

June 2024



Bringing European Building Policy to Life

# Article 9: MEPS and trajectories for progressive renovation

## Policy needs and analysis of good practice examples

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This project has received funding from the European Union's LIFE programme under grant agreement No.101120194. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor CINEA can be held responsible for them.

Project number	101120194
Start date of the project	October 2023
Duration of the project	33 months
Deliverable number	3.1
Deliverable leader	e-think energy research
Reviewers	Lukas Kranzl (TU Vienna), Denisa Diaconu, Jules Oriol, Caroline Milne (BPIE), Martin Pehnt (Ifeu)

Version	Date	Beneficiary	Author
V0.1	08.03.2024	e-think	First draft: Francesca Conselvan and Marcus Hummel
V0.2	22.04.2024	e-think	Draft for internal review: Francesca Conselvan and Marcus Hummel
V0.3	29.04.2024	e-think	Final version: Francesca Conselvan and Marcus Hummel

## About EPBD.wise

EPBD.wise aims to kickstart action to bring to life the recast European Performance of Buildings Directive (EPBD) as part of making EU climate goals a reality. Over the course of three years, project partners worked with public authorities (such as municipalities, energy agencies, etc.) in six European countries: Bulgaria, Greece, Hungary, Poland, Romania and Ukraine. The overarching aim was to ensure the design, implementation and evaluation of key provisions to ensure EU buildings align with climate goals. Starting with investigation of needs and good practices in the six focus countries, EPBD.wise builds replicable models to support the widespread implementation of effective measures across Europe.

For more information, follow EPBD.wise on [X](#), [LinkedIn](#) or visit the [website](#).

## Contents

Executive summary .....	4
List of abbreviations.....	5
List of figures .....	6
List of tables .....	6
1 Introduction .....	7
1.1 Scope and objectives of the Deliverable .....	7
1.2 Structure of the Deliverable .....	7
1.3 Relations to other tasks and deliverables.....	7
1.4 Status quo of Article 9 in the recast EPBD (2024/1275).....	7
2 Methods and procedures.....	9
2.1 Challenges and policy needs .....	9
2.1.1 Survey of policy needs in focus countries .....	9
2.2 Definition of good practice .....	9
2.2.1 General criteria.....	9
2.2.2 Criteria specifically addressing Article 9.....	10
2.2.3 Template for good practice description .....	11
3 Policy needs regarding implementing Article 9 .....	11
3.1 Policy needs identified from desk research.....	11
3.2 Policy needs identified from stakeholder workshops.....	13
3.3 Policy needs identified from questionnaires to focus countries .....	14
3.3.1 Bulgaria .....	14
3.3.2 Greece.....	15
3.3.3 Hungary.....	16
3.3.4 Poland .....	17
3.3.5 Romania .....	19
3.3.6 Ukraine .....	20
4 Good practice examples and status quo analysis.....	20
4.1 Summary of good practice examples.....	20
4.1.1 Belgium Flanders region .....	21
4.1.2 Belgium Brussels region .....	21
4.1.3 England and Wales .....	22
4.1.4 France .....	23

4.1.5	The Netherlands .....	24
4.1.6	Scotland .....	24
4.2	Summary of lessons learned .....	24
4.2.1	Trigger points for renovation .....	24
4.2.2	Strategies to enforce renovation .....	25
4.2.3	Elements to support renovation policy .....	25
5	Overall conclusions and recommendations beyond the scope of the project ...	26
	References .....	29
	Annex 2: Questions to representatives of focus countries .....	32
	Annex 3: Good practice #1 .....	34
	Annex 4: Good practice #2 .....	37
	Annex 5: Good practice #3 .....	41
	Annex 6: Good practice #4 .....	44

## Executive summary

The EPBD.wise project is dedicated to assisting public authorities in six focus countries (Bulgaria, Greece, Hungary, Romania, Poland, and Ukraine) in implementing the provisions of the recast Energy Performance of Buildings Directive (EPBD) (2024/1275). This deliverable addresses the implementation of Article 9, specifically minimum energy performance standards (MEPS) for non-residential buildings and trajectories for progressive renovation of the residential building stock.

The primary objective of this deliverable is to conduct an in-depth analysis of the policy needs of the focus countries to effectively implement Article 9, while also providing a comprehensive overview of the successes and barriers encountered in existing good practices across EU countries.

The structure of the deliverable involves two main parts. First, deriving the policy needs of the focus countries through questionnaires, bilateral discussions, and roundtable sessions with national stakeholders from the buildings sector, and from other relevant projects and studies. Second, conducting desk research to identify good practice examples from countries that have already implemented instruments relevant to Article 9, both in residential and non-residential sectors. From these examples, insights into best practices and barriers are extracted, along with questions for further analysis and discussion.

EPBD.wise underlines that the two policy needs questionnaires to the focus countries were developed at the project's outset, prior to the release of the final version of the EPBD. This explains the project's primary focus on MEPS. In its next phase, EPBD.wise will also address strategies for the progressive renovation of the residential building stock.

Regarding the elaboration of Article 9, EPBD.wise identified five main policy needs: 1) better availability and understanding of building stock data, in particular for the non-residential sector; 2) support in defining worst-performing buildings and methodology to identify them; 3) identification of investment needs, budgetary resources and how to leverage private investments; 4) enabling frameworks, such as energy performance certificates (EPCs), renovation passport (RPs) and training of qualified workforce; and 5) compliance the quality of the renovation.

It is important to note that this deliverable does not offer recommendations. Rather, it aims to identify and compile the policy needs upon which tailored recommendations will be developed in subsequent stages of the project. This approach ensures that recommendations to be developed in further steps of the project are specific to the needs and contexts of the focus countries.

In conclusion, this deliverable represents an essential step in the EPBD.wise project, laying the foundational knowledge and strategic framework necessary for developing tailored, actionable policy recommendations in the next phases of the project.

## List of abbreviations

BRP	building renovation passport
CDC	<i>Caisse des Dépôts et Consignations</i>
DHW	domestic hot water
EE	energy efficiency
EEO	energy efficiency obligation
EPB	energy performance of buildings
EPBD	Energy Performance of Buildings Directive
EPC	energy performance certificate
FCCP	focus country contact point
GHG	greenhouse gas
LTRS	Long-Term Renovation Strategy
MEPS	minimum energy performance standards
MFB	multi-family building
MS	Member States (EU)
NBRP	National Building Renovation Plan
nZEB	nearly zero energy building
OSS	one-stop shops
PV	Photovoltaic (solar)
RP	renovation passport
RVO	<i>Rijksdienst voor Ondernemend Nederland</i>
SFB	single-family building
WP	work package
WPB	worst-performing building
ZEB	zero-emission building

## List of figures

<b>FIGURE 1</b> MINIMUM REQUIREMENTS FOR NON-RESIDENTIAL BUILDINGS. MS MUST DERIVE THE 16% AND 26% THRESHOLD OF WPBS BASED ON THE PRIMARY OF FINAL ENERGY CONSUMPTION. ....	8
<b>FIGURE 2</b> RENOVATION ROADMAP FOR RESIDENTIAL STOCK. PRIMARY ENERGY CONSUMPTION MUST DECREASE OF 16% BETWEEN 2020 AND 2030, AND 20%-22% BETWEEN 2020 AND 2035. ....	9

## List of tables

<b>TABLE 1</b> CRITERIA FOR SELECTING GOOD PRACTICE EXAMPLES FOR MEPS AND PROGRESSIVE RENOVATION OF THE RESIDENTIAL SEGMENT .....	10
<b>TABLE 2</b> OBLIGATIONS FOR RESIDENTIAL BUILDINGS (AT THE INDIVIDUAL'S CHOICE).....	21
<b>TABLE 3</b> OBLIGATIONS FOR THE SERVICE SECTOR.....	22
<b>TABLE 4</b> PENALTIES ACCORDING TO THE INFRINGEMENT AND ITS DURATION IN ENGLAND AND WALES .....	23

# 1 Introduction

## 1.1 Scope and objectives of the Deliverable

This Deliverable aims to explore the policy needs and challenges related to MEPS for non-residential buildings and trajectories for progressive renovations of residential buildings as specified in Article 9 of the recast EPBD (2024/1275). The EPBD.wise project focus on six European countries: Bulgaria, Greece, Hungary, Poland, Romania and Ukraine.

EPBD.wise will identify specific policy needs for each country, with the aim of understanding the specific national circumstances surrounding Article 9 implementation and elucidating the broader policy contexts that influence its effectiveness. In addition, EPBD.wise will consider good practice examples from European countries that have already implemented instruments such as MEPS and trajectories for progressive renovation in both the residential and non-residential segments. In turn, EPBD.wise will analyse these cases, assess their implications and barriers, and identify key components of best practices to replicate in the focus countries.

The objective of this document is to lay the foundation for the project's second phase, which involves developing customised recommendations for successfully implementing Article 9 in the focus countries, particularly Poland and Romania, which have shown significant interest.

## 1.2 Structure of the Deliverable

The Deliverable covers Article 9 of the recast EPBD (2024/1275). Chapter 2 covers methods and procedures used in carrying out this Deliverable. Chapter 3 presents policy needs identified through desk research, interactions with stakeholders of focus countries and a set of questions sent to the representatives of these countries. Chapter 4 provides a summary of good practices from countries that have previously implemented measures akin to MEPS and progressive renovation of the residential building stock.<sup>1</sup> The report wraps up with some general conclusions on how the project consortium will develop policy guidelines (Deliverables 3.2 and 3.3) for the efficient and effective implementation of Article 9 in further phases of this project.

## 1.3 Relations to other tasks and deliverables

Methods and procedures for collecting policy needs and good practice examples have been jointly developed for the following work packages (WPs) in the project: zero-emission buildings (ZEB) and national building renovation plans (NBRPs), MEPS, building renovation passports (BRPs), and EPCs. The interrelationships and potential synergies among the individual topics are considered throughout the report. These interrelationships will also be taken up in a cross-cutting deliverable on the summary of policy needs across all topics and work packages.

## 1.4 Status quo of Article 9 in the recast EPBD (2024/1275)

The Energy Performance of Buildings Directive (EPBD) sets out a policy framework for the EU to achieve a fully decarbonised building stock by 2050. Recent revisions, within the recast EPBD (2024/1275), introduce new measures for the renovation of existing buildings, specifically MEPS for non-residential buildings and a national trajectory for residential

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<sup>1</sup> Good practice examples are described in more detail in Annex 3-6.

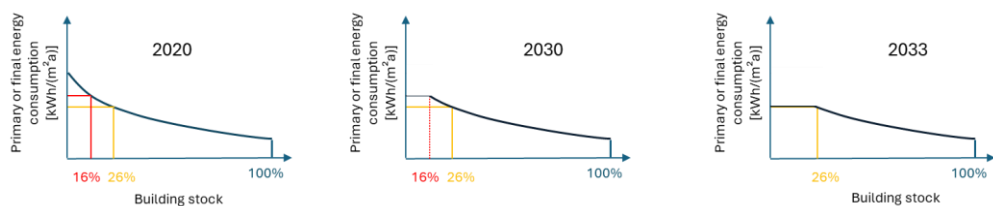


buildings. As summarised below, they aim to increase the rate of renovation, particularly for the worst-performing buildings in each country.

#### a) MEPS for non-residential buildings

- Member States (MS) will need to establish regulations and programmes that will lead to renovating the 16% worst-performing non-residential buildings by 2030 and the 26% worst-performing non-residential buildings by 2033. According to EPBD, MS will be able to choose whether to express the thresholds in either primary or final energy use (Figure 1).

**Figure 1** Minimum requirements for non-residential buildings. MS must derive the 16% and 26% threshold of WPBs based on the primary or final energy consumption.



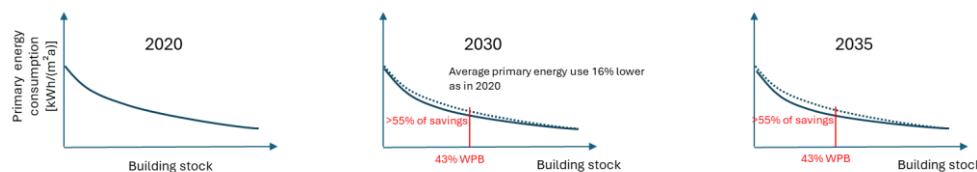
- The maximum energy performance threshold will be established based on available information and, where appropriate, on statistical sampling for the non-residential building stock as of 1 January 2020.
- The maximum energy performance threshold may be differentiated across different building types and categories.
- MS may define additional indicators of non-renewable and renewable primary energy use.
- MS must identify individual buildings that can be exempted from MEPS, such as buildings for religious activities, historical buildings, agricultural buildings and buildings owned by armed forces. MS must ensure that the criteria for such exemptions are clear and that equivalent energy performance improvements are achieved.<sup>2</sup>

#### b) Trajectories for progressive renovation of the residential building stock

- MS are required to ensure a national trajectory that decreases the average primary energy use of the entire residential building stock as follows: at least 16% by 2030; 20% by 2035; and 22% by 2040. Thereafter, every five years must show a progressive decrease of average primary energy use from 2030 to 2050 (Figure 2).

<sup>2</sup> Criteria to exempt individual buildings, estimated share of exempted buildings, estimation of equivalent energy performance improvements due to exempted buildings must be reported in the NBRP (recast EPBD (2024/1275) §9.6 and Annexe II).

**Figure 2 Renovation roadmap for residential stock.** Primary energy consumption must decrease of 16% between 2020 and 2030, and 20%-22% between 2020 and 2035.



- The national trajectory shall be in line with the national roadmap, as well as the 2030, 2040 and 2050 targets, and should be part of the NBRP.
- MS will have to identify the number of buildings and building units or floor areas to be renovated annually, including the number of worst-performing buildings.
- MS should prioritise addressing energy poverty by offering adequate financial and technical support to vulnerable households (Article 6), and should ensure implementation of MEPS by introducing appropriate monitoring and penalty schemes (Article 7).

## 2 Methods and procedures

### 2.1 Challenges and policy needs

The following compilation and review of challenges and policy needs are based on the results provided by other projects and studies, discussions with national stakeholders, and literature review. Specific attention is paid to the six focus countries selected in the EPBD.wise project. However, to replicate results in all EU Member States, the compilation and analysis of policy needs is not meant to be limited to only the focus countries.

#### 2.1.1 Survey of policy needs in focus countries

For the six focus countries (Bulgaria, Greece, Hungary, Poland, Romania and Ukraine), EPBD.wise compiles a list of questions to be answered by country representatives (see Annex 2: Questions to representatives of focus countries; for detailed answers, see Section 3.3). Please note that EPBD.wise developed the questions for focus countries at the project's outset, before the final version of the EPBD was available. This explains why findings primarily refer to MEPS. The questionnaire aimed to investigate whether a broader economic and policy context might have impacts on the implementation of MEPS and of Article 9 in general.

### 2.2 Definition of good practice

The compilation of good practice examples is based on both general and specific criteria that apply to MEPS and to trajectories for progressive renovation of the residential building stock. Criteria were compiled based on the identified challenges and policy needs.

#### 2.2.1 General criteria

In general, good practice examples respond to the general challenges outlined in the Grant Agreement. These challenges are relevant for all WPs (i.e. 2 through 5) and have been further developed to establish a set of criteria to define good practice as shown in Table 1. Good practice examples can provide solutions and/or responses to one or more criteria as listed in Table 1.

**Table 1** Criteria for selecting good practice examples for MEPS and progressive renovation of the residential segment

<b>Good governance</b>
Collaboration among regional, federal and municipal levels (vertical and horizontal) to tap the full potential of available data on building stock
Policies and actions to target non-residential and public buildings
Stakeholder participation, including civil society: know-how is available, which is being used in the policy process
<b>Data availability, accessibility and quality for effective policymaking</b>
Data quality assurance
Data availability and access for understanding the worst-performing buildings and different design options
Data availability and access for monitoring progress in the building stock and evaluating policy impacts
Monitoring system of compliance
<b>Estimation of the impacts, in particular, the broader benefits of energy efficiency</b>
The complex interplay among different instruments, effects and measures is considered for assessing the impacts of policy instruments and addressing the energy performance of the building stock
<b>Construction industry and labour and skill shortages</b>
Overview of national initiatives to promote smart technologies and skills and education in the construction and energy efficiency (EE) sectors
Development of training modules and on-site training
<b>Clear presentation of co-benefits</b>
Estimation of expected energy savings
<b>Financing</b>
One-stop shops
Financing the investment cost of renovation measures
Use of public funds to leverage private-sector investment or address specific market failures

In addition to the general challenges of implementing the recast EPBD (2024/1275), several specific important aspects, particularly for the topic of Article 9, are described below.

### 2.2.2 Criteria specifically addressing Article 9

Implementing instruments, such as MEPS and trajectories for progressive renovation, in various regions and countries can serve as reference to effective practices in addressing barriers to energy efficiency in buildings. EPBD.wise analysis focuses on shortlisted examples that exemplify successful strategies in overcoming obstacles to implementation. These examples shed light on:

- Specific segments of the building stock, especially worst-performing buildings, that were targeted for renovation as well as buildings eligible for exemption.
- Trajectories for the progressive renovation of the residential segment by reducing final energy consumption.

- Methodologies to identify and address worst-performing buildings in the residential segment.
- Trigger points to incentivise renovation.
- Adopted programmes and strategies to encourage renovation.
- Tools and solutions employed to facilitate MEPS implementation, such as technical assistance (including technical support mechanisms to coordinate resources and expertise effectively).
  - Availability of financial schemes to incentivise renovation activities and promote investment in energy-efficient technologies.
  - Monitor compliance and ensure the quality of renovations, while also highlighting efforts to communicate the societal benefits of energy-efficient buildings to the broader community.

### 2.2.3 Template for good practice description

Based on the definition provided in the previous section, EPBD.wise developed a template for documenting good practice examples (see also Deliverables 2.1, 4.1 and 5.1). Good practice documentation is also available as separate annexes (Annexes 3 through 6) to enable flexible use of the content in discussions and for target-group oriented dissemination.

## 3 Policy needs regarding implementing Article 9

The following section pays specific attention to the six focus countries of EPBD.wise. However, to support to transfer of the results to other EU Member States, the compilation and analysis of policy needs is also relevant for other EU Member States.

### 3.1 Policy needs identified from desk research

This section summarises the main policy needs and challenges that Member State may face when implementing Article 9. Policy needs have been elaborated through desk research that covers European as well as national projects, programmes and initiatives. Analysis of various forms of MEPS and regulatory instruments targeting building renovation across different building segments and countries suggested the following policy needs.

**Metrics to assess building energy performance:** The primary metrics used include EPC class and kilowatt-hour per square meter (kWh/m<sup>2</sup>). Policymakers target the renovation of worst-performing buildings by setting a minimum EPC class.

- Addressing policy needs: Adopt methods to assess buildings that communicate performance and allow for comparisons.

**Triggers for compliance:** Existing standards typically use building life-cycles as trigger points, such as major renovation or building transactions (sale or rent). A clear trend is emerging towards implementing more performance standards in rented residential and non-residential buildings. Older buildings often lack modern energy-efficient features, leading to higher energy consumption and costs for tenants.

- Addressing policy needs: Establish mechanisms to distinguish between rented and owner-occupied buildings.

**Exemptions:** While establishing stringent standards is important, so is considering exemptions for certain cases, such as protected buildings, those designated as historically significant, places of worship, temporary structures, and low-energy-use industrial and

agricultural buildings. Other criteria may include renovation costs, payback periods and architectural constraints. Buildings falling below certain usage thresholds could also be exempted.

- Addressing policy needs: Elaborate a methodology to define exemptions.

**EPCs:** Currently the most widely used compliance tool, EPCs allow before and after comparisons to determine if building renovations resulted in the energy performance improvements associated with renovation funding.

- Addressing policy needs: Establish a system of EPCs and an EPC database for open and transparent access. Additionally, to avoid poor quality and assessments, set up mechanisms to monitor the quality of the EPC issued by energy audits.

**Technical assistance:** Renovation policy should be supported by providing advisory services to ensure that building owners understand the requirements of and resources available for compliance. One-stop shops (OSS) can facilitate technical assistance, with special attention to the worst-performing buildings and various types of housing.

- Addressing policy needs: Boost the presence of one-stop shops or advisory service, as well as the channels through which services are delivered (e.g. local authorities, energy agencies, industry and the non-profit sector).

**Qualified workforce:** Increasing demand for energy renovations will require a significantly larger number of specialised workers. Education, training and skills development are needed across the construction sector and in related fields.

- Addressing policy needs: Support education, training and certification programmes for builders, architects and energy auditors to ensure high-quality renovation.

**Financial support:** Lack of funding and financing options are a main barrier to renovation. Providing a comprehensive financial ecosystem, such as renovation grants and tax benefits, encourages compliance and offsets costs for property owners.

- Addressing policy needs: Define a comprehensive financial ecosystem of public and private schemes, suited to diverse sectors and situations of building owners and occupants.

**Enforcement and/or penalties:** Enforcement of standards at the local level is a feature for almost all the good practice examples reviewed. Introducing penalty systems for non-compliance serves as an effective mechanism to encourage compliance and drive behaviour change. Penalties can generally be of two types: financial fines and the accumulation of penalty points (which can eventually lead to being ineligible to rent out the property). By linking penalties to specific outcomes (such as rental eligibility), the government creates tangible consequences for non-compliance, thereby incentivising property owners to invest in energy-efficient renovations.

- Addressing policy needs: Establish mechanisms to check compliance and clear penalties for non-compliance, with the obligation to renovate buildings to the target energy standard.

Additional policy needs derived from the recast EPBD also warrants mention.

**Database for energy performance of buildings:** Building renovation significantly depends on energy performance data at the stock level. These data help pinpoint the energy performance distribution across the entire building stock and identify the worst-performing

elements. In turn, this can inform setting sector-specific priorities and the monitoring of long-term energy performance trends.

- Addressing policy needs: Establish – and keep up to date – a building stock database that encompasses both residential and non-residential segments and identifies the worst-performing buildings.

**Definition of worst-performing buildings:** Generally in the EU, the worst-performing buildings for the residential segment are defined as those within the 43% of buildings showing the lowest energy performance in the national building stock.

- Addressing policy needs: Set a definition of worst-performing buildings, based on EPCs or primary/final energy consumption.

**Thresholds for MEPS:** MS must define the threshold for renovation of worst-performing buildings for the non-residential sector. In turn, they must set a maximum energy performance thresholds, based on analysis of the existing non-residential building stock.

- Addressing policy need: Define methodologies to derive the MEPS threshold for non-residential buildings and check compliance with national renovation strategies.

**National trajectories for residential buildings:** MS must reduce the average primary energy use of their building stocks, using data from statistical sampling and EPCs. The trajectory must identify either the number of buildings and building units or the floor area to be renovated annually, including the number or floor area of the worst-performing buildings. At least 55% of the trajectory should be achieved through renovation of the 43% worst-performing residential buildings.

- Addressing policy need: Derivate the trajectory and ensure renovation of the 43% worst-performing buildings.

**Renovation Passport:** RP is a mechanism to indicate a building's current performance, provide recommendations for renovation and track progress.

- Addressing policy need: Introduce RPs to enable building owners to plan staged renovations of their buildings.

### 3.2 Policy needs identified from stakeholder workshops

During its interactions with the focus countries, EPDB.wise organised two stakeholder workshops. One workshop focused on MEPS, while the other addressed ZEB, NBRPs, and RP and EPCs. The workshops aimed to delve deeper into understanding specific policy needs, discuss potential data gaps, clarify unresolved questions and issues, and explore solutions to overcome these challenges. This subsection specifically concentrates on aspects of the workshop related to Article 9.

During the workshop discussions, it became clear that the primary challenge is the availability of precise data on the building stock. Official data are frequently missing and existing official databases are often outdated. Moreover, these databases sometimes lack information about the renovation status of buildings. Consequently, it is vitally important to share best practices and explore potential methods to address these data gaps.

The demographic challenge posed by internal migration from rural to urban areas is one significant barrier to building renovation. As people move to cities, many rural houses become uninhabited. This shift leads to a situation in which the cost of renovating these vacant properties often exceeds their market value. Consequently, investing in the renovation of such

buildings becomes economically unfeasible, hindering efforts to improve and maintain rural housing infrastructure. When modelling renovation scenarios, it is therefore essential to consider the urban versus rural location indicator to ensure a realistic and effective approach.

Workshop participants underscored the significant barrier posed by financing in building renovation endeavours. The scarcity of suitable financing instruments, especially from private sources, is another major challenge. Establishing robust financial schemes that can attract private funding, including support from banking institutions, is critical. These schemes ought to prioritise deep renovation initiatives. In parallel, a pressing need exists for proactive campaigns to highlight the benefits of building renovations.

Additionally, a conspicuous deficiency in comprehensive technical assistance and a proficient workforce is evident, further impeding renovation initiatives. To address this, governments should prioritise the provision of training programmes aimed at promoting a skilled and qualified workforce.

In conclusion, an efficient implementation of building renovation policies requires robust collaboration among various stakeholders, including government entities, private investors, community groups, and environmental organisations, ensuring that plans align with broader goals of environmental sustainability and social welfare.

### **3.3 Policy needs identified from questionnaires to focus countries**

To collect different policy needs from the focus countries, EPBD.wise developed several questionnaires and bilateral meetings. As the questionnaire was developed at the beginning of the project, i.e. before seeing the final version of the recast EPBD (2024/1275), the main focus is on MEPS specific to non-residential buildings. Of six countries, two (Poland and Romania) have identified MEPS as their main interest to receive support for effective implementation of the EPBD. This section summarises the main results from all six focus countries, and from the extended questionnaire sent to Poland and Romania. Templates of the questionnaires are available in Annex 2: Questions to representatives of focus countries.

#### **3.3.1 Bulgaria**

In Bulgaria, MEPS for new buildings and renovations have evolved over time. Currently, new buildings must meet nZEB standards, while renovations must achieve at least Class B energy performance. Despite these standards, no practical obligation is in place for residential buildings to reach a specific energy performance level. Legally, buildings over 250 m<sup>2</sup> are required to undergo an energy audit and implement the necessary measures within three years to meet minimum energy requirements. However, no enforcement mechanisms or sanctions for non-compliance have been put in place. Energy audits are generally conducted when required for participation in subsidy programmes. As of 2022, only 5 090 out of 66 000 multifamily residential buildings were included in the first renovation programme; an additional 3 068 buildings were renovated in the second programme. To date, single-family buildings (SFBs) have not been included in these audits. A significant portion of public buildings has been audited over the past 15 years; the extent of audits for private buildings in the tertiary sector, however, remains unknown and is likely minimal. This indicates a need for more robust enforcement and support mechanisms to ensure compliance and broader uptake of energy efficiency measures.



Classification of worst-performing buildings in Bulgaria relies on data from the EPC database, which provides information on the share of buildings in each energy class. Data in the Long-Term Renovation Strategy (LTRS) is outdated, particularly for renovated buildings, as it does not reflect their current energy performance based on new standards. This issue primarily affects multifamily buildings (MFBs) and public buildings. Consequently, a pressing need exists for updated data to accurately reflect the current energy performance standards and support effective policymaking.

Currently, financing renovation financing is fragmented and reliant on periodic campaigns tied to the availability of national or EU funding. This inconsistent approach hinders long-term planning and the effective implementation of EE measures. The anticipated National Decarbonisation Fund offers a promising solution, with a primary focus on building renovation. To achieve meaningful impact, a thorough needs assessment and proper structuring of the fund are essential.

Bulgaria is moving towards introducing obligatory building passports that include EPCs with a simplified methodology. To support this transition, a combination of financial incentives is being implemented, such as subsidies, attractive financing mechanisms, tax relief and additional support for vulnerable households. Flexible financing schemes are also being explored, potentially incorporating on-bill and on-tax payment options to cover the costs of EPCs and renovations. A key aspect of this strategy is the regulation of step-by-step renovations through BRPs. These passports will ensure that renovations are carried out systematically and efficiently. Additionally, information and technical assistance will be provided by establishing one-stop shops (OSS), which will offer comprehensive support to building owners and managers. The enforcement of provisions under the new Condominium Act is also a critical component, ensuring compliance with the new energy performance standards and regulations.

The following challenges and considerations regarding MEPS implementation in Bulgaria have been identified:

- **Underperforming buildings:** Bulgaria's population has shrunk by 25% over the past 30 years, leading to an excess of buildings constructed in the 1970s and 1980s, many of which are now obsolete and energy inefficient.
- **Outdated renovation data:** Current data do not reflect the correct energy performance of buildings based on new standards.
- **Economic inefficiencies:** Large office spaces with minimal occupancy pose economic challenges.
- **Cost of intellectual labour:** This includes costs associated with consultancy and energy audits for EPCs.
- **Need for technical assistance:** Guidance and resources are needed to help building owners and managers efficiently navigate the renovation process.

### 3.3.2 Greece

Greece has implemented significant EE requirements for buildings, aiming to improve their overall performance and reduce energy consumption. Currently in place are the following regulations:

- **New Buildings and Major Renovations:** All new buildings or those undergoing significant renovation must achieve at least energy class A.



- **Public Buildings:** Since January 2021, all buildings leased and utilised by public authorities must meet nZEB standards. From December 2023, these buildings must attain at least EPC energy class B.
- **National Energy Efficiency Schemes:** Buildings included in national energy efficiency schemes must undergo significant upgrades, with a requirement for at least a three-class improvement after renovation measures.
- **Renewable Energy Usage:** New residential buildings are mandated to cover at least 60% of their domestic hot water (DHW) needs with renewable energy sources (RES).

Currently, however, Greece lacks specific MEPS for future buildings.

At present, Greece lacks a clear definition of worst-performing buildings beyond energy classes specified in EPC. It is estimated that buildings constructed before 1980 lack insulation entirely, while those built between 1980 and 2010 are under-insulated based on current regulations. This lack of insulation is a significant challenge to improving energy efficiency of the Greek building stock.

Greece has support schemes in place for the energy upgrade of residential and public buildings. Actual implementation of these measures, however, requires financial incentives linked to future obligations, such as MEPS.

The following challenges and considerations regarding MEPS implementation in Greece have been identified:

- **Unauthorised buildings:** Many buildings have been constructed without proper permits, complicating legal compliance and retrofitting efforts.
- **Conservation restrictions:** Numerous areas are subject to conservation measures, limiting the scope and methods of EE improvements.
- **Public building renovation:** Renovating public buildings involves a lengthy and complex process of procurement, assignment and approval. This bureaucratic delay hampers timely implementation and fund release.
- **Unclear ownership:** Unclear ownership statuses of many buildings further complicate renovation efforts, making it difficult to plan and execute EE projects.

### 3.3.3 Hungary

Hungary's Energy Efficiency (EE) decree includes several key elements to ensure minimum energy performance. It sets standards for overall building performance, the maximum U-value (thermal transmittance) of external building components, and the maximum allowable greenhouse gas (GHG) emissions. The decree also outlines requirements for technical systems within buildings to enhance energy efficiency and reduce environmental impact.

Determining which buildings perform the worst is a challenge, as a significant portion of Hungary's buildings exhibit poor performance, with many being considered candidates for demolition. Over 20% of homes suffer from mould, mustiness and dampness. Many residents are unable to address these issues due to poor building conditions, low incomes or heating difficulties. Hungary also lacks adequate financial schemes to modernise low-income homes.

The government offered financial support to the residential sector but not to the non-residential sector. The increase of the energy prices has spurred a wave of non-residential building renovations.

One main challenge is that policies are not horizontally harmonised; to date, not effort has been made to integrate policy across areas such as family support, housing initiatives, tax incentives, bank regulations for housing loans, monument protection and social support measures.

### 3.3.4 Poland

The 2021 Polish building stock database is incomplete and outdated, lacking comprehensive and accurate data. The central registry includes only buildings larger than 250 m<sup>2</sup> and public buildings, while information on private dwellings is gathered through owner surveys. The rise in coal subsidies complicates data collection, increasing the number of homes reporting coal-based heating systems.

The identification of worst-performing buildings lacks a clear definition in Poland. Rather, the LTRS distinguishes between 'critical', 'very bad', 'poor' and 'medium' energetic states [1]. The Polish main association that works with energy efficiency of buildings Fala Renowacji, has proposed criteria, suggesting that buildings falling into class G exceed energy performance thresholds of 400 kWh/(m<sup>2</sup>\*y) for SFBs and 460 kWh/(m<sup>2</sup>\*y) for others.

Poland is working on setting thresholds for the energy performance of its building stock, with a current goal to implement MEPS for non-residential buildings. By 2030, all non-residential buildings must have an energy performance lower than 330 kWh/(m<sup>2</sup>\*y), with a more stringent requirement of 280 kWh/(m<sup>2</sup>\*y) by 2033. Poland also plans to introduce (by 2026) different energy classes for various types of non-residential buildings, such as hospitals, hotels, public buildings, and industrial facilities.

Public buildings in Poland are prioritised for renovation towards nZEB standards. Dedicated programmes and funding have been established to facilitate renovation of buildings used by public bodies. Additionally, the country is leveraging energy service companies (ESCOs) and providing expedited technical assistance to enhance the efficiency and effectiveness of these renovations. Responsibility for implementing renovation lies with the Ministry of Economic Development and Technology at the national level, with coordination at the regional level.

Poland has implemented regulations to enhance the energy efficiency of buildings through several key measures. The "Antismog Law" mandates the replacement of solid fuel boilers with higher quality alternatives by a specified date. Additionally, the "Technical Requirements for Buildings" requires the installation of thermostats when replacing high-emission heat sources. Beyond these regulations, the "Thermorenovation Tax Deduction" offers financial incentives for thermorenovation projects.

The introduction and enforcement of an energy class system via EPCs were initiated in April 2023, primarily applicable to properties for sale or rent. However, EPCs can be very expensive (costing up to €1 000) and there are concerns about their quality, as they may contain biased or inaccurate information.

RPs are proposed as instruments for implementing MEPS in non-residential buildings, and EPCs should include reference values for MEPS.

One-stop shops to assist residents in renovation planning and funding acquisition are in pilot stages. One programme, called 'Operators', was introduced in 2023. For no charge, it looks for potential beneficiaries, helps them determine the scope of renovation work needed, and supports residents in obtaining funds to replace stoves and/or modernise thermal systems.

To address a shortage of qualified workers, the government has launched training programmes for young individuals, complemented by promotional campaigns to address this gap.

Most funding is for residential buildings and is concentrated on replacing solid fuel heat. The Clean Air Programme<sup>3</sup> primarily targets SFBs, while the Thermal Renovation Fund<sup>4</sup> is largely aimed at MFBs.

The Ministry of Economic Development and Technology oversees implementation of MEPS, emphasising conditions for distribution of additional funds. Penalties for lack of compliance by building owners are risky, as they can lead to political backlash.

The following challenges and considerations regarding MEPS implementation in Poland have been identified:

- **Lack of cohesion among ministries to implement policies:** Fragmentation of responsibility among different ministries makes it difficult to implement cohesive policies and coordinate maintenance efforts effectively. Each ministry likely operates its own separate database, resulting in a lack of comprehensive information on the state of the building stock.
- **Threshold determination:** Establishing thresholds for building energy performance requires careful consideration, balancing ambitious targets with feasibility and sector-specific considerations.
- **Distinguishing rural and urban buildings:** The depopulation of rural areas makes it vital to introduce an indicator as to whether buildings are in urban and rural areas.
- **Lack of definitions:** Clear definitions are needed for ZEB and worst-performing buildings.
- **Building stock inventory:** Building inventories and prioritisation strategies are needed, particularly for public buildings and small-scale renovations.
- **EPCs:** The limited labelling system currently in place represents a serious obstacle, as it cannot effectively link aid and grants. Also, lack of a trained and skilled workforce is problematic.
- **Ecosystem of financial support:** Financial schemes should focus on building renovations over mere heat source replacements.
- **Workforce availability:** Addressing the shortage of a qualified workforce should be addressed through training programmes and promotional campaigns.
- **Monitoring:** Effective monitoring mechanisms are needed, without relying solely on penalties.
- **Better communication:** Positive communication of the benefits of building renovation would support greater uptake.

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<sup>3</sup> <https://www.gov.pl/web/climate/clean-air-20-programme-launched>

<sup>4</sup> <https://www.bgk.pl/programy-i-fundusze/programy/program-termo/premia-termomodernizacyjna-z-opcja-grantu-termomodernizacyjnego/>

### 3.3.5 Romania

The current database of the Romanian building stock is derived from statistical data [2] and from the databases of the different institutions. The government aims to create a National Building Registry in order to integrate databases related to buildings data and EPCs.

Lack of clarity on which buildings perform the worst – and what proportion they represent in the overall building stock – is problematic in Romania. At present, no database exists specifically dedicated to identifying these poorly performing buildings. As a result, renovations are carried out on a first-come-first-served basis. Developing the National Buildings Registry (in relation to the NBRP) will facilitate identification of worst-performing buildings. In turn, RPs can play a crucial role in both identifying worst-performing buildings and implementing MEPS. The government plans to integrate EPCs into this standard, so information for the worst-performing buildings (e.g. category and target levels) is included.

The Ministry of Regional Development holds responsibility for implementing the political framework of MEPS. It should be developed at national level, encompassing all residential sectors, particularly SFBs, which are more prevalent in rural areas.

The Romania government plans to establish thresholds for various categories of buildings, such as offices, shops, blocks of flats, SFBs, educational buildings and healthcare facilities. Currently, there is some debate surrounding whether SFBs should be included in MEPS.

Romania has different financing programmes dedicated to renovating public buildings. To maximise the standard of renovations, programme indicators should be updated to align with nZEB or ZEB standards for approved projects. Municipalities play a crucial role in this initiative by prioritising the renovation of the worst-performing buildings within their jurisdictions.

Centralised OSSs are not currently in place in Romania. The goal is to establish them regionally through the National Building Renovation Plan. There is a need to further expand and develop existing programmes to train a qualified workforce.

Several financing programmes in Romania support smaller-scale measures, such as installation of solar photovoltaic (PV) panels. But the country lacks adequate financial support for building renovation. Moreover, there is a notable absence of laws designed to attract private investments.

Romania has a system of EPCs. Owners are required to provide an EPC when renting or selling any dwelling. While EPCs are conducted by certified energy auditors, a clear and efficient system to verify the quality of such audits is lacking. Strengthening institutional oversight will ensure higher standards and more reliable outcomes in energy efficiency projects.

Romania has programmes to develop a qualified workforce in building energy efficiency. For instance, the 'Green Building Professional' is a paid programme for training and certification of specialists in green construction. It is organised by the Romanian Council for Green Buildings.<sup>5</sup>

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<sup>5</sup> <http://www.rogbc.org/en/education/rogbc-certification-training-program>

Several challenges and considerations regarding Article 9 implementation in Romania have been identified:

- **Data gaps:** Lack of comprehensive data of the existing building stock, especially of the non-residential segment.
- **Definitions lacking:** No clear definition of worst-performing buildings.
- **Target level of renovation:** A clear definition of ZEB and its indicators is needed to renovate public buildings to such standards.
- **Tools to implement renovation:** Currently, there are no OSS. Given the limited number of qualified workers, training schemes need reinforcement.
- **Financial support:** The government adopted a medium-ambition target for building renovation, which needs €30 billion in funding. The financial support should not depend only on grants, subsidies, low-interest loans and tax exemption. Effort should be made to also attract private investments.

### 3.3.6 Ukraine

Ukraine faces unique challenges in relation to the recast EPBD due to the destructive impact the ongoing war is having on its building stock. At the end of 2020, Ukraine did not have a clear definition of worst-performing buildings but did have a database of construction projects. This database compiles information on projects tackling building renovation, as well as experts and energy auditors who can issue EPCs. EPCs are mandatory when a building undergoes reconstruction using national and EU funds but are not required for buildings being sold or rented out.

The Minregion Decree N260 (dated 27.10.2020) approves the minimum requirements for specific energy consumption for heating and cooling of residential and public buildings in Ukraine. These requirements set limits for energy that can be consumed for heating and cooling purposes in various types of buildings, based on their size and purpose. The limits are specified for different temperature zones in Ukraine and aim to promote energy efficiency and sustainability in the construction and operation of buildings.

## 4 Good practice examples and status quo analysis

This section strongly builds on projects covering topics and policies relevant to implementing the recast EPBD (2024/1275), as well as lessons learned from implementation. Status quo analyses and identification of good practice examples include quantitative and qualitative analyses, stakeholder engagement, legal and administrative screening, and evaluation techniques. Good practice examples are documented based on templates and individual good practice descriptions found in Annexes 3 through 6.

### 4.1 Summary of good practice examples

In this section, EPBD.wise highlights exemplary practices from European countries that have already implemented minimum energy performances requirements for building renovations or similar instruments. The case studies span both residential and non-residential segments to draw insights that can inspire future practice in the renovation of non-residential buildings and can support MS, especially the focus countries selected in EPBD.wise, in effective implementation of Article 9 of the EPBD.

### 4.1.1 Belgium Flanders region

At the end of 2014, the Flemish government launched the Renovation Pact with the aim to develop and implement a coherent action plan that leads to a strong increase in the renovation rate and EPB in line with the European energy and climate targets [3]. The Renovation Pact introduced a requirement for a minimum level of roof insulation and glass standards as follow:

- **Mandatory roof insulation:** All roofs of independent dwellings<sup>6</sup> should be insulated with R-value of at least 0.75 by 2020.
- **Mandatory double-glazed unit:** all dwellings must be fitted with double-glazed units by 2023 [4].<sup>7</sup>

Since 2015, rental homes that do not meet the minimum insulation have accrued penalty points. As of 01 January 2020, homes having accumulated 15 penalty points are banned from being rented out. Since there is no renovation enforcement for homes outside the rental sector, the penalties do not apply to homes that are a primary and sole residence.

Building renovation receives support from green bonds and from Flemish energy loans (interest free-energy loan for the priority target group, up to €15 000 for a duration of 10 years).

For the non-residential sector, the 2019-2024 Coalition Agreement mandates that, from 2021, all inefficient tertiary buildings must undergo deep energy renovation within five years of a transfer of full ownership [3].

### 4.1.2 Belgium Brussels region

In 2021, the government introduced a regulation focusing on measures to enhance energy efficiency for both residential and non-residential buildings [5]. The objective is to reach 100 kWh/(m<sup>2</sup>\*y) primary energy use for residential buildings and energy neutrality for heating, DHW, cooling, and lighting for non-residential buildings.

For residential segment, a staged approach is proposed to achieve a target energy performance by 2050: owners select five mandatory measures from the priority measures suggested by the EPB certificate to implement between 2030 and 2050 (

Table 2).

**Table 2** Obligations for residential buildings (at the individual's choice)

Period	Objective
2030	Deadline for one of the mandatory measures
2035	Deadline for the second of the five mandatory measures
2040	Deadline for the third of the five mandatory measures
2045	Deadline for the fourth of the five mandatory measures
2050	Deadline for the fifth of the five mandatory measures

<sup>6</sup> Single family dwellings, one-room flats and apartments, i.e. not rooms.

<sup>7</sup> The Flemish housing code issues technical reports that outline various visible defects in a property, each associated with penalty points related to safety, health and housing quality. For details see: <https://derouckenpartners.com/en/wooncode/>

Source: [Stratégie de réduction de l'impact environnemental du bâti existant en Région de Bruxelles-Capitale aux horizons 2030-2050](#)

The strategy includes the development of an upgraded EPC (certificate PEB) and a renovation plan, with requirements for all buildings to have an EPC by 2025.

For the non-residential sector, a similar system of compulsory improvements has been introduced to achieve energy neutrality by 2050, with regulations expected to be implemented in 2021 and deadlines set for the installation of mandatory measures by 2050 (Table 3).

**Table 3** Obligations for the service sector

Period	Objective
2020/2021	Definition of sector segmentation and regulatory guidance Stabilisation of a method for calculating energy performance Adoption of an implementing decree for public authorities
2022/2023	Adoption of implementing decrees, setting measures and requirements to be achieved
2030	Start of deadlines for meeting requirements in certified service sector buildings
2040	Achievement of performance level required for public buildings
2050	Achievement of performance level required for service sector buildings

Source: [Stratégie de réduction de l'impact environnemental du bâti existant en Région de Bruxelles-Capitale aux horizons 2030-2050](#).

Support for compliance includes energy advice, improved EPCs, low-interest loans for lower-income households, and subsidies covering approximately 20% of renovation costs, based on income eligibility.

### 4.1.3 England and Wales

In England and Wales, the Energy Efficiency (Private Rented Property) Regulations 2015 mandate that properties cannot be rented out if they don't meet a MEPS of EPC E as of 1 April 2018 [6]. These regulations apply to all privately rented domestic properties since April 1, 2020, and will extend to all non-domestic privately rented properties from April 1, 2023.<sup>8</sup> Specific exemptions are listed, including cost and payback thresholds for renovation projects, with opportunities for 'high cost' exemptions. Landlords are exempt from the requirement to achieve a minimum level of EE (EPC E) if all feasible EE improvements within the £3 500 budget cap have been implemented and the property remains sub-standard [7].

Local authorities have the discretion to determine financial penalties, within specified maximum limits, for landlords who rent out a non-compliant property. Penalties depend on the duration of the breach (Table 4).

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<sup>8</sup> In 2021, 62.5% (15.5 million ) of households owned the accommodation in which they lived and 37.3% (9.3 million) rented their accommodation (Source: <https://www.ons.gov.uk/peoplepopulationandcommunity/housing/bulletins/housingenglandandwales/census2021>).



**Table 4 Penalties according to the infringement and its duration in England and Wales**

Infringement	Less than 3 months	3 months or more
Renting out a non-compliant property	Up to £2 000	Up to £4 000
Providing misleading information on the PRS Exemption Register	Up to £1 000	
Failing to comply with a notice	Up to £2 000	

Source: [The Domestic Private Rented Property Minimum Standard \(pp 80\)](#).

Financial support is available through schemes, such as the energy efficiency obligation (EEO). Only certain high-cost measures are subsidised, such as solid wall insulation and renewable heating, for properties with low EPC labels. The government expects landlords to ensure basic EE features, especially functioning heating systems, for their tenants. Owners of non-residential buildings can face fines for non-compliance (imposed by weights and measures authorities), with penalties limited to a maximum of £150 000.

#### 4.1.4 France

In its LTRS, France defined worst-performing buildings as those in energy efficiency classes F and G [8]. As mandated by the 2015 Energy Transition Law [9], France placed a series of measure to renovate its building stock and gradually phase out homes classified as F or G. Since 2016, the sale of social housing units below an EPC class E rating has been prohibited. The Climate and Resilience Act of 2021 mandates the renovation of the worst-performing buildings according to their energy certificates. By 2025, no buildings should be classified as G; by 2028, all buildings with an F rating must be renovated; and by 2034, buildings must achieve at least an EPC D, with penalties for non-compliance [10].

In 2019, the government introduced a separate legislation for large commercial buildings over 1 000 m<sup>2</sup> [11]. Owners must reduce final energy consumption of such buildings by 40% in 2030, 50% in 2040 and 60% in 2050. Compliance will be monitored through an online platform collecting annual consumption data, and lack of compliance is fined up to €7 500.

The renovations are funded by a mix of tax incentives, subsidies and EEOs. In 2019, these programmes were consolidated into a single subsidy, called MaPrimeRénov<sup>9</sup>, which prioritises low-income households. Additional programmes, such as SARE and France Rénov<sup>1</sup>, aim to provide information and guidance for housing energy renovations through a public service. The SARE program, managed by the Environment and Energy Management Agency and co-led at the regional level, offers information and support to households and small private tertiary premises for undertaking energy renovation projects<sup>10</sup>. France Rénov<sup>1</sup> is the new name for a government programme including personalised help with planning a home renovation programme and certain forms of financial aid<sup>11</sup>.

<sup>9</sup><https://www.maprimerenov.gouv.fr/>

<sup>10</sup> <https://www.ecologie.gouv.fr/politiques-publiques/sare-service-daccompagnement-renovation-energetique>

<sup>11</sup> <https://france-renov.gouv.fr/>



### 4.1.5 The Netherlands

In 2018, the Netherlands published an amendment that required all office buildings to meet EPC class C, meaning that use of office buildings with a D energy rating or lower will become illegal [12]. The Dutch government intends that, by 2030, all office buildings will have achieved an A label. In total, around 62 000 office buildings must comply with the obligation. Historic buildings temporarily used as offices, and buildings for which less than 50% of the floor area is used for offices can be excluded from the obligation. Office buildings that do not meet the required standard can incur penalty payments up to the closure of the office. The strategy is supported by technical information offered by the Netherlands Enterprise Agency (*Rijksdienst voor Ondernemend Nederland* [RVO]) and a comprehensive financial scheme, which includes tax incentives and green loans with preferential interest rates.

### 4.1.6 Scotland

In 2020, Scotland issued the Energy Efficiency (Private Rented Property) decree, which aimed to establish a minimum energy efficiency standard for residential properties [13]. Initially, new tenancies were required to meet an EPC of E or register an exemption from 1 October 2020. Enforcement, however, was delayed due to the COVID-19 crisis. The regulations were further extended to cover all residential privately rented properties from 1 April 2022, with new tenancies needing to meet a higher standard of D from that date. This higher standard will apply to all tenancies (new and existing) from 1 April 2025.

Scotland offers robust advisory and financial support for energy efficiency and renewable energy in homes. Home Energy Scotland provides free advice nationwide, while homeowners can access interest-free loans of up to £38 500 (€42 789). Additionally, government grants and schemes target low-income or fuel-poor households, providing energy efficiency measures and heating support [14]. Local authorities manage area-based initiatives to reach challenging households and properties.

## 4.2 Summary of lessons learned

The detailed examination of these good practices reveals specific aspects that contribute to their success, providing potential roadmaps for other countries to adapt and implement similar approaches. This analysis offers a foundational understanding of effective Article 9 implementation strategies, presenting a robust framework for future policy development and execution. Through these targeted adaptations, Bulgaria, Greece, Hungary and Poland can significantly improve Article 9, ensuring better compliance with the new EU directive and promoting greater EE across their building sectors.

### 4.2.1 Trigger points for renovation

Commonly utilised trigger points in existing MEPS good practices presented in section 4.1 include transactional events such as sales, rentals, or significant renovations. However, it's crucial to emphasise that relying solely on these trigger points, particularly sales, may not sufficiently prompt the necessary renovations. On average, a building, residence or office will typically be sold only once between now and 2050, with some properties not changing ownership at all during this timeframe. Given that rental turnover tends to occur more frequently, using rental changes as trigger points could serve as a more effective strategy for incentivising renovations. For instance, the average rental turnover period in Germany is approximately 11 years, whereas in England it is around 2.5 years [15].

Rather than setting standalone triggers, such measures should be integrated into a broader compliance framework with set milestones. For instance, England and Wales set different deadlines for the rented residential and non-residential buildings. Residential buildings must reach EPC class E by 2020 and C by 2028, while rented non-residential must have EPC class E by 2021, class D by 2025 and C by 2028.

#### 4.2.2 Strategies to enforce renovation

Various regions have implemented diverse strategies to enforce building renovation and enhance energy efficiency.

##### a) Measures-based model

Flanders adopted a measured-based model for residential buildings by making mandatory renovation requirements, such as minimum roof insulation and double glazing. While the inclusion of these measures establishes a baseline for housing decency, it falls short of achieving complete decarbonisation.

##### b) Progressive performance standards

Most of the good practice examples include progressive performance standards, characterised by gradually imposing stricter requirements. France, for example, set a series of consumption reduction targets that elevate by 10% every 10 years – i.e. 40% by 2030; 40% by 2040; and 60% by 2050). These approaches shift the standards from being static to evolving progressively.

##### c) Phased renovation obligation model

Brussels introduced a pioneering phased renovation mandate, compelling homeowners to undertake five selected measures outlined in the EPC every five years. The overarching aim is to achieve a performance target of 100 kWh/(m<sup>2</sup>\*y) by 2050. This approach holds the potential for substantial renovation of the building inventory.

##### d) Targeting worst-performing buildings

France enacted legislation targeting renovation of the worst-performing residential buildings, with strict measures for buildings exceeding energy consumption thresholds (using more than using >450 kWh/(m<sup>2</sup>\*y) and requiring homes to be EPC class E by 2028. Similar approaches apply in England and Wales to rented residential and non-residential buildings, which, respectively, must be EPC class E by 2020 and by 2021. In the Netherlands, offices having an EPC below class C will also be prioritised.

#### 4.2.3 Elements to support renovation policy

Policies are not stand-alone measures but part of frameworks that include practical support to building owners, appropriate funding and finance, and a system of penalties for lack of compliance.

- **EPCs:** EPCs are the established reference tool across EU to assess the EPB and inform building owners and tenants regarding their buildings' energy performance. EPCs are used to identify worst-performing buildings and buildings that need major renovations, as in France for residential buildings with EPC class F and G.

- **Building information tool:** The Brussels model of a phased renovation obligation requires buildings to have an EPC that lists the necessary renovation measures. This EPC functions as a renovation passport (RP). Its applicability to other countries, however, is challenging due to differing national EPC templates. Often, EPCs focus on asset ratings rather than operational ones, making it difficult to illustrate the pathway to full decarbonisation. RPs offer guidance on achieving carbon-neutral building renovations. In the Netherlands, online tools for assessing investment costs and carbon savings, also help building owners navigate compliance and make informed decisions regarding energy efficiency measures. They also provide an approved register of energy advisors.
- **Financial schemes:** The Netherlands presents a comprehensive financial scheme of public and private support. Renovation activities are incentivised via the use of tax reduction and exemption, VAT rates and refunds, investment cost deduction, green loans and favourable interest rates. The Brussels government introduced a bonus scheme linked to the renovation obligations of the residential stock. Flanders offers green loans and interest-free energy loans (Flemish energy loans). In Brussels, grant applications for building renovation can be made through IRISbox, a one-stop shop designed to standardise and simplify administrative procedures.
- **Penalties:** Flanders, England and Wales, and Netherlands have all adopted systems of penalties to ensure compliance. Penalties can be pecuniary, in a point system, up to the impossibility to rent out the building. The role of EPCs in such systems should be underlined, as they become a tool for checking and confirming compliance with a regulated standard.

## 5 Overall conclusions and recommendations beyond the scope of the project

The questionnaires, the bilateral meetings with representatives of the focus countries and the stakeholder roundtables carried out within EPBD.wise highlighted critical areas for the development of policy guidelines concerning Article 9, which will be concluded in this project by January 2026. In synthesising the insights gathered from these practices, several key policy needs emerged, which serve as foundational pillars for formulating effective policy guidelines. Particular attention is given to Poland and Romania, as they are interested in receiving assistance to better understand the potential implementation of Article 9. Such recommendations can also be valuable for other countries experiencing similar challenges.

### a) Data of the building stock

It is essential that Member States collect key statistics on the number, floor area, year of construction, and energy use of different categories of buildings. France synthesised data from various sources to gain a precise understanding of its building stock. That led to the creation of the national energy renovation observatory, the primary role of which is to furnish input for studies (e.g. on building refurbishment). Differentiating between two distinct categories of data is important: the building stock data required to set the trajectory of the residential segment (§9.2), and the data necessary to identify the worst-performing buildings (§9.1).

### b) Definition of worst-performing buildings

As part of the recast EPBD (2024/1275), MSs are required to report policies and measures to renovate buildings with low energy efficiency. It is essential to determine what non-residential buildings falls within this category. Practical methods to ascertain this include referencing EPCs (e.g. buildings in class F and G), compiling lists of implemented measures (such as insulation installation, which typically excludes a building from worst-performing status), and considering construction periods (buildings erected after 2000 are unlikely to be classified as worst-performing).

### **c) Demographic challenge**

In some countries, such as Poland or Hungary, a common trend is that young people relocate from rural to urban areas, leaving behind inherited properties. This presents a significant barrier to revitalising these countryside homes: as time passes, the uninhabited homes degrade, and local economies stagnate. Eventually, the cost of renovation frequently surpasses the value of the property,

### **d) Target level of renovation**

Renovation goals are met more effectively when they are structured as a roadmap, outlining which segments of the building stock will be renovated and what energy efficiency standards should be attained within a specified timeframe. In 2014, for instance the Flemish government enforced a minimum level of roof insulation for rented residential properties; in 2019, the requirement was expanded to include double-glazed windows. Similarly, England and Wales mandated that rented residential buildings be upgraded to at least an energy class E by 2018, with non-residential buildings reaching the same standard by 2023. France has enacted two legislations targeting both private residential buildings and large commercial structures. Residential buildings are required to undergo renovations to achieve an energy class of E by 2028. Energy consumption in commercial buildings over 100 m<sup>2</sup> must be decreased by specified percentages within specific time frames: 40% by 2030; 50% by 2040; and 60% by 2050.

Without mandatory provisions extending to buildings above class F and a clear long-term plan with milestones beyond 2030/2033, the risk remains that although some progress may be made by 2030, many buildings may remain at relatively low performance levels until 2050. This poses a threat to the overarching goal of transforming existing buildings into nZEBs equivalent to class A by 2050. Policies should outline a dynamic strategy for bringing all buildings to high and medium performance standards by 2050 and avoid lock-in effects. One main challenge lies in setting definitions of nZEB and ZEB standards and relevant indicators.<sup>12</sup>

Exemptions also play a crucial role in boosting the pace of building renovations. At present, secondary residences, historical buildings or buildings with specific architectural constraints are not required to meet minimum standards and undergo renovation.

### **e) Tools to implement renovation**

Representatives from focus countries acknowledge that tools such as EPCs and RPs, coupled with technical assistance from OSSs, contribute significantly to the advance renovation levels. In certain countries, such as Poland and Bulgaria, concerns arise due to the high cost of EPCs – up to €1 000 – and their quality. RPs have been widely recognised by representative

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<sup>12</sup> For a detailed description of nZEB and ZEB definitions see Deliverable 2.1

countries as a useful instrument to create roadmaps for renovations and increase the renovation rate.

#### **f) Financial support**

Lack of access to capital is a key barrier to building renovation, especially deep renovation. Both Poland and Romania underlined the need for financial schemes focused on building renovation, not only on energy efficiency but for other aspects such as thermal modernisation. Representative of focus countries emphasised that public financial schemes, for which approaches such as subsidies, tax incentives and loans are the main financial instruments, result in insufficient activity to reach the renovation targets. It is, thus, paramount to attract private investments that further support building renovation.

In 20XX, France adopted the zero-interest eco-loans (*Prêt à taux zero*) to facilitate building renovation of residential properties built before 1990. The scheme is supported by about 20 banks and saw €480 million in investments by 2015, with €40 million in government spending stimulating €12 of private investment for each €1 of public support. The Netherlands adopted (20XX) the Green Funding Scheme that uses incentives such as below-market interest rates and capital gains tax exemptions to encourage individuals to invest in green funds. By leveraging private investment, the scheme achieves significant impact, with over €80 of private investment for every €1 of public funding.

#### **g) Monitoring and compliance**

Renovation schemes need frameworks that include relevant consequences in the case of non-compliance. In the Netherlands, owners of office buildings that are not renovated to meet set requirements incur fines or may lose the ability to rent the office. Penalties can be a controversial tool because they often raise political resentment. Governments may consider other consequences, such as restrictions on the ability to use or rent the building or restrictions on rent increases. An alternative payment could be the system of penalty points adopted by the Flemish government if the buildings does not meet the standards of insulations. Systems of penalties and alternative consequences for non-compliance with renovation schemes, such as those implemented in the Netherlands and in Flanders, can encourage adherence while mitigating political backlash.

In summary, detailed examination of these good practices reveals specific aspects that contribute to their success, providing a roadmap for other countries to implement and/or adapt similar approaches. This analysis offers a foundational understanding of effective strategies for MEPS and renovation trajectories implementation, presenting examples of robust frameworks for future policy development and execution. Through these targeted adaptations, Poland and Romania can significantly improve the renovation of existing buildings, ensuring better compliance with the new EU directive and promoting greater energy efficiency across their buildings sector.

## References

- [1] Government of Poland, (2022), *Long-Term Building Renovation Strategy. Supporting renovation of the national building stock,* Government of Poland, Warsaw. Available: [https://energy.ec.europa.eu/system/files/2022-06/PL%202020%20LTRS%20\\_%20EN%20version.pdf](https://energy.ec.europa.eu/system/files/2022-06/PL%202020%20LTRS%20_%20EN%20version.pdf)
- [2] Government of Romania (2020), *National Long-Term Renovation Strategy to Support the Renovation of the National Stock of Residential and Non-Residential Buildings, Both Public and Private, and to Gradually Transform it into a Highly Energy Efficient and Decarbonised Building Stock by 2050*, Government of Romanis, Bucharest. Available: [https://energy.ec.europa.eu/document/download/2c11f72a-47aa-4cd8-bc54-9fcdcfdebde1\\_en?filename=ro\\_2020\\_ltrs\\_en\\_version.pdf](https://energy.ec.europa.eu/document/download/2c11f72a-47aa-4cd8-bc54-9fcdcfdebde1_en?filename=ro_2020_ltrs_en_version.pdf)
- [3] Vlaamse Regering (2020), *Long-Term Strategy for the Renovation of Flemish Buildings*, Vlaamse Regering (Flemish Government), Brussels. Available: [https://energy.ec.europa.eu/document/download/921e2081-983c-4812-b416-4de8943df275\\_en?filename=beflanders\\_ltrs\\_2020\\_en.pdf](https://energy.ec.europa.eu/document/download/921e2081-983c-4812-b416-4de8943df275_en?filename=beflanders_ltrs_2020_en.pdf)
- [4] Vlaamse Regering (2019), *Vlaamse Codex [Flemish Codex]. Besluit van de Vlaamse Regering betreffende de woningkwaliteitsbewaking (Decision of the Flemish government regarding home quality control)*, Vlaamse Regering (Flemish Government), Brussels. Available: <https://codex.vlaanderen.be/Zoeken/Document.aspx?DID=1032181&param=inhoud>
- [5] Regional Government of Brussels-Capital (n.d), *Stratégie de réduction de l'impact environnemental du bâti existant en Région de Bruxelles-Capitale aux horizons 2030-2050*, Regional Government of Brussels-Capital, Brussels. Available: [https://environnement.brussels/sites/default/files/user\\_files/strategie\\_reno\\_fr.pdf](https://environnement.brussels/sites/default/files/user_files/strategie_reno_fr.pdf)
- [6] Government of the United Kingdom (2015), *The Energy Efficiency (Private Rented Property) (England and Wales) Regulations 2015*. Government of the United Kingdom, London. Available: <https://www.legislation.gov.uk/ukdsi/2015/9780111128350/contents>
- [7] Government of the United Kingdom (2019), *The Domestic Private Rented Property Minimum Standard*, Government of the United Kingdom, London. Available: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/882957/Domestic\\_Private\\_Rented\\_Property\\_Minimum\\_Standard\\_-\\_Landlord\\_Guidance\\_2020.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/882957/Domestic_Private_Rented_Property_Minimum_Standard_-_Landlord_Guidance_2020.pdf)
- [8] European Commission (2020), *Long-term strategy of France for mobilising investment in the renovation of the national stock of residential and commercial buildings, both public and private*, European Commission, Brussels. Available: [https://energy.ec.europa.eu/document/download/aeb8a440-69a4-4a74-b2e0-29e1f3fd6084\\_en?filename=fr\\_ltrs\\_2020\\_en.pdf](https://energy.ec.europa.eu/document/download/aeb8a440-69a4-4a74-b2e0-29e1f3fd6084_en?filename=fr_ltrs_2020_en.pdf)
- [9] Légifrance (2015), *Code de l'énergie [Energy code]. (Article L100-4, as modified by Law n° 2015-992 of 17 August 2015)*. Gouvernement de France, Paris. Available: [https://www.legifrance.gouv.fr/codes/article\\_lc/LEGIARTI000047303609](https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000047303609)
- [10] Légifrance (2021), *LOI n° 2021-1104 du 22 août 2021 portant lutte contre le dérèglement climatique et renforcement de la résilience face à ses effets (1)*, Gouvernement de France, Paris. Available: <https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000043956924>
- [11] Légifrance (2018), *Article 175. Law portant évolution du logement, de l'aménagement et du numérique (Law on the evolution of housing, development and digital). (Law n° 2018-1021 of 23 November 2018)*. Gouvernement de France, Paris. Available: [https://www.legifrance.gouv.fr/loda/article\\_lc/LEGIARTI000037642495](https://www.legifrance.gouv.fr/loda/article_lc/LEGIARTI000037642495)

- [12] Netherlands Enterprise Agency (2020a), *Energielabel C kantoren: de stand van zaken* (Energy label C offices: the state of affairs), Netherlands Enterprise Agency, Den Hague. Available: <https://www.rvo.nl/actueel/nieuws/energielabel-c-kantoren-de-stand-van-zaken>
- [13] Government of the United Kingdom (2020), *The Energy Efficiency (Domestic Private Rented Property) (Scotland) Regulations 2020*. Government of the United Kingdom, Available: <https://www.legislation.gov.uk/sdsi/2020/9780111043912>
- [14] Scottish Government (2020), *Energy Efficient Scotland: Improving energy efficiency in owner occupied homes*, Scottish Government, Edinburgh. Available: <https://consult.gov.scot/housing-and-social-justice/energy-efficient-scotland-owner-occupier-proposals/>
- [15] Sunderland, L. and M. Santini, *Next steps for MEPS: Designing minimum energy performance standards for Europe*, Regulatory Assistance Project, Brussels. Available at: <https://www.raonline.org/knowledge-center/next-steps-for-meps-designing-minimum-energy-performance-standards-for-european-buildings/>



Annex 1: Survey of related projects, programmes, and initiatives **Fehler! Keine gültige Verknüpfung.**

Country	Intro.	Fully enforced	Trigger point	Long Trajectory	Building segment	Metric	Minimum standards	Penalties	Exemption
Belgium Flanders	2015	2020	rented	energy performance standard of EPC A by 2050	residential	technical measures	minimum roof insulation	penalty points	no exemption
Belgium Flanders	2019	2023	rented	residential buildings with EPC E or F must be EPC D	residential	technical measures	double glazing	penalty points	no exemption
Belgium Flanders	2019	2021	transfer of ownership	meet the energy standards within five years of purchase	non-residential	technical measures	EPC C	not specified	no exemption
Belgium Flanders		2023		see above	large non-residential	technical measures	energy from renewable sources	not specified	no exemption
Brussels	2021	2023	sale or renovation	100 kWh/m <sup>2</sup> /y primary energy use or EPC C+ by 2050	residential	EPC	EPC C+ by 2050	not specified	no exemption
England and Wales	2016	2020-2028	rented	all owner-occupied homes must have EPC C by 2024	residential	EPC	EPC E by 2020 EPC C by 2028	fine capped at £4,000	Protected, historically buildings, places of worship, temporary buildings and low-energy-use industrial and agricultural buildings
England and Wales	2016	2018-2023-2030	rented	not long-term trajectory but the government must review the impact every 5 years	non-residential	EPC	EPC E by 2021 EPC D by 2025 EPC C by 2028	fine capped at £150,000	
Scotland	2020	2022-2025-2040	rented and sale	existing buildings being near zero carbon by 2050	residential	EPC	EPC E by 2021 EPC D by 2025 EPC C by 2040		properties without an EPC
France	2019	2023	rented	dividing GHG emissions by 2050 from 1990 baseline	residential	energy performance	Worst-performing: using >450 kWh/m <sup>2</sup> /year		based on renovation costs and payback period and specific architectural constraints
France	2019	2028	sale	above	residential	EPC	EPC E		
France	2019	2030-2040-2050		meet a series of energy-saving targets in their building stock over a period of 30 years from 2020 to 2050	non-residential buildings over 1,000m <sup>2</sup>	Final energy consumption	40% in 2030, 50% in 2040, 60% in 2050	capped at €7,500	temporary structures, places of worship and places used for defence, civil protection and internal security of the state. Adjustment of the target: based on renovation costs and payback period and specific architectural
Netherlands	2018	2023		vision for all buildings to be sustainable by 2050	office buildings	EPC	EPC C	administrative penalties ( fines of €10,000 )	buildings less than 50% used as office; buildings with less than 100m <sup>2</sup> used for offices; historical buildings temporarily used as

**Fehler! Keine gültige**

**Verknüpfung.Fehler! Keine gültige Verknüpfung.**



## Annex 2: Questions to representatives of focus countries

### Questions to all six focus countries

1. Do MEPS or similar instruments currently exist in your country? If yes, what is the policy setting regarding the design and implementation of MEPS in your country?
2. What accompanying policies would be required to make MEPS work in your country?
3. Is there a clear definition for worst-performing buildings in your country? Do you have an overview of their share within the building stock (in terms of number of buildings and floor area)?
4. Is there an ecosystem of financial support in which MEPS schemes to be embedded? If yes, what type of financial incentives do you think would stimulate the deployment of MEPS in your country?
5. What kind of support would you and representatives in your country responsible for the elaboration of MEPS schemes like to receive from the EPBD.wise project in terms of MEPS implementation?

### Extended questionnaire for the focus countries interested in Article 9

#### General observation and overlaps with other work packages

1. To what extent are/ should MEPS be developed in relation to a ZEB standard?
2. How can/ should BRPs make use of MEPS in their design?
3. Should EPCs be connected to/ integrated in MEPS design? In what way? (e.g., show compliance, indicate target level, qualify as WPBs etc.)

#### Specific questions

4. Which authority is responsible to implement the political framework on the MEPS in your country?
5. At which territorial level do you think it is most reasonable in your country to implement a MEPS system? (regional, municipal, national)

#### Communication

6. How is the stakeholder environment in favour/ opposing to MEPS?

#### Layout

7. The recast EPBD (2024/1275) requires that each Member State defines thresholds of maximum energy performance (in terms of kWh/(m<sup>2</sup>\*y)), so that 16% and 26% respectively, of the current building stock is above that value. How would you determine the thresholds? Do you plan to distinguish thresholds for different parts of the buildings stock (e.g. offices and shops, etc.)? Do you plan to also define thresholds for non-renewable primary energy and/or operational GHG emissions?
8. Which buildings are planned be excluded from MEPS? How high is the share of the buildings that are planned to be excluded?
9. Is it planned to define criteria for the exemption of individual buildings that would be targeted by the MEPS, like an unfavourable cost-benefit analysis? (this would be needed to be reported in the NBRP)

10. Do you have an inventory of the non-residential building stock in your country? If yes, what is the level of completeness of the inventory and which information is contained? At which territorial level does the inventory exist (municipal, regional, national)? If no, is there a plan to set up such an inventory in the near futures?
11. How do you plan to identify the worst-performing non-residential buildings (in contrast to the method for calculating the threshold, here we mean, how you identify single buildings that need to renovate until 2030, 2033)?
12. Do you prioritise some segments of the building stock compared to others? Particularly, those buildings that should be upgraded to nZEB and those buildings that should only be decarbonised? What would be the criteria of selection? Art 6 of the EED (2023) requires that at least 3% per year of the heated and/or cooled buildings owned by public bodies undergo renovation to become nearly zero-energy or zero-emission. How do you plan to implement it?
13. Do you have planned or plan requirements regarding small measures or individual components? Instead of doing large scale renovation, to introduce regulation regarding obligations for smaller measures by certain dates or if certain efficiency exceeded (eg. PV panels installation, floor or roof insulation)
14. Does your country have or plan to introduce an obligation on PV and renewable sources on existing public buildings?

#### **Monitoring**

15. Does a monitoring strategy for MEPS implementation exist? If not, how do you plan it? what instrument and what body is responsible for it?
16. Who conducts the monitoring (e.g. Energy audit)?
17. Could a system of penalties work and encourage renovation?

#### **Expert and skills**

18. How is the situation of one-stop-shops in your country?
19. A dynamic roll-out of energy renovations supported by MEPS depends on the availability of a qualified workforce. Do you believe your country has the necessary competence and skills in the workforce to accelerate high-quality renovation works? Does your country have training programmes to acquire the necessary competences and skills?

## Annex 3: Good practice #1

Flemish Renovation Pact	Belgium Flanders
Author: Francesca Conselvan, e-think energy research	Date: February 2024
Contributors: Marcus Hummel, e-think energy research	

Aspects addressed	
ZEB – Zero-Emission Building	<input type="checkbox"/>
MEPS – Minimum Energy Performance Standards	<input checked="" type="checkbox"/>
NBRP – National Building Renovation Plan	<input type="checkbox"/>
BRP – Building Renovation Passport	<input type="checkbox"/>
EPCs – Energy Performance Certificates	<input type="checkbox"/>

Legend: Tick the appropriate box

General challenges addressed		Specific challenges addressed: MEPS	
Good governance	<input checked="" type="checkbox"/>	Legal framework (e.g. regulation)	<input checked="" type="checkbox"/>
Staff shortage in public administration	<input type="checkbox"/>	Overview of worst-performing buildings	<input type="checkbox"/>
Data availability for effective policies	<input checked="" type="checkbox"/>	Trigger points to renovate	<input checked="" type="checkbox"/>
Data accessibility for effective policies	<input checked="" type="checkbox"/>	Renovation roadmap	<input checked="" type="checkbox"/>
Data quality for effective policies	<input type="checkbox"/>	Renovation type	<input checked="" type="checkbox"/>
Estimation of impacts (broader benefits)	<input checked="" type="checkbox"/>	Financial instruments	<input checked="" type="checkbox"/>
Industry and labour and skill shortages	<input type="checkbox"/>	Energy poverty/Vulnerable households	<input checked="" type="checkbox"/>
Clear presentation of co-benefits	<input type="checkbox"/>	Monitoring	<input type="checkbox"/>
Financing	<input checked="" type="checkbox"/>	Penalties	<input checked="" type="checkbox"/>

Legend: Tick the appropriate box

Short description of good practice - summary
<p><b>Goal:</b> Rental homes that do not meet the minimum insulation requirement and the energy performance standard of 100kWh/(m<sup>2</sup>*y) cannot be rented out. From 2021 offices and public buildings must undergo an energy renovation within five years of purchase.</p> <p><b>Trigger:</b> Rent.</p> <p><b>Segment of the building stock:</b> Rented homes; public buildings and offices.</p> <p><b>Exempted:</b> Homes that are sold and non-residential buildings that do not fall into the category public and office.</p> <p><b>Type of renovation:</b> Roof insulation and double-glazed windows.</p> <p><b>Type of financial instrument:</b> Basic grants, bonus, collective renovation project.</p> <p><b>Metric:</b> Technical measure of energy performance or EPC.</p> <p><b>Penalty:</b> System of penalty points.</p>

**Communication:** Widespread communication campaign and public information points in municipalities.

**Barrier:** Political barrier due to the formation of the government.

## Characteristics and detailed description of solution

Context addressed	
Technical	Roof insulation. The insulation must provide a minimum thermal resistance of $R=0,75 \text{ M}^2\text{K/W}$ . Double glazing standards for windows.
Legal	Flemish Renovation Pact and penalty points for noncompliance. Homes that had accrued 15 penalty points by 1 January 2020 can no longer be rented out. Exception from penalty: primary residence. Energy threshold: The thresholds are $600 \text{ kWh}/(\text{m}^2\cdot\text{y})$ for a free-standing houses, $550 \text{ kWh}/(\text{m}^2\cdot\text{y})$ for a semi-terraced houses, $450 \text{ kWh}/(\text{m}^2\cdot\text{y})$ for a terraced house and $400 \text{ kWh}/(\text{m}^2\cdot\text{y})$ for an apartment.
Administrative	Municipal level.
Societal	350.000 dwellings (13%) need structural renovations. Renovation loans with 0% interest for vulnerable groups. Free energy scans (20.000 per year): advice on behaviour and renovation possibilities, free small EE-measures (lamps, showerhead..., worth 20 euro). High grant + practical support. Climate Fund: extra budget for renovation of social housing.
Economic	(4.750 euro per house and 2.375 euro per apartment)

Legend: Allocate a topic

**Technical:** e.g. construction types, materials, heating and cooling systems, electricity supply

**Legal:** e.g. federal or regional/municipal responsibility; relation with building regulation, energy audit, RES legislation

**Administrative:** e.g. is the unique definition of building address and unit address available or not; databases, tools

**Societal:** e.g. how is energy poverty dealt with

**Economic:** e.g. which subsidy schemes exist on what basis

Built environment addressed	
Residential buildings	<input checked="" type="checkbox"/>
Non-residential buildings	<input checked="" type="checkbox"/>
Public	<input checked="" type="checkbox"/>
Office	<input checked="" type="checkbox"/>
Educational	<input type="checkbox"/>
Health	<input type="checkbox"/>

Scale addressed	
Building	<input checked="" type="checkbox"/>
Neighbourhood	<input type="checkbox"/>
District	<input type="checkbox"/>

Others:	Vulnerable households		
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Legend: Tick the appropriate box or add explanation

Target group(s) addressed			
Building owners	<input checked="" type="checkbox"/>		<input type="checkbox"/>
Property managers	<input checked="" type="checkbox"/>		<input type="checkbox"/>
Municipal administrations	<input checked="" type="checkbox"/>		<input type="checkbox"/>
Other (explain)			

Legend: Tick the appropriate box or add explanation

<p><b>Lessons learnt and key recommendations</b></p> <p><b>Clear Minimum Standards:</b> standards for roof insulation and glazing, ensuring that homes meet certain energy performance thresholds.</p> <p><b>Enforcement Mechanisms:</b> Implementing penalty systems for non-compliance, such as being ineligible for renting out.</p> <p><b>Municipal Level Enforcement:</b> Enforcing standards at the municipal level.</p> <p><b>Incentives and Support:</b> Providing financial support, such as renovation grants and tax benefits.</p> <p><b>Communication and Information:</b> comprehensive communication campaign and the establishment of public information points.</p>
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## Annex 4: Good practice #2

Renovation strategy	Belgium, Brussels Capital
Author: Francesca Conselvan, e-think energy research	Date: February 2024
Contributors: Marcus Hummel, e-think energy research	

Aspects addressed	
ZEB – Zero-Emission Building	<input type="checkbox"/>
MEPS – Minimum Energy Performance Standards	<input checked="" type="checkbox"/>
NBRP – National Building Renovation Plan	<input type="checkbox"/>
BRP – Building Renovation Passport	<input type="checkbox"/>
EPCs – Energy Performance Certificates	<input type="checkbox"/>

Legend: Tick the appropriate box

General challenges addressed		Specific challenges addressed: MEPS	
Good governance	<input checked="" type="checkbox"/>	Legal framework (e.g. regulation)	<input checked="" type="checkbox"/>
Staff shortage in public administration	<input type="checkbox"/>	Overview of worst-performing buildings	<input type="checkbox"/>
Data availability for effective policies	<input type="checkbox"/>	Trigger points to renovate	<input type="checkbox"/>
Data accessibility for effective policies	<input type="checkbox"/>	Renovation roadmap	<input type="checkbox"/>
Data quality for effective policies	<input type="checkbox"/>	Renovation type	<input checked="" type="checkbox"/>
Estimation of impacts (broader benefits)	<input type="checkbox"/>	Financial instruments	<input checked="" type="checkbox"/>
Industry and labour and skill shortages	<input checked="" type="checkbox"/>	Energy poverty/Vulnerable households	<input type="checkbox"/>
Clear presentation of co-benefits	<input type="checkbox"/>	Monitoring	<input checked="" type="checkbox"/>
Financing	<input checked="" type="checkbox"/>	Penalties	<input type="checkbox"/>

Legend: Tick the appropriate box

Built environment addressed	
Residential buildings	<input checked="" type="checkbox"/>
Non-residential buildings	<input checked="" type="checkbox"/>
Public	<input checked="" type="checkbox"/>
Office	<input checked="" type="checkbox"/>
Educational	<input type="checkbox"/>
Health	<input type="checkbox"/>
Others:	Vulnerable households

Scale addressed	
Building	<input checked="" type="checkbox"/>
Neighbourhood	<input type="checkbox"/>
District	<input type="checkbox"/>

Target group(s) addressed			
Building owners	<input checked="" type="checkbox"/>		<input type="checkbox"/>
Property managers	<input checked="" type="checkbox"/>		<input type="checkbox"/>
Municipal administrations	<input checked="" type="checkbox"/>		<input type="checkbox"/>
Other (explain)			

Short description of good practice - summary
<p><b>Goal:</b> Large-scale deployment of innovative solutions for the sustainable and circular renovation of Brussels buildings. The building stock of the residential and tertiary sector (with the exception of industry), in private or public ownership, must aim for zero emissions<sup>13</sup> by 2050.</p> <p><b>Segment of the building stock:</b> residential and tertiary sector. Public buildings, whose function is equated with a tertiary function such as schools, administrative offices, daycare centres, nursing homes, sports halls, cultural centres, museums, swimming pools built more than 10 years ago.</p> <p><b>Exempted:</b> New buildings under the EPB scheme and hospitals, universities and dormitories, and buildings built less than 10 years ago.</p> <p><b>Action workflow:</b> An energy performance of a maximum of 150 kWh/(m<sup>2</sup>*y) by 2040 for all homes owned by public real estate managers; by 2040, a maximum average consumption of 100 kWh/(m<sup>2</sup>*y) for all EPB units owned by a public real estate manager, with the exception of classified homes or homes registered on the watch list; an obligation for regional and local authorities to purchase or rent new zero-energy buildings by 2030. From 2030, these must be ZEBs; zero emissions requirements and solar energy production for new buildings owned or occupied by public authorities from 2027.</p> <p><b>Type of renovation:</b> Insulation facade internal and external and floor, windows, external sun blinds, ventilation, heating and cooling systems, green roof or water storage, rainwater tank.</p> <p><b>Renovation workflow:</b> 1. Contact Sibelga and Sibelga confirms if the building is eligible for the RenoClick programme; 2. Apply for the programme; 3. If project is not selected look at other RENOLUTION incentives.</p> <p><b>Type of financial instrument:</b> Public premium.</p> <p><b>Metric:</b> Technical measures.</p>

<sup>13</sup> with no GHG from fossil fuels on site and with very low operational production of GHG

## Characteristics and detailed description of solution

Context addressed	
Technical	One-stop-shop
Legal	regional
Administrative	Public buildings in the Brussels capital region
Societal	n/a
Economic	RenoClick Premium and other RENOLUTION incentives

Legend: Allocate a topic

**Technical:** e.g. construction types, materials, heating and cooling systems, electricity supply

**Legal:** e.g. federal or regional/municipal responsibility; relation with building regulation, energy audit, RES legislation

**Administrative:** e.g. is the unique definition of building address and unit address available or not; databases, tools

**Societal:** e.g. how is energy poverty dealt with

**Economic:** e.g. which subsidy schemes exist on what basis

Built environment addressed	
Residential buildings	<input type="checkbox"/>
Non-residential buildings	<input checked="" type="checkbox"/>
Public	<input checked="" type="checkbox"/>
Office	<input type="checkbox"/>
Educational	<input checked="" type="checkbox"/>
Health	<input checked="" type="checkbox"/>
Others:	

Scale addressed	
Building	<input checked="" type="checkbox"/>
Neighbourhood	<input type="checkbox"/>
District	<input type="checkbox"/>

Legend: Tick the appropriate box or add explanation

Target group(s) addressed			
Building owners	<input type="checkbox"/>		<input type="checkbox"/>
Property managers	<input type="checkbox"/>		<input type="checkbox"/>
Municipal administrations	<input checked="" type="checkbox"/>		<input type="checkbox"/>
Other (explain)			

Legend: Tick the appropriate box or add explanation

### Lessons learnt and key recommendations

**Comprehensive Strategy:** Encompasses a wide range of actions and projects.

**Stakeholder Engagement:** Involving multiple stakeholders, including regional, community, and municipal institutions, as well as network operators like Sibelga.

**OSS Approach:** IRISbox is a one-stop-shop designed to standardise and simplify administrative procedures.

**Financial Support** 45 grants for both renovation and energy-saving works





## Annex 5: Good practice #3

Building Decree	The Netherlands
Author: Francesca Conselvan, e-think energy research	Date: February 2024
Contributors: Marcus Hummel, e-think energy research	

Aspects addressed	
ZEB – Zero-Emission Building	<input type="checkbox"/>
MEPS – Minimum Energy Performance Standards	<input checked="" type="checkbox"/>
NBRP – National Building Renovation Plan	<input type="checkbox"/>
BRP – Building Renovation Passport	<input type="checkbox"/>
EPCs – Energy Performance Certificates	<input type="checkbox"/>

Legend: Tick the appropriate box

General challenges addressed		Specific challenges addressed: MEPS	
Good governance	<input checked="" type="checkbox"/>	Legal framework (eg. regulation)	<input checked="" type="checkbox"/>
Staff shortage in public administration	<input type="checkbox"/>	Overview of worst-performing buildings	<input type="checkbox"/>
Data availability for effective policies	<input type="checkbox"/>	Trigger points to renovate	<input type="checkbox"/>
Data accessibility for effective policies	<input type="checkbox"/>	Renovation roadmap	<input checked="" type="checkbox"/>
Data quality for effective policies	<input type="checkbox"/>	Renovation type	<input type="checkbox"/>
Estimation of impacts (broader benefits)	<input type="checkbox"/>	Financial instruments	<input checked="" type="checkbox"/>
Industry and labour and skill shortages	<input type="checkbox"/>	Energy poverty/Vulnerable households	<input type="checkbox"/>
Clear presentation of co-benefits	<input type="checkbox"/>	Monitoring	<input checked="" type="checkbox"/>
Financing	<input type="checkbox"/>	Penalties	<input checked="" type="checkbox"/>

Legend: Tick the appropriate box

Short description of good practice - summary
<p><b>Goal:</b> Office buildings must at least have an energy performance label of C as of 1 January 2023 (this is equal to an EE Index of at least 1.3) and a performance label A as of 1 January 2030. Office buildings that do not have an EPC yet will need to register an EPC of A, B or C to comply with the regulation. The government gave property owners more than four years to prepare for compliance.</p> <p><b>Building segment:</b> Around 62,000 offices need to comply with the standard. Of these 56% currently do not have an EPC.</p> <p><b>Exemptions:</b> Buildings in which less than 50% of the floor area is used for offices. Historic buildings that are temporarily used as offices. Buildings that will be demolished or will change its use and those that do not use energy to regulate indoor climate.</p> <p><b>Metric:</b> EPC.</p>

**Target audience:** Building owners.

**Technical assistance:** RVO offers technical information to support compliance with the standard. It provides an online tool that enables building owners to explore investment costs, annual savings, payback times and carbon savings for different options to meet the standard. The government also has an approved register of energy advisors. Building owners can receive a grant for the cost of this advice if they go on to implement measures.

**Financial support:** The Dutch government provides tax incentives (see Context addressed)

**Monitoring:** A nominated ‘competent authority’, usually the local municipality, will enforce the standard. Failure to comply will be addressed periodic penalty payments up to the closure of the office.

**Penalty:** Failure to comply with the renovation obligation — defined in the regulation as being equal to an EE index of at least 1.3 — by 1 January 2023, periodic penalty payments up to the closure of the office.

## Characteristics and detailed description of solution

Context addressed	
Technical	
Legal	National
Administrative	
Societal	n/a
Economic	<p>(a) Energy Investment Allowance permits companies to deduct 45% of advanced energy saving investment costs from taxable profit.</p> <p>(b) The environmental investment allowance is available for entrepreneurs to make tax-deductible investments in a broader range of environmental measures.</p> <p>(c) Installation of solar thermal and heat pumps is partially subsidised through the Renewable Energy Investment Allowance.</p> <p>(d) Green loans with preferential interest rates are also available for commercial buildings; these are often coupled with support services, such as free energy consultations.</p>

Legend: Allocate a topic

**Technical:** e.g. construction types, materials, heating and cooling systems, electricity supply

**Legal:** e.g. federal or regional/municipal responsibility; relation with building regulation, energy audit, RES legislation

**Administrative:** e.g. is the unique definition of building address and unit address available or not; databases, tools

**Societal:** e.g. how is energy poverty dealt with

**Economic:** e.g. which subsidy schemes exist on what basis

Built environment addressed	
Residential buildings	<input type="checkbox"/>
Non-residential buildings	<input checked="" type="checkbox"/>
Public	<input type="checkbox"/>

Scale addressed	
Building	<input checked="" type="checkbox"/>
Neighbourhood	<input type="checkbox"/>
District	<input type="checkbox"/>

Office	<input checked="" type="checkbox"/>
Educational	<input type="checkbox"/>
Health	<input type="checkbox"/>
Others:	


Legend: Tick the appropriate box or add explanation

Target group(s) addressed			
Building owners	<input checked="" type="checkbox"/>		<input type="checkbox"/>
Property managers	<input type="checkbox"/>		<input type="checkbox"/>
Municipal administrations	<input type="checkbox"/>		<input type="checkbox"/>
Other (explain)			

Legend: Tick the appropriate box or add explanation

Lessons learnt and key recommendations
<p><b>Financial Support and Incentives:</b> Grants for energy advice and tax incentives for EE investments.</p> <p><b>Technical Support and Information:</b> Online tools for exploring investment costs and carbon savings, as well as an approved register of energy advisors, helps building owners navigate the compliance process and make informed decisions about EE measures.</p> <p><b>Exemptions and Thresholds:</b> Exemptions for certain types of buildings or cost thresholds for EE measures.</p>

## Annex 6: Good practice #4

Plan for the Energy Renovation of Buildings	France
Author: Francesca Conselvan, e-think energy research	Date: February 2024
Contributors: Marcus Hummel, e-think energy research	

Aspects addressed	
ZEB – Zero-Emission Building	<input type="checkbox"/>
MEPS - Minimum Energy Performance Standards	<input checked="" type="checkbox"/>
NBRP – National Building Renovation Plan	<input type="checkbox"/>
BRP – Building Renovation Passport	<input type="checkbox"/>
EPCs – Energy Performance Certificates	<input type="checkbox"/>

Legend: Tick the appropriate box

General challenges addressed		Specific challenges addressed: MEPS	
Good governance	<input checked="" type="checkbox"/>	Legal framework (eg. regulation)	<input checked="" type="checkbox"/>
Staff shortage in public administration	<input type="checkbox"/>	Overview of worst-performing buildings	<input type="checkbox"/>
Data availability for effective policies	<input type="checkbox"/>	Trigger points to renovate	<input type="checkbox"/>
Data accessibility for effective policies	<input type="checkbox"/>	Renovation	<input type="checkbox"/>
Data quality for effective policies	<input type="checkbox"/>	Renovation type	<input type="checkbox"/>
Estimation of impacts (broader benefits)	<input type="checkbox"/>	Financial instruments	<input checked="" type="checkbox"/>
Industry and labour and skill shortages	<input type="checkbox"/>	Energy poverty/Vulnerable households	<input type="checkbox"/>
Clear presentation of co-benefits	<input type="checkbox"/>	Monitoring	<input checked="" type="checkbox"/>
Financing	<input type="checkbox"/>	Penalties	<input checked="" type="checkbox"/>

Legend: Tick the appropriate box

Short description of good practice - summary
<p><b>Target:</b> buildings of the tertiary sector with over 1,000 m<sup>2</sup>. 37% of the national stock of tertiary-sector buildings accounts public buildings. They must reduce their final energy consumption by 40% in 2030, 50% in 2040 and 60% in 2050, compared to 2010.</p> <p><b>Exempted:</b> temporary structures, places of worship and places used for defence, civil protection, and internal security of the state. Obviously disproportionate costs of actions compared to the expected benefits in terms of final energy consumption.</p> <p><b>Action workflow:</b> The aim of energy saving may be achieved in either of two ways: based on a quantitative target related to a reference year, which must not be earlier than 2010; or based on an absolute target value determined for the relevant periodic reviews to refresh knowledge of the occupied building stock and its energy consumption.</p>

**Type of renovation:** a. The waste heat self-consumed by buildings subject to obligation can be deducted from consumption, thus contributing to achieving the objectives.

b. The energy consumption linked to the charging of any electric and plug-in hybrid vehicle is deducted from the energy consumption of the building and is not included in the reference consumption.

**Type of financial instrument:** a soft loan from the Caisse des Dépôts et Consignations (CDC), an equity investment by the CDC in Energy Performance Contracts and the Interacting internal performance contracting scheme. The Energy Saving Certificate schemes, the ERDF and the ADEME Heat Fund serve to fund operations.

**Monitoring:** Compliance will be monitored through an online platform collecting annual consumption data, and lack of compliance is fined up to €7,500.

## Characteristics and detailed description of solution

Context addressed	
Technical	
Legal	For public buildings: responsibility of central government and its agencies
Administrative	Tertiary sector, including public and governmental buildings
Societal	
Economic	Big Investment Plan

Legend: Allocate a topic

**Technical:** e.g. construction types, materials, heating and cooling systems, electricity supply

**Legal:** e.g. federal or regional/municipal responsibility; relation with building regulation, energy audit, RES legislation

**Administrative:** e.g. is the unique definition of building address and unit address available or not; databases, tools

**Societal:** e.g. how is energy poverty dealt with

**Economic:** e.g. which subsidy schemes exist on what basis

Built environment addressed		
	Small	Large
Residential buildings	<input type="checkbox"/>	<input type="checkbox"/>
Non-residential buildings	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Office	<input type="checkbox"/>	<input type="checkbox"/>
Educational	<input type="checkbox"/>	<input type="checkbox"/>
Health	<input type="checkbox"/>	<input type="checkbox"/>
Other (explain)	Tertiary sector, including public buildings	

Scale addressed	
Building	<input checked="" type="checkbox"/>
Neighbourhood	<input type="checkbox"/>
District	<input type="checkbox"/>

Legend: Tick the appropriate box or add explanation

Target group(s) addressed			
Building owners	<input checked="" type="checkbox"/>		<input type="checkbox"/>

Property managers	<input type="checkbox"/>		<input type="checkbox"/>
Municipal administrations	<input checked="" type="checkbox"/>		<input type="checkbox"/>
Other (explain)			

Legend: Tick the appropriate box or add explanation

**Lessons learnt and key recommendations**

Legislation to enforce the renovation of large buildings in the tertiary sector  
 Progressive renovation strategy with milestones to reduce final energy consumption  
 System to monitor compliance and pecuniary penalty for lack of compliance