy renovation project, which is rarely their main priority.

In order to upscale home energy renovation, public policies usually focus on boosting demand through *awareness raising, mandatory requirements, or by providing public subsidies and low interest loans*. However, given the lack of capacity of home owners to cope with the complexity of low energy renovation, it is obvious that home (low) energy renovation can only be upscaled if appropriate services are put in place on the supply side, in order to decrease the burden of renovation on home owners. This is how the development of “Integrated Home Renovation Services” (IHRS) can provide a coordinated and coherent response to the needs of homeowners at each step of their customer journey, in order to make the renovation process as painless as possible. The concept of IHRS covers each step of the customer journey. Some of the most widely used typologies for identification of the main IHRS models include advice, support and implementation.

3.1.1. Factors in decision making process for renovation

What is the customer experience of homeowners renovating their home? The question is rarely tackled in the policy debate and, when asked, the answers suggest that many homeowners avoid renovating their home not only because of a lack of interest, but also because they are reluctant to engage in the process. In most cases, homeowners manage the renovation process on their own, which includes defining the energy savings measures, contracting with various construction companies, coordinating the worksite and taking delivery of the work. They are on their own to access a bank loan or mobilize subsidies. Some homeowners even perform all or part of the works themselves.

While from a homeowner's point of view, home renovation is one coherent project, it is usually not seen as such by contractors or by public authorities, whose interventions are focused on specific aspects or moments of the project. In this context, we define the *customer journey as the sequence of interactions between a homeowner and all the stakeholders involved in the renovation, from the homeowner's point of view*. Delegating part or all of the tasks for which homeowners are not well equipped, can make the renovation experience much more attractive, and avoid that homeowners abandon their project or keep it to the simplest measures.

As described in the previous section, there is a multiplicity of reasons why building owners do not routinely consider options for improving their home's energy performance, and even when there are convenient "trigger points", the energy saving options can often be overlooked, ignored, rejected or only partially realized. From the consumers' viewpoint, it is important to consider their decision-making process, which has been roughly illustrated in Figure 13 where the final column highlights some of the most prevalent barriers for a given scenario.

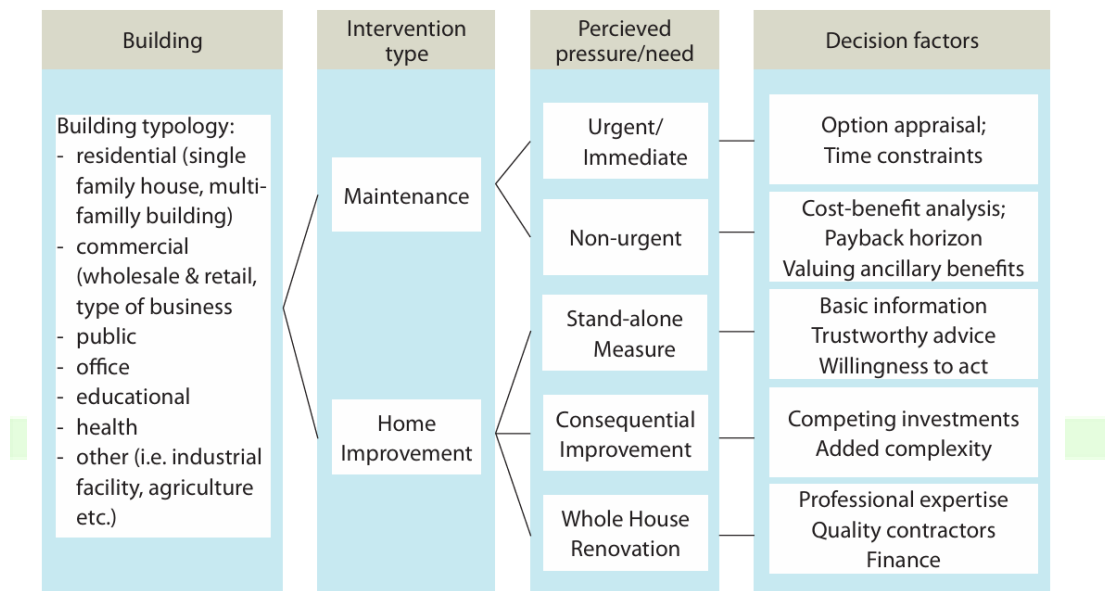


Figure 13 Building owner's decision-making process for undertaking renovation work

3.1.2. Homeowners' renovation journey

A large number of professionals already offer renovation-linked services to homeowners. Figure 17 presents in rows what is considered to be the main steps in the customer journey and, in columns, the main types of actors involved in the housing sector [28]. Where rows and columns meet, it is indicated to what extent the expected services appear to be a core business, a secondary or a marginal activity for the type of actor considered. It should be noted that, on Figure 14 the customer journey is

presented in a very sequential manner, while in practice several of these steps are conducted in parallel, possibly with several iterations at certain stages.

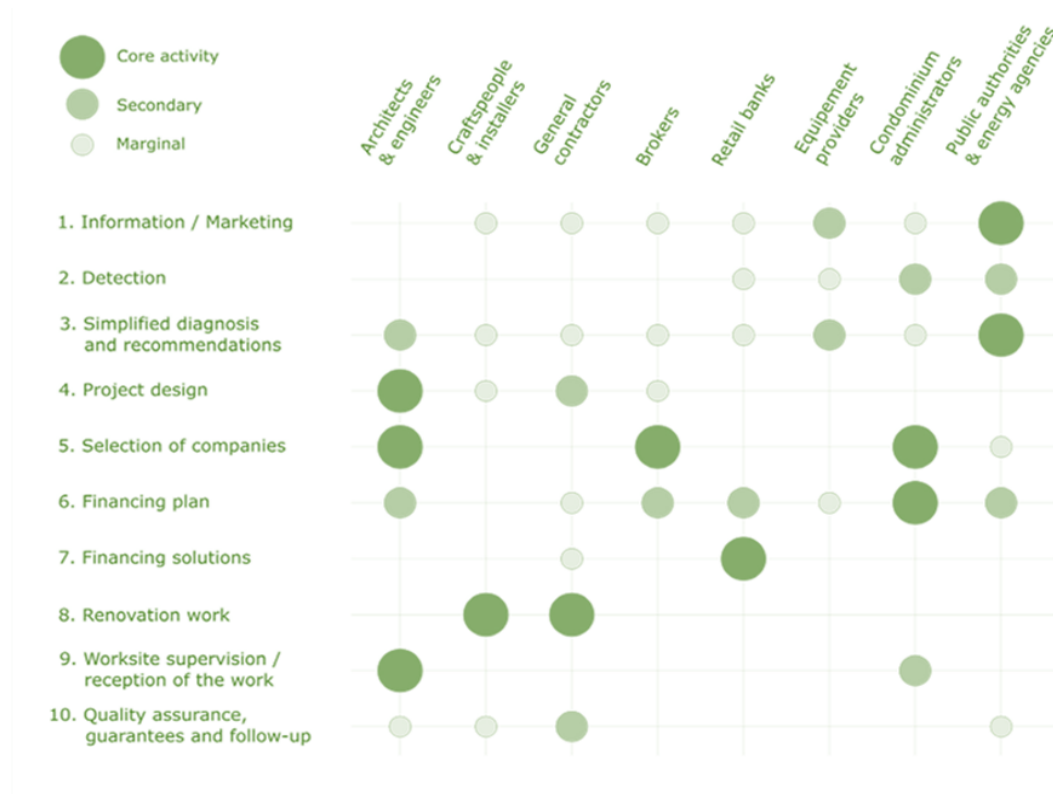


Figure 14 Main steps in the customer journey and the main types of actors involved [28]

The mission of supporting individuals with project design, selection of companies, worksite supervision and acceptance of the work is typically the activity of architects, energy auditors and engineers, possibly in association. By definition, **architects and engineers** provide independent advice, analyze quotations and coordinate the renovation works, working in the best interest of their clients. However, this independence means that they are not in a position to carry out the work themselves, or to offer finance. The support of architects and engineers is usually needed for low energy renovations, but its costs remain a barrier except where it is subsidized.

In the majority of cases, **craftspeople and installers** are the first entry point of homeowners into an energy renovation journey. The primary motivation for contacting them varies greatly and is not necessarily that of saving energy. Craftspeople and installers are very often called to (urgently) repair or replace faulty equipment. In many cases, they are contacted for a project aimed primarily at adapting the home to the (evolving) needs of the household, in which they may be asked to include energy improvements. The construction sector is organized by trades and extremely fragmented, made up of a myriad of small and micro enterprises. This means that craftspeople, even those highly skilled to meet the needs expressed by their clients, are not necessarily in a position to offer complex and comprehensive refurbishments. And it is not reasonable to expect them to spend time they do not have, answering needs that were not expressed, proposing solutions that only their peers and competitors can deliver.

General contractors (and to some extent craftspeople networks, especially those affiliated to energy providers) are in a better position to propose a broader set of interventions, part of which will be sub-contracted to smaller companies. However, they will most likely focus on the interventions they know best and/or which are the most profitable for them, and will not necessarily advise the homeowner to

engage in complex energy renovations which they are not experienced in. While general contractors often provide valuable advice to homeowners, their advice cannot be neutral as their interest is to sell the standard works where they maximize their profits and limit their risks. In addition, general contractors do not necessarily have sufficient means for marketing and promoting new innovative solutions to homeowners and they are, in most cases, not capable of providing financing solutions.

Brokers are often put forward when reviewing existing one stop-shops models, especially as initiatives led by private actors. Brokers act as intermediaries between individuals and professionals, not only from the construction sector but also, possibly, from the financial sector. On the one hand, brokers help homeowners define their project and, on the other hand, they help professionals find clients. Assuming that homeowners' willingness to pay for such services is low, the underlying business model is usually based on a commission charged to professionals, typically 5–10 % of the amount charged to home owners. This means that, ultimately, brokers' main clients are not the homeowners but the professionals, for whom they act as business introducers. While this market positioning is perfectly relevant, it is not always well explained and understood, sometimes leading homeowners to distrust the advice given. All the more so considering the aggressive telemarketing practices of some brokers, which are damaging the reputation of all players in this market segment, including the most virtuous.

Retail banks are specialized in providing financing solutions and their role is crucial to allow deeper renovations, which usually require external finance. Their existing customer relation can be activated to provide first level advice, such as information on energy savings opportunities and existing subsidies, and even sometimes simplified energy diagnosis. However, while retail banks can improve their products to better meet the needs of their clients, they can provide credit only if there is a solvent demand for credit.

Equipment providers (i.e. hardware stores and equipment vendors) are quite active nowadays in promoting energy efficiency measures, which is a good way to boost their sales. Although their market positioning differs, they usually have a significant marketing capacity and can be excellent information relays. They are traditionally core actors in the vocational training of craftspeople and construction companies. In addition, these actors are in a position to reach the informal energy renovation market, i.e. the significant number of individuals who perform energy renovations without any professional support.

In the specific segment of multifamily buildings, **condominium administrators** are increasingly dealing with energy efficiency, particularly where the legislation requires energy audits, and sometimes even energy improvements. However, they operate in a particularly challenging market segment where the decision-maker (i.e. the homeowners General Assembly) is usually weak, fleeting (the General Assembly meets usually once, exceptionally twice per year), divided (mosaic of individuals with divergent interests) and distrustful of any external actor. Their low remuneration compared to the complexity of an energy renovation project, and the risk of losing their management mandate if they are too insistent, mean that they are probably not the best prescribers, although they can play a central role.

Finally, **public authorities**, especially local and regional authorities and their energy agencies, can provide valuable information and first level advice to homeowners thanks to their proximity. However, they are usually reluctant to intervene in a competitive market and prefer to position themselves in a neutral role of information and orientation. This means, for example, that they do not go beyond a certain level of detail in their recommendations, or they cannot recommend a specific private actor. Furthermore, many of these structures do not have the human and financial resources to proactively approach homeowners and, as consequence, are mostly in contact with homeowners who are already motivated or engaged in a renovation process.

In a nutshell, it is not the lack of participants in the market that explains the low uptake of energy renovation, but rather their absence of coordination and their diverging interests which prevent a holistic answer to the needs of the home owner. Public intervention is needed to create and strengthen the missing links between fragmented market offers, and to accelerate the transformation of practices towards low energy renovation.

3.1.3. The meaning of Integrated Home Renovation Services

While it is fairly simple to describe what “Integrated Home Renovation Services” (IHRS) might include, their concrete implementation can take many different forms depending on the local context and resources. Here is how to understand the terms:

- Integrated has a twofold meaning. The approach should combine various services in a packaged offer to homeowners, in order to create confidence and simplify the renovation process. The approach should also be well integrated in its context, making best use of what is locally available, notably in terms of public support schemes and local market players.
- Home means private homes, which can be individual or multifamily buildings, but not public buildings, social housing or tertiary buildings.
- Renovation focuses on existing buildings and excludes new buildings. In particular, the focus should be on low energy renovation, either all at once or at least in a planned staged approach that could be followed-up by the IHRS, using tools such as Building Renovation Passports.
- Services emphasizes the nature of solutions to be provided. Note that this approach is often discussed under the denomination of one-stop-shop. However, the use of this term in the public debate is not yet stabilized and it is commonly used to refer to a wide range of very different approaches, not limited to housing, many of which focus on streamlining public funding (i.e. single funding portal).

3.1.4. The role of IHRS in different step of renovation journey

The different steps of the customer journey are identified in Figure 14.

Information/marketing

At this first stage of the customer journey, the aim is to raise homeowners’ awareness on how they consume energy, the importance of controlling their consumption and the means to do so. The aim of this stage is to reach out to the largest audience through the use of various communication media.

Detection

Homeowners are rarely ready to make major decisions and the window of opportunity for an ambitious renovation is quite small. It is therefore important to detect and target more precisely those households who are more likely to undertake a renovation, like global renovation of newly purchased home.

Simplified diagnosis and recommendations

Beyond the provision of information (message-centered), a further step is to provide advice (recipient-centered) to homeowners, i.e. to guide them in their choices. This advice covers technical and financial aspects. At this stage, advice may be in a form of simplified diagnosis, to estimate roughly the potential energy savings, the costs and available public grants.

Project design

At this step IHRS can support homeowners more operationally in their energy renovation project: firstly, by carrying out a detailed on-site energy audit, to analyze the specific situation and determine potential savings; secondly, by defining in details the work to be performed, including specific requirements (e.g. on thermal bridges) and making sure these specifications comply with grant requirements (e.g. levels of thermal resistance, qualification of the builders...). Such detailed project design is rarely prepared for individual retrofitting measures (such as a boiler replacement) but it is usually needed for comprehensive low energy renovations.

Selection of companies

In this step, the homeowner asks construction companies (or groupings thereof) to provide quotations and then selects the best offer. The selection of companies is a crucial step. It usually represents a lot of stress for homeowners due to the difficulty of mobilizing companies, the technicity of the offers and the fact that actual investment costs are decided.

Significant cost reductions can be achieved through IHRS at that step, especially for low energy renovation, by moving from a project approach to a program approach, i.e. through standardization and replication.

Three possible IHRS organizations can be distinguished at this stage:

- **Assistance:** the IHRS works in the exclusive interest of the homeowner, which means that it must have no contractual relationship with the companies performing the refurbishment.
- **Delegation:** the IHRS works in the exclusive interest of the homeowner and receives part of the homeowner's prerogatives through a delegation contract. Although the home owner ultimately assumes all consequences, the IHRS may perform certain acts defined in its mandate.
- **General Contractor:** the IHRS not only proposes to design but also to carry out the renovation work. In that case, the IHRS may perform part of the work itself and/or hire construction companies and impose their choice on the home owner.

Financing plan

Whereas financing is not the solution to home renovation, lack of clarity on how to afford home renovation is often a good reason for abandoning the project. The financing plan is one of the first questions homeowners ask at an early stage; *it is progressively refined as technical choices and costs are clarified.*

The financing plan needs to be clarified well ahead of the start of the works, including the agreement on a potential loan. It may seem obvious for an IHRS to add this type of service on top of a core technical offer.

Financing solutions

Immediately connected to the financing plan, a crucial step in most renovation projects, especially when targeting low energy renovation, is access to external financing sources, which usually consist of

consumer loans (potentially subsidized) and secured housing loans/mortgages (in the case of a renovation bundled with a home acquisition project), as well as public grants. An IHRS can provide different services, potentially in combination:

- ✦ **Support in accessing public grants.** Although it is often possible to combine different grants, understanding the different requirements can be complex, as funding schemes are usually not coordinated between the different funding bodies (local, regional, national and European levels, as well as energy utilities in many countries).
- ✦ **Pre-financing of public grants.** While public grants improve the profitability of the investment, they are usually received ex-post, sometimes long after the work has been paid for. This means that the homeowner must have the capacity to finance the full investment, including the pre financing of the grant amounts.
- ✦ **Pre-qualification for a retail bank financing offer.** Although the bank will usually make its own analysis of the homeowner's financial situation, the IHRS can facilitate due diligence, notably by providing the information in a standardized format, in agreement with the bank.
- ✦ **Autonomous financing solutions.** The IHRS can even include a standalone financial offer within the package of services. This constitutes a third qualitative leap and a (substantial) "option" that may be added to each of the three models (although it has only been observed with the support and implementation models). Integrating finance makes the IHRS more attractive to the homeowner, as the decision to launch the work no longer depends on a third-party's approval (the bank).

Renovation work

At this stage, the work is carried out by one, or more likely several, construction companies, usually organized as separate and uncoordinated trades. The added value of the IHRS is to organize and rationalize their different interventions. Yet, the lack of qualified craftspeople to carry out low-energy renovations is often cited by frontrunners as one of the main obstacles to the implementation of their IHRS. Conversely, craftspeople often argue that the energy renovation market is not sufficient (or less attractive in tense markets) for them to invest in training their staff. They may even view the IHRS as a competitor rather than a partner and refuse to collaborate, for example by refusing to act as a subcontractor to the IHRS.

Worksite supervision/reception of the work

Worksite coordination and supervision are essential to avoid faulty work by contractors, which can lead to serious problems for the building (e.g. moisture due to thermal bridges or lack of ventilation) and can also have financial consequences if grant requirements are not met. For complex renovation projects, planning and coordinating the work of different craftspeople is also a challenge for which IHRS services are often appreciated.

Quality assurance, guarantees and follow-up

Given current market maturity, the risk of poor workmanship remains very high, especially when it comes to low-energy renovation. Homeowners' satisfaction on the results is essential to establish confidence in the services provided by an IHRS. This raises the question of what an IHRS can guarantee to homeowners, which can take two main forms:

The IHRS can provide a guarantee on the quality of the work performed (i.e. guarantee on the materials and methods used, also referred to as intrinsic energy performance guarantee), with a clear commitment to correct defaults that lead to lower energy performance than planned.

3.2. The concept of One-stop shops

3.2.1. The definition of One-stop shops

The classic renovation model, referred to as “atomized model” by Brown (2018) [29], requires the customer to make all major decisions, keep in touch with all suppliers and partners involved, invest a lot of time and take risks. The success of the renovation depends on the ability of the customer to act as a project manager/organizer in terms of technical, financial and time-management. But this customer is typically not educated in building renovation and project management, and thus runs a high risk of timing, financing and quality problems (Figure 15).

Offering “integrated solutions” enables the manufacturers, service providers, and new entrants to capture a market niche, where they meet the customers’ specific requirements ranging from individual packages to full service solutions. Construction and renovation provision with energy performance improvement is going through a transition, where complex, fragmented offers can be integrated into offers of higher value proposition, and through which a supplier can better position itself. In addition, other terms are used to refer to the same concept of “one-stop shop”.

“One-stop shops” aim to attract customers and clients by allowing them to save the time and energy they would otherwise spend going to different companies for different activities.

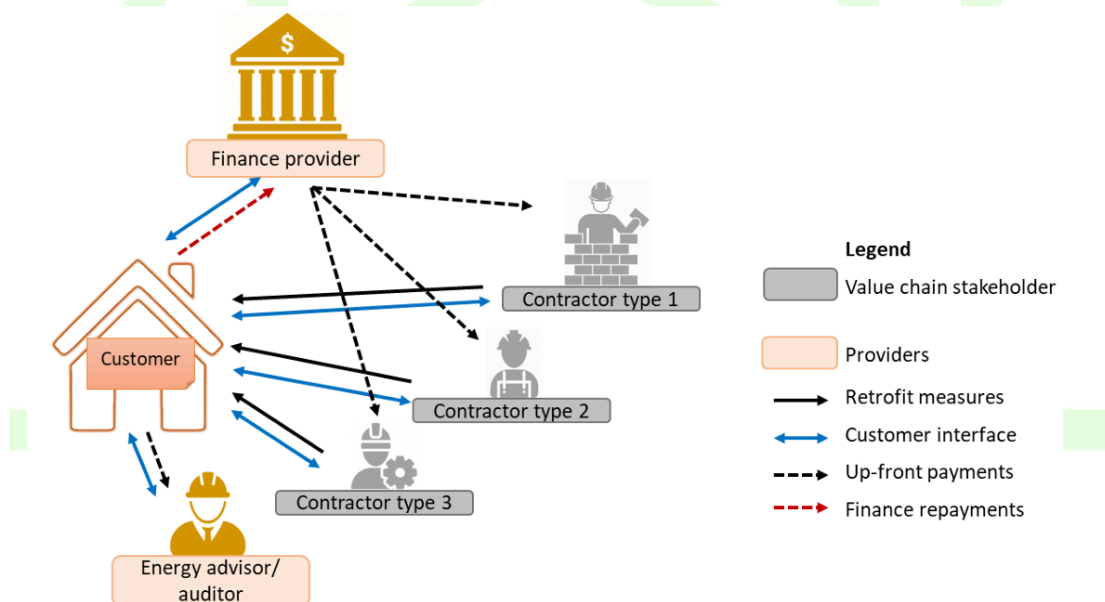


Figure 15. The atomized market model with financial provision Source: Brown (2018) [29]

As opposed to the “atomized model” (Figure15), in the one-stop shop model, the OSS stands in the middle of an energy renovation stakeholder map and subcontracts all other contractors, occasionally even the financial actor (Figure 16). The OSS practically represents and manages the whole (or large part) of the customer chain. The customer receives all information, all contract, all management from the OSS.

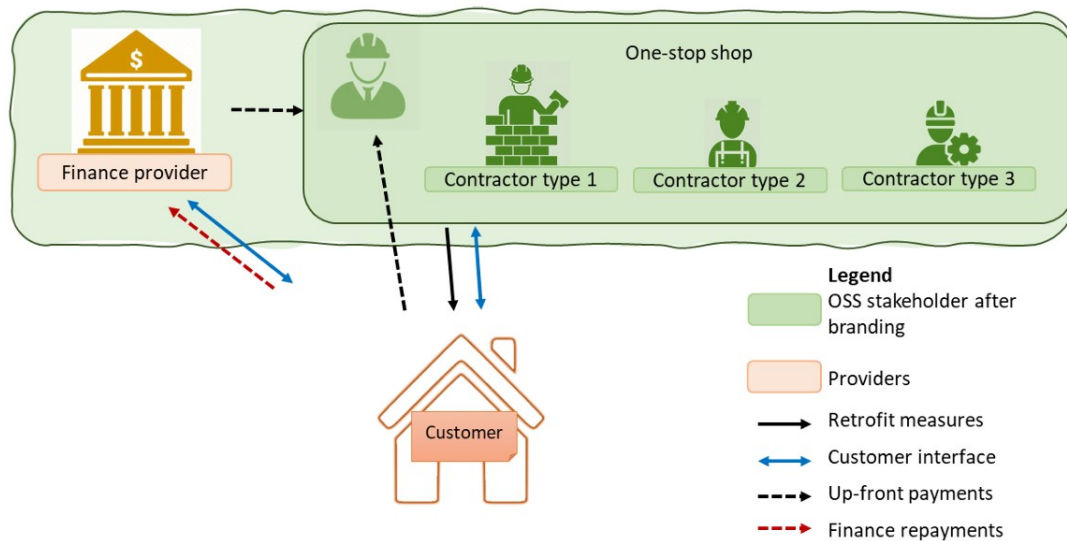


Figure 16. The One-stop shop model. Source: Brown (2018) [29]

3.2.2. The need for one-stop shops

The buildings sector, and in particular, existing dwellings are pivotal in meeting a number of the European headline targets (not only climate and energy targets, but also employment, poverty and social inclusion targets) [30], while they are not yet at the receiving end of many ambitious policies, although financial and soft measures have been used at EU and national level, whose impacts are to be further strengthened. Insite of the intrinsic advantages there are a large number of barriers that delay or even prevent a seemingly rational decision by the asset owners, as presented in Table 3.

Table 3 Key barriers in the existing buildings sector, valid both for the residential and public sectors

Barrier	Scope
Lack of knowledge	- Lack of information about energy performance - Lack of implementation capacity and relevant technical skills - Resistance to use advanced materials and methods
Regulatory framework	- No national commitments to EE renovation - Scarce number of policies that support of efficient use of energy - Sluggish internal procedures that do not support EE renovation of public buildings
Financial issues	- Lack of financing models that support renovation - Non favorable financial returns
Implementation inefficiency	- Fragmented construction trades, imposing many different professions to be involved in different stages - Split incentives as the investment decisions are usually made not by direct beneficiaries of the renovation

From a customer perspective, the “integrated solution” becomes a “one-stop-shop” (OSS) service in the buildings sector, when asset owners that would like to realize energy renovation of their buildings are aided in more than one/few steps in the process. An OSS service transforms a cumbersome and complex set of decision-making/actions by non-experts into a single entry, customer-friendly offer. The OSS concept means moving away from the classic set-up where asset owners face directly every entry

point of a complex renovation value chain with a number of interlocutors, and where the asset owner – who is a non-expert – has to find the best combination of the parts of a complex solution, to a situation where project promoters can benefit from a customer-centered service offer establishing a bridge between the fragmented supply side and the also fragmented demand side.

The OSS service providers for buildings are organizations, consortia, projects, and even independent experts or advisors that usually cover the whole or large part of the customer chain from information, technical assistance, structuring and provision of financial support, to the monitoring of savings. They are key to facilitate the implementation of locally-developed project pipelines and strong and trustworthy partnerships with local actors (e.g. SMEs, financial institutions, energy agencies). They also often develop partnerships with (local) banks.

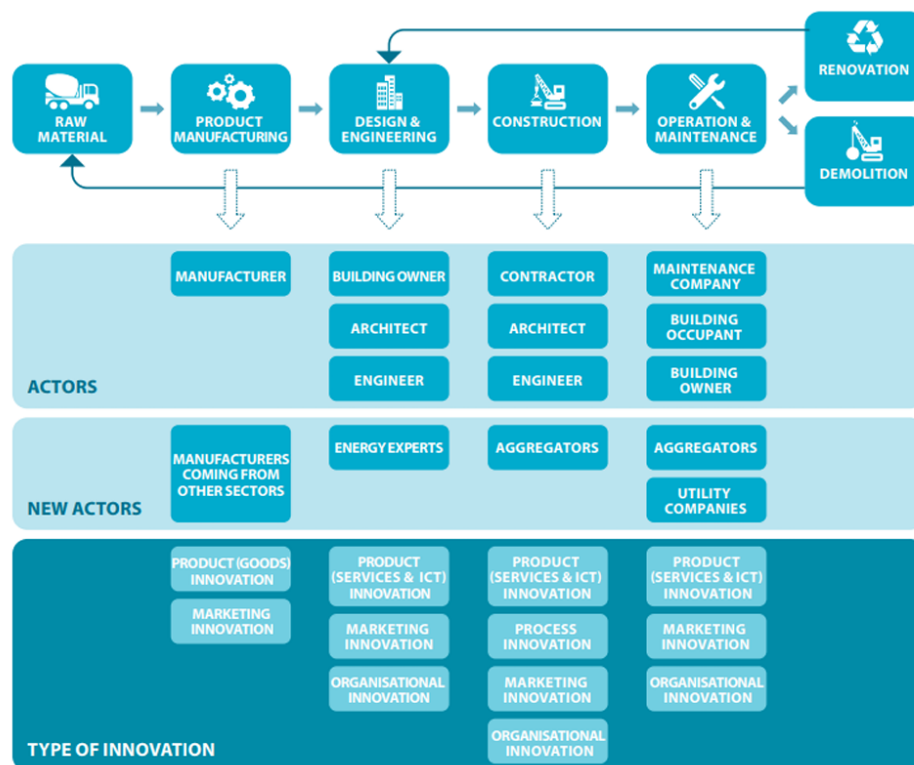


Figure 17. Mapping the building process, its actors and the potential innovation [32]

The concentrated services that bridge various steps in the value chain are more complex than traditional suppliers, however, the client or the energy user has to deal with only one or few suppliers, which makes the process more convenient, and ideally more trustful. There is a good place for “one-stop-shops” in almost any value chain related to energy efficiency. The Figure 17 shows the construction value chain, and the places where organizational innovations, i.e. new, combined offers by OSS could be placed.

With the growing popularity, comes a need for a more precise definition that can allow a clear diversification from similar business models and concepts. It can also then develop into quality assurance and clarity on what the business offers for clients. The following Figure 18 simplifies the place and role of the OSS among other actors.

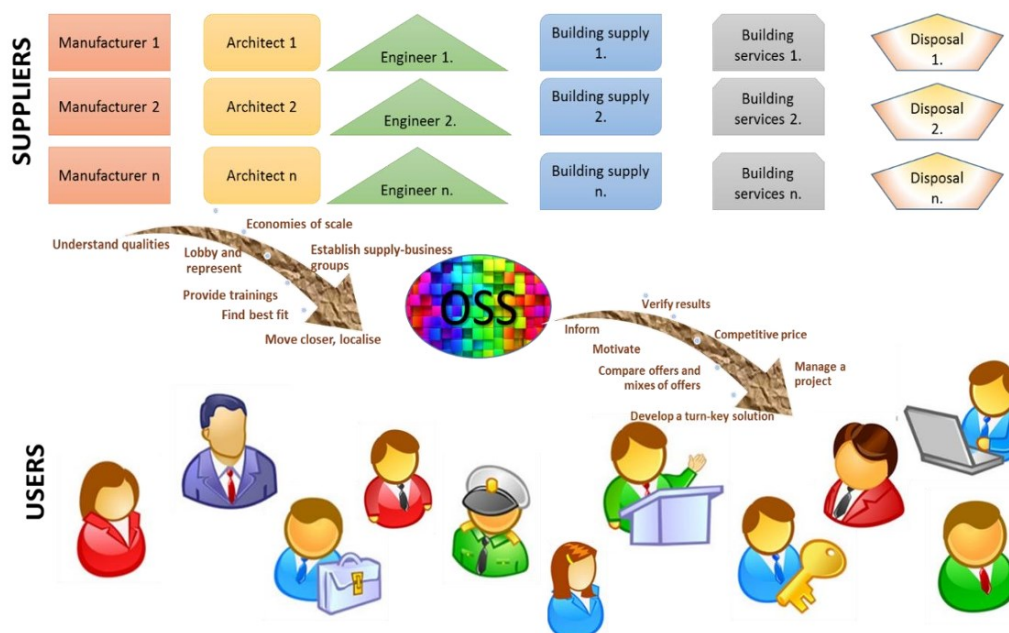


Figure 18. The intermediary role of OSS, and some of the benefits and advantages it can offer to both sides [32]

The role of an OSS is many-folded and varies depending on the specific example. In general, we can consider it as an intermediary point of contact (Figure 19) that translates the fragmented supply side, e.g. designers, suppliers, installers, financiers into one offer to the homeowners. On the other hand, the one-contact point is also valuable for the suppliers, who often find it difficult to manage the transactions towards their potential clients due to the varied requirements, lot of resources for awareness raising, extra visits and/or visits to customers who will finally not contract them, etc.

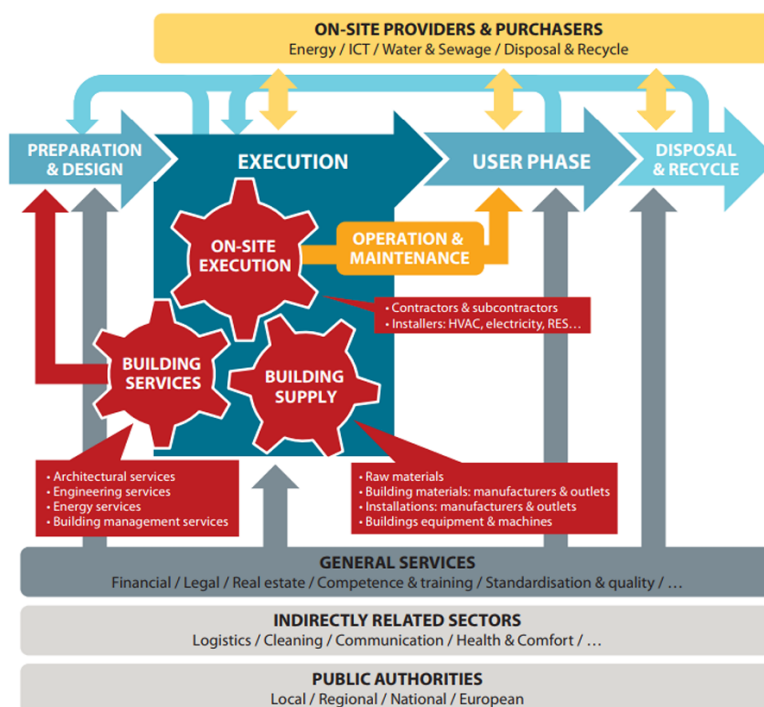


Figure 19. Interlinkages between stakeholders in an energy efficiency value chain. An OSS will combine several of these functions [32]

There have been similar services in the market (such as Energy Service Companies or ESCOs, facilitators, consultants), and it is important to distinguish them from the OSS, in order to ensure transparency in the market and avoid free-riders or false expectations from the clients.

3.2.3. Main OSS implementation models

There are number of choices which constitute qualitative leaps and tipping points between different models. Empirically three main models for OSS could be identified (Figure 20), although the boundaries between them may be porous:

- ◆ Advice model: the IHRS focuses mainly on the upstream parts of the customer journey, essentially information and first level advice, without getting into specific project details.
- ◆ Support model: the IHRS supports homeowners in the de tailed design of their energy renovation project. The IHRS makes a first qualitative leap by being fully engaged in market activities, taking position and incurring professional liability for the support provided. In concrete terms, the switch from the advice to the support model can be materialized by the existence of a service contract, for instance, but not only.
- ◆ Implementation model: the IHRS makes a second qualitative leap by not only providing detailed advice but also carrying out all or part of the renovation work. As a result, and without prejudice to the quality of the advice provided, the IHRS no longer works exclusively in the interest of the homeowner but also has an economic interest in delivering works.

In addition to the services included in these three positioning models, a third qualitative leap can be made by offering autonomous financing solutions.

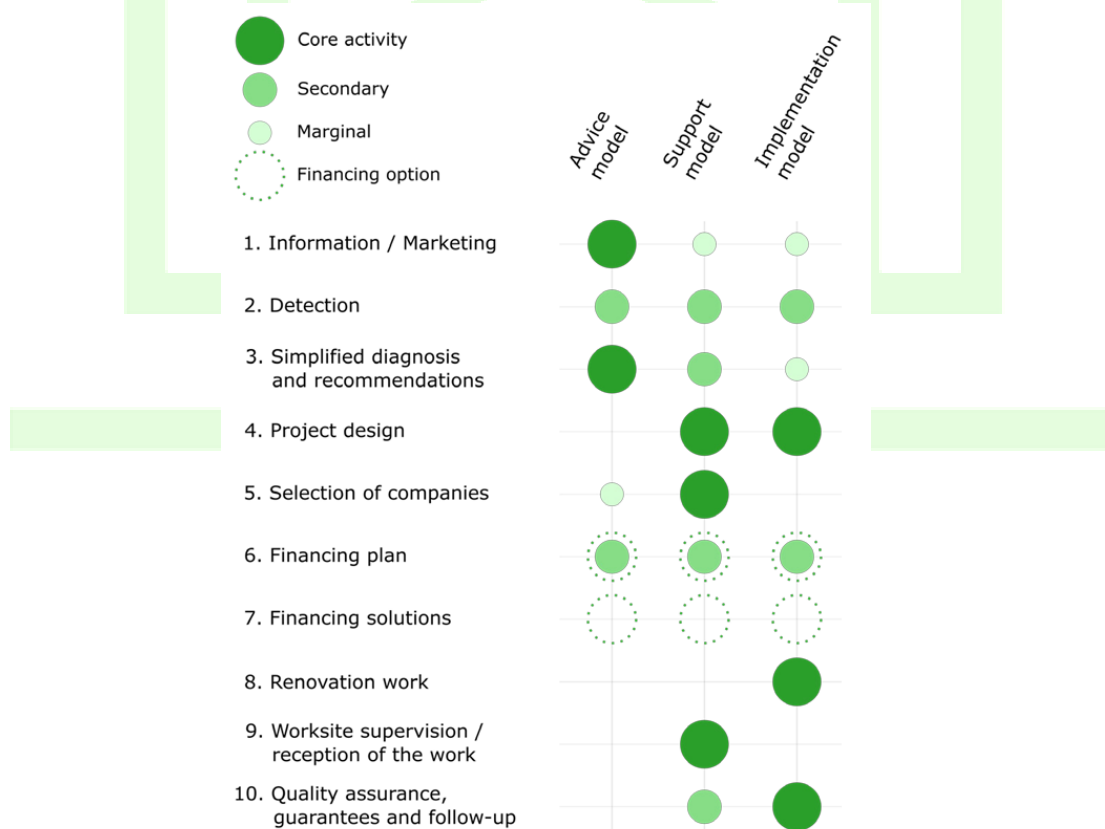


Figure 20. Main models of integrated home renovation services

Rather than a fourth model though, this is a (substantial) “option” that may be added on top of any of the three previous models (in particular the support and implementation models). It is important to understand that, while the distinction between the different models is easy to define in generic terms, the exact tipping point is much less clear when one gets into the details, especially when it comes to distinguishing between advice and support. The boundaries between models are open to interpretation and in case of litigation, a court may judge that the IHRS is liable, even in the absence of a contract or even though the contract does not mention any liability.

According to the latest study [29] from 2024, the distribution of the OSSs by models favors the “whole service model” i.e. implementation model, as presented on Figure 21.

EU EC OSS SERVICES BREAKDOWN

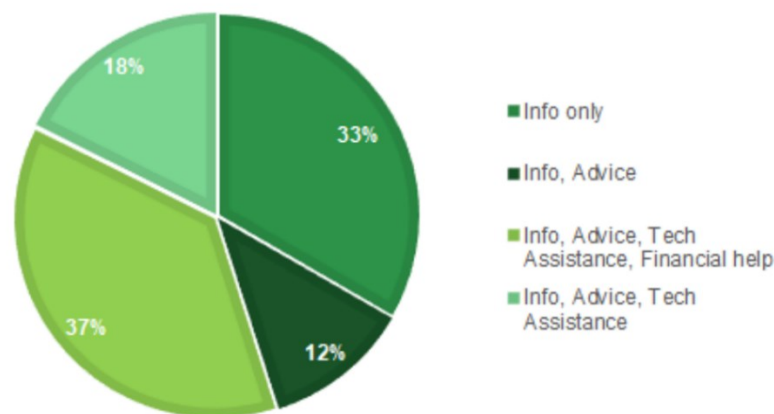


Figure 21. Most frequently used models of OSS in EU according to survey in [29]

3.2.4. Legal framework for establishing one-stop shops

Interest from the European Commission about the “one-stop-shop” (OSS) business concept for buildings has recently increased, and has become a critical element of the “Smart financing for smart buildings” initiative [30], whereas Member States are encouraged “to develop dedicated local or regional one-stop-shops for project developers, covering the whole customer journey from information, technical assistance, structuring and provision of financial support, to the monitoring of savings.

These facilities should lead to more locally-developed project pipelines and strong and trustworthy partnerships with local actors (e.g. SMEs, financial institutions, and energy agencies), the key being to connect the supply of finance with demand for it. One-stop-shops are transparent and accessible advisory tools from the client perspective and new, innovative business models from the supplier perspective.

One-stop-shops are also advocated by the Directive 2024/1275/EU on the energy performance of buildings (EPBD) and Directive 2012/27/EU on energy efficiency (EED). It calls for improved financing of buildings, and for one-stop-shops to be utilized as advisory and assistance tools for long-term renovation strategy, as part of which Member States are required to facilitate access to mechanisms, such as one-stop-shops, which are considered as advisory tools here to inform and assist consumers in relation to energy efficiency renovations and financing instruments. The revised EPBD dedicates the whole Article 18, to define the one-stop shops: “Member States shall provide the information through accessible and transparent advisory tools such as renovation advice and one-stop-shops. One-stop shops should provide technical assistance and be easily available to all those involved in building

renovations, including homeowners and administrative, financial and economic actors, such as SMEs, including microenterprises.”

OSS services are effective because the OSS:

- is local;
- accelerates building refurbishments by informing, motivating, as well as by assisting building owners to follow through energy efficiency investments, by standing beside them from the start to the end;
- can facilitate interested, but not yet committed energy users/asset owners to actually implement an energy saving or other type of sustainable project;
- can ease access to financing and occasionally offer better rates;
- can be one of the tools to increase the renovation rate,
- can also improve the average renovation depth in terms of energy performance, because an OSS walks through the full renovation route.

3.3. Types of One-stop shops

The set-up of the collaboration in a renovation project managed by an OSS is more complex than a regular refurbishment project at first sight. These renovation services can be carried out by the OSS itself, or by suppliers that are subcontracted by the OSS. An OSS renovation supply chain consists of – at least: one or a bundle of customers, one or several contractors and the one-stop shop.

3.3.1. OSS types according to the business model

Naturally the one-stop shop is the key player in the OSS-based renovation value chain. The configuration of the OSS has been found to belong to six main categories as summarized in Table 4. While all one-stop shops aim at building renovation and improving the energy performance of buildings by helping the building owners to go through the refurbishment process, the types listed have different operational structures and business models.

Table 4 The six key types of OSS identified [35]

Government driven (local or regional) OSS	Industry driven OSS	ESCO based OSS	Facilitator OSS	Cooperative type OSS	Store OSS
Their programs are mostly driven by climate energy considerations, sometimes by social targets.	Manufacturers or installers that aim to extend their businesses or improve customer care.	Building on their complex offerings, they extend and reclassify their value-added solution-parts.	Consultants develop that their original customer related businesses e.g. by extending the type of services in order to reach more customers	Aims mostly at the societal benefits, not necessarily focused only at energy savings/cost savings	A large store or a warehouse, where the shoppers can get with acquainted with the technologies and products, and have a personal contact option to ask for tailored advice and further assistance at the spot.

Some OSS belong to more than one category because

- a) their structure or ownership has changed in the meanwhile,
- b) they work as a consortium,
- c) they provide various services.

The review of the existing 63 OSS reported by Boza-Kiss, Bertoldi and Della Valle in 2021 [36] state that when considering the main functionality and main owner, 56 OSS could be identified (for 7 OSS it was not possible to determine): 22 of the identified OSS are government driven, 18 are run by consultants or other private small organizations, 9 of them are subsidiaries of industrial actors, and 2 of them work as shops that have an OSS section.

3.3.2. OSS types according to the clients

On the demand side of the value chain, the customers are typically owners of residential buildings, typically built before 2000 or even 1990. Almost 80% of the OSS included in the report [36], target single domestic buildings. Six of these OSS are solely targeting single houses. Seventeen of 25 OSS renovate multi-apartment buildings, and therefore, their customers are the homeowner associations or their representatives. Three OSS in our sample work specifically with property managers and condominium managers, this way they succeed in renovation works in multiapartment buildings.

The social aspects are captured by a number of OSS where four of the identified OSS work with social housing, although none of them deal with these exclusively. In social housing refurbishment, the OSS supply their offer to the owners of these buildings in collaboration with the tenants. It is typical that these offers are fast paced, industrialized in order to reduce disturbance, while not driven purely by the cost-benefit value of the renovation, and thus able to carry out deeper renovations. It is rare, but existent that OSS target specifically public buildings. It is more common that the OSS that have a focus on residential clients can also work with mixed-used buildings, and as a spin-off also with public buildings.

3.3.3. OSS types by contractors

Most of the OSS do not implement the renovation works themselves, but coordinate contractors that visit the households and implement the measures. OSS provides the contractors with the harmonized tools (e.g. digital platform), a training and company profile. The OSS also supports the craftsmen with customer care, and therefore any communication, complaint or further work request are handled by the OSS. The contractors can work with the OSS in the following ways:

- subcontracted by the OSS (being a public organization, a local-government subsidiary or an industry driven organization) to provide the services agreed with the client;
- a joint venture is set-up with the retailers (materials and product manufacturers / suppliers), so that the contractors become part of the one-stop-shop as a joint consortium. This joint venture helps the industrial partner to provide complementary products or services to their normal products.

The construction industry these days has moved away from the conventional competition and contract models towards working in partnerships. These partnerships have a potential to overcome traditional price driven competition towards a more collaborative working environment and a value-driven competition.

3.3.4. OSS according to price of the services

The one-stop shop offer includes more than a simple renovation project, and it is reasonable to expect that the service has a price tag. From 63 reviewed OSSs in [36] the information from 23 OSSs related to the prices that they work with was collected. Three main business models have been differentiated:

- There are providers that offer their services for free, and the homeowners do not have to pay for the information and/or the organizational provision by the OSS.
 - There are OSSs that are operated by a municipality as a municipal service.
 - Some OSS offer service also free because industry partners have established the OSS to provide community service to potential customers, who then often purchase their products.
 - There are also OSS that offer their services for free, either because they are testing the service, or have other revenue sources specifically for offering the service. However, they consider running the OSS services with a price in the future.
- Under another business model, the OSS sets a fee for the specific service, which typically includes general and tailored advice, feasibility study, selecting contractors, technical assistance during the project, and monitoring the technical implementation and savings. These value offers may not all be included; however, the price can be clearly matched with the content. In these cases, the implementation costs are clearly separated from the OSS service costs, and probably depends on the content of the renovation and the contractors chosen.
 - Prices can be set as a fix price, and range across large varieties depending on the country (and thus the customers' financial possibilities), and the cost structure of the OSS.
 - A number of OSS link their prices to the overall project volume.
 - Several of the OSS offer various plans, depending on the requirements of the customer.
- There are OSS that bundle their offer to another service and consider the OSS service as free, while paying for other services. For example, the OSS will not charge the homeowners, but the contractor will pay a fee per project for basic services.

3.4. Increasing the impact of OSS service

The business case of one-stop shops for energy renovation of residential buildings has been described in the previous chapters. It is based on the offerings of technical, organizational and financial elements that make the complex energy renovation easier and swifter. The OSS engage with a number of technical, organizational or financial innovative solutions that package effectively with the whole-supply chain idea. These include working with standard technical elements, such as prefabricated building parts, or hinging on a certain life-event or another renovation goal of the tenants and owners, and they use a number of innovative financial solutions.

3.4.1. Partnership with other refurbishment companies

Home-owners and tenants are most likely to renovate the homes and buildings during a transaction, such as purchase or rent. It is most common to upgrade the kitchen and the bathroom, but often the

façade is also renovated. These renovations largely cover structural and/or aesthetic changes. However, an energy performance improvement can be more easily added at these points than as a separate element.

The transaction events are not easily captured by the traditional construction sector. Yet, several OSS have established collaborations with real estate agents, who can connect them to the newly contracted homeowners or new tenants that are in the right phase for renovations.

3.4.2. Packaging of interventions or step-by-step approach

Certain OSS recommend three basic packages that include a different set of renovation measures. A list of measures that can be grouped because of easy complementarity, price and timing is separated from the other list and the tenant can choose from them. In another variation, “the Step-by-Step renovation” consists in the replacement of different building components (such as windows, plasterwork, roof covering, boiler etc.) closer to the end of their lifetime, thus encourages the building owners/tenants to implement only fewer but more economical measures at one time, and upgrade the works later in a next step.

3.4.3. Pre-fabricated technical elements

Prefabrication of buildings, building parts and renovation elements has around 100-year long history. The use of pre-constructed elements and parts led to standardized quality and an increase in the effectiveness of the construction process. Recently, search for innovative ways to minimize construction/refurbishment costs and tenant disturbances at the same time led to the reinvention of similar, but multifunctional prefabricated elements. Additional benefits include reduced operating costs and environmental impact of buildings, while also increasing functionality if these renovations lead to low energy buildings.

The Energiesprong retrofit scheme applied by a number of OSSs across Europe (and in the US) results in net zero energy renovations. The renovated houses generate the total amount of energy required for their heating, hot water and electrical appliances, and provide significantly improved indoor comfort. This can be achieved by using new technologies, such as prefabricated facades, insulated rooftops with solar panels, smart heating, and ventilation and cooling installations.

3.4.4. Pooling of buildings

In order to achieve economies of scale, OSS sometimes bundle several renovation projects together. This can reduce the prices of materials and works, as well as the costs of financing, if needed. This approach is mostly beneficial for relatively small-scale interventions, not deep renovation.

Alternatively, standardized measures can be applied to a series of very similar buildings. The multi-disciplinary team of complementary actors is set-up, consisting of partners with complementary competences, such as architects and designers, constructors, energy-efficiency experts, market and financial experts, technology suppliers, strategy and operations planners. Starting from the initial design phase, the team works together, in strict collaboration with the building owner, in order to select the optimal renovation measures to adopt, planning the whole renovation project according to customers' needs. The cross-fertilization of gathering different actors together in an early phase of the renovation project permits to define a holistic approach to the renovation intervention. In this way sustainable and energy efficient retrofitting solutions can be deployed, with an optimal control over the total costs of the renovation project and guaranteed efficiency performances.

3.4.5. Digitalization

Many of the OSS use digital tools at various stages of their value chain. The online tool helps the homeowners identify their own aims, the level of intervention they can afford, and the tool guides them to optimize the choices. The ICT tool processes the information gathered and suggests an optimized approach to the renovation project.

The contractors also use digital tools to assess, record and track, and finally monitor the measures to be done. The main advantage of digital tools is the possibility to harmonize the renovation works and effectively manage the whole process. The quality of the initial information is highly important. In addition, a solid understanding of users' behavior and willingness to commit to energy savings is essential. The online/digital tool supports the designer/contractor to map the main project objectives and to suggest an optimized plan of renovation.

This key player needs to be adequately trained and be devoted to the OSS in order to harmonize the project. The digital tools can also help increase awareness and knowledge of interested, but not yet committed building owners. Furthermore, digitally supported OSS renovation has a smooth linkage with financial services. The banks or other financial providers that can better access the information, will have the approval of the project and calculations directly from the OSS or the contractor, which can serve as a guarantee for the project success and help the granting process easier and more reliable from both the bank and the client perspective.

3.4.6. Financial instruments

One-stop shops integrate some level of financial evaluation and solution into their offer. As described before, OSS provide financing directly integrated into their value offer or mediate the access to various financing options. In the latter case, the existence and partnership with alternative financial schemes is critical for the smooth implementation of a project.

- **Energy Performance Contracting (EnPC)** – This model is particularly prevalent in OSS services that started off as Energy Savings Companies (ESCOs). It enables the homeowner to cover the costs of the renovation services via the energy cost savings. These repayments can be either shared savings, in which the contractor takes a percentage of the savings over a period of time, first out, in which the contractor recoups all savings until they are paid off, or guaranteed savings, whereby the beneficiary covers the upfront costs, but the ESCO must meet a minimum performance level, and may have to pay the difference if performance falls short.
- **Referred bank loans** – The OSS, partnering with a bank, may issue advice on the most suitable financial product for its needs, and help them to complete application forms. The regional or local authority may not use any of its own funds in the actual set-up of the financial products offered by the institutions (unlike the approach below), but instead involve some training for, and active engagement with, local financial institutions.
- **Financial instruments & investment funds** – There are a number of municipal-based OSS that established their own revolving funds and created financial instruments to offer loans to households at favorable rates. These can be established using public funds, direct borrowing through General Obligation Bonds, or using European Structural and Investment Funds (ESIFs). European funding can be used to create guarantee funds for local banks to encourage them to invest.
- **Property Assessed Clean Energy (PACE)** – A local government issues bonds for renovation projects, with the homeowner repaying via increases in the property tax bill.

3.4.7. Energy Efficiency Certificates

Tools that inform home owners, raise their awareness or otherwise motivate them to engage in a refurbishment, in particular in an energy renovation form a crucial part of an OSS-driven refurbishment. OSS have no capacity to topple awareness or opinion, and their offers are typically taken-up by already informed citizens and organizations. Therefore, Energy Performance Certificates or other labels, audits, evaluation, smart meters expand the population size that can be targeted by OSS [37].

4. Good practice examples

4.1. OSS EU map

Since their first appearance on the market One-stop shops have shown different resilience to the market competitiveness and the challenges to sustain. There are several surveys done to map the currently existing OSS, and in each of the cases there are some differences according to the geographical coverage and the period when the survey was conducted. One of the most frequently referenced and most up-to-date European map of OSS is the one presented on Figure 22 [38].

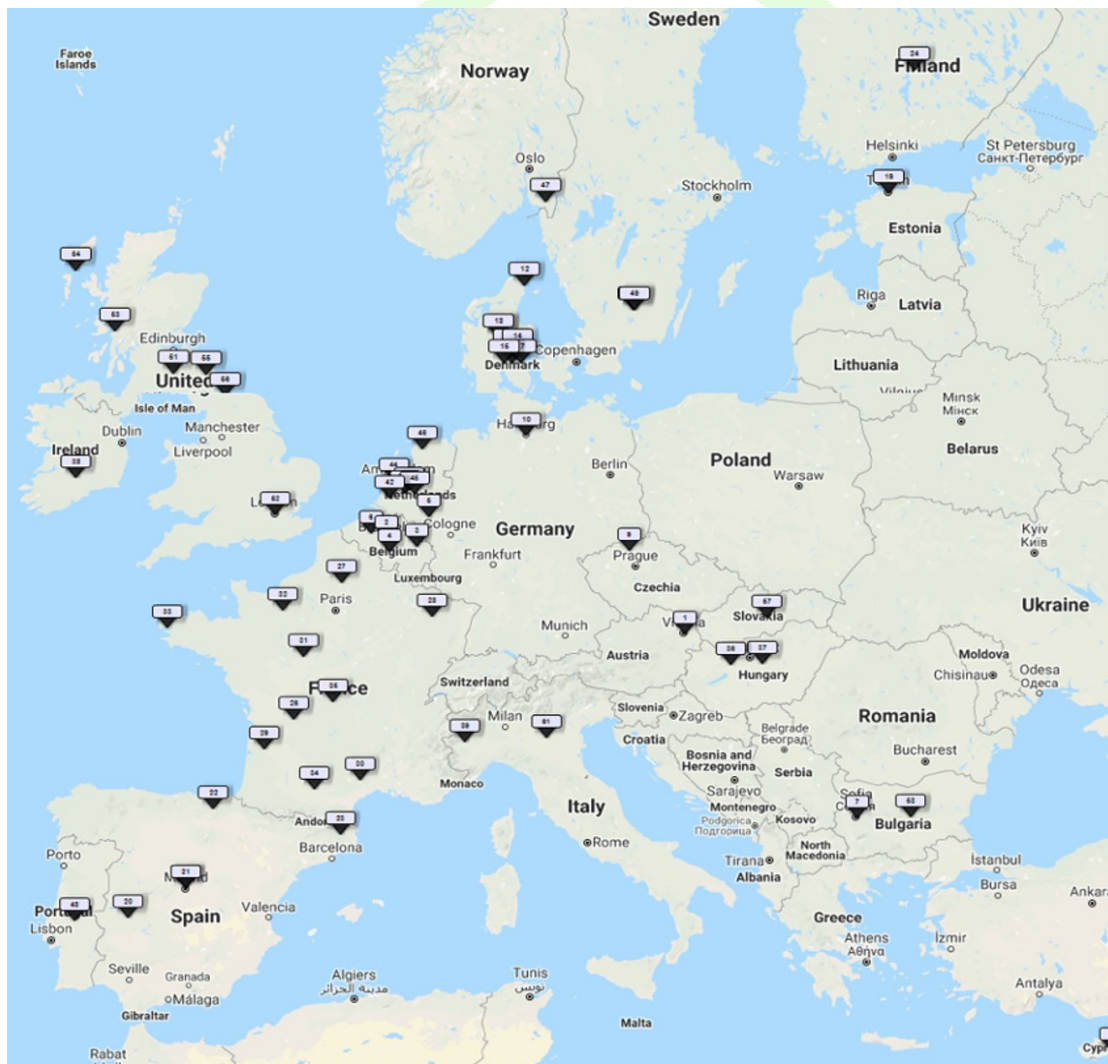


Figure 22. European OSS map [38]

This map of EU OSS represents 63 OSS in 22 EU MS, which represents ¼ of the whole market. These OSS have experienced expansion in the last decade, providing an average number 10-500 projects per year/OSS.

4.2. Overview of selected EU projects that support OSS

There are many examples of the projects, especially recently initiated in the frame of the LIFE program that are targeting the OSS, their methodology, models and developing different financial models to support OSS services. Some of them are listed below.

4.2.1. Project example INNOVATE

The project addresses the specific barriers on the homeowners' side to energy refurbishment in the residential sector. The project offered different solutions depending on where the homeowners stand in the decision-making process. For some, it is not obvious why saving energy is important, and they are not aware of the multiple benefits of energy refurbishments. Others are aware, but do not know what measures they should take, how to finance these, whom to contact and how to start. Still others have problems with renovation costs.

Title	Integrated solutionS for ambitiOus energy refurbishment of priVATE housing (INNOVATE project)
Geographical coverage	11 target territories in 10 EU Member States (NL, DK, BE, LV, CZ, CY, SE, IT, ES and UK)
Time frame	2017-2020
Key outputs	1) pre-set, attractive renovation packages that homeowners can select from and which can be tailored, and 2) the set-up of business solutions, among them OSSs.
Contribution to OSS concept	• The concept and actual creation of renovation packages • Establishment of OSS in some of the partner countries • The project aims to promote deep renovation
Target sector	Private building sector (single-family houses and condominiums)
Info page	http://www.financingbuildingrenovation.eu/cases/parity-projects/

4.2.2. Project example Refurb

The project is designed on the understanding that homeowners should be assisted in several steps to achieve a nearly-zero energy renovation. They should find information in one place, which is an online tool in the REFURB project. This will help them overcome the lack of understanding of the multi-benefits of refurbishments, and the fragmented offers by suppliers, as well as the alternative financing options.

Title	REFURB (REgional process innovations FOR Building renovation packages opening markets to zero energy renovations)
Geographical coverage	Denmark, Belgium, the Netherlands, Estonia, Slovenia, Germany
Time frame	2015-2018

Key outputs	An online tool that helps the user define how to obtain a nearly-zero energy standard renovation, with 50-80 % energy reduction, by a step-by-step approach and a methodology or roadmap for the homeowners. Dedicated renovation packages for different market segments and regions in Europe. The packages also provide information about different possibilities for financing.
Contribution to OSS concept	• Dedicated renovation packages. • Online tool for evaluating the renovation need, and a roadmap for obtaining a nearly-zero energy improvement, and financing. • Conceptual analysis of supply and demand side of the OSS.
Target sector	Private residential sector
Info page	http://go-refurb.eu/

4.2.3. Project example COHERENO

The COHERENO project is based on the need to eliminate barriers for collaboration by the renovation supply organizations, providing enterprises with guidance on how to collaborate and on developing services for the different customer segments.

Title	Collaboration for Housing nearly zero-energy renovation (COHERENO)
Geographical coverage	Belgium, Austria, Norway, Germany, the Netherlands
Time frame	2013-2016
Key outputs	Nationally recognized public lists of actors in NZEB single-family house renovations; The enabling of motivated supply actors to launch integrated services of NZEB renovation of single-family houses and the establishing of 24 new business collaborative models
Contribution to OSS concept	• Tools to increase trust and confidence (list of actors, quality assurance system recommendations); • New business models for collaboration and integrated services in the lines of OSS (no details available).
Target sector	Single-family owner-occupied houses
Info page	www.cohereno.eu/about.html

4.2.4. Project example Europa

The EUROPA Project gives the opportunity to seek new tools and different strategies to address one of the most complex targets for deep renovation, which is the condominium building. It aims to enhance the approach, to develop innovation and to create an effective network dealing with dwellings' renovation massification.

Title	EUROPA - Renovation simpler, better, together
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Geographical coverage	France, Germany, Italy, Latvia and Portugal
Time frame	2020-2023
Key outputs	EUROPA's OSS approach contains both a virtual and a physical place, where you can find all information and services needed to implement a deep renovation project. Therefore, it covers the following services: Matchmaking service: To match the end users with the right service providers involved in the renovation process and suitable financial support schemes. Energy renovation financial planning: To offer tailor-made financing plans to help stakeholders reach deep renovation through energy as a service. Administrative support: To help to overcome bureaucratic burdens.
Contribution to OSS concept	• The Energy Efficiency Subscription (EES) which sets standards and requirements for the deep energy renovation of residential buildings to improve the energy performance of renovated buildings while ensuring high quality of the renovation interventions in the five regions involved. Developed EES simulation tool • Mentoring program with online training materials
Target sector	House owners and residents of multifamily buildings, property managers, condominium co-owners, market Operators, financial Institutions
Info page	http://europaonestop.eu/

4.2.5. Project example COOP

The “One Stop Renovation Co-op” LIFE Project (OSR-Coop Project) is dedicated to advancing cooperative One-Stop Shop (OSS) building renovation services. Its mission is to map out, analyse, transform, and integrate existing services provided by partner cooperatives, ultimately offering efficient and holistic solutions and services.

The OSR Coop project seeks to revolutionize home renovations through improvements to the renovation One Stop Shop (OSS) concept, emphasizing citizen engagement, environmental impact reduction, and affordability.

Title	OSR - One Stop Renovation Co-op
Geographical coverage	Normandy in France, Belgium, Portugal, Ireland and UK
Time frame	2022-2025
Key outputs	The OSR-Coop project is developing One Stop Shops renovation services that strengthen the citizen-led renovation movement. The cooperative advantage is highlighted, showcasing how citizen-led renovation brings broader economic, social, and environmental benefits to a local area. The approach of the project is focused on

	categorizing services, identifying common elements, and typifying service archetypes. Based on the work done and the challenges from our case studies policy recommendations were driven.
Contribution to OSS concept	- The project's primary focus is on deep household renovation, and the end goal is to develop and pilot various one-stop shop archetypes. These models will be readily available for replication throughout the project duration. - To ensure widespread adoption, the project will create an easily accessible replication toolkit and conduct training modules that will be disseminated across Europe. This initiative aims to empower citizen energy cooperatives and communities, enabling them to learn from the OSR-Coop Project and effectively implement the developed models.
Target sector	Citizens communities, authorities
Info page	https://osr-coop.rescoop.eu/

4.3. Overview of selected OSS case studies

In the following section an overview of some successful examples of the established functional OSS will be given. The data presented in this overview are adopted from several sources where a comprehensive analysis of the existing OSS throughout Europe is presented [35-38].

The following list presents the OSS that are business driven, meaning established as service provider of the integrated home renovation services. The overview is aiming to present the success stories in order to follow the positive experience as good practice examples.

4.3.1. OSS example Energies POSIT'IF

The OSS was initiated in the far 2013, as one of the first successful OSS examples, that is still operational. Due to the fact that both the depth and the rate of energy renovation was found to be inadequate to achieve the 38% energy consumption reduction target by 2020 set by Région Ile de France. The available direct public funding of projects was not considered enough to contribute to the target, therefore new, alternative financial schemes were considered in addition.

Title	Energies POSIT'IF
Geographical coverage	Ile de France Region in France
Time frame	2013-2016
Service content	The OSS offers two operational business models. In the first option, the condominiums collaborate with it on developing the plan and potentially in arranging financing, however, the actual implementation remains in the hands of the condominium. Alternatively, the OSS develops the financing and implementation/operation plan. It provides third-party financing (loan directly from the OSS or a bank loan) and can assist in the accession of other funds/grants. It also acts as an intermediary between the owners and the technical partners. The condominiums are in direct contact only with the OSS, and pay a monthly fee for the project and the service. The fee takes into account

	the energy savings; however, it may still be higher due to the selected payment period and/or renovation measures that did not generate energy savings.
Implemented measures	• Deep renovation of residential multifamily buildings and social housing Social responsibility • Renewable energy heating and green electricity production
Target clients	Condominiums (homeowners' associations, social housing companies)
Costs of the OSS	€2,061,018 total budget for the project The starting capital of €5.32 million of the ESCO is shared by the Regional Council and Local authorities (85%) and Private partners (2 financial institutions) (15%)
Info page	http://www.energiespositif.fr/

4.3.2. OSS example Rhodoshop Program Development Unit (PDU)

Rhodoshop project: a pilot program to facilitate investment in energy efficiency by creation of One-Stop-Shop in Rhodope Region of Bulgaria.

Title	Rhodoshop Programme Development Unit (PDU)
Geographical coverage	Sofia, Bulgaria
Time frame	2017-2020
Service content	The OSS acts as a central procurement agency on behalf of local authorities to undertake energy retrofitting works in their buildings and street lighting systems. Rhodoshop PDU combine/bundle suitable projects in the subscribed municipalities in order to gain critical mass and get better financing terms.
Implemented measures	• Building renovation • Green procurement
Target clients	Local public authorities, other stakeholders in small sized rural municipalities
Costs of the OSS	€ 470,550 total budget for the project
Info page	http://cordis.europa.eu/project/rcn/210315_en.html

4.3.3. OSS example Retrofit Works

Based on the concerns that SMEs had not enough capacity to participate in the Green Deal policy (whereby consumers can pay for energy saving works using a loan attached to the electricity meter and repaid using the savings generated), local SMEs decided to cooperate and create a delivery scheme that could bring them on the market and benefit the consumers, too.

Title	Retrofit Works
Geographical coverage	London
Time frame	2013-

Service content	The OSS acts as an intermediary between SME suppliers and customers. In effect the OSS does not participate in the implementation, but in the preparatory and follow-up works. The service is the following: - Householders are assessed, 3 quotes are generated from the energy survey from local SME companies via the online tool; - All installer Practitioner members are quality vetted, and referenced; - A grant scheme assessment is made for householder circumstances.
Implemented measures	NA
Target clients	Homeowners
Costs of the OSS	Profits are returned to the cooperative membership – either directly, or as the members deem fit. For example, assisting in the provision of discounted training programs and certification schemes or funding capital works for fuel poor households.
Info page	http://retrofitworks.co.uk/

4.3.4. OSS example Reimarkt

Based on the concerns that SMEs had not enough capacity to participate in the Green Deal policy (whereby consumers can pay for energy saving works using a loan attached to the electricity meter and repaid using the savings generated), local SMEs decided to cooperate and create a delivery scheme that could bring them on the market and benefit the consumers, too.

Title	Reimarkt
Geographical coverage	Municipality level in the Netherlands
Time frame	2014-
Service content	The OSS is labelled as a convenient shop for sustainable living. Tenants and homeowners are offered turnkey solutions to extend their home, ameliorate comfort, or improve the looks of their home while improving energy performance. The solutions come with a guarantee on price, comfort level and energy reduction. Projects are funded through the rent, own funds, or by taking out a loan. The OSS is aware and is able to offer alternative financing options. The OSS bundles the offers of small, local supplier, thus markets their offers and matches them with the retrofit needs. These suppliers have no capacity and knowledge to widely disseminate their products, therefor Reimarkt helps in actually selling their products, contribute to product development, customer care and takes on marketing.

	The OSS does not act as energy advisors, but build on users' requirements with standardized building blocks, yet tailored full solutions.
Implemented measures	Energy efficient retrofits piggybacking on other retrofits
Target clients	Owners and tenants of private housing
Costs of the OSS	NA
Info page	http://reimarkt.nl/

4.3.5. OSS example Bolig Enøk

An industry-driven structure. Its information was analyzed under the Success Families project, whose objective was to speed up the implementation of sustainable renovation of single-family houses.

Title	Bolig Enøk
Geographical coverage	Østfold, Akershus and south east of Oslo (Norway)
Time frame	2011-
Service content	Homeowners employ a "Project Manager", who provides technical analysis, recommendations and project management of the full renovation process. The Project Manager takes care of contacts with all involved actors such as main contractor, subcontractors, authorities as well as assisting in applying for relevant grants. The homeowner is invoiced for the complete project by Bolig Enøk, which thereby takes on the risk towards the customer.
Implemented measures	The technical solutions offered were energy-efficient windows and doors, heat pumps, internal extra insulation or new insulation, and demand-based ventilation with a heat recovery.
Target clients	Owners of single-family houses from 60-80's in selected areas in the region of Østfold, Akershus and south east of Oslo, who are creditworthy to increase their mortgage loan.
Costs of the OSS	NA
Info page	https://boligenok.no/

4.3.6. OSS example BetterHome

Uncertainty is one of the reasons why the renovation rate continues to linger around 1% and private investments remain limited. A more service-oriented supply-side together with a deeper awareness on the demand-side may be able to change the play.

Title	BetterHome
Geographical coverage	Frederiksberg, Denmark
Time frame	2014-

Service content	A burden-free renovation process, focused on lowering the energy consumption and improving indoor climate at the same time. In order to inspire homeowners, the OSS offers 3 inspirational packages (Energy Package, Comfort Package and Modernization Package). The homeowner uses an online tool to enter details about their homes and energy consumption, and receive a report and recommendations on renovation measures and offers from local suppliers. The local representative comes to the home to discuss the details and fix the offer. After this is accepted, the local craftsmen carry out the implementation, who are also enabled by training to ensure BetterHome standard, and can use the digital platforms to structure the works. On the financing side, the customer discusses the renovation project with his/her usual bank, and the bank can use the BetterHome tool to refer to the details. The associated banks trust the BetterHome quality and financial characteristics.
Implemented measures	Mainly deep renovation projects, with investments of ~ €70 000 and energy savings of approximately 30-70%.
Target clients	Mainly single-family houses constructed between 1950 and 1990
Costs of the OSS	After starting in 2014, it became profitable after 3 years. Indirect turnover was ~ €13 million in 2017
Info page	http://www.betterhome.today/

4.3.7. OSS example Oktave

Private houses in France account for 25% of the total national greenhouse gas emissions. In this context, the required rate of energy renovation of the existing building stock is approximately 19,000 homes/year by 2050, including 10,000 single-family homes/year. The launch of the below organization, Oktave, is part of these efforts to achieve the objectives.

Title	Oktave
Geographical coverage	Main office in Strasbourg, and 11 other places in the Region (collaborates with 9 local refurbishment platforms set up by local authorities) (local)
Time frame	2017-
Service content	Oktave offers a holistic service combining technical support and financing of projects. For the moment, Oktave works in collaboration with the Alsace Province. It will build partnerships with the local authorities and the local actors, which will be able to be its relays at the spot. Oktave advisers provide personalized support on technical, financial and administrative aspects of the renovation project and are the primary and only contact point for the renovation project. In this

	journey, Oktave connects homeowners with qualified and referenced professionals. Oktave also helps to set up the financing plan for the works, which can combine grants, tax rebates, and commercial loans. In this context support includes connection with banks for loans, which can be (at the moment) zero-interest loans, or with third parties/ESCOs in order to repay the loan from the energy cost savings. For the craftsmen, Oktave offers trainings.
Implemented measures	NA
Target clients	Homeowners, at present limited to single family homes
Costs of the OSS	€ 1.5 million starting grant from the Greater East Region of France (which is representing 50% of the capital of the company).
Info page	https://www.oktave.fr/oktave/qui-est-oktave

4.3.8. OSS example Energy Savers

By 2007, condominium conversion in Chicago had supplanted energy cost-driven abandonment as the primary means of erosion: over 50,000 Chicago area homes were in foreclosure in 2007, a 50% increase from 2006.

It was then seen by the Preservation Compact and the Center for Neighborhood Technology (CNT) that improving the physical conditions of existing housing stock through retrofits, energy efficiency programs were the way to overcome the above trends, and redevelop a demand for multifamily affordable housing. As part of these efforts, the Energy Savers Program was created and implemented.

Title	Energy Savers
Geographical coverage	Chicago
Time frame	2008-
Service content	The program fit into a more general system of programs that aimed at the saving of potentially abandoned apartments/buildings by improving their state and energy performance, thus controlling the tenancy costs. The program offered homeowners help in: - Identifying opportunities in their buildings for energy savings; - Connecting owners to financing options and rebates; - Recommending trusted contractors to do the work; - Overseeing the retrofitting process; - Reporting on the energy savings after upgrades. The program uses predefined retrofitting packages, which are then tailored to the specific buildings.
Implemented measures	Only highly cost-effective measures, no information about the exact measures.
Target clients	Homeowners, at present limited to single family homes
Costs of the OSS	NA

Info page	https://rpssc.energy.gov/sites/default/files/reports/c-705_EnergySavers.pdf
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4.3.9. OSS example KredEx

Estonia uses two to three times more energy than the Nordic countries even though the average temperature is higher. The average annual heating energy used in the buildings is 200-400 kWh/m².

Title	KredEx
Geographical coverage	Tallin, Estonia
Time frame	2009-
Service content	The core of KredEx is the offers of grants and loan schemes. KredEx provides revolving project finance, under the “Apartment building renovation loan program” to multi-apartment building owners and housing associations. It also administers grants in the energy efficiency and housing sector on behalf of the Estonian national and local authorities. These programs are based on a holistic approach, and the financial support is combined with awareness raising campaigns, technical studies, best practice dissemination, and based on an established legal framework. The grantee requires: - Obligatory technical consultants - Agreements for post-maintenance have to be established - The audit is required to be done through measurements
Implemented measures	NA
Target clients	Multi-apartment building managers
Costs of the OSS	NA (the grant volume is €102 million)
Info page	http://kredex.ee/en/energy-efficiency/

4.3.10. OSS example PKA - Sustain Solutions

The pension fund PKA found that their members were looking for investments that could merge sustainability and profit, and therefore they developed a strategy with specific reference to climate change. In parallel, they have created an OSS in Denmark.

Title	PKA - Sustain Solutions
Geographical coverage	Denmark
Time frame	2015-
Service content	Holistic solution for renovations that is supported from the Funds resources and the investments are recovered from the utility cost savings. Actual energy savings usually range between 30-60%.
Implemented measures	NA

Target clients	NA
Costs of the OSS	€40 million investment by PKA
Info page	https://www.euractiv.com/section/energy/interview/pension-fund-eu-should-promote-one-stop-shop-for-housing-renovation/

4.4. Conclusions from example OSS

The “one-stop-shop” finds a niche market to act on because there is fragmentation both on the supply side and on the demand side. On one hand, the clients that would like to engage with a building renovation project find that it requires information, expertise and a complex project management, where the client would have to deal with a large number of various providers, suppliers, be aware of a large number of legal and regulatory requirements, administer large number of certifications, and maybe even apply for grants, loans or other forms of financing. Besides, being time-consuming, it is close to impossible for a regular citizen to establish informed choices about the combination of possible solutions, timings and organization. An OSS can take this decision process over from the client.

At the same time, the renovation actors (planners, engineers, installers, manufacturers, financial partners, etc.) also find it difficult to engage with single private clients, who need a lot of time-investment in cumbersome information-provision, visits, failed decisions, and the clients seem to be very varied from a supplier’s point of view. They can also benefit the pooling capacity of an OSS.

From the OSS side, extending the offers of a manufacturing or single service firm, or entering as a new entrant into larger sections of the value chain of energy renovation of buildings seems to ensure a more resilient business structure, which is beneficial for the suppliers of OSS.

It is shown through the examples and in this summary, how an OSS is able to bridge the gap between the fragmented supply and demand side. The majority of the reviewed examples are currently running, although some have been closed or simply discontinued or the pilots not replicated. Although those OSSs still running are too young to tell what will happen on the long-run, the idea is clearly promising, even on economic terms, shown by the interest from commercial actors at different parts of the value chain. A main challenge for a success of a “one stop shop” model is to have a clear understanding of the house owner needs in the local context and in a broader perspective than pure energy related issues.

A number of OSS examples presented here have been assisted by public aids. While the industry driven examples are market based, the more complex ones and those that offer a truly wide variety of tailored solutions to the clients have been receiving public funds.

4.4.1. Lessons learnt from successful OSS

When analyzing the successful examples, there are some common recommendations that can be driven from successful OSS:

- Involve local authorities to effectively promote the One-Stop Shops among homeowners, suppliers and craftspeople. Local authorities may furthermore be interested in renovating their own building stock and in stipulating demand to foster climate action and mitigation of energy poverty.

- Develop a hybrid system to fund the One-Stop Shop that includes the collaboration of homeowners, suppliers, local authorities, and housing corporations.
- Ease and facilitate home owners' renovation journey to avoid postponed renovations.
- Make the One-Stop Shop user-centric. Homeowners compose their respective renovation, choose suppliers based on selected criteria, and receive an insight in investment, incentives and products.
- Identify renovation triggers to reach and activate the right target groups.
- Involve ambassadors to become more effective.
- Promote in-person energy consultancy to activate homeowners with offers and to establish trust.
- Be smart about combining digital and site presence: these serve different target groups and create the right balance between efficiency and impact.
- Make the One-Stop Shop simple: include products and prices. This is challenging in the building sector, but leads to a three times higher impact.
- Offer a standardized service with customizable components based on the target audience, their needs and their expectations to increase scalability.

4.5. Recommendations driven after the analysis of case studies

4.5.1. Policy Recommendations

Analyzing the case studies identifies challenging areas pending an improvement in a more favorable legal and policy frameworks. Thus, this policy brief serves as a strategic roadmap for EU officials and policymakers, guiding them toward fostering a standardized, citizen-centric paradigm for building renovations. The blueprint ensures a future marked by sustainability, inclusivity, and operational efficiency across diverse member states.

- [1] Standardize OSS Definition** - we propose a standardized EU-wide OSS definition, comprehensively encompassing businesses, community buildings, and renovation activities. Such a holistic definition will serve as a lighthouse, guiding Member States toward a unified vision for comprehensive renovation services, simplifying consumer recognition and offering citizen confidence.
- [2] Formalize the 'End-to-End' OSS Model** - formalize the model within the OSS definition, to maximize the number of entities that can play the role of an OSS, whilst promoting citizen trust and local economic and social benefits.
- [3] Enhance Regulatory Alignment** - robust EU-wide regulatory alignment designed to streamline building renovations specifically, conducted by energy cooperatives and communities. Such alignment not only reduces bureaucratic hurdles but also cultivates an environment conducive to citizen participation and a consistent approach to energy efficiency.
- [4] Promote Citizen-led Renovation** - Member States to actively embrace citizen-led renovation approaches as part of the broader Energy Communities agenda, accentuating the importance of local partnerships and cooperative models. This should be done by creating an EU-wide enabling framework for citizen-led renovations, as it was done for energy communities in the

Renewable Energy Directive. This recommendation seeks to embed sustainability and democratization at the heart of inclusive renovation strategies.

- [5] Facilitate Information Sharing - development of an EU-wide dynamic platform for the seamless exchange of best practices, innovative tools, and successful service archetypes among Member States and energy 5 communities working on CLR. This platform would serve as a repository of knowledge, fostering a collaborative ecosystem for efficient renovation initiatives.
- [6] Optimize Grant Aid Systems - encourage Member States, drawing insights from OSR-Coop Project case studies, to undergo a thorough evaluation and optimization of their grant aid systems and other financial tools. Accessibility, affordability, and inclusivity should be the guiding principles to ensure a robust framework supporting energy upgrades and deep renovations, and the placing of a value on the additional benefits realized by Citizen Led approaches.
- [7] Monitor and Evaluate - advocate an establishment of sophisticated monitoring and evaluation mechanisms, tracking the impact of national incentive frameworks. This recommendation ensures an evidence-based approach to policy evolution, and allows citizens and policy makers to track energy efficiency and climate goals in the field of home renovations.

4.5.2. General recommendations

The fragmentation of the renovation value chain acts as a substantial access barrier to sustainable retrofitting. Indeed, many property owners perceive in particular energy renovations as complex and risky, among others, due to unpredictable factors, which can influence the works' length and costs. We thus welcome the explicit reference to **one-stop-shops (OSSs) in the Renovation Wave strategy**, as they are a promising voluntary tool. Indeed, by acting as a single contact point for sustainable renovation, thanks to a user-oriented approach, OSS are one of the solutions to address the complexity and challenges of renovation works. OSSs have already been part of the "Clean energy for all Europeans" Communication, which encouraged the development of local facilities providing information, technical assistance, financial advice and support, as well as the monitoring of energy savings after completion of the works. Within this frame, OSSs were also included in the amended Directive 2018/844/EU on the energy performance of buildings (EPBD), which called on the Member States to make use of them to support households in their renovation efforts.

In line with the above policy objectives, OSSs should in principle ensure a full range service path: from the design of the whole renovation and the creation of an ad hoc financial plan to the coordination of the process and the provision of – or the facilitation of access to – adequate and affordable funding or financing schemes. However, so far OSSs on sustainable renovation across the EU neither constitute a uniform service package nor a standardized approach. Instead, they too often focus exclusively on some specific aspects such as awareness-raising or the coordination of market actors (e.g. auditors, installers, technicians).

Although all kinds of OSSs play an important role in supporting and fostering sustainable renovation, our construction SMEs and property owners are convinced that pivotal focus should be given to those operating to help consumers throughout the whole renovation journey, from the initial to the final workplan, including the financing. Besides ensuring well-informed and evidence-based decisions, "full service" OSSs would not only facilitate the retrofit process by accompanying and unburdening the consumers, but also enhance business opportunities for local contractors and companies, while paving the way towards a more sustainable built environment for all.

A central problem in the roll-out of OSSs across Europe is the complex and diverse framework in which they have to operate. Despite the positive examples running in some European regions and cities, the OSS approach still faces some major obstacles to its wider deployment and long-term sustainment, e.g. related to local and regional regulatory differences, legal requirements and required performance indicators.

In addition to this, due to the characteristics of their business model, it is important to see OSSs in a larger framework, namely as enablers for a sustainable built environment instead of focusing on their economic short-term viability as independent entities. Indeed, OSSs are particularly resource and capital intensive, due to investment needs in robust IT tools, development and marketing skills, technical competences and trainings, as well as the long duration of renovation projects, especially for multiapartment buildings. Therefore, most existing OSSs are rightly supported by substantial public intervention, e.g. through subsidies to the owners or to the service provider itself, the set-up of a public or public-private enterprise, or the management of project calls to establish a delegated public service.

Indeed, households' propensity and financial ability to pay for the initial counselling/orientation phase is reportedly very low, especially when they are potentially interested in renovating but not yet committed to undertake the process. A mere reliance on charges applied for the services to the final beneficiaries cannot, thereupon, be the solution. Clear and definite criteria for the use of public resources in this specific market segment are necessary, notably with respect to EU state aid rules. The effective achievement of objectives of general economic and social development could be ensured in this way, while fair competition would be preserved so as to guarantee sufficient attractiveness and viability for private sector investments.

In light of the arguments exposed above and with a view to foster and upscale the OSS approach, notably by making it a sustainable business model, UIPI and EBC would like to put forward the following proposals:

Encourage funding of comprehensive/all-inclusive OSSs, which can unlock the full potential of sustainable renovation in the private residential sector by accompanying owners throughout the whole retrofit process, including counselling, technical advice and financial support;

Ensure that first-level advice, namely the information given to consumers at a stage when the renovation project is still very uncertain, is free of charge. Online platforms run by local authorities, which provide information on existing OSS to interested owners, could be a tangible example;

Through EU support, foster the OSS model in order to develop context-specific approaches to reach the different segments of the building and housing sectors;

Sufficient flexibility must be ensured to allow consumers to choose their most trusted and qualified professionals should they decide to rely on the OSS in their renovation journey;

Involve relevant stakeholders in the development and management of OSSs to ensure that the tools are targeted to market needs and expectations, to increase the level of trust and to strengthen adequate communication and support (e.g. by involving property owners, consumers' associations as well as qualified and representative construction enterprise associations);

With a view to ensure legal certainty, provide consistent EU-wide guidance on how local and regional authorities can act in compliance with European state aid rules in order to ensure proportionate compensation (e.g. with respect to the definition of the public service obligations entrusted to OSSs);

In the context of the revision of the EU VAT legislation, broaden the application of reduced VAT rates to also encompass consultancy and advice services aimed at improving the sustainability of buildings, such as those performed by OSSs;

Encourage Member States to make use of the next Multiannual Financial Framework (MFF) to set up and manage effective OSS models at local and regional level, for instance by earmarking, in their national recovery plans, part of the funding from the Recovery and Resilience Facility for this purpose;

Promote and streamline the financial support and technical assistance (e.g. ELENA facility) provided by the European Investment Bank to actors wishing to establish an OSS by facilitating the blending of European Structural and Investment Funds with EIB loans.

4.6. Ongoing Mapping of One-Stop-Shops in Europe

4.6.1. EU Peers online survey

EU Peers aims to strengthen and spread the Integrated Home Renovation Services (IHRS) concept as a key instrument across Europe to increase the residential renovation rate significantly.

Centrepiece is its Community of Practice, connecting practitioners for collaborative problem-solving. The Community of EU Peers provides multiple entry points and participation opportunities to benefit all members. It is open to One-Stop-Shops and other Integrated Home Renovation Services stakeholders.

The base structure of the Community consists of seven Community platforms for nine priority countries (IT, FR, ES, HU, IE, and Baltic countries (LV, LT, EE)) and one for all other EU countries. At the level of the Community platforms, regular peer exchange and learning activities occur. They are complemented by European networking events in person and online series for capacity building. A dedicated mentoring program will assist in setting up emerging One-Stop-Shop initiatives. Finally, EU Peers is committed to improving framework conditions for IHRS through advocacy, policy recommendations, and dialogue with market stakeholders [39]. The project EU Peers has received funding from the European Union's LIFE Program under Grant Agreement No. 3875032 and runs from September 2023 to August 2026.

The EU Peers initiative is currently running a survey to map One-Stop-Shops (OSS) and show their impacts at EU-level. As of mid-October, 53 organizations already responded to the survey including 38 OSS. Here, some relevant figures obtained so far from the survey are highlighted, with the courtesy of EU Peers [39]. These are only preliminary findings and we aim at collecting additional responses until the end of February 2025.

- Among the 38 OSS, **27 (63%) have been created between 2021 and 2024**, while only 6 (14%) have been created before 2015 and 10 (23%) between 2016 and 2020.
- Only **9 (20%) OSS target deep renovation** while 30 (68%) target all levels of renovations and 5 (11%) target renovation with significant energy savings.
- The cost paid by homeowners for an **energy audit is on average between €200 and €1000**.
- The **cost for supporting homeowners** in the renovation (project design, quotes, selection of contractors, etc.) is most of the time a flexible **rate of the total costs of the renovation works (between 5 and 8%)**.
- **10 (23%)** of the 38 OSS **carry out the renovation work and/or hire contractors to do it**, among which the majority are private companies falling in the competitive sector.

- **The primary source of revenues** for the 38 OSS came from EU funds in 2023 (58% of the respondents), followed by local subsidies for 23%, regional subsidies and **fees charged to clients, representing respectively 16% each.**
- The average running/**operational costs are estimated at around €223,000 per year** (note that not all OSS responded to this question – and a lot of variation may exist between OSS).
- The average number of **Full Time Equivalents (FTE)** within OSS in **2023 was estimated at 7,31. When they were founded, the average number of FTE for an OSS was only 2,77.**
- **The average customer journey duration for a single-family home is estimated at 3,7 days.** For **condominiums, it is estimated at 39,6 days.**
- On average, an OSS renovated around 270 homes as part of its activities in 2023 (note that some OSS did not report any figures. In addition, a lot of OSS are still in the early stage of their development, and much more homes are expected to be addressed by OSS in the future).
- Finally, respondents were asked (1) whether the national legislative framework is favorable for OSS and (2) to which extent OSS are recognized as a key tool for accelerating the building renovation in their respective countries. For both questions, respondents gave a score of 5 out 10. The majority of the responses highlight the lack of sustainability in national policies and the lack of funding to support the creation of OSS.
- The number of respondents is not high enough to draw significant conclusions. However, the responses show that OSS across the EU are relatively young, targeting all levels of renovations. Most of them are dependent on EU funding but have a great potential for development. The survey is planned to be open until the end of December 2024 to collect more responses.

5. Macedonian construction sector

5.1. The status of building stock in North Macedonia

The status of the building stock in North Macedonia in terms of the age of the buildings and the level of energy efficiency measures that are implemented is not reported in an explicit way in any of the official publication. Therefore, for the purpose of this report an estimation is given, based on the official statistical numbers that can be found, related to the building stock. As a main sources for information the official publications and the web site of State Statistical Office.

According to the latest Census 2021, the country has population of 1,8 million, living in 598.600 households, while the total number of dwellings of all types is 840.000 [40]. There is no distinction for the type of the dwellings in terms of single-family house or multi apartment building in the provided statistics from the Census.

However, there is a very comprehensive database of the multiapartment buildings for collective habitation in the country, that is run as a resource center, established as part of the USAID and Habitat Macedonia project "Energy efficiency in the housing sector", with the main goal of contributing to efficient and effective handling of problems and issues arising from housing in residential buildings. This Register of the multiapartment buildings in North Macedonia, provides data for residential buildings in 36 municipalities of North Macedonia (conducted in the period from 2015 to 2024) [41]. This web tool provides an electronic overview of data on residential buildings in North Macedonia, primarily in terms of energy characteristics. This tool enables a visual display, search, analysis and

update of the characteristics of the housing stock in the municipalities (Figure 23).

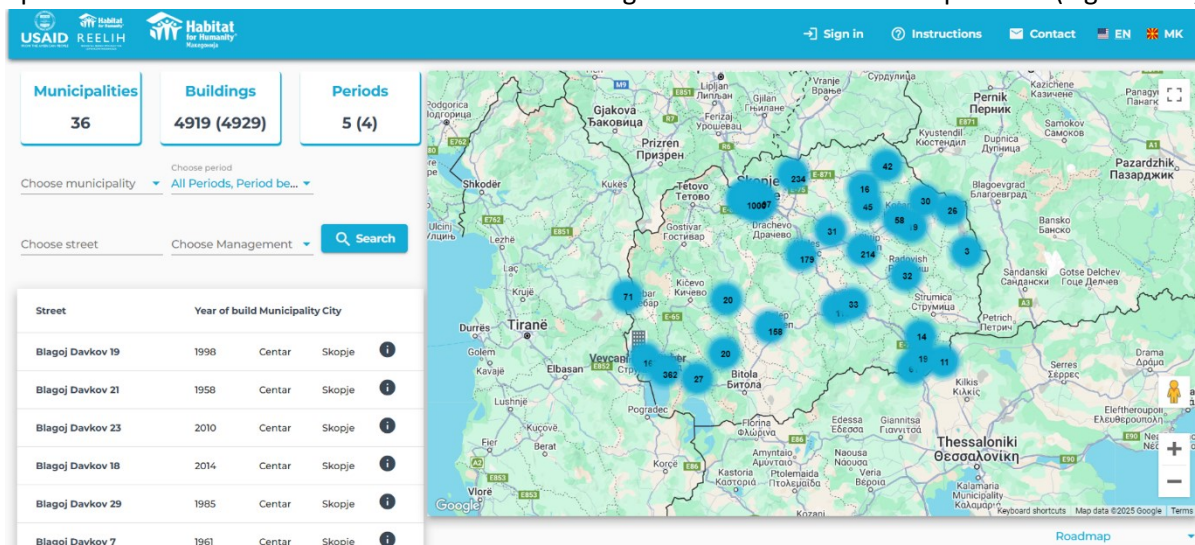


Figure 23. The national Register of the multiapartment buildings in North Macedonia

This tool aims to help homeowner's associations and the homeowners themselves to find the appropriate solution for improving energy efficiency in residential buildings and their own homes. At the same time, the tool represents a source of data that can help local authorities, as well as organizations dealing with energy efficiency in the creation of policies and measures for the promotion of energy efficiency.

In this register 4941 multiapartment buildings are listed, along with their specific data like Municipality, Period of construction of the residential building, Address of the residential building, Type of building management and also include basic data on the thermal insulation characteristics of the building envelope elements (facades, windows, roofs and floors). The distribution of the multiapartment building stock in North Macedonia by age, i.e. the year of construction, according to this source [41] is presented on Figure 24.

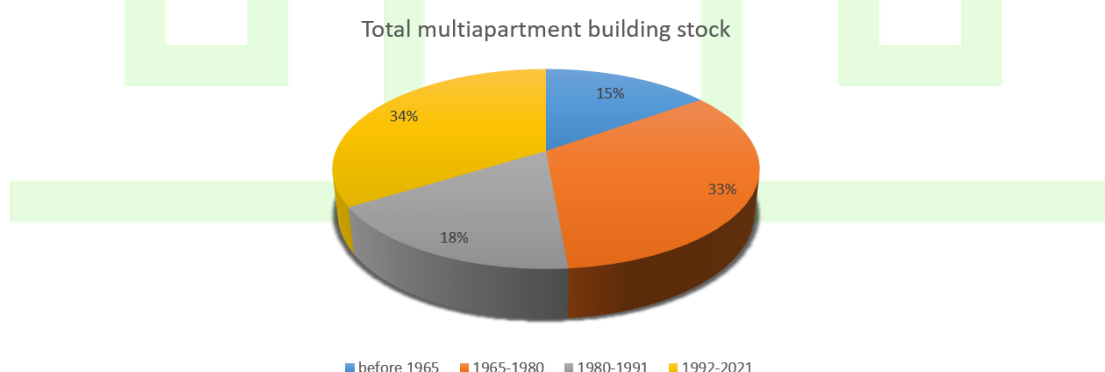


Figure 24. The distribution of the total multi apartment buildings according to the year of construction

The figure presents that there was expansion in construction in the period between 1965-1980, and then after 1992. Implementing the measures for energy efficiency has started after the 2010, so even the building constructed in the last period cannot be considered as energy efficient. A more precise overview of the affiliation of the buildings is given on Figure 25, where the number of dwellings settled in the capital city of Skopje is presented separately.

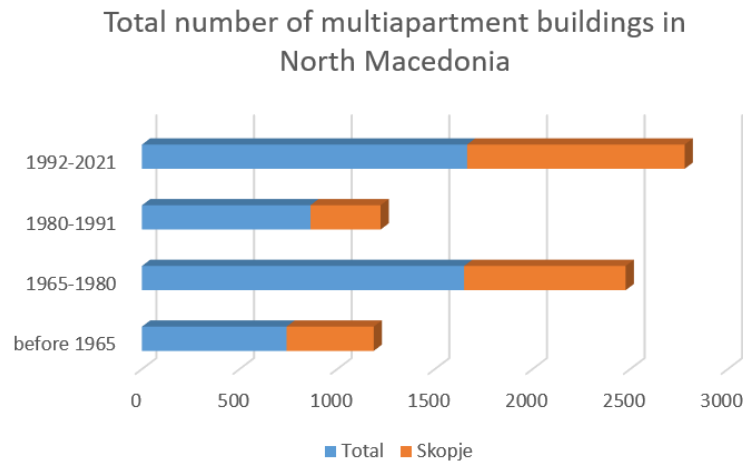


Figure 25. The share of total number of multiapartment buildings that are settled in Skopje

5.2. The national legislation supporting building renovation

In this chapter we present a brief overview of the legal framework and institutional post presence in the Republic of North Macedonia in energy, energy efficiency, living environment and climate.

5.2.1. Energy

The current legal framework and strategic priorities related to energy are mainly incorporated in the Law on energy [42], adopted in the latest version by the Parliament of the Republic of North Macedonia in July 2024.

The law establishes the legal framework for the domestic energy sector, including the guard areas of electricity, natural gas, heat energy, as well as the market of crude oil, oil derivatives and fuels for transport. In addition, the Law regulates the areas for using RES, reliability in the supply of energy, status and competences of the Energy and Water Regulatory Commission services of the Republic of North Macedonia and construction of energy facilities and other issues related to energy.

About the creation of the energy policy in the country's strategic documents are particularly important. In that context, in January 2020, the Government adopted the Energy Development Strategy in Republic of North Macedonia until 2040 [43]. This document outlines the five strategic targets of the country: energy efficiency, safety of the energy markets, decarbonization, competitiveness and harmonized legislation.

5.2.2. Energy efficiency

The applicable legal framework for the area energy efficiency, including the Directive for energy efficiency, the Directive for energy performance of buildings, the Regulation on labelling of energy-dependent products and the eco-design directive has been transposed in the Law of energy efficiency [44].

The main regulatory document that is supporting the actions against climate change is the law on energy efficiency was adopted in February 2020. At the same time, efforts are being made to harmonize the national legislation with the relevant regulations for energy efficiency of the European Union. The implementation of the Law on Energy Efficiency is under the direct authority of the Ministry

of Economy and the Ministry for Energy and mineral resources which is newly established ministry, that has been operational since July 2024.

The law on energy efficiency includes the following elements:

- Regulation of energy auditors, so that in the future energy audits will be performed by appropriately trained and authorized auditors relevant to each market.
- Introduction of obligations for energy efficiency in the transmission, distribution and supply of energy.
- Enabling the implementation of long-term contracts for energy services by energy service providers. This legal solution specifies the provisions and the model of contracts that enable the implementation of projects to improve energy efficiency, such as for the reconstruction of buildings, as well as for other investments in energy equipment and installations. Introduction of requirements for information and labeling indicating the class of energy efficiency and the eco-design of energy-efficient products offered on state markets.
- Establishment of the Energy Efficiency Fund as an independent legal entity. The funds will be used to finance energy efficiency projects and measures, following the example of European Union countries, where energy efficiency funds have existed for a long time and successfully help in the development of energy services and improvement of energy efficiency in general. With technical assistance from the World Bank, we expect the preparation of the analysis to begin soon. Its ultimate goal is to establish a Fund for Energy Efficiency which, in the initial period, will provide financing of credit lines through the Macedonian Bank to support the development intended for the reconstruction of public buildings and then in accordance with effective solutions and financial mechanisms that support the domestic economy and citizens through the creation of innovative solutions. We expect the fund to enter into force in the second half of 2023. Considering that the initial funds for its establishment have been provided, as a loan from the World Bank.

The relevant laws and by-laws that support the building renovation are listed below:

- Rulebook for energy control
- Rulebook on energy characteristics of buildings
- Rulebook on the amount of the fee for issuing a certificate and certificate for energy characteristics
- Rulebook for amending the rulebook on energy characteristics of buildings
- Rulebook on the labelling of energy consumption and other resources for energy-using products
- Ordinance on eco-design of products
- Tariff for the maximum fee for performing energy control
- Rulebook for amending and supplementing the rulebook for energy control

5.2.3. Environment

The environmental regulation captures several important aspects, i.e. assessment on the impact of the effects of certain projects, plans and programs on the environment, quality of ambient air, limitations for the emission of harmful gases from large power plants with internal combustion as well as new or sweat fully renovated power plants that use fossil fuels. All of them, by transposing the relevant

directives from the European legislation are transposed in several laws and by-laws. The main document is the Law of environment and the relevant by-laws, which have the amendment the provisions of Directive 2011/92/EU and Directive 2014/52/EU already introduced in the latest version of the Law from 2015 [45].

The law of quality of ambient air and accompanying secondary legislation transpose the Directive (EU) 2016/802 which refers to reducing the content of sulfur in certain liquid fuels. It is supported by the Regulation on the boundary values for permitted emission levels of polluting substances in waste gases and vapors emitted by the stationary sources in the air.

5.2.4. Climate

Provisions related to the area of climate are for now included only in the Law of environment, a preparation of a special climate law is underway action that will enable the transposition of Regulations (EU) 525/2013, which refers to the mechanism to monitor and report emissions of the greenhouse gases. The most relevant document is the Strategy for protection of environment and climate changes [46] developed by the Ministry for environment and physical planning.

5.3. Recent national project activities related to sustainable construction and energy poverty

5.3.1. Participation of North Macedonia in BUILD UP Skills initiative

Sustainable construction and the actions to support and enable the energy efficient construction and building renovation in North Macedonia, similar as in EU were substantially supported by tailored actions like BUILD UP Skills initiative initiated by the European Commission in 2012. BUILD UP Skills is a strategic European initiative to stimulate the training of craftspeople and other on-site workers in the building sector on the topics of energy efficiency and renewable energy. It was created as a part of the European Commission's Energy Efficiency Plan and was funded by the Intelligent Energy Europe (IEE) program, a European Union funding program to promote energy efficiency and renewable energy in Europe.

North Macedonia has undertaken the preparatory activities within **Build Up skills Pillar 1** [47], resulting with creation of two strategic documents: the Status Quo Analysis with baseline indicators for building sector defining the gaps between actual situation and the needs for skilled on-site workers, and the Roadmap, endorsed by 30 members of national qualification platform, addressing the priority measures for overcoming the identified barriers. The shortage of 9.600 skilled workers for energy efficiency and renewable energy sources was identified as necessary in order achieve the priority goals for energy efficient construction: upgrading national education system to provide qualifications for implementation of EE (energy efficiency) and RES (renewable energy sources); designing of training schemes for EE and RES in buildings; building capacity of the education institutions in line with the needs of the skilled workers and overcoming communication barriers to implement of the roadmap goals.

Under the action of **Build Up Skills Pillar 2**, North Macedonia has participated with **BUS BEET project** [48], delivering 2 types of voluntary qualification schemes (training programs for 10-day trainings and methodology for the procedure for recognition of prior learning (RPL), including non-formal and informal education), for 5 prioritized EE skills: façade workers, roofers, carpenters, HVAC installers and electrical installers. Developed five training modules were disseminated through training courses and

sessions for RPL, resulting with successful qualification and certification of more than 1240 people, through these voluntary qualification schemes.

As a succeder of the first 2 projects in BUS initiative, the **project TRAINEE** [49] that was funded as part of the H2020 Program, Energy efficiency call 2016-2017 was initiated. The overall objective of TRAINEE was to increase the number of skilled building professionals. The main idea is that contribution of Building sector to achievement of national energy targets depend upon qualifications for implementing EE measures in buildings, of the professionals and blue-collar workers across whole value chain. Therefore, in order to support upgrading existing workforce qualifications with skills for implementation of EE, the project TRAINEE has worked on developing different training schemes for obtaining EE qualifications. In order to establish tools for measuring contribution of improved skills to energy efficiency of the building, the actions were toward increasing awareness and competences for use of BIM tools. The introduction of BIM was in order to lead to reduction of gap between design and actual energy performance of the buildings and visibly express effects from improved skills in designing, building, operation and maintenance. The implementation of the ideas for developing training schemes was successfully completed, with creation of two qualification schemes: non-formal training programs for EE and RES skills and training programs for BIM, as first type of qualification scheme through training and “delivering” knowledge and skills and developing Methodology and establishing procedure for recognition of previous learning (RPL), obtained through informal learning, as second type of qualification scheme.

As main project result and in order to ensure sustainability, Knowledge and Skills Management Centre K&S Skopje was established as focal point that integrates all available support for provision of qualified workforce, deploying and delivering of trainings, conducting RPL procedures, provision of recognition of VQS from market actors and capacity building for replication of deployed training schemes. To achieve the visibility and to enable promotion of certified workers and professionals, Digital Register with integrated databases for certified workers and trainers is created and it is established within the activities of Knowledge and Skills Management Centre, www.ks.org.mk. After realization of pilot trainings developed within the project all certified professionals and workers are listed in the databases. The final number of entries occurring in the Register is 1566 certified building professionals (white collar and blue-collar workers).

The second pillar of implementation of supporting measures implemented by the project, encompassed of activities for spreading initiative for introduction of Building Information Modelling BIM on national level. The work included wide promotional action, with series of promotional events and workshops, for different target groups and establishing a system for sustainable training in BIM, by creation of training programs for different profiles involved in construction. An exceptional tool that is must to be promoted is the developed on-line tool for self-evaluation of buildings by the occupants, aiming at raising awareness on the effects of tenants’ behavior on the energy performance of the object and proposing measures for its improvement. This tool can have an important role also in supporting the renovation decision by the home owners.

The value of energy skills – set as the base stone of sustainable construction was the light motive of the final project in this series, the **SEetheSkills project** [50] that was implemented under the call Construction skills of Horizon 2020 research and innovation program. The project implemented a novel 3V approach on wide interregional level, to tackle direct stimulation of demand of energy skills in construction, in order to ensure easy uptake of project results. The 3V approach refers to: VISIBILITY of skills by creation of an on-line repository for skills registration i.e. Integrated SEetheSkills area to make the skills visible, VALIDATION of energy skills by making them comparable within SEetheSkills area for management of knowledge&skills and through transferring and replication of training

schemes between project partners; which finally results with the raise of the VALUE of skills and tackling their market demand internationally and globally, initiated by expressing the benefits of using energy skills in achieving sustainability of construction.

The SEetheSkills project have achieved visibility of skills through establishing the main project result, the Integrated Register of Energy Skills as cloud repository on interregional level, that have finally resulted with increased number of skilled building professionals and/or blue-collar workers. In a moment that is critical for the construction sector where the shortage of workers is increasing. The Integrated register of energy skills is interrelating the three databases: the Database of training schemes based on BUS Advisor app with added 28 additional training schemes, the Register of certified professionals with added 3.372 certified building professionals and the Database of EE construction materials, that numbers more than 25.000 construction items.

The validation of the skills of the construction professionals was achieved mainly with the developing and implementing of e- RPL tool; developing of the Mobile app for self-assessment of skills; enabling e-learning training enriched with gamification and microlearning tools.

To emphasize the skills value in order to stimulate market demand for energy skills in design, construction and maintenance of buildings and manufacturing and installation of EE construction materials National “micro” roadmaps for legislation changes for increasing demand for energy skills were drafted. Along with the developed Digital Badge of sustainable energy skills and the visible promotion of the energy skills through their contribution into the achievement of better energy performance of buildings, new or renovated, through analyzed case studies by using digital tools like BIM.

Regarding BIM skills there were two H2020 projects implemented in North Macedonia. **BIMcert** (2018-2020) <https://iege.edu.mk/project/bimcert/> is a training program delivered via a blended online learning platform, offering a range of Building Information Modelling (BIM) learning tools and materials. Through the platform, utilizing gamification and “bite-size” learning, the aim is to deliver training to a wide range of construction industry workers, at a time and location that suits them. The qualifications via BIMcert are targeted at learners who have an interest in working across the architectural, engineering and construction sector, including supply chain, particularly within the area of digital construction and Building Information Modelling. With the focus on the use of BIM for Energy Efficiency, the aim is to improve the building environment by training all involved in more efficient ways of designing and constructing the built environment.

ARISE’s project 2021-2023 mission was to support the dual transition of the construction sector, by training all professional profiles in the sector, on digital and sustainable energy skills needed in the future transition, along with recommendations for key market drivers, skills recognition, and exploitation of the benefits of their implementation.

In its innovative approach, ARISE apply a system-related solution to:

- The method of training,
- Transaction and recognition of individual learning profiles,
- Matrix of maturity of skills, new qualifications, and jobs,
- Teaching content based on professional expertise,
- The impact of energy performance skills on buildings,
- New market models of skills demand,

Stimulation of investments in buildings with high energy efficiency.

Over 1000 participants from all over Europe will be engaged in the demonstration phases of the project, which will thus improve their skills and competencies. This will induce effects of energy savings of over 4.5 million kWh / year, the share of energy from renewable sources of over 2.25 million kWh / year, reduction of greenhouse gas emissions of over 3.5 t / y per year, and initiating investments in energy-efficient buildings of 1.3 million EUR / year.

The training and qualification transaction system to be developed by the Project will provide participants with cryptocurrency with a value commensurate with the level of competencies achieved – CERTcoin. The received credits will be deposited in the Individual Learning Account and can be used in valid certificates. The training process will thus become more accessible, more time-efficient, and equally attractive to all professional profiles of members of the construction sector, both in terms of delivery and demand for services and products. The project aims to build an ecosystem for innovative solutions to adapt to climate change.

All the above presented projects that were implemented in North Macedonia have contributed in development of sustainable training offer for energy efficient construction, and have produced skilled professionals from different occupations, able to take over the renovation actions.

5.3.2 Participation of North Macedonia in projects targeting energy poverty

The **project ComAct**, that had run 2020-2024 aimed to make impactful energy-efficient improvements in multi-family apartment buildings in the Central and Eastern European (CEE) region and in the former Soviet Union republics (CIS region) affordable and manageable for energy-poor communities as well as to create the necessary assistance conditions for lifting them out of energy poverty [51]. The countries in the Central and Eastern European (CEE) region and in the former Soviet Union republics (CIS region) have the most energy-poor people in Europe. This is mainly due to high energy prices and poor energy efficiency of the buildings, heating systems and household appliances.

In this region, the housing stock is predominantly privately-owned and characterized by a large percentage of multi-family apartment blocks (MFAB). This is the result of its mass privatization in the 1990s, along with the deconstruction of the social safety net: without subsidies, utility and energy costs of the flats soared, burdening the family budgets. In parallel, the socialist-era collective maintenance mechanisms were abandoned, and the decay of homeowners' associations has not been addressed effectively.

Against this backdrop, undertaking renovation works in multi-family buildings requires coordinated action among the apartment owners. To address the complex roots of energy poverty, there is a need to develop a new approach to make interventions affordable, substantially influence energy costs and consequently reduce the high energy poverty level in the CEE and CIS region, working in the following countries: Hungary, Bulgaria, Lithuania, Republic of North Macedonia and Ukraine.

ComAct project seeks to assist energy poor homeowners living in multi-apartment buildings in the CEE and CIS region by making energy efficient interventions affordable for all. ComAct does this by equipping the homeowners with necessary technical, financial and community solutions. And not only the homeowners as final beneficiaries but other stakeholders are needed in this process as well, such as public bodies and financial institutions.

Having the homeowners living in multi apartment buildings as target stakeholders, the main project result that is contributing to the concept of OSS is the creation of a Toolbox of current and past financing schemes available in the five pilot countries and beyond. This toolbox serves as a basis to further develop tailor-made financing mechanisms that would serve energy poor homeowners and make the energy efficient interventions in their buildings affordable.

The project **Award Excellence, Invest in Trust: Tailored Energy Management Services for East European Local Authorities – EXCITE**, [52] 2020-2023 have supported implementation of the European Energy Award in Bulgaria, North Macedonia, Romania, Slovenia and Ukraine by providing direct technical support for 3 pilot cities in each country. On top, a specialized training for local energy managers was delivered, along with a tailored business models for local climate actions, and broad civil engagement campaigns.

The EU's energy sectors are being decarbonized, but the process is not developing evenly across the bloc. The low-carbon transition is slower in central and eastern Europe. The EU-funded EXCITE project aimed to enhance energy efficiency measures in the central eastern European municipalities, including the pilot cities in North Macedonia. It has applied the European Energy Award (EEA), which supports local authorities in establishing interdisciplinary planning approaches and implementing effective energy and climate policy measures through the rational use of energy and increased use of renewable energies. By applying the well-established energy management scheme of the European Energy Award (EEA) in Central and Eastern European municipalities, enabled them to become trusted partners to the investors and engaging local communities for deliberate climate action. Through applying the EEA methodology, the project resulted in enhanced implementation of energy efficiency measures at local level through securing the necessary technical, economic and social conditions for attracting of private investors, promoting public entrepreneurship and successful leveraging of the scarce public resources.

Another project tackling energy poverty that was implemented by the partner in North Macedonia was the project **Tailored measures supporting energy vulnerable households – EnergyMEASURES** (2020-2024) [53]. Between 50 and 125 million people are at risk of energy poverty in the EU. Efforts to address this issue will require a suite of measures informed by participatory and inclusive approaches.

EnergyMEASURES work to address energy poverty in seven European countries (BE, BG, IE, MK, NL, PL, UK) through two complementary and synergistic strands of work. Namely, through direct household engagements that are complemented and informed by cutting edge policy and practice innovations.

As a direct result the project is proposing some steps that can help the energy consumption advisors understand people's energy usage better and help them inform consumers about their options when choosing a certain energy consumption strategy. The information on behavioral change and its importance on the subject on energy poverty is thoroughly shared, as well as a step-by-step guideline on how to help integrate behavior change approaches while engaging energy poor within the EnergyMEASURES project.

CLEAR-X project (2021-2024) stands for "Consumers Leading the EU's Energy Ambition Response, Expansion". The overall objective of the project is to enable consumers to lead the energy transition by investing in renewable energy sources (RES) and energy-efficient (EE) technologies. It aims to facilitate consumers' access to household renewables at an affordable price, through the provision of trusted information, collective purchase schemes, and an improved regulatory framework. CLEAR-X <https://www.beuc.eu/past-projects/clear-x> builds on learning and experience from the CLEAR 2.0 project, which focused on Western and Central Europe, and oversaw 17 group purchase projects, triggering 29,000 renewable energy installations. Thanks to that experience, we will now focus on Central and Eastern Europe and engage another 38,000 consumers to trigger €27 million worth of

renewable installations. The six target countries are Bulgaria, Cyprus, Lithuania, North Macedonia, Slovakia & Slovenia.

Consumers had access to a selection of lab-tested products (tested for energy efficiency, usability, etc), a selected installer, and a trusted third-party contact point throughout their purchase journey. As a result, consumers will be able to easily adopt RES and EE technologies and adapt their energy consumption behavior, translating into lasting energy and monetary savings at the household level.

6. Market assessment report for available services for renovation in NMK

The available services to homeowners and building owners are categorized for analysis in the following way:

- Technical and social diagnosis;
- Building analysis/energy audits: renovation roadmap/project design;
- Coordination of renovation works (permits, contracting for work, supervision and quality assurance);
- Financing;
- Subsidies and guarantee.

For each of the categories, separate market assessment is conducted and the findings are discussed under the following separate topics.

The overview of the total number of the active legal entities that are licensed by the Ministry for transport, who has the jurisdiction over the construction in North Macedonia, according to the specific services that the companies are providing, related to the construction of buildings form the first and second category, is presented on Figure 26

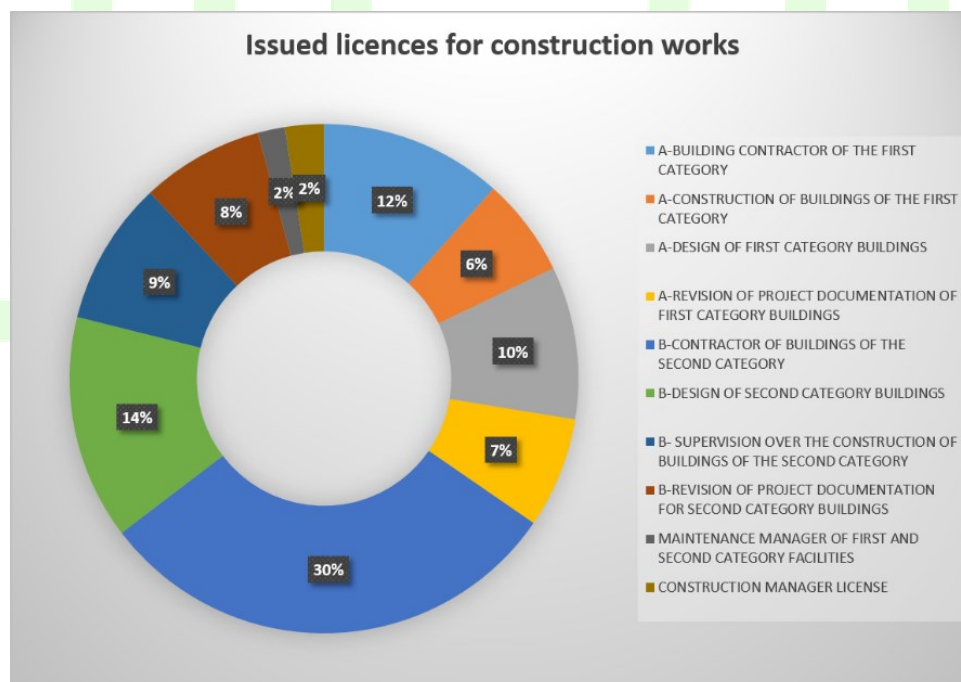


Figure 26. The share of construction companies that are licenced for construction works [54]

The licenses that are subject of issuing according to a specific rule by the Ministry of transport are referring to construction of buildings from the first and the second category. The building from the first category, according to the Law for construction are the buildings of national interest, huge energetic objects (plants, power plants etc.), objects related to national safety. The buildings that belong to the second category are the building that are in the service of municipalities, culture, big sports objects (halls, stadium, arenas etc.), and bi educational objects of national interest. The third and the fourth category of buildings are the multi apartment and single apartments buildings, aiming mainly the housing.

On Figure 26 the percentage shares of the licensed construction companies are presented, calculated on the basis of 514 licensed companies that are listed in Annex 1.

However, the total number of the companies that are working in the construction sector, according to the data of the State statistical Office for 2022 is 5.659 legal entities, as presented on Table 5, distributed according to the number of employees.

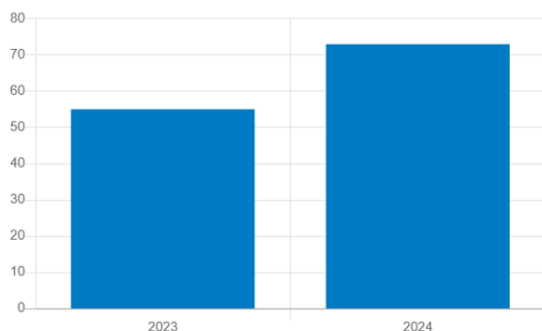
Table 5 Number of companies working in construction sector

Sectors of activity	Total	%	Number of active enterprises by number of persons employed					
			0	1-9	10-19	20-49	50-249	250 +
Total	71 228	100.0	4 176	59 965	3 249	2 168	1 443	227
Construction	5 659	7.9	360	4 719	323	192	57	8

6.1. Technical and social diagnosis

- This type of service is the first step toward the decision for home renovation in the homeowner journey. This service is often provided by the engineers and architects, although also public authorities and energy auditors may suggest the retrofitting. However, in the lack of legislative obligations, the decision on the start of the renovation journey is completely up to the home owners. That is why this initial step is very important in the whole cycle of the services that one-stop shop should offer.
- In North Macedonia the registered construction companies in the Central registry of the Republic of North Macedonia [55] are not listed by the specific service they provide. However, by selecting the companies that provide development of the construction projects, which is the closest elaboration of the service for technical diagnosis of the need for renovation, around **70 service providers are identified** (Figure 27). This number corresponds to the number of licensed companied for project design (Figure 26). The complete list of the identified market actors for providing this service is given as separate annex to this document.

Number of entities in the commercial register and the register of other legal entities at the end of the year



Establishment, amendments, deletions

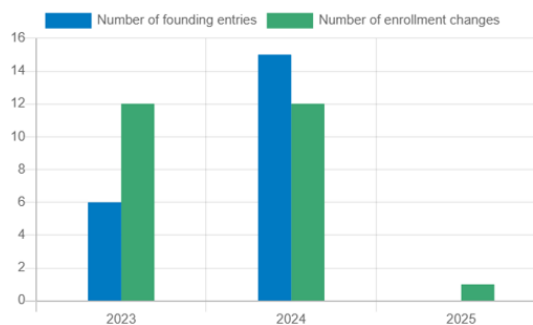


Figure 27. Registered legal entities that provide as service designs of construction work [55]

8.1. Building analysis/energy audits: renovation roadmap/project design

Energy audits and supervision of the construction work is a service for which specific skills are required, in the form of a specific license for revision and supervision of project documentation and the construction works. The number of the licenses companies for supervision and revision of construction projects are around 50, according to the Registry of the Ministry for transport [54] (Figure 28)

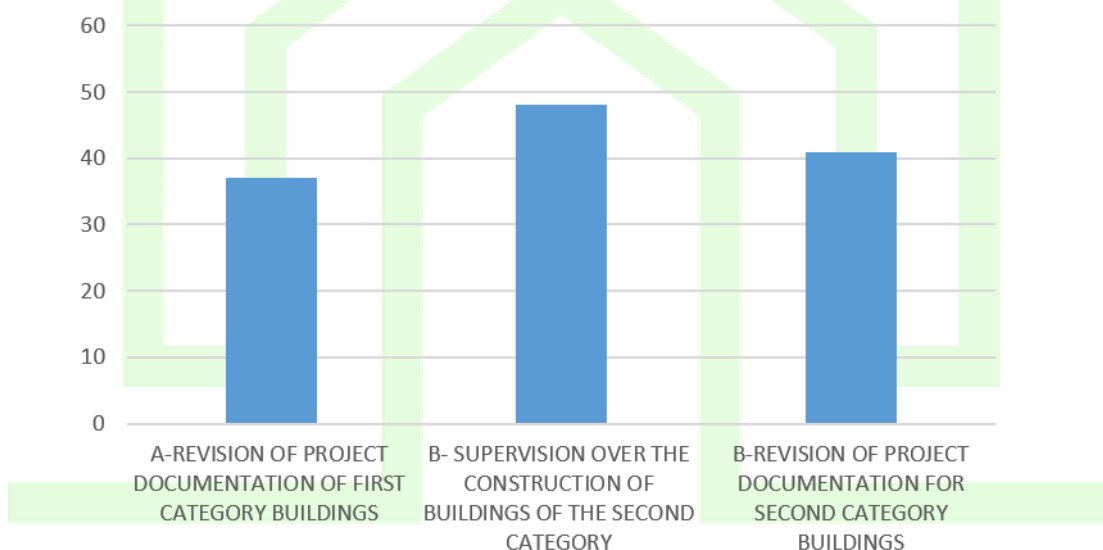


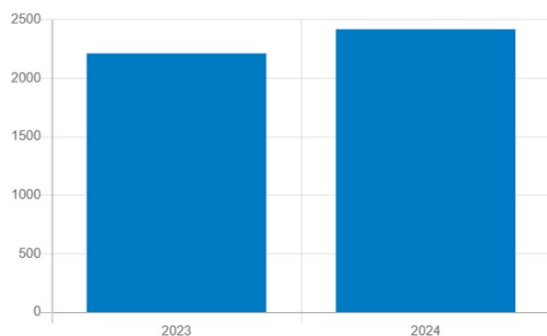
Figure 28. Registered legal entities that provide as service revision of construction work [54]

8.2. Coordination of renovation works

For the exact renovation works the “ordinary” construction services will be considered. The number of the companies registered for construction works as active legal entities working in the sector is around **2400**, as presented on Figure 29. The number of the licensed companies for construction works according to [54] is only 220, but this discrepancy in the number of available construction companies is due to the fact that the licenses are issued only for constructing buildings in the two building categories, the first for constructing important state buildings related to energy supply and security

and for constructing buildings from the second category which are related to education, culture, municipalities' buildings etc.

Number of entities in the commercial register and the register of other legal entities at the end of the year



Establishment, amendments, deletions

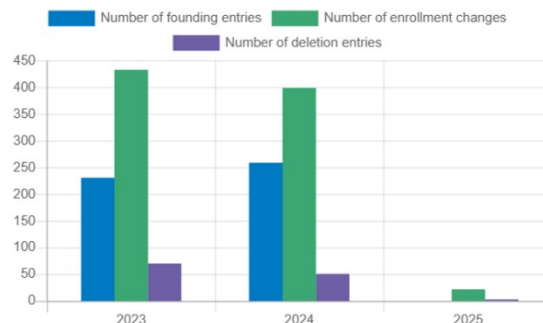
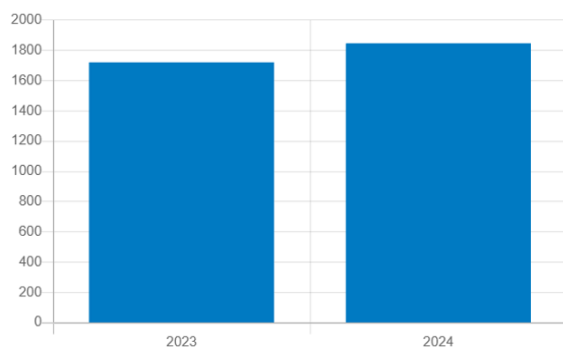


Figure 29. Registered legal entities that provide construction work [55]

Additionally, here the number of the companies that provide installation services is provided, including the electrical installations, plumbing and isolation, which are one of the very frequently contracted works when the renovation is considered. This number of registered legal entities is around **1800** [55] (Figure 30).

Number of entities in the commercial register and the register of other legal entities at the end of the year



Establishment, amendments, deletions

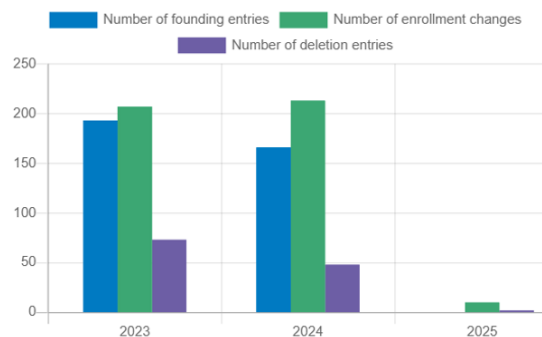


Figure 30. Registered legal entities that provide as service installation work [55]

8.3. Financing

In North Macedonia, following the EU practice and recommendations for providing financial support to investments toward energy efficiency and implementation of RET, there are several national initiatives and financial instruments that can be grouped as follows.

8.3.1. Governmental financial support

Some of the active measures for financing energy efficiency measures in homes are the Governmental incentives for:

- licensed renewable energy producers (“premium tariff” as an alternative to more traditional feed-in-tariff schemes);
- decreased communal tax rate for higher class for EE buildings (on local level);
- The Ministry of economy has established measures for low-income households include the reimbursed of part of the costs for purchased and installed. The Ministry for Economy should announce public calls for the planned subsidies in 2021. [56]
 - Solar thermal collector systems – up to 70%, but not more than 15,000 MKD per household, from a total amount of 2 million MKD
 - PVC or aluminum windows – up to 70%, but not more than 25,000 MKD per household, from a total amount of 3 million MKD
 - Pellet stoves – up to 70%, but not more than 25,000 MKD per household, from a total amount of 3 million MKD
 - Inverter air conditioners – up to 70%, but not more than 25,000 MKD per household, from a total amount of 3 million MKD.
- Municipality of Karposh was providing 100% subsidies for the renovation of façades and roofs of MFABs from 2009. In 2017 the subsidies decreased to 70%, while in 2021 the subsidies decreased to 50%. The program is implemented in partnership with Habitat Macedonia. There is a public call, and homeowner associations apply for the subsidies. The municipality can provide 50% subsidy for the façade and 30% for the roof of MFABs, up to €7,000 and €2,500 respectively.

8.3.2. The EBRD Green Economy Financing Facility (GEFF)

The EBRD Green Economy Financing Facility (GEFF) in Western Balkans provides finance for green economy investments in the residential sector as well as to businesses who provide energy efficiency and renewable energy products and services to households.

GEFF in the Western Balkans is implemented under the Regional Energy Efficiency Program for the Western Balkans (REEP Plus) [57]. EBRD GEFF in the Western Balkans is co-funded by the European Union through the Western Balkans Investment Framework, Austria, Japan, and Austria and Switzerland through the High-Impact Partnership on Climate Action (HIPCA). HIPCA is supported by Austria, Canada, Finland, Korea, the Netherlands, Switzerland, Spain, TaiwanICDF and the United Kingdom. The partnership with donors is central to promoting the high-performing green technologies and practices. Donors provide critical support to the GEFF projects which mitigate or build resilience to the effects of climate change and other environmental threats.

GEFF financing takes place through local Participating Financing Institutions (PFIs) who use the Facility to finance eligible borrowers for investments into eligible projects:

- Komercijalna banka
- ProCredit banka
- NLB banka
- SHPARKASSE banka

The auxiliary eligible costs for financing are calculated according to the percentage presented on Figure 31.

ELIGIBLE MEASURE	COSTS OF SUPPORT ACTIVITIES ACCEPTABLE FOR THE CALCULATION OF THE FINANCIAL INCENTIVE (MAXIMUM % OF THE COST OF THE TECHNOLOGY)
Insulation of exterior walls	600%
Insulation of partition walls	200%
Insulation of roof, top floor	100%
Insulation of floors	100%
Biomass stoves / boilers	100%
Heat pumps (electricity driven)	70%
High efficiency lighting, low-heat generating lighting	50%
Solar water heaters	50%
Windows, doors, glazing	25%
Balanced mechanical ventilation with heat recovery	25%
Hot water storage tanks	25%
Building-integrated photovoltaic systems	10%*
Air-conditioners and refrigerators, freezers and combined refrigerators/freezers	10%

Figure 31. Auxiliary eligible costs for financing from GEFF program

8.3.3. The financial support from commercial banks

The commercial banks portfolio for EE renovation in the amount of €10 million will feed into the project regarding boosting demand of homeowners for energy investment interventions.

8.3.4. Green Finance Facility

The establishment of the Green Finance Facility in North Macedonia (the "GFF", the "Facility"), equivalent of USD 30.4 million in favor of Participating Financial Institutions (the "PFIs") established in North Macedonia for on-lending to SMEs for investments in renewable energy (RE) and energy efficiency (EE) in accordance with the GFF Policy Statement. The GFF was developed in partnership with the United Nations (UNDP), with contributions from the Joint SDG Fund and from the Government of North Macedonia and is operational since 2023.

The Facility aims to support green economy investments in eligible renewable energy and energy efficiency measures under the Bank's Green Economy Transition ("GET") Approach. The Program builds on the momentum created to date and focuses on the competitiveness and climate resilience of SMEs in North Macedonia.

Green Finance Facility is the UNDP project in North Macedonia that provides loans for poor family to invest in energy efficient renovation. The cooperation with these projects will support IHRS offer to be more attractive and affordable for homeowners as the project activities includes investment subsidies (30% grant component up to 7000 USD), meaning that will increase the demand for EE renovation and IHRS.

8.4. Loans, Subsidies and guarantee

The loan products that can be received for building renovation include loans to homeowner associations, loans to residential building management companies, loans to specialized construction companies that do EE improvements, and loans to individual homeowners. Loans to municipalities are also under consideration. The subsidies that are promising to boost significantly the renovation include

subsidies from the local governments/municipalities and, once established, subsidies from the National Fund for Energy Efficiency.

There are several market practices (loans for EE measures with municipality's co-financing), that include guarantee instruments for commercial banks' loans and Habitat for Humanity Macedonia to homeowner associations (70% coverage) and commercial banks' loans to residential building management companies (50% coverage).

Following the identified subsidies and loan opportunities for supporting home renovation in North Macedonia are presented.

8.4.1. Habitat for Humanity Macedonia – Energy Efficient Homes

More information can be found at <http://www.habitat.org.mk/>

The duration is: 2009 – ongoing

Recipients are the apartment owners and HOAs in multi-apartment buildings for energy efficiency upgrades, homeowners of single houses for energy efficiency renovation.

The managing body of the instrument is Habitat Macedonia.

Loan terms: Amount: up to 250.000 MKD (per apartment); Repayment period: up to 48 months; Annual rate of total costs: up to 6%.

Other benefits from implementation of financing mechanism: Providing subvention from municipal budget for energy upgrades of multi-family apartment buildings.

Details: The revolving fund was established in 2009 and is used through five different financial models: direct loans to the homeowners; with municipal subsidies; for HOAs; to specialized companies (construction company); through microfinance institutions. The program offered loans to HOAs, developing the first such product as a prerequisite to improving energy efficiency in MFABs.

The process in MFABs goes through five steps:

1. Promoting financial opportunity for energy efficiency upgrades among homeowners
2. Facilitating the process of providing consent among homeowners to start retrofitting of MFAB
3. Offering loans to homeowners/HOAs and examining creditworthiness (if loans go directly from Habitat Macedonia) or linking them with microfinance partners
4. Providing loans for energy efficiency upgrades for homeowners using different financial models
5. Monitoring loan repayment and energy efficiency retrofitting, providing technical advice for homeowners when needed.

8.4.2. Subsidies form municipalities

One of the municipalities that provide subsidies for home renovation is the Municipality of Karposh, Skopje.

The timeframe of this opportunity is: 2009 – ongoing.

The recipients are homeowner associations, to benefit low-income households living in multi-apartment buildings.

The instrument is managed by Managing body at the local self-government.

Volume of funding: Depending on allocated resources in the annual municipal budget. For 2021 there was €65,000.

Own contribution: 50%

Details: Municipality of Karposh was providing 100% subsidies for the renovation of façades and roofs of MFABs from 2009. In 2017 the subsidies decreased to 70%, while in 2021 the subsidies decreased to 50%.

The program is implemented in partnership with Habitat Macedonia. There is a public call, and homeowner associations apply for the subsidies. The municipality can provide 50% subsidy for the façade and 30% for the roof of MFABs, up to €7,000 and €2,500 respectively.

8.4.3. Loans issued by commercial banks

Ohridska banka: A++ SPECIFIC-PURPOSE CASH LOANS & Ohridska bank: A++ CASH MORTGAGE LOAN

<http://www.ohridskabanka.mk/a-plus-plus-credit.nspix>

Recipients: Individuals

Managing body: Ohridska Banka

Loan terms: A++ Specific Purpose: Interest rate: fixed interest rate during the first three years starting from 5.50%, followed by a variable rate until the end of the loan term. A return of up to 20% of the amount of the approved loan – energy-efficiency investment grants. Loan maximum up to €50,000. Loan repayment term of up to 240 months. Currency: MKD, with foreign currency clause included. With or without insurance for the life of the loan.

A++ Cash mortgage: Interest rate: fixed interest rate throughout the entire loan term, starting from 5.55% during the first 3 years. A return of up to 20% of the amount of the approved loan – energy-efficiency investment grants supported by the EBRD. Loan maximum up to €20,000. Loan repayment term of up to 95 months. Currency: MKD, with foreign currency clause included. With or without insurance for the life of the loan.

Details: Specific-purpose cash loans intended for financing energy-efficient products. By investing wisely in technologies with a higher level of energy efficiency, clients can receive a grant of up to 20% for a successfully realized project

Sparkasse banka: ECO loans for ECO home – improve energy efficiency in your home

http://www.sparkasse.mk/Private_clients/Loans_and_Financing/Purpose_Loans/ECO_loans_.aspx

Recipients: Individuals

Managing body: Sparkasse Bank

Volume of funding: Maximum loan amount: Up to €50,000. Repayment period: up to 20 years. Approval fee: 2% (minimum 500 MKD). Interest rate: fixed, for the first three years starting from 5.7% ; flexible, after expiration of the fixed period, starting from 5.9% depending on the client's internal credit rating.

Details: Consumer loans for energy efficiency within the EBRD Western Balkans Green Economy Investments Project (GEFF). GEFF in Macedonia is part of the Regional Energy Efficiency Program for the Western Balkans launched by the EBRD providing and supporting investments in the green economy. ECO loans can be used enhancing energy efficiency in the household. Successfully implemented and approved projects are eligible for investment grants between 15% and 20% of the investment value. The Technology Selector is an online energy efficiency technology catalogue with high performances already approved for funding by GEFF, and includes the following categories: Windows, doors and glazing; Insulation; Biomass stoves/boilers; Gas boilers; Solar water heaters; Photovoltaic systems; Heat pumps; Lighting; Balanced mechanical ventilation; Hot water storage tanks. Eligible projects include funding technologies from the Technology Selector as well as ancillary material costs, delivery and installation up to the defined maximum percentage of the technology costs.

Halkbank AD Skopje: ECO LOAN

https://halkbank.mk/eco_loan_retail.nsp

Recipients: Individuals

Managing body: Halkbank

Loan terms: Amount: up to 300.000 MKD. Maximum term: up to 95 months. Grace period: up to 3 months. Interest rate: fixed 5.5 pp (6.18 % APR). Upfront fee: 1.75% from the amount. Loan costs: costs for checking in Macedonian Credit Bureau: 350 MKD (the fee is paid before the payment of the loan and is not paid for declined or cancelled requests). 150 MKD loan application. Credit worthiness: half of the total monthly incomes for employees and one-third of the monthly income for pensioners. Earmarked use of funds according to pro-invoice/invoice. Collateral: loan agreement.

Details: Eco loan is intended for individuals who want to increase the energy efficiency of their home by financing economically efficient products and projects, as well as using renewable energy sources (installation of solar panels) and supplying better thermal insulation at home (energy-efficient façade, windows and doors, installation of efficient heating systems). In this way, they will reduce energy consumption and associated costs, while at the same time contributing to the protection of the environment. The loan is also available for pensioners.

ProCredit bank: Green loan for EE home

www.pcb.mk/en/green-loan

Recipients: Individuals

Managing body: ProCredit Bank

Loan terms: Interest rate: fixed 6%; repayment period: up to 5 years; disbursement fee: 2%; down payment: 0%; collateral: not needed.

Details: ProCredit Bank Macedonia launched a program of green finance products consisting of energy efficiency loans for private individuals as well as for businesses, using funds from the European Bank for Reconstruction and Development (EBRD). The loans are intended for energy efficiency improvements of housing according to the eligible measures for grants described on the Technology selector on the Green Economy Financing Facilities website. Some of the eligible measures are: insulation of outside walls, roof, floor; installation of windows, doors, biomass boilers, energy efficient lighting, gas boilers, heat pumps, solar photovoltaic system, etc.

8.4.4. Other Loans

Savings house Moznosti

<http://www.moznosti.com.mk/habitat-loan-for-energy-efficiency.nsp>

Started from: 2018 – 2023

Recipients: Farmers, business owners of Micro and Medium Enterprises, pensioners and others

Managing body: Moznosti and Habitat Macedonia.

Loan terms: Amount: up to 600.000 MKD; Repayment period: up to 95 months; Annual nominal interest rate: 5%; Annual rate of total costs: from 8.165%

Details: The loan is part of the joint initiative with Habitat Macedonia for energy efficiency in rural areas and is for energy-efficient façades, windows and doors replacement, efficient heating and cooling systems, systems for renewable energy (mainly solar systems), etc. The loans can be used by pensioners and farmers.

MFI Horizonti: “Domus” housing loan & “Instant” housing loan

<https://horizonti.org.mk/en/mikro-zaemi-za-domuvanje>

Duration: “Domus” housing loan: 2010 – ongoing

Recipients: Recipients for both housing loans are people with their own home and substandard living conditions, plus owners of micro and small businesses in the area of commerce, services and retail production. Individual agricultural producers are eligible for the “Instant” housing loan.

Managing body: Microcredit Foundation Horizonti

“Domus” housing loan terms:

Amount: 100,000-300,000 MKD; Repayment period: 24, 36, 48 and 60 months; Interest: 11% annually, declining; RTE from 20.14% to 23.52%.

“Instant” housing loan

Amount: 30,000-60,000 MKD; Repayment period: 6-18 months; Interest: the interest rate for all individual loans expressed in denars is fixed at 11.00% on an annual basis calculated according to the proportional method

Details: “Domus” housing loan aims renovation, extensions, repairs, reconstruction, etc. “Instant” housing loan is targeting heating material and winter supplies; home appliances; furniture and furnishings; minor home repairs; education costs (field trips, tuitions, computers, student accommodation); covering debts for utilities and taxes; surcharge for flats and land purchase.

MFI Horizonti in partnership with Habitat Macedonia: “Home” housing loan

horizonti.org.mk/en/mikro-zaemi-za-domuvanje habitat.org.mk/index.php?page=portfolio

Duration: 2007 – ongoing

Recipients: Roma families and other marginalized groups with their own home, living in substandard conditions.

Managing body: MFI Horizonti in partnership with Habitat Macedonia

Loan terms: Amount: 50.000-300.000 MKD; Repayment period: 18, 24, 36, 48 and 60 months; Interest: 11% annually, declining; RTE from 21.62% to 23.82%.

Details: The “Home” housing loan was established in 2007 as a partnership by Habitat Macedonia and MFI Horizonti, creating a revolving fund to offer Roma families and other marginalized groups loans for the reconstruction of their homes. HFH Macedonia is responsible for identifying the housing needs and provides construction technical advice for the partner families. At the same time, MFI Horizonti assesses the creditworthiness of the partner families, administers the loans, and provides suitable financial control over the partner families, in order to achieve a proper repayment rate. The loans are for renovation, extensions, repairs, reconstruction, etc. More than 40% of the home improvements are for the purpose of improving energy efficiency, such as thermal insulation of the façade or changing old windows.

7. Identified gaps for successful establishment of OSS services

The OSS Habitat project, aims to compile and integrate various findings and outcomes from several R&I projects dealing with energy renovation of buildings and success stories of established OSS on EU level. This report includes a wide and comprehensive overview on the concept of one-stop shops. The analysis has identified multiple tools and services at the level of stakeholders, but also at a higher-level hints or policy recommendations for market activation, recommendations for setting up OSS, building their business models or empowering them with ad hoc tooling. The project re-MODULEES is one of the initiatives that provides a very intuitive recommendations’ portfolio [58].

Open-stop shops confirmed to be a decisive factor to accelerate the local market in building renovation. The diversity of IHRS models explored in the report showed various market activation modes and different portfolio of services, these services being highly dependent to the existing actors and the institutional network regulating and potentially financing.

Despite the fact that OSS could take multiple forms, it appears that this high diversity could be organized around a limited number of archetypal types. Each of these types is centered on its own value proposition: public, private or hybrid.

Public authorities could, and have to play a decisive role in preparing the legal environment in which OSS have to operate as well as easing the setting-up of OSS in a local market (business model, interaction with the financial sector, with local authorities if relevant). The ideal case is to enable full institutional and funding framework to guide all stakeholders and homeowners in their renovation journey. More specifically any move or supporting action towards the following dimensions will be very beneficial:

- More simplicity in the customer journey and especially with the funding bodies
- More human centered and a clear focus on property owner in its living context when setting up of the OSS service offer
- More standardization in the service offer, or at least homogenization.

By homogenization process of OSS **some ‘positive incentivization’ under the control of a national institution could facilitate their emergence**, such new entities with national public funding. Then the mission of an operator-assembler as a provider of integrated tailor-made solutions for various configurations will include: speeding up decision market and implementation, facilitating administrative procedures to obtain financing, design, implementation and reducing costs, resources and intervention times, integrated referring to technical digital, financial and insurance aspects.

Tooling of OSS matters. Offering to newly established OSS tooling environment with modular blocks to support their operation all along the customer journey. These tools could be tuned to the local needs of the renovation OSS and thus addresses the ‘no tool’ or ‘scattered tooling’ syndrome experienced by some OSS.

Knowledge sharing between OSS for favouring replication of OSS models and of their components having proven their success and adoption by the local ecosystems. Also enhancing all actions related to the establishment a space of dialogue and intermediations between heterogeneous populations (homeowners, intermediates, institutions, and authorities) is playing a beneficial role for successful OSS.

7.1. Identification of gaps

In order to develop a successful OSS for home renovation it is beneficial to follow the logic of integration as much as necessary (while as little as possible at the local implementation level). A well-planned customer journey shall be the result of balanced use of technical, digital, financial tools by an OSS team. A successfully supported customer journey ensured by an emerging or existing OSS usually have to accomplish various ‘bridging the gaps’ missions [58]:

- Bridging the tooling and complexity gap
- Bridging the funding gap: sustainability of business model of OSS remains a tricky part usually requiring public support and involvement of local authorities
- Bridging the trust gap between suppliers and the demand side by putting the owner at the center, under the benevolent eye of institutions.

All the above gaps to be fulfilled are born by the OSS’ multiple dimensions. Typical OSS have proven their value in:

- ✦ assisting homeowners (the demand side) in their renovation journey,
- ✦ building trust and confidence by liaising to reliable and trustworthy experts
- ✦ bridging some coordination gaps between the supply, the demand side and the finance/institutional side.

7.1.1. Identification of the national gaps for successful implementation of the OSS

Following the gap analysis proposed in the previous section and based on reMODULES project [58], for the national situation in the Macedonian construction sector in terms weather the environment is favorable for establishment of successful OSS, is evaluated.

The main conclusions are in accordance with the general observation all across EU:

Fragmentation of the sector is the first issue, having multiple construction companies, that offer construction and renovation work, but do not offer the services as advice, needs analysis and preparation of the tailored offer. The fragmentation issue is also present regarding the “advice” service, as there is significant number of design studios and companies that could offer and recommend tailored project for energy efficient home renovation, but not services that belong in the implementation phase. Another issue beside the mentioned above is the lack of renovation work offers that target deep renovation. This is influenced by *non-existing strict national regulation and definition*

on the aspect of deep renovation, not in terms of definition and measurable indicators nor in terms of legal obligations.

Unavailability of funding opportunities is important gap identified in national context. Although there are a number of funding schemes, they are very poorly promoted and the vast majority of potential customers are not familiar with the existing opportunities. Another issue is the high cofounding rate, that restricts the use of the available partial funding.

Mistrust in the quality of the performed work. Although the analysis of the national status in construction sector have identified abundance of activities for providing skilled workforce, their value is not always visible nor promoted. This is also linked with the absence of implementation of energy efficiency measures defined in the legislation, which could be overcome if renovation certificates are in place, which is not the case.

These general findings about the gaps in construction sector that inhibit expansion of renovation work of homes, are also validated (or better formulated confirmed) with the small-scale test survey involving 30 randomly chosen respondents – home owners, aiming to level their opinion about the biggest obstacles for making decision for home renovation. The results are presented at the following graph given on Figure 32.

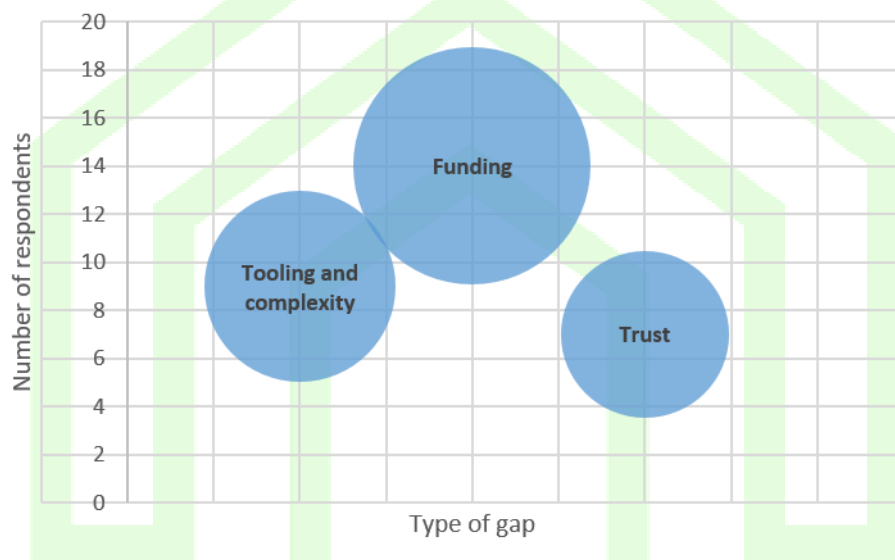


Figure 32. Levelling the influence of gaps for wider home renovation

The content of the three gap categories, ordered by the level of negative influence is given below in the Table 7.

Table 6 The list of gaps' issues according to the level of negative influence on the renovation decision

Tooling and complexity	Funding	Trust
-Strong fragmentation of different services -Absence of integrated service offer -Lack of tools to ease decision making	-Not familiar with funding opportunities -Complex application procedure -High cofounding rate	-Low confidence in the quality of work -High rate of delayed job finalization -The customers believe more to old "traditional" companies

These identified gaps will be further considered in the next section, in order to provide solutions and suitable recommendations.

7.2. Recommendations for overcoming the gaps

7.2.1. General recommendations

Currently, every implementing organization is developing its own version of OSS, resulting in a wide range of OSS models. The models can be differentiated by their ownership type, which broadly includes

- (i) industry-driven,
- (ii) consultant-driven,
- (iii) energy service company or utility-driven,
- (iv) local government driven, and
- (v) cooperative-driven models.

OSS can also be differentiated by the type of service they provide such as

- (i) facilitation-oriented, where the focus of the OSS is to give advice and put the homeowner in contact with the right installers,
- (ii) coordination-oriented, where the OSS coordinates the required work, and
- (iii) all-inclusive, where the OSS guides the building owner throughout the full renovation journey.

More than 60 OSS have appeared across the EU over the last 10 years [59]. Despite this, OSS remain a niche idea in the EU and the existing models have not achieved any particular scale. The roll-out of the Renovation Wave Strategy and concurrent Recovery and Resilience Facility plans make it clear that these services will have to become more mainstream. The development of more standardized OSS models, which can be replicated and quickly deployed across Europe, is an important step. However, the European Commission needs to address several barriers which are currently hampering an effective replication of OSS models.

Rapid deployment of OSS is required to double the Renovation Wave and to increase the overall quality of renovations. OSS are just one part of a wider policy package, which ought to include regulatory measures (e.g. mandatory minimum energy performance standards and taxonomy regulation), training programs for professionals, technical assistance support and communication campaigns. It also needs to include additional financial mechanisms and incentives, for example through European Investment Bank funds, the European Local Energy Assistance (ELENA) program and Project Development Assistance (PDA).

The role of the OSS could be to bring all these provisions together and make sure the result is attractive to homeowners across the EU. This section outlines 12 specific recommendations on how the European Commission can support a rapid deployment of OSS, divided into four broader categories [60]:

- 1) mandate Member States to ensure access to reliable renovation advice,
- 2) contribute to creating a favorable environment for establishing OSS services,
- 3) offer replicable OSS elements, and
- 4) provide detailed guidelines on how to develop and implement an OSS.



Mandate Member States to ensure access to reliable renovation advice

1. Require Member States to ensure the majority of building owners have access to reliable renovation advice



Contribute to creating a favorable environment for establishing one-stop shop services

2. Streamline technical assistance and funding requirements
3. Set up a standardized OSS project template
4. Set up an EU-wide certification for highly qualified experts
5. Build capacity at the local level to enable actors to implement one-stop shops
6. Encourage local authorities and financial institutions to get involved



Offer replicable one-stop shop elements

7. Toolbox of replicable OSS elements for local implementers
8. Set up standardized contract templates and use OSS to aggregate renovation opportunities
9. Explore how one-stop shops can be used to facilitate aggregation of renovation opportunities



Provide detailed guidelines on how to develop and implement a one-stop shop

10. Toolbox with guidelines and good practice examples for local implementers
11. Guidelines on how to involve stakeholders in the one-stop shop implementation
12. Explore how one-stop shops can be used to market deep renovations

7.2.2. Specific country related recommendations

As already presented in the previous sections of this report, preparation of a clever and effective Business model is a key step to establish a successful OSS.

A three-step approach to develop a Business Model - BM corresponding to a given OSS.

Step 1 - Carry out a market gap analysis for your local area. This step tackles the heterogeneity and fragmentation of the market to get the necessary knowledge about the typology of the building stock in the area, the typology of homeowners and tenants and their socio-professional categories, the home improvement needs and the status of the active actors in the area (e.g., suppliers, other OSS)

Step 2 - Choose your Business Model and legal structure. The selection of the best matching scheme results from the degree of maturity of the market, but also from the available resources (financial and

human). Usually, the public intervention is more necessary for less mature markets, as the one in North Macedonia.

Step 3 - How to work out the details the business model and plan? Instancing with actual projections in a business plan remain the trickiest part once the above steps are fulfilled. The safest way is deploying with a standard business model canvas: starting with the customer segments and the value proposition and then progressively quantify progressively and iteratively the 9 blocks that encompass the renovation journey.

When starting the creation of OSS two driving factors have to be thoroughly explored in their generic understanding:

- What are the generic features of Business Model design to reach sustainability on the long run?
- What are the generic features on the tooling for OSS to increase their efficiency in operation?

Having in mind the diversification between the three possible model options:

- the public,**
- the private and**
- a hybrid model of OSS,**

and the three different types of OSS according to the scope of service provided (as presented on Fig. 33), different scenarios to successfully overcome the gaps are further discussed.

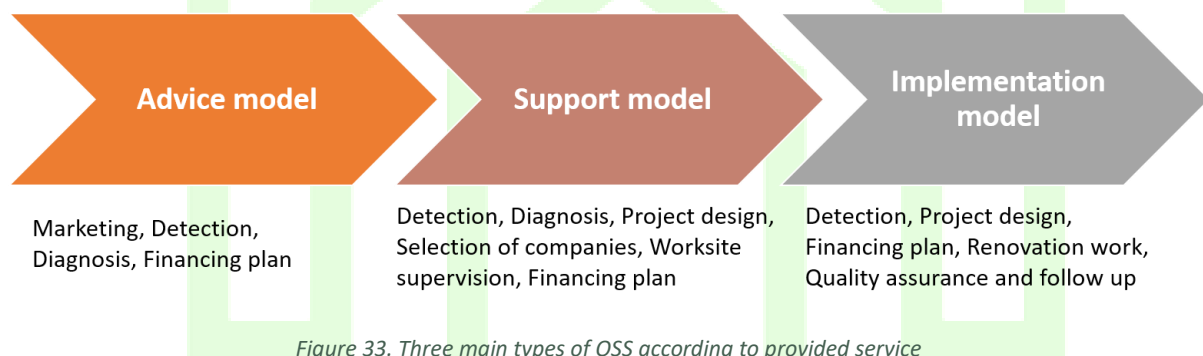


Figure 33. Three main types of OSS according to provided service

The public OSS model

The public OSS model, a privileged position for triggering confident onboarding and engagement of homeowners. Local authorities and municipalities are expected to play a key role in stimulating citizens toward home renovations and finding ways to stimulate local renovation markets. Despite relatively slow rates of home renovations, more and more experience has been accumulated in leveraging means and networks of home renovation stakeholders.

Local authorities have 'by-design' a high visibility on local needs, on the structure of the building stock (in its region or a city), the particularities of local architecture, of cultural norms, and on the supply side. They have thus a potential 'first-mover' role to provide advice and initial assessment to citizen exploring 'terrae incognita' of home renovations, or to a lesser extent to organize this service provision.

The dominant model is the advice model. However, a wide range of options in the service composition is possible. Most often coverage includes the phase of detection until the start of renovation works.

Advantages: The connection to the local authority which will create a solid trust foundation from the perspective of homeowners

- The complementarity between the role of the local authority and the role of the OSS
- The ability to interact directly with the customer
- The high degree of knowledge to the customer profiles (houseowners, representatives of social housing, etc.) as a proximity actor
- The availability of offices and reception spaces by the OSS for citizens is a factor that facilitates proximity and building of trust.

Challenges:

Barriers of the legal context.

- Municipal/public OSS have to comply to some limitations as local public servant. Provision of information on qualified suppliers must comply with restrictions from the 'public procurement law'. Transparency on the selection criteria of the supplier to avoid accusation in breaking competition rules. Another related aspect is the compliance with data privacy constraints.
- Multiple layers or different authorities involved could impact or delay decision making. When different authorities are involved with their own missions, coordination could be tricky.

On the economic model of the OSS and its efficiency:

- Facing the costs of the awareness raising stage
- Onboarding customers in an efficient way
- Facing the limitation of public funding which reduces the volume of services that can be offered
- The continuous search for efficiency, that could be facilitated by tooling.

On the quality and relevance of the service offered:

- The lack of technical expertise in some municipal / public OSS or lack of skilled personnel (e.g., project coordinators, technical advisors, or OSS managers)
- The necessity to ensure a high level of quality of the registered supplier

On the sustainability of the OSS business model:

- Next to the presence of multiple authority (governance aspects), the dependence to the political context (change after elections) may be a negative factor
- The perennity of public funding to ensure the perennity of the public OSS
- Securing the supply side on the OSS territory (for example by avoiding bureaucracy for the selection process, or by maintaining legal requirements stable over time).

The Private OSS Model for support and implementation

As already introduced in the generic features and the multi-sided business models, One-stop shop can be seen as a provider or intermediate that helps to develop integrated, tailor-made designs for every situation that is asking for assistance and as a potential matchmaker. The dominant model is the implementation model but private OSS may also offer only advice and support. **However, this scenario is the one with the highest probability to be established in North Macedonia.**

Advantages: The private OSS are driven by the quality of renovation works, trust, cost benefit, efficiency.

- The founding asset is the business assets, the portfolio of customers and the network of suppliers co-working on the offer, usually the renovation works.
- Another asset is the access to updated information on public or private funding during the advice / support phase.
- Last, the ability to execute the service offer in due time and high standards of quality and transparency of costs to build trust.

Challenges:

- Usual conditions of success for a private business: Quality of service, build confidence, cost efficiency, qualified personnel, customer focus.
- Ability to access public funding to support its development by activating EU, national or regional support for OSS (e.g., Elena, Life projects, etc.).

The mixed-ownership OSS Model, a role-centred configuration to push deep renovation rates

The mixed ownership OSS configuration can be considered as a derivation of the public-type OSS initiated by a local authority or municipality. In a context of increasing attractiveness of the OSS to engage homeowners and push further renovation activity, multiple examples of mixed ownership have been observed: the OSS can be set up by a single entrepreneur and by a multi-disciplinary team, can be Public-Private Partnership or semi-public entities, a joint venture of retailers with industry and contractors among most prominent examples.

The mixed ownership OSS are driven by the governance between shareholders, quality of renovation works, trust, cost benefit, efficiency. This model shows the expected dominance of the support and implementation model.

Advantages: They derive directly from the assets of the public and the private model, including the most important ones from the both:

- The connection to the local authority and the complementarity between the role of the local authority and the role of the OSS.
- The business assets taking the form of the portfolio of customers and the network of suppliers co-working on the offer, usually the renovation works.

Challenges: In addition to the challenges formulated in the previous category, one could highlight here:

- The governance aspects among shareholders with possibly divergent views to ensure sustainability and financial autonomy of the structure over the long run.
- The management of the supply side implies the question of trust and of the attractiveness of the business model to the private actors. Usually, the suppliers are SME with often less than 5 employees that do not want to bother with certifications and complexity rather than be directly active in the market. There is a challenge to maintain their interest despite the complexity of maintaining a dynamic supply offer in a region.

This scenario, although with not high probability to be established in North Macedonia is the most suitable, according to the status of renovation, nationally.

Conclusions

This report presents an overview of the status and potential for establishment of One-stop shops for home renovation in North Macedonia. By presenting the state-of-the-art of the European OSS services, and conducting a comprehensive study of the available models and types of provided renovation services, as well as different business models, the most common barriers and challenges for each of them are identified.

The document also gives a review of EU funded projects in construction and particularly on home renovation services as a relevant example of the preceded actions, in order to identify the lessons learnt from these projects. Specifically, the projects that were implemented in North Macedonia were considered.

The second part of the report include the findings from the conducted profound analysis of the national market assessment. This research is categorized for analysis in following way:

- ◆ technical and social diagnosis;
- ◆ building analysis/energy audits: renovation roadmap/project design;
- ◆ coordination of renovation works (permits, contracting for work, supervision and quality assurance);
- ◆ financing; subsidies and guarantee.

The report is finalized with elaborated recommendations based on the gap analysis. Three different scenarios for OSS are considered to evaluate which one corresponds the best to the national needs for home renovation and offer a whole scope of services for the home owners, through the entire renovation journey.

References

- [1] COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE EUROPEAN COUNCIL, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS The European Green Deal, COM/2019/640 final, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2019%3A640%3AFIN>
- [2] EC. (2017a). The 2020 climate and energy package. [Online] February 11, 2017. http://ec.europa.eu/clima/policies/package/index_en.htm
- [3] EC. (2017b). 2020 Framework for climate and energy policies. [Online] 9 February 2017. http://ec.europa.eu/clima/policies/2030/index_en.htm
- [4] EC. (2017c). EU action on climate. [Online] February 9, 2017. <http://ec.europa.eu/clima/policies/brief/eu/>
- [5] Gevorgian A., Pezzutto S., Zambotti S., Croce S., Filippi Oberegger U., Lollini R., Kranzl L., Müller A., European Building Stock Analysis, Bolzano, Italy: EURAC Research, 2021, ISBN 978-88-98857-68-5
- [6] Jens Laustsen, J; Ruysevelt, P; Staniaszek, D; Strong, D; (2011) Europe's Buildings under the Microscope: A country-by-country review of the energy performance of buildings. Buildings Performance Institute Europe (BPIE): Brussels, Belgium.
- [7] Pezzutto, S., Zambotti, S., Croce, S., Zambelli, P. Building stock analysis-Methodology. [Online] 2019. <https://gitlab.com/hotmaps/building-stock>.
- [8] Karl Dickinson, Sustainable Buildings Retrofitting Shallow & Deep – Different Dives into Retrofitting, June 25, 2021, <https://citychangers.org/shallow-deep-retrofits/>
- [9] COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS A Renovation Wave for Europe - greening our buildings, creating jobs, improving lives, COM/2020/662 final, <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1603122220757 &uri=CELEX:52020DC0662>
- [10] Renovation Wave: doubling the renovation rate to cut emissions, boost recovery and reduce energy poverty, press release, 14 October 2020, https://ec.europa.eu/commission/presscorner/detail/en/ip_20_1835
- [11] Marina Economidou et all. Europe's buildings under the microscope, Buildings Performance Institute Europe (BPIE). ISBN: 9789491143014 (2011)
- [12] European Commission (2008). Accompanying document to the Proposal for a Recast of the Energy Performance of Buildings Directive (2002/91/EC) - Impact Assessment, SEC(2008) 2864.
- [13] Addressing the environmental and climate footprint of buildings, European Environment Agency, 2024, ISBN 978-92-9480-677-2, doi:10.2800/1800539
- [14] BPIE (Buildings Performance Institute Europe) (2021). Deep Renovation: Shifting from exception to standard practice in EU Policy. <https://www.bpie.eu/publication/deep-renovation-shifting-from-exception-to-standard-practice-in-eu-policy/>
- [15] Ministry of Transport, Mobility and the Urban Agenda of Spain (2020). 2020 Update of the long-term strategy for energy renovation in the building sector in Spain.
- [16] Netherlands Enterprise Agency (2020). Long-term renovation strategy.
- [17] BPIE (Buildings Performance Institute Europe) (2022). Report on the evolution of the European regulatory framework for buildings efficiency
- [18] BPIE, On the way to a Climate-Neutral Europe, 2020, https://www.bpie.eu/wp-content/uploads/2020/12/On-the-way-to-a-climate-neutral-Europe-_Final.pdf

- [19] EPB Center, <https://epb.center/epb-standards/energy-performance-buildings-directive-epbd/> (accessed January, 2025)
- [20] Directive (EU) 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings (recast) (Text with EEA relevance) PE/102/2023/REV/1, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202401275&pk_keyword=Energy&pk_content=Directive (Accessed January 2025)
- [21] A European Green Deal, European Commission https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en (Accessed January 2025)
- [22] Renovation Wave, European Commission https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/renovation-wave_en (Accessed January, 2025)
- [23] BPIE, The European Renovation Wave: From words to action, 2020, https://www.bpie.eu/wp-content/uploads/2020/10/Renovation-Wave-briefing_04.pdf (Accessed January 2025)
- [24] European Commission, The 2021-2027 EU budget – What’s New? https://ec.europa.eu/info/strategy/eu-budget/long-term-eu-budget/2021-2027/whats-new_en (Accessed January 2025)
- [25] European Commission, Invest EU Fund, https://europa.eu/investeu/home_en, (Accessed January 2025)
- [26] European Commission, Energy Performance of Buildings Directive, https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/energy-performance-buildings-directive_en (Accessed January 2025)
- [27] Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955 (recast) (2023), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ%3AJOL_2023_231_R_0001&qid=1695186598766 (Accessed January 2025)
- [28] Christophe Milin, Adrien Bullier. Towards large-scale roll out of “integrated home renovation services” in Europe, European Climate, Infrastructure and Environment Executive Agency, European Commission (2021)
- [29] Julianna PUETT, Irene PEREZ BELTRAN, Amelie CLEMOT, Vincent GUILLEE, Katya DIAZ SALCEDO, One-Stop Shops for Energy Communities: Mapping Service Design Attributes, Synergies, and Challenges Sciences Po Paris (2024)
- [30] Brown, D. (2018). "Business models for residential retrofit in the UK: a critical assessment of five key archetypes." Energy Efficiency 11: 1497-1517.
- [31] Commission Staff Working Document Impact Assessment. SWD/2014/015 final. Accompanying the document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions A policy framework for climate and energy in the period from 2020 up to 2030 (2014)
- [32] Accelerating clean energy in buildings. Annex to the Clean Energy For All Europeans. Brussels, 30.11.2016. COM(2016) 860 final.
- [33] Bullier A., Milin C. (2013). Alternative financing schemes for energy efficiency in buildings. ECEEE 2013 Summer study.
- [34] Maarten De Groote, Marianne Lefever, Driving transformational change in the construction value chain: reaching the untapped potential, 2016, Buildings Performance Institute Europe, <https://bpie.eu/wp-content/uploads/2016/01/DrivingTransformationalChangeCVC2016.pdf>
- [35] Boza-Kiss, B. and P. Bertoldi (2018). One-stop shops for energy renovations of buildings: Case studies. One stop shops in the EU. P. Bertoldi. Ispra, Italy, European Commission. 1: 64.
- [36] Boza-Kiss, B., Bertoldi, P., Della Valle, N. and Economidou, M., One-stop shops for residential building energy renovation in the EU, EUR 30762 EN, Publications Office of the European Union, Luxembourg, 2021, ISBN 978-92-76-40100-1, doi:10.2760/245015, JRC125380.

- [37] Refabert, F. (2019). Webinar - Financing Home Renovation in Europe. Sustainable Energy Investment Forums.
- [38] Paolo Bertoldi, Benigna Boza-Kiss, Nives Della Valle, Marina Economidou, The role of one-stop shops in energy renovation - a comparative analysis of OSSs cases in Europe, Energy and Buildings, Volume 250 (2021) 111273, ISSN 0378-7788, <https://doi.org/10.1016/j.enbuild.2021.111273>
- [39] EU Peers Community for Integrated Home Renovation Services, <https://www.eu-peers.eu/about-us> (Accessed January 2025)
- [40] Official results of the Census 2021, State Statistical Office, 2021, <https://popis2021.stat.gov.mk/#> (Accessed January 2025)
- [41] Register of multiapartment buildings in North Macedonia, <https://domuvanje.org.mk/reelih/?mun=registar> (accessed January 2025)
- [42] Law of energy, Ministry for energy and mineral resources, (2024) <https://www.ea.gov.mk/%d0%bf%d1%80%d0%be%d0%bf%d0%b8%d1%81%d0%b8/>
- [43] Energy Development Strategy in Republic of North Macedonia until 2040, Energy, water services and municipal waste management services Regulatory Commission of the Republic of North Macedonia, https://www.erc.org.mk/page_en.aspx?id=284
- [44] Law of energy efficiency, Energy, water services and municipal waste management services Regulatory Commission of the Republic of North Macedonia, https://www.erc.org.mk/page_en.aspx?id=284
- [45] Law for environment, Ministry for environment and physical planning, <https://www.moepp.gov.mk/regulativa/nacionalno-zakonodavstvo/zivotna-sredina/zakon-zivotna-sredina>
- [46] Strategy for protection of environment and climate changes, Ministry for environment and physical planning, <https://www.moepp.gov.mk/dokumenti/strategii>
- [47] BUILD UP Skills MK, Pillar I project (2012-2013), <https://build-up.ec.europa.eu/en/skills/projects/build-skills-north-macedonia-pillar-1>
- [48] BUILD UP Skills BEET, Pillar II project (2014-2016), <https://build-up.ec.europa.eu/en/skills/projects/build-skills-north-macedonia-pillar-2-beet>
- [49] Toward market-based skills for sustainable Energy Efficient construction – TRAINEE, 785005 – TRAINEE – H2020-EE-2016-2017/H2020-EE-2017-CSA-PPI (2018-2020), <https://trainee-mk.eu/en/>
- [50] Sustainable Energy Skills in construction: Visible, Validated, Valuable – SEETheSkills 101033743 – SEETheSkills – H2020-LC-SC3-2018-2019-2020 / H2020-LC-SC3-EE-2020-2 (2021-2024), <https://seetheskills.eu/>
- [51] Community Tailored Actions for Energy Poverty Mitigation ComAct, H2020-LC-SC3-EE-2019 (2020-2024), <https://comact-project.eu/the-project/>
- [52] Award Excellence, Invest in Trust: Tailored Energy Management Services for East European Local Authorities EXCITE, H2020-LC-SC3-2018-2019-2020 (2020-2023), <http://www.excite-project.eu/>
- [53] Tailored measures supporting energy vulnerable households – EnergyMEASURES, H2020-LC-SC3-2018-2019-2020, <https://energymeasures.eu/>
- [54] Registry of licensed companies for construction work issued by the Ministry for transport of North Macedonia, <https://www.mtc.gov.mk/licenci-gradeznistvo-formulari/Registar-za-izdadeni-litsentsi-za-gradenje->
- [55] Statistical Bulletin of the Central Registry of RNM, <https://www.crm.com.mk/en/open-data/statistical-bulletin>

- [56] The Ministry of Economy started with measures for subsidies for solar collectors and PVC/aluminum windows in households, <https://dejure.mk/zakon/promocija-na-obnovlivi-izvori-na-energija-i-pottiknuvanje-na-energetska-efikasnost-vo-domakjinstvata-za-2021-godina>
- [57] Green Economy Financial Facility- GEFF, <https://ebrdgeff.com/macedonia/the-programme/eligibility-assessment-services/#>
- [58] Athanase Vafeas, The re-MODULEES One-Stop Shops guidelines (2024) www.re-modulees.eu
- [59] Economidou, M et. al. (2021) One-stop shops for residential building energy renovation in the EU. European Commission. [Report] Available: <https://op.europa.eu/en/publication-detail/-/publication/423a4cad-df95-11eb-895a-01aa75ed71a1/language-en>
- [60] Jonathan Volt, Orlaith McGinley, Underpinning the role of One-Stop Shops in the EU Renovation Wave, (2021) www.turnkey-retrofit.eu

