Efficient Buildings Europe

Energy Performance of Buildings Directive (EPBD) 2024

Implementation Guide

Authors

Lead author: **Rémi Collombet**, Head of EU Policy, Efficient Buildings Europe

Contributor: **Rose Hartwig Peillon**, Project and Policy Officer, Efficient Buildings Europe

Editor: **Adrian Joyce,** Secretary General, Efficient Buildings Europe and Renovate Europe Campaign Director

Graphic design: JQ&ROS Visual Communications, jqrosvisual.eu

Cover photo: Shutterstock (Mark Oleksiy)

About us

Efficient Buildings Europe represents Europe's leading companies involved with the manufacture, distribution and installation of energy saving goods and services for buildings.

Efficient Buildings Europe members employ more than 280,000 people in these activities in Europe and have over 1,200 production facilities and office locations.

The mission of Efficient Buildings Europe is to work together with the EU institutions to help Europe move towards a more efficient use of energy in buildings, thereby contributing to Europe's commitments on climate change, energy security and economic growth.

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Foreword

Sean Kelly

EPP shadow rapporteur on the Energy Performance of Buildings Directive.
Member of the European Parliament for Ireland South

The Energy Performance of Buildings Directive (EPBD) represents an important moment for the European Union as we chart a course towards climate neutrality and energy resilience. By prioritizing energy efficiency within our building stock, we address not only environmental concerns but also enhance our energy security and economic competitiveness.

As lead negotiator for the Parliament's biggest political group, the EPP Group, I was committed to achieving a balanced approach between ambition and practicality. The EPBD is designed to foster a significant reduction in energy consumption across the EU's buildings, an essential step given that buildings account for around 40% of our energy use and 36% of energy-related emissions. This Directive provides a robust framework for building decarbonization, introduces national renovation passport schemes, and sets new targets for solar energy deployment.

A key aspect of the EPBD is its emphasis on cost-effectiveness. Recognizing that renovation can be a substantial investment, the Directive allows flexibility for Member States to tailor implementation strategies to their specific contexts. This flexibility is crucial for ensuring that energy efficiency improvements are both feasible and effective across diverse national landscapes.

The development of One Stop Shops and the emphasis on workforce training will streamline the renovation process and support the emergence of a skilled labor force in each Member State. These measures will reduce the administrative burden on individuals and businesses, making it easier to achieve the Directive's objectives.

As we move forward, the role of Member States will be crucial in translating the Directive's goals into concrete outcomes. I commend Efficient Buildings Europe for their timely and insightful guide, which will be invaluable in navigating this next phase. We must continue to work together to turn these ambitious targets into tangible improvements, fostering a more energy-efficient and sustainable Europe.

Introduction

Rémi Collombet

Head of EU Policy
Efficient Buildings Europe

After 3 years of intense negotiations, EU policymakers adopted the Energy Performance of Buildings Directive (EPBD) recast, acknowledging the key role of buildings in delivering the climate and energy transition. Well implemented, the EPBD can support greater competitiveness in the EU. This recast signalled a shared understanding of the importance of energy in buildings and its crucial role in lowering energy bills, improving living conditions through improved indoor environmental quality and enhancing energy security.

Translating core elements of the EU Renovation Wave into European Law, the Directive sets a clear objective for the buildings sector: full decarbonisation by 2050. To reach climate neutrality and deliver benefits to European businesses and citizens, the underperforming buildings in the EU must be addressed. This detailed guidance note on the amended aspects of the EPBD shows how to do it. We trust that it will be a useful reference document for public and private stakeholders, engaged in addressing the challenge of improving the energy performance of our building stock.

The key to delivering tangible results for Europe's citizens and businesses now lies in promptly and fully implementing the Directive. This entails establishing stable policy frameworks and well-designed financing schemes in each Member State to drive investments in the sector.

From designing energy-efficient solutions for new buildings to providing cutting-edge solutions for retrofitting existing buildings, our industry is ready to support this endeavour and scale up to meet increasing demand.

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Glossary of abbreviations

BACS: Building Automation and Control Systems

BIM: Building Information Modelling

BIPV: Building Integrated Photovoltaics

EE1: Energy Efficiency First

EED: Energy Efficiency Directive

EPBD: Energy Performance of Buildings Directive

EPC: Energy Performance Certificate

EV: Electric Vehicle

GHG: Greenhouse Gas

GWP: Global Warming Potential

HVAC: Heating Ventilation Air Conditioning

IEQ: Indoor Environmental Quality

LTRS: Long-Term Renovation Strategies

MEPS: Minimum Energy Performance Standards

NBRP: National Building Renovation Plan

NECP: National Energy and Climate Plan

NZEB: Nearly Zero Energy Building

OSS: One-Stop Shops

PV: Photovoltaic

RED: Renewable Energy Directive

RP: Renovation Passport

SCP: Social Climate Plan

SRI: Smart Readiness Indicator

TBS: Technical Building Systems

WLC: Whole Life Carbon

WPB: Worst Performing Buildings

ZEB: Zero Emission Building

55 recommendations

to deliver efficient buildings

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Photo: Shutterstock (Pyty)

Photo: Shutterstock (Ant Clausen)

1 Planning the roll-out of efficient buildings from national to building level

The 2024 EPBD recast offers a more integrated and holistic approach to the rollout of efficient buildings. It builds a clear architecture from the macro-level National Building Renovation Plans to the micro level with the Renovation Passports and Energy Performance Certificates (EPCs).

Member States are now encouraged to move from ad-hoc, fragmented policies to medium and long-term industrial renovation planning. The definition of roadmaps and passports should involve all actors in the efficient buildings supply chains and provide long-term visibility to encourage investments in the sector. The Directive's implementation offers an opportunity to engage the buildings ecosystem as a whole – product manufacturers, contractors, property owners, banks and cities – around the achievement of the EPBD's new energy performance standards.

National Building Renovation Plans

Article 2, 3, Annex III

Why it matters

National Building Renovation Plans (NBRPs) replace the Long-Term Renovation Strategies (LTRS) of the 2018 EPBD Directive. Compared to LTRS, NBRPs are a more comprehensive tool.

The NBRP serves as the **primary planning tool for Member States,** guiding the strategic direction and implementation of building renovations. It requires detailed outlines of renovation trajectories, the specific measures to be employed, and the financial tools and resources dedicated to achieving these goals.

What is in the EPBD recast?

In their NBRP, Member States are asked to prepare a trajectory ensuring that all residential and non-residential buildings, public and private, are highly energy-efficient and decarbonised by 2050, aiming to transform all existing buildings into zero-emission buildings.

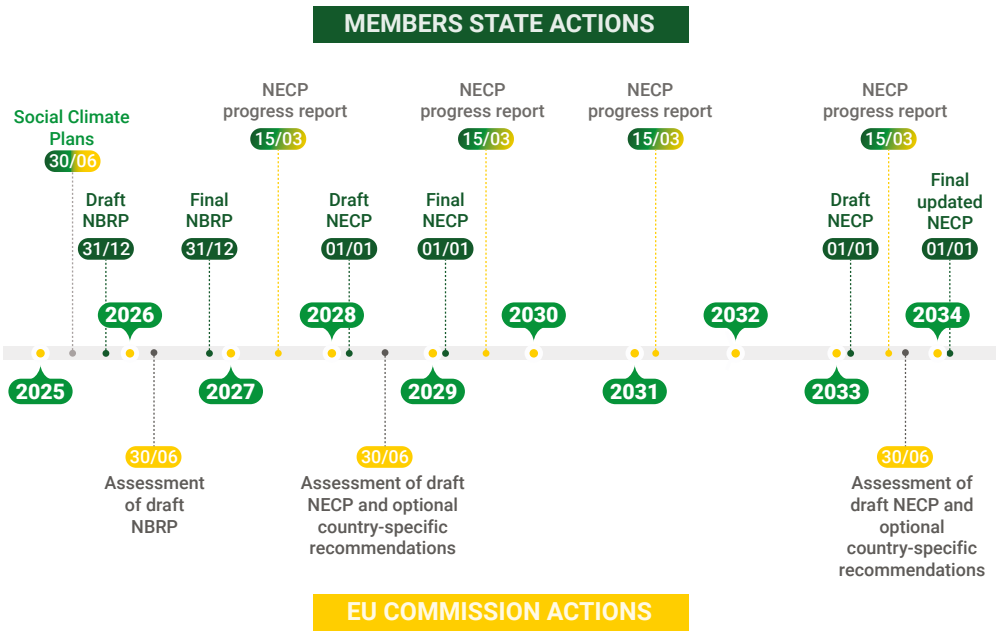
More specifically, the NBRP must contain:

- An overview of the national building stock and market barriers;
- A roadmap with targets and progress indicators to achieve 2050 goals;
- An overview of policies and measures supporting the roadmap;
- A mapping of investment needs, financing sources, and administrative resources;
- Thresholds for greenhouse gas emissions and energy demand for zero-emission buildings;
- Minimum energy performance standards for non-residential buildings;
- A national renovation trajectory for residential buildings with 2030 and 2035 milestones;
- An estimate of expected energy savings and wider benefits.

Member States must submit their Plans to the European Commission every five years, with the first draft due by December 31, 2025, and the final plan due by December 31, 2026. NBRPs objectives must be reflected in the NECPs. This will ensure that the role of buildings, and interactions with other sectors and the energy system, is fully embraced in the latter.

NBRPs have a strong public engagement component. Indeed, the EPBD states that to develop its Plan, each Member State must conduct a public consultation on the draft plan before submitting it to the Commission.

Figure 1: Timeline for the preparation of energy and renovation plans



Source: BPIE, 2024

Tips and tricks for a good NBRP – learnings from the draft 2023 NECPs assessment

The assessment of the previous Long Terms Renovation Strategies showed numerous shortcomings.

- **Updating means improving:** the NBRPs should not simply be an updated list of existing national programmes. They should reflect more strategic thinking and align policy measures and financing with the EPBD's objectives.

- **The Energy Efficiency First (EE1st) principle is not just a slogan:** National officials should explain how it will be implemented. The principle must be reflected across all dimensions of the NBRP's. Evidence should be provided on how energy efficiency considerations are put on an equal footing with supply-side ones, and what guided the final planning decisions. The Commission published a guidance on this matter[1] – an update will be released in 2025.
- **A figure is not a commitment:** Do not simply refer to the goals set by the EPBD, demonstrate the measures that are planned or in place to achieve them. Design a monitoring mechanism to detect deviations and correct them where appropriate.

There is a concern that Member States may not update their NBRP when submitting it alongside the next draft NECP, given that there will be just one year between the finalisation of the first NBRP (end of 2026) and the submission of the second NBRP, which must be included with the next draft NECP (beginning of 2028). The first draft NBRP should consider the information provided in the latest updated NECP to ensure initial alignment between both planning tools.


Photo: Daikin Europe

1. European Commission, 2021, Detailed recommendations EUR-Lex - 32021H1749 - EN - EUR-Lex (europa.eu).

Efficient Buildings Europe's recommendations

Craft a stable and coherent renovation policy framework to enhance market visibility

- As underlined in the Green Deal Industrial Plan Communication[2], to support the EU's fast transition to climate neutrality, the industry must be able to rely on a "predictable, coherent and simplified regulatory environment" that allows it to plan the long-term investments needed to reach the EU's 2050 goals.
- **NBRPs are the place to create such consistency among targets, national measures, and financing tools**, and thus provide the market visibility necessary for the industry to fulfil the objectives of the EPBD.
- Measures and funding should be matched and **described with a sufficient level of detail** (building segment, action, group impacted, expected results etc..). Policy frameworks should support demand-side energy reduction and the decarbonisation of the building stock. Monitoring and evaluation measures should be put in place by national ministries to compare results versus expectations and correct where necessary.
- NBRPs should address how to overcome typical renovation hurdles in specific segments (single-family homes, multi-apartment buildings, small condominiums, schools, etc...), while paying attention to the right sequencing of measures respecting the energy efficiency first principle. This exercise should build on the learnings from the previous national LTRS.

Ensure continuity in national financing schemes to support efficient buildings

- **National-level funding for energy efficiency and renovation measures should provide long-term certainty.** This would break the stop-and-go cycles preventing the consolidation of a sustainable efficient buildings ecosystem. Numerous programmes have been announced and revised in recent years to support renovation works: *Sanierungsscheck* in Austria, *Ma Prime Renov* in France, *the Superbonus* in Italy, *Clean Air Programme* in Poland... Nonetheless, **national funding schemes** lack stability and long-term certainty (e.g., CEE in France). Long-term visibility (on the total budget, type of renovation works covered, and financial support for each renovation step) would encourage households to undertake renovation projects and incentivise contractors to hire and train workers and equipment manufacturers to invest in new production facilities. A stable environment is also key to avoiding boom and bust cycles and sustaining national renovation ecosystems. It is a prerequisite to the success of the EPBD implementation.

2. COM/2023/62 final.

- More should be done to **properly plan public investments** in this sector. The design and publication of the NBRPs in 2025 is the perfect occasion to provide long-term visibility and link funding streams to specific targets and policy measures. Funding should be explicitly targeted to achieve Minimum Energy Performance Standards by 2033/2035.
- With forecasted total investment needs of over €3.5 trillion by 2030[3], the energy renovation market cannot be upscaled with public financing alone. Member States must help unlock private financing by encouraging the emergence of new financing tools, such as zero-rate loans or by incentivising new financing models, such as the pay-for-performance model. Private financing for renovation efforts could go through energy service companies (ESCOs), coupled with measured performance. Such financing schemes could also support compensating CO_2 emissions (i.e. renovation credit), monetising the positive contribution of energy efficiency measures in preventing and/or reducing grid congestion.
- NBRPs are a place to discuss how to balance and fine-tune different support schemes, alongside a more granular analysis of needs according to economic profiles.[4]

Foster an inclusive design process for NBRPs

- A public consultation must be held before submitting the draft plan, involving local authorities and civil society, representatives of craftsmen, financial institutions, and solution providers.
- The inclusive design of an NBRP is intricately linked to the impact it can have. Including perspectives and inputs of a large stakeholder panel, including fewer usual suspects, increases public acceptance and support for measures and their durability over time.
- Similarly, various ministries should be involved in the drafting and development of KPIs for all NBRPs (i.e. construction, housing, energy, climate ministries, but also environment, education, health, and culture).
- Article 3 states that the European Commission will examine whether the national consultation process has been "sufficiently inclusive". In practice, this means a clear consultation process (public communication on the modalities, easily accessible platform, etc...) with sufficient time to provide meaningful input.
- Good examples from the previous Long Term Renovation Strategies can be found here: OurBuildings-Long-term-renovation-strategies-report_final.pdf (bpie.eu).

3. COM/2020/662 final.

4. Climate Strategies offered a breakdown on the need and type of public funding needed per economic profile: Engaging Retail Lenders in Home Renovation | Climate Strategy & Partners.

Encourage the use of innovative solutions

- **Strategic investments in innovative solutions** from advanced materials to digital tools can significantly accelerate and facilitate the implementation of the EPBD.
- Innovative tools to map the status of the building stock, its potential and trajectory for upgrade, should be encouraged and supported. AI and machine learning can be used to increase our knowledge of the building stock beyond EPC coverage and speed up the deployment of renovation strategies at the national/local level. See examples from IMOPE/URBS in France and BNP Paribas machine learning tool for worst-performing buildings[5]. These tools can help overcome data gaps, design support schemes according to certain criteria, e.g. social conditions/energy poverty and help combine energy efficiency works with anti-seismic prevention.
- Digital tools such as **Building Information Modeling** (BIM), can speed up and improve the way we plan, design, build and renovate buildings. For example, Spain developed a state-of-the-art BIM plan which could be replicated to phase in the use of this technology[6].
- Energy efficiency metering solutions can streamline the process of producing an EPC, or complement it, making it easier to generate and assess variations to optimise the overall energy performance of a building. Likewise, innovative building measurement solutions (post-renovation) can help to elevate the trust of the financing sector and facilitate the mobilisation of private and public finance.
- Finally, industrial prefabrication has the potential to slash the cost and time required for energy renovations. According to BPIE's findings[7], one of the main actions needed to accelerate the uptake of these approaches should be the **increase of public funding directed towards prefabricated solutions**, a move that promises to streamline energy renovations. In another report[8], BPIE recommends that in their NBRPs, Member States assess the national building inventory for its suitability for industrial prefabrication, incorporating benchmarks for upgrading existing structures and emphasising the opportunities for industrial prefabrication. The accuracy of the mapping of renovation needs in each segment will greatly facilitate such an approach.

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5. Machine Learning To Predict French Residential Buildings' Energy Performance, 2024, Machine learning to predict French residential buildings' energy performance by Imène Ben Rejeb-Mzah, Melik Bedioui, Amine Larhchim, Yassine Ben Jemaa :: SSRN.

6. BIM Plan for public procurement, 2023, executive_summary__en_a4_web.pdf (mitma.gob.es).

7. Industrial prefabrication solutions for building renovation, BPIE, 2022, Industrial prefabrication solutions for building renovation - Innovations and key drivers to accelerate serial renovation solutions in Europe > BPIE - Buildings Performance Institute Europe.

8. Recommendations for industrial renovations, BPIE, 2022, BE_WLC_PolicyRecs_Final.pdf (bpie.eu).

Good Practices – learnings from the LTRS process (examples from the EPBD.wise project)

Lithuania: accounting for the multiple benefits of energy efficiency[9]

The Lithuanian LTRS provides a good practice example for this, where environmental, economic, and social benefits are split into monetised and non-monetised benefits, and a quantified estimate is given for each benefit described. The Lithuanian example also outlines the following wider benefits: reduced energy consumption; reduced CO_2 emissions; increase in GDP; improved health and working capacity of the population; growth in the value of residential real estate; impacts of the renovation of the building stock on pollution; and reduced compensation for heating costs of the vulnerable population group. The following non-quantifiable benefits are also discussed: energy independence; utilisation of existing production capacity; increase in the service life of buildings; reduced need for subsidies in the sectors concerned; and strengthening of the sector of manufacturers of construction and building materials.

Photo: Shutterstock (Standret)

9. EPBD.wise, 2024, National Building Renovation Plans and Zero-Emission Buildings Policy needs and best practices.

Slovakia – organising a successful public consultation process[10]

To develop a long-term renovation strategy and involve as many stakeholders as possible in its preparation, the Ministry of Transport and Construction of the Slovak Republic established a working group composed of representatives from various government departments, civic associations active in building renovation and development, research and professional organisations, and representatives from Slovak towns and municipalities—a total of 32 entities. Throughout the preparation of the strategy, the Ministry consulted with working group members on specific areas, either in person or in writing, depending on the topic and part of the strategy.

As part of the standard procedure for materials submitted to the Government for discussion, the renovation strategy underwent ministerial and inter-ministerial consultations. In line with the rules for preparing and submitting materials to the Slovak Government, the strategy was also subject to public consultation via the publicly accessible web portal at www.slov-lex.sk. This procedure includes a standardised format and process for evaluating comments.

Any entity, including members of the public, can provide feedback on any part of the submitted material using an electronic form, and the submitting party is required to evaluate every comment received. Any accepted comments are incorporated into the final strategy by the submitting party.

10. Ibid.

Renovation Passports

Article 2, 12, Annex VII

Renovation passports (RPs) are empowering documents that give building owners and/or managers more reliable, personalised, and independent information on the potential for energy savings tied up in their buildings, while describing the path to achieve those savings and correlated benefits.

It is a document that outlines a step-by-step renovation roadmap for a specific building based on an on-site audit that fulfils quality criteria and indicators. It is prepared in consultation with the building owner and ensures that the full energy-efficiency potential of the building is achieved by the end of the term covered by the roadmap.

Why it matters

The new EPBD encourages the use of an RP in conjunction with the NBRPs and, possibly the EPC, reflecting the need for better guidance and support for owners throughout their energy renovation journey. Although recommendations are included in the EPCs of most countries, the latter are not adequately tailored to the needs of the owner and do not motivate them into action.

Renovation passports are worked out in conjunction with building owners, encouraging the uptake of energy improvements at the best moments in the life of the building (trigger points). They describe **the best, most realistic and cost-effective way** for a building to be brought up to its full energy performance potential. This means that effective use of RPs could lead to an increase in the rate and depth of energy renovations across the EU raising the quality of works and encouraging better coordination between professionals.

The use of such tools shows building owners how the **improved energy performance** that they expect after undertaking specifically planned works to their building, can be achieved. As such, it can also be an important supporting document for green mortgages and other financial support measures, thus linking it to national support schemes.

As an RP contains a record of the building and the works that have been previously undertaken, it brings **added value to the property at the point of sale** as the new owner has reliable evidence of the condition of the building and of the stage it has reached on its way to achieving its full energy performance potential.

What is in the EPBD?

Renovation passports are now defined as a "tailored roadmap for the deep renovation of a specific building in a maximum number of steps that will significantly improve its energy performance." This means that the renovation passport outlines how, in a few steps, an existing building should be renovated into a ZEB.

By 29 May 2026, Member States must introduce a scheme for renovation passports based on the framework set out in Annex VIII. They must take measures to make renovation passports affordable.

These passports must contain key information such as:

- Information on the current energy performance of the building;
- A detailed roadmap highlighting the steps to take for a staged deep renovation;
- Information on national requirements, including benchmarks and timelines;
- Information on available funding.

The RP scheme is voluntary unless the Member State decides to make it mandatory.

RPs can be drawn up and issued jointly with the energy performance certificate. It must be issued in a digital format suitable for printing, by a qualified or certified expert, following an on-site visit.

When the renovation passport is issued, a discussion with the expert must be suggested to the building owner to allow the expert to explain the best steps through which to transform the building into a zero-emission building well before 2050. Experience shows that such discussion is essential for the ownership of the renovation project by the building owner.

Member States may develop a complementary tool allowing building owners and building managers to simulate a draft simplified renovation passport and for them to update it once a renovation takes place or a building element is replaced.

Member States must ensure that the renovation passport can be uploaded to the national database for the energy performance of buildings and ensure that the renovation passport is stored in, or can be accessed via, where available, the digital building logbook.

Efficient Buildings Europe's recommendations

Encourage the uptake of renovation passports

Trigger points such as change of ownership, rent, change to the cadastre and the achievement of Article 9 (Minimum Energy Performance Standards) objectives offer a good occasion to ask building owners to acquire a renovation passport so they can benefit from guidance on the next steps. The mandatory requirements in Annex VIII are a good starting point, which encompass crucial elements such as delivering information on the current energy performance of the buildings and outlining the steps towards deep renovation. Both elements must be combined with the optimal sequencing of renovation steps. To ensure that RPs are achieving their full potential it will be important to give Member States as much clarity as possible on the definitions, e.g. "significant impact" or "optimal sequencing." Renovation passports should also preserve technological neutrality and not serve as marketing materials to promote certain materials over others.

Make the link between RPs and EPCs

Renovation Passports and EPCs create synergies in assessing and improving building performance in a holistic way. To reduce costs, the EPBD recast encourages Member States to allow them to be issued jointly by the same expert. If issued together, the renovation passport should replace the recommendations in the EPC, while retaining the option to obtain the certificate separately.

The iBRoad2EPC project created a tool to integrate elements of the building renovation passport in the EPC. By standardising the process and integrating it as a plug-in in national EPC software, this solution reduces costs and improves access to information for building owners. More information here: Horizon 2020 iBRoad2EPC project – Integrating Building Renovation Passports into Energy Performance Certification schemes for a decarbonised building stock.

Good practices (from the EPBD.wise project[11])

Wallonia (Belgium) - planning the role out of RPs in the national/regional roadmap

Wallonia's LTRS presents details of individual actions and steps to implement the building passport and related renovation and monitoring of the building stock. The RP and renovation roadmap have been identified as tools to be developed as a priority, to ensure that any renovation project is part of a comprehensive assessment consistent with the long-term vision and targets for building decarbonisation.

Germany – *the Sanierungsfahrplan*

The *Sanierungsfahrplan* in Germany is a strategic tool designed to assist homeowners and property managers in carrying out energy-efficient building renovations. Its primary goal is to make these renovations more accessible and systematically organized. The tool offers a customised, step-by-step plan tailored to the specific needs and conditions of each building, detailing energy-saving measures, and potential improvements. It begins with a comprehensive analysis of the building's current energy performance to identify areas for possible upgrades. The roadmap emphasises a long-term renovation strategy, spreading out improvements over time to ensure they are more manageable and cost-effective. It also provides information on available subsidies, grants, and financing options to support the implementation of these renovation measures.

11. EPBD.wise: Bringing European Building Policy to Life > BPIE - Buildings Performance Institute Europe.

Austria - Ensuring a reliable RP scheme

In 2024, the province of Carinthia, Austria, introduced a funding guideline that outlines the responsibilities for initiating and carrying out renovation processes, the necessary qualifications for the involved experts, and the related funding provisions. The guideline consists of two key modules: 1) energy and renovation consulting and 2) coaching for the implementation of renovation measures. The energy advisor's responsibilities include preparing an energy advisory report and developing a renovation roadmap. Energy advisors must pass exams for two specific courses, have their work evaluated, and participate in regular courses to stay updated on technical issues and solutions. The renovation coach's role involves assisting homeowners in executing renovation measures. To qualify, renovation coaches must hold a professional engineering license and be affiliated with an architectural office. Grants are available to support the work of both the energy advisor and the renovation coach.

Photo: BASF

Energy Performance Certificates

Articles 2, 19, Annex V

Why it matters

Energy Performance Certificates (EPCs) inform building owners, prospective buyers, or tenants about the energy efficiency of their building or dwelling.

The 2022 energy price crisis has increased the importance of EPCs for citizens and businesses in many European countries. The latter now associate better energy classes with lower energy bills and higher comfort. **This is starting to have clear consequences on property values and rents:**

- In Flanders, Belgium, homes with the best labels (A+, A and B) sell for almost 11% more than similar homes with an average label (E). In addition, homes with an A+, A or B label are sold almost a month faster than homes with a worse score[12].
- Rents cannot be indexed on inflation for dwellings with a low EPC class in some European countries (Belgium in 2022, France since 2022).
- Energy standards for buildings are increasingly based on EPCs. This is the case, in France, Belgium, the Netherlands, etc…

The EPBD 2024 recast improves the reliability and comparability of EPCs across European countries. It integrates the new dimensions in the Directive's scope including several elements of the Smart Readiness Indicator and information regarding indoor environmental quality in the Annex V template.

What is in the EPBD?

Article 19 of the EPBD recast mandates Member States to establish a certification system for a buildings' energy performance. Energy performance certificates (EPCs) must display numeric indicators of both primary and final energy use in kWh/m²/year – and include, for comparison purposes, reference values (MEPS, nZEB, ZEB).

By May 29, 2026, EPCs must comply with a specified template (Annex V) and use a scale from A to G to classify buildings. Recommendations for improving energy performance and reducing greenhouse gas emissions are required unless the building already achieves Class A. There is one exception: Member States which rescaled their EPCs between 01/01/2019 and summer 2024 (entry into force of the EPBD) may postpone the rescaling to 31/12/2029.

12. ING, 2024, The impact of the EPC score on the value of your home.

EPCs must be issued by independent experts, be easily understandable, and include information on potential improvements and available incentives. They must be issued based on an on-site visit, which may be carried out, by virtual means with visual checks.

Member States are required to implement measures to make energy performance certificates **affordable**.

Efficient Buildings Europe's recommendations

Roll out EPCs to the whole building stock

Member States should:

- make EPCs compulsory at the following trigger points: change of ownership, rent, change to the cadastre
- ensure that all buildings have an Energy Performance Certificate by 2030. They could finance this measure under Article 8 (Revised Energy Efficiency Directive, 2023).

Encourage renovations by shortening EPC validity

EPCs with an energy class D and below should only be valid for 5 years. This would incentivise building owners to reassess the performance of their dwellings and get updated information on the actions they could undertake.

Improve the quality control of EPCs

The quality of EPCs has been problematic in several EU countries. Consumer associations ran tests and are raising their concerns as EPCs are starting to have an impact on property values, renovation requirements etc…

However, this is not a fatality. Several measures can be implemented to improve the quality of Energy Performance Certificates:

- Invest in training for certifiers and make them liable for incorrect EPCs. This is already happening in some countries such as France. EPCs now have the same legal value as other real estate diagnostics, with the exception of the recommendations that they contain which retain only an indicative value.
- Encourage the use of new technologies to simplify the work of certifiers and increase the reliability of input data. For example, some companies are now offering software to draft accurate plans of dwellings via the camera of a phone or a tablet. Measured performance as mentioned in Annex I of the EPBD is a way to accurately reflect the energy performance of buildings.

Distribute buildings evenly across classes

This will ensure that buildings are distributed fairly, enabling the administration to quickly identify which buildings should be renovated first.

Provide information on the technical solutions to reach ZEB level

The EPC is an important tool to assist in moving towards zero-emission buildings. As such it should highlight the steps and solutions to get there e.g. insulation, ventilation, efficient lighting, highly efficient and renewable energy-based (fossil-free) technical building systems, controls etc...

Include hot water efficiency in the EPCs

15% of energy consumption in buildings in the EU is used to heat water.[13] Currently, national EPCs may only take into account domestic hot water generation. This excludes potential energy efficiency gains from energy efficiency technologies in taps and showers, which improve the energy performance of buildings by up to 2% for existing buildings and by up to 6% for high-performing buildings. Combined with decentralised water heaters, a reduction of up to 12% is possible, without behavioural change from users.[14]

Given that the EPBD recognises domestic hot water consumption as one of the main sources of energy consumption for efficient buildings, we recommend accounting for hot water consumption in EPCs. This would raise awareness about the potential of hot water efficiency among energy advisors and consumers. A realistic calculation of hot water consumption in EPCs would also incentivise investments in efficient hot water technologies.

The calculation methodologies for EPCs need to allow the energy performance of taps and showers to be accounted for, as opposed to flat rate values for hot water consumption. Respective formulas can be found in studies[15] or energy labels[16].

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13. Eurostat, Energy consumption in households, 2021.

14. German Energy Agency (dena): Summary of the main results of the study Energy savings potential of water-saving showers and faucets.

15. B. Oschatz, J.Rosenkranz, Short study into the energy savings potential of using water-saving and efficiency technologies in showers and tap fittings in residential buildings, 2024, p.35-36.

16. https://uwla.eu/wp-content/uploads/2024/02/TAPS-Showers-Technical-January-2024.pdf.

Good practice

Increasing coverage and data quality: Portuguese EPC

Portugal's multi-purpose Energy Performance Certificate system supports various stakeholders, including homeowners and policymakers. With over 2.5 million EPCs issued, covering almost 40% of the building stock, it includes both residential and non-residential buildings. The Portuguese EPC database provided crucial support for monitoring Long Term Renovation Strategies and is now positioned to similarly support the Portuguese Energy Agency, ADENE, in monitoring the NBRP.

Figure 2: EPC data in Portugal

Source: ADENE

A key success factor of the EPC system is the **quality control of data** stored in the central database[17]. This database contains over 600 million entries with up to 300 variables per building, each with a unique EPC ID. Ensuring high-quality data is crucial as it provides valuable statistical information on the building stock, aiding in informed decision-making and policy formulation. Qualified experts carefully review the data and information recorded by EPC assessors to ensure accuracy and compliance with established criteria and methodologies. This system is endorsed by DGEG (the national institution responsible for energy policy), which

17. Implementation of the EPBD in Portugal, ADENE for the Concerted Action on the EPBD, 2020, Implementation-of-the-EPBD-in-Portugal--2020.pdf (ca-epbd.eu).

builds confidence among stakeholders—including building owners, real estate agents, and policymakers—by guaranteeing the reliability of the EPC database. Regular audits and quality checks are conducted, with feedback provided to assessors to improve accuracy and consistency. By adhering to rigorous quality control measures, Portugal's system serves as a model for other countries aiming to strengthen their own EPC quality assurance mechanisms[18].

Public awareness campaigns have been essential in educating homeowners about EPC benefits, increasing understanding and uptake[19]. Fundamentally, these campaigns hold the power to profoundly influence their target audience, aiming to inspire action and foster positive change[20].

Photo: Shutterstock (Dmitry Kalinovsky)

18. EPBD.Wise, 2024 Energy Performance Certificates: Policy needs and best practices > BPIE - Buildings Performance Institute Europe.

19. For instance, read more about the "Certificar é Valorizar" campaign here: https://enr-network.org/wp-content/uploads/F2_ADENE_Awareness-raising-campaign-for-EE-in-households.pdf. The campaign aimed at Promoting energy efficiency in households involves shifting behaviours and advocating for the use of Energy Performance Certificates (EPCs).

20. On the topic of public awareness campaign, see: EnR catalogue of best practices relared to behavioural insights, European Energy Network, 2021, Booklet-EnR-150421-website-min.pdf (enr-network.org).

Provisional EPCs: the Dutch model

The Dutch government designed a scheme to allocate provisional energy labels to buildings without a proper EPC. This scheme accounts for 44.5% of the total certificates in the Netherlands. While traditional EPCs results in a registered certificate, this second method only informs homeowners of their building's current energy class.

Provisional energy efficiency ratings are assigned free of charge by the Netherlands Enterprise Agency (RVO) to all Dutch buildings that have not yet received an actual EPC. The energy performance of reference building types is developed using cadastral data, including:

- Surface area
- Date of construction
- Quality of insulation for floors, roofs, and walls
- Heating system
- Presence of renewable energy

Using this data, the Netherlands Enterprise Agency (RVO) established 60 reference building types. The approximate energy consumption of a dwelling is calculated, and a corresponding energy label is assigned.

Dwelling owners are encouraged to update or add additional information about energy improvement measures, providing evidence such as invoices and photographs. A qualified expert reviews the uploaded changes and documents before replacing the provisional EPC with a certified EPC.

For a private single-family dwelling, the average and median price for an energy performance certificate ranges between €250 and €300. Housing associations generally receive lower prices (~€110).

Use the results of EU projects

The X-tendo Toolbox is an innovative resource designed to support the implementation of next-generation EPCs across Europe. This toolbox focuses on ten essential features that enhance the compliance, reliability, usability, and consistency of energy performance assessments and certifications. It aims to improve energy performance assessments and encourage energy renovations by incorporating elements such as smart readiness, comfort, outdoor air pollution, real energy consumption, district energy, EPC databases, building logbooks, enhanced recommendations, financing options, and OSS. Find more information here: Toolbox X-tendo Toolbox.

Photo: Hans Grohe

Photo: Tom Thiele

2 Building Standards

The EPBD 2024 recast considers technological progress to support the development of building codes in a way that brings buildings on track for 2030 and 2050 requirements. The recast notably addresses stagnating renovation rates through new energy performance standards and requirements which apply to both new and existing buildings.

In addition to introducing an updated performance standard, the recast includes new requirements for the renovation of existing buildings. Minimum Energy Performance Standards (MEPS) are introduced for non-residential buildings, prioritising the renovation of the worst-performing structures. For the first time, the Directive also sets national trajectories to improve the energy consumption of the residential building stock.

Zero Emission Buildings (ZEBs)

Articles 2, 7, 11

Why it matters

The new zero-emission building standard builds on the uptake of 'nearly zero energy buildings' (nZEB). It increases the ambition of provisions on demand reduction, requiring a highly efficient building design and envelope and it introduces provisions on decarbonisation via clean heating and cooling and demand-side flexibility solutions.

This standard will improve the required performance of new and renovated buildings by the end of the decade, with public buildings leading the way. It will also become the new end goal of 'deep' and 'staged deep' renovations.

What is in the EPBD?

A ZEB is first defined in terms of energy demand, as "a building with a very high energy performance, in accordance with Annex I, requiring zero or a very low amount of energy" (Article 2).

Thresholds for the maximum ZEB energy demand must be set at the national level. However, the Directive guides this exercise through 2 provisions:

- It must achieve at least the most recent cost-optimal levels. These levels should be updated every five years, leading to a progressive improvement of the ZEB threshold.
- The maximum threshold for the energy demand of a zero-emission building must be at least 10 % lower than the threshold for total primary energy use established at Member State level for nearly zero energy buildings on 28 May 2024. This nZEB threshold should be "no worse than the 2023 national cost-optimal level" (Article 2§3).

The cost optimal methodology helps to balance costs and benefits. It should account for the multiple benefits of energy renovations: economic growth, improved health, etc…

ZEBs are also defined in terms of decarbonisation:

- A zero-emission building cannot cause on-site carbon emissions from fossil fuels.
- Operational GHG emissions of ZEBs must comply with a maximum threshold established at the Member State level in their national building renovation plans. That maximum threshold may be set at different levels for new and renovated buildings.
- Member States must ensure that the total annual primary energy use of a new or renovated zero-emission building is covered either by:
  - energy from renewable sources generated on-site or nearby, fulfilling the criteria laid down in Article 7 of the Renewable Energy Directive;
  - energy from renewable sources provided from a renewable energy community within the meaning of Article 22 of the Renewable Energy Directive;
  - energy from an efficient district heating and cooling system in accordance with Article 26(1) of the Energy Efficiency Directive;
  - energy from carbon-free sources.

Where this is not technically or economically feasible, the total annual primary energy use may also be covered by other energy from the grid complying with criteria established at the national level.

Beyond decarbonisation, the EPBD pushes for the emergence of interactions between buildings and power grids using demand response: where economically and technically feasible, a ZEB must offer the capability to react to external signals and adapt its energy use, generation, or storage. This will create new opportunities for building owners and facilitate the integration of variable renewables in the energy system.

Photo: Shutterstock (Basicdog)

Efficient Buildings Europe's recommendations

Make the ZEB standard future-proof

- Developing the ZEB standard needs to be done in line with the overall trajectory towards 2050, as zero-emission buildings should not have to be renovated again before 2050.
- Avoid the pitfalls of the implementation of nZEB schemes (delays, outdated cost assumptions, missing elements…)
  - Please find an assessment of the nZEB national standards here: Nearly-zero_EU-Member-State-Review-062021_Final.pdf.pdf (bpie.eu).
- The initial proposal for the recast EPBD included climate-specific thresholds which could inform national choices.

Ensure the multiple benefits of energy efficiency are factored into the new methodology for cost-optimal levels

The current methodology needs to be extended so that wider benefits not related to energy use - such as the impact of a healthy indoor climate through improved indoor environmental quality - are factored in to be able to quantify the multiple benefits of energy efficiency better.

Provide legal certainty and clarity to Member States

The maximum threshold for the energy demand of a zero-emission building shall be at least 10 % lower than the threshold for total primary energy use established at Member State level for nZEBs. We recommend clarifying that national u-values can only get more ambitious to align with the targets stemming from ZEB. Under no circumstances should u-values be deprioritised.

Minimum Energy Performance Standards (MEPS)

Articles 2, 9

Why it matters

The insufficient investments and low renovation rates across the Member States called for new policy measures to achieve the climate ambitions[21] of the EU. Minimum Energy Performance Standards are the main innovation of the EPBD recast 2024. Addressing the worst performing buildings in priority, they aim at improving the energy efficiency of existing buildings in the EU.

Establishing MEPS in the EU will encourage investments throughout the renovation value chain, unlock further production capacity and help companies optimise training programmes. Clear timelines and benchmarks will also help homeowners to better plan their renovation works whilst improving living conditions for millions of citizens.

What is in the EPBD?

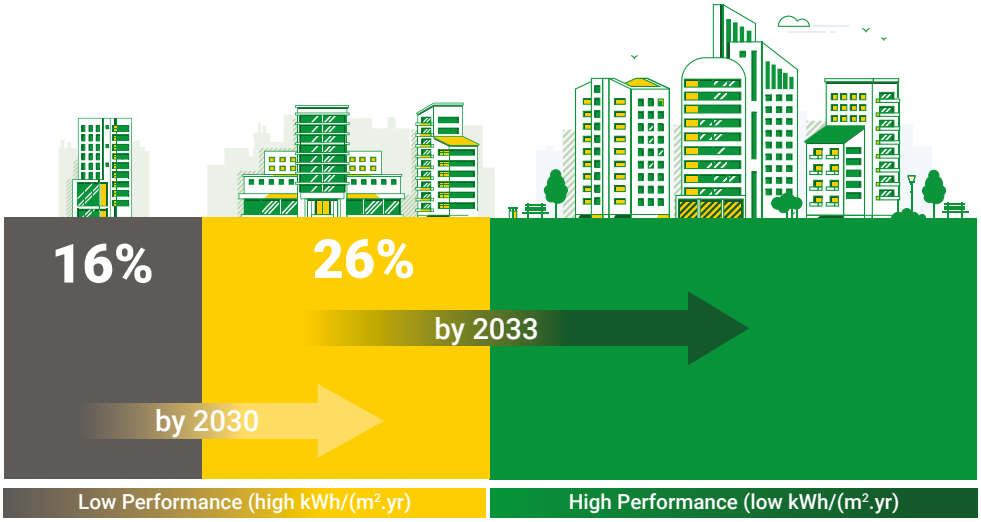
The EPBD recast defines MEPS as "rules that require existing buildings to meet an energy performance requirement as part of a wide renovation plan for a building stock or at a trigger point on the market such as sale, rent, donation, or change of purpose within the cadastre or land registry, in a period of time or by a specific date, thereby triggering the renovation of existing buildings" – Article 2.

Non-residential buildings

The Directive introduces building-specific performance requirements on the worst-performing non-residential buildings. Member States must identify the 16% and 26% worst-performing buildings (2020 baseline) and set requirements to bring these parts of the stock above the thresholds, as described in the figure 3.

21. BPIE, 2023 EU buildings climate tracker 2nd edition a call for faster and bolder action.

Figure 3: Non-residential minimum energy performance standards



The energy renovations achieved since 2020 will count towards the achievement of the objective.

Member States may exempt certain individual non-residential buildings for the following reasons:

- In light of the expected future use of the building;
- In case of "serious hardship";
- If there is an unfavourable cost-benefit assessment for the overall renovation of the building.

However, negotiators included additional safeguards to maintain the original ambition of the provision. Member States must:

- Avoid exempting a "disproportionate number" of non-residential buildings;
- "Ensure equal treatment between non-residential buildings";
- Achieve equivalent energy performance improvements in other parts of the non-residential stock to compensate for individual buildings exempted.

If the national non-residential building stock, or part of it, is seriously damaged by a natural disaster, a Member State may temporarily adjust the maximum energy performance threshold so that the energy renovation of damaged non-residential buildings is being accounted for as part of the overall target. Member States must ensure that a similar percentage of the non-residential building stock undergoes energy renovation.

Compliance with the requirements must be verified at the building level, using EPCs or, where applicable, other available methods.

Member States must complete this approach with further requirements in line with a net-zero emission building stock by 2050.

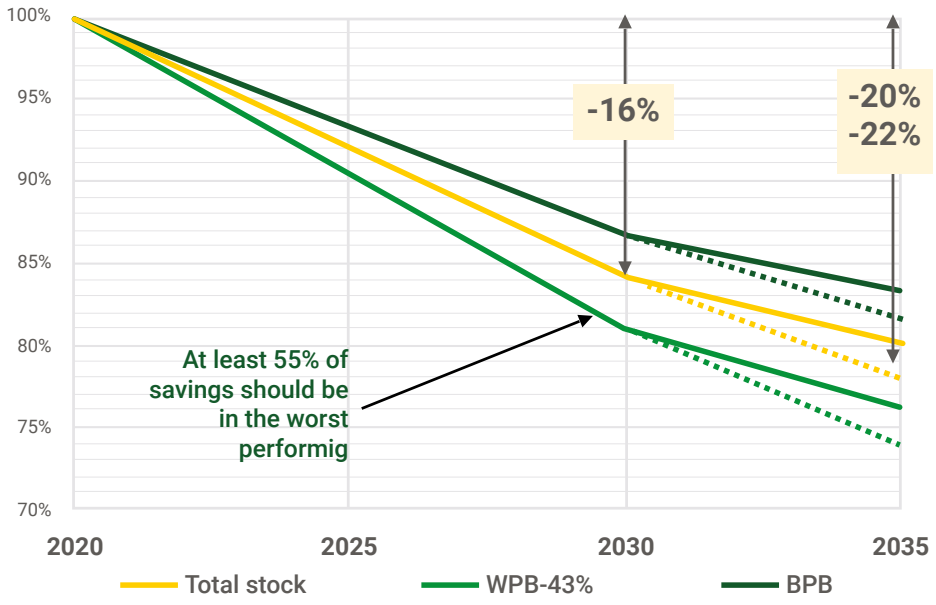
Residential buildings

A different approach was adopted for the residential building stock. Member States "must establish a national plan for the progressive renovation of residential buildings" from 2020 to 2050, with milestones set every five years starting from 2030. This plan should be represented as a decrease in the average primary energy consumption (kWh/m²/year).

Additional indicators, such as operational GHG emissions and non-renewable and renewable primary energy use, may also be included.

The methodology for estimating this trajectory should use data from statistical sampling and EPCs. The trajectory should be set as represented in the figure below:

Figure 4: National trajectory for the average primary energy use in kWh/(m².y)



Source: European Commission

The Directive states that the trajectory must be established at the latest by 29/05/2026. However, the text requires Member States to include their trajectories in their first draft National Building Renovation Plan that must be submitted six months before, by 31/12/2025.

While this approach provides Member States with ample flexibility in the choice of policies to achieve their objectives, the Directive specifies that part of the decrease (55%) should come from energy renovations in Worst Performing Buildings. The latter are defined as the 43% of the building stock with the highest energy consumption (kWh/m^2/y).

Potential exemptions

The exemptions listed in Article 9 (6) apply to both the non-residential and residential-related provisions. They are excluded from the calculations baseline.

When applying MEPS, Member States may exempt the following building categories:

- officially protected historical and/or heritage buildings, in so far as compliance with the standards would unacceptably alter their character or appearance, or if their renovation is not technically or economically feasible;
- buildings used as places of worship and for religious activities;
- temporary buildings with a time of use of two years or less, industrial sites, workshops and non-residential agricultural buildings with low energy demand and non-residential agricultural buildings which are used by a sector covered by a national sectoral agreement on energy performance;
- residential buildings which are used for either less than four months of the year or with an expected energy consumption of less than 25 % of all-year use;
- stand-alone buildings with a total useful floor area of less than 50m^2 ;
- buildings owned by the armed forces or central government and serving national defence purposes, apart from single living quarters or office buildings for the armed forces and other staff employed by national defence authorities.

Technical and financial support

To achieve the objectives of Article 9, Member States are required to:

- Offer appropriate financial measures to building owners, particularly to vulnerable households and people affected by energy poverty;
- Provide technical assistance, including through one-stop shops;
- Design integrated financing schemes which provide incentives for deep renovations and staged deep renovations.

Efficient Buildings Europe's recommendations

Innovative tools and neighbourhood approaches can speed up the identification of worst-performing buildings (WPB)

Member States should focus on identifying worst-performing buildings as a core priority, mapping where useful data exist. Several approaches already exist to overcome low EPC coverage. Some projects mapped worst-performing buildings using energy poverty/energy consumption data. Others use AI and machine learning to develop satisfactory proxies.

In France, the Distribution System Operator Enedis helped identify worst performing buildings in the public sector through the project Prioréno: Service Prioréno : prioriser la rénovation énergétique de vos bâtiments publics | Enedis

AI and machine learning should be used more systematically to increase the knowledge of building stocks beyond EPC coverage and speed up the deployment of targeted renovation policies and MEPS at the national level. See examples from the project IMOPE/URBS, TSAV – UPC / Ciclica and BNP Paribas machine learning tool for worst-performing buildings in France.

This is an area where DG ENER could collaborate with DG CONNECT to map out the specific needs of Member States, review available technologies, the maturity of their deployment, and propose how to mainstream their use, to the benefit of faster deployment of NBRPs. Boosting the mapping of all EU 27 building stocks via AI and machine learning would also benefit the overall energy transition (planning of supply, transmission, distribution etc...), and help the industry anticipate the real needs for solutions.

MEPS should be easy to understand and provide long-term visibility

In the Energy Efficiency Directive, articles 5 and 6 require governments to ensure that at least 3 % of the total floor area of buildings owned by public bodies is renovated each year. Member States must also ensure that the total final energy consumption of all public bodies combined is reduced by at least 1,9 % each year, when compared to 2021. Non-residential MEPS can help cover these provisions.

The EED also requires cities to draft heating and cooling plans (article 25) and the RED sets targets for the uptake of renewable energy in heating and cooling (article 23) and in buildings (article 15a). The rollout of decarbonised heating and cooling solutions should be coordinated with the introduction of MEPS to provide clarity and long-term visibility to citizens and businesses alike while avoiding lock-ins in the path to zero-emission buildings.

The coordination between different files should be done through the NBRPs at the national level and through the rollout of renovation passports at building level.

Minimum Energy Performance Standards must now be translated into policy measures at the national level. Efficient Buildings Europe recommends adopting clear building-level performance standards based on EPC classes to reach or a set of actions to implement. The deadlines for compliance and potential penalties should be communicated well in advance.

Securing a supportive ecosystem for MEPS deployment well in advance, including transparency of the energy performance, reliability of EPCs and awareness of financing schemes is essential. An interesting way of securing EPC reliability is to make the certifier liable when producing EPCs (cf "opposabilité" in France).

In addition, the economic dynamics and the links between regulations and price signals should not be neglected. For example, a ban on rent increases linked to the poor energy performance of the flat or building, is an economic signal that can prepare the ground for MEPS schemes in the rental sector. Such sequencing has been in place in FR (rental freeze for F and G class rented flats was in place since August 2022, ahead of the first step in F & G rental bans, respectively in Jan 2023 and Jan 2025).

Furthermore, it is imperative to provide enough support e.g. in the form of examples of MEPS in residential and non-residential buildings, especially for Member States without any experience with these types of policies. The specific data, sources and methodologies needed to define MEPS should be integrated to allow for a swift uptake and implementation of MEPS.

The early translation of the EPBD Article 9 will allow citizens and businesses to plan their projects. It will also provide market visibility to the efficient buildings industry. Ensuring the consistency of these requirements over time will also be necessary to guarantee their credibility whilst allowing for a level of predictability for industry investments.

The residential sector trajectory should be achieved through renovations in the WPB segment

The trajectory approach gives Member States a lot of flexibility, given its focus on delivering an average reduction of primary energy consumption in the full stock. Unfortunately, this might lead to a very low level of ambition in the measures proposed to achieve Article 9 §2. However, there is room to ensure that, through appropriate guidance, Member States focus on renovation to achieve the residential ambition, instead of not taking any additional action, promoting changes in the primary energy factor, or unduly relying on the new build dynamic to meet the target.

Indeed, the efficient buildings industry interprets the §2 provision as a requirement to achieve progress in WPB through energy renovations, incorporating the right sequencing of measures and thus respecting the energy efficiency first principle. This interpretation would be closer to the original intent of the Directive and deliver significant benefits notably for the most vulnerable households:

- Bigger benefits per renovation (energy savings, GHG cuts, energy bills, improved comfort). This is especially important for public acceptance and buy-in e.g., having to demonstrate the tangible socio-economic benefits of the energy transition.
- A clear focus and sequencing of the renovation efforts in the WPBs offers better predictability on investment needs in buildings. Banks and other financial institutions will have various products for renovating buildings compared to constructing new buildings. To upscale private finance, there must be clear estimates of how many buildings must be renovated per country to meet the residential target.
- This would ensure that both decarbonisation AND energy demand reduction are addressed by the Directive to avoid lock-in effects.
- When the Emission Trading System II (ETS II) kicks in, there is likely to be a perception that the people who can least afford higher prices are being forced to pay more. To counter that, it must be clear that the revenues will help the most vulnerable households renovate their homes and reduce their energy needs. The Social Climate Fund (SCF), which accompanies the ETS II, is imperative in this respect to ensure that allocations go to the renovation of buildings where most needed, leading to long-term energy savings, while ensuring adherence to the energy efficiency first principle.

To a large extent, energy renovations are delivered by European investments in European-based production and jobs - that will reinforce European competitiveness.

Reduced energy and electricity demand at household level means more power available to decarbonise our industries. Making sure that the energy efficiency first principle is and remains the cornerstone is of strategic importance, as this also helps keep prices for European industry affordable, ensures grid stability and boosts competitiveness.

Use MEPS in the residential sector

Member States should communicate to building owners what the trajectory means for their buildings. This can be achieved by translating the trajectory into MEPS targeting individual buildings according to specific criteria. The EPBD indeed allows for a variety of MEPS designs, enabling Member States to tailor MEPS to the ownership structure, investment capacity, and specific sub-segments of the residential stock (such as single-family homes and multi-apartment buildings). MEPS designed with sufficient lead time and in good synergy with other tools (finance, support, awareness etc…) trigger a collective understanding by all market actors and encourage a fragmented sector to work together.

Here are some examples of policies that could be rolled out to achieve the EPBD target for residential buildings:

- Requirements for single-family buildings listed for sale, donation or change of purpose within the cadastre or land registry;
- Requirements for buildings listed for rent;
- Requirements for multi-family buildings with X units or more;
- Requirements for housing companies or social housing providers to achieve an improvement in the average energy performance of their portfolio;
- Requirements to replace an existing fossil heating system with a renewable heating system or connection to an efficient district heating system';
- Requirements for social housing providers or sectoral agreements established with social housing providers;
- Requirements for multi-family buildings owned entirely by a single commercial undertaking.

These requirements should be expressed using widely understood metrics (EPC classes or kWh/m^2/year) and must be set well in advance of a clear deadline.

Photo: Schneider Electric

Future-proof the building stock, go beyond the thresholds

Considering, the average length of renovation cycles (around 15 years) and the necessity to achieve a decarbonised building stock by 2050, Member States should encourage building owners to go beyond the current EPBD Article 9 requirements and develop proper renovation plans, with the support of a renovation passport.

As required in Article 17, financial support should encourage deep or staged deep renovations. This will help building owners adopt a long-term perspective when designing their energy renovation projects.

Historical buildings should not be exempted by default

A sizable proportion of the existing building stock in the EU can fall into the category of historic, heritage or other protected buildings (their definition varies greatly between EU countries), many of which are amongst the worst-performing buildings in terms of energy consumption. They must be in the scope of the Energy Performance of Buildings Directive (EPBD), as well as in national building renovation plans and other strategies that are designed to meet the EU's climate objectives. This means improving their energy performance and reducing their CO_2 emissions thus improving living conditions for their occupants. Member States should speed up dedicated support and training to renovate historical buildings.

These buildings can be renovated with modern techniques, combining passive and active technologies – as demonstrated in this recent Efficient Buildings Europe briefing on the topic.

Photo: Saint-Gobain ISOVER

Good practices

Flanders: Using trigger points to incentivise renovations

Non-residential buildings

Since January 1, 2022, Flanders has implemented a renovation obligation for non-residential buildings. These regulations aim to enhance the energy efficiency of existing buildings by meeting specific standards for insulation, heating, cooling, ventilation, and lighting. Any new owner, building leaseholder, or ground leaseholder of a commercial or office building is required to meet four energy standards within a maximum of five years.

The four energy standards are:

- Installing roof insulation;
- Installing energy-efficient glazing;
- Replacing heating systems older than fifteen years that do not meet the minimum renovation requirements;
- Replacing cooling systems older than fifteen years with those that use refrigerants free of ozone-depleting substances or other harmful refrigerants.

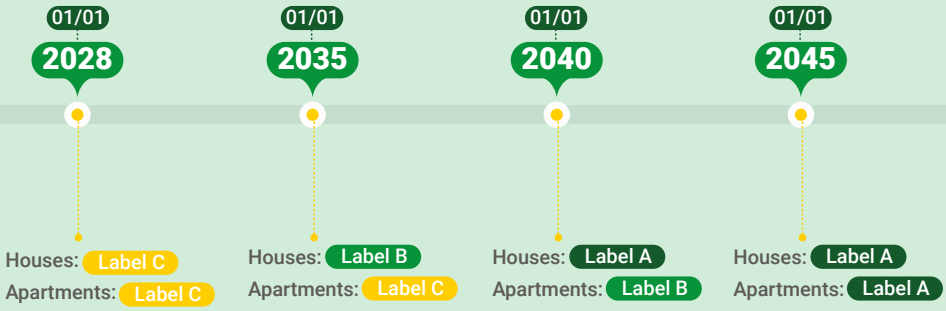
In addition to these basic standards, a new owner of a building smaller than 500m² must achieve an energy label of C or better within the same five-year period.

Since January 2023, large non-residential buildings have been required to take an additional step. Within five years of the transfer, they must achieve a minimum 5% share of renewable energy. Additionally, when non-residential buildings are sold or leased, an energy performance certificate (EPC) is required. On May 1, 2023, this EPC requirement was extended to all other transfers.

Residential buildings

Since January 2023, new owners of residential buildings with an EPC label E or F are required, within five years of purchase (and other transfers) or after the establishment of a leasehold, to carry out deep energy renovations to the house to minimum EPC label D.

Label D is the first intermediate step. Label A is the end goal for every house or flat by 2050. The long-term path was set with a tightening of the obligation in 2028 (Label C), 2035, 2040 and 2045. Planned long-term path and label to be achieved within five years of purchase when purchased after:



Source: Flemish Government

Such rules trigger a widespread understanding of the trajectory for residential buildings and help in linking energy performance and market value. To have a long-term trajectory is equally key for financial institutions, which can develop dedicated financing products.

Photo: Kingspan

The Netherlands: MEPS for commercial buildings

Every office building in the Netherlands larger than 100m² is required to have at least energy label C. This means that primary energy consumption in an office building cannot exceed 225 kWh per m² per year.

Cities are in charge of compliance checks. Penalties for non-compliance with this regulation include a government order to cease the use of the building. The compliance rate by the deadline was above 55%. While this is not yet optimal, it encouraged a positive dynamic in the sector and pushed investors to look for future-proof buildings.

Some exemptions exist - the obligation does not apply if:

- the usable area of the office functions is less than 50% of the total usable area of the building;
- the usable area of the office functions in the building is less than 100 m²;
- it concerns national monuments as referred to in the Heritage Act or in the provincial or municipal monument ordinance;
- the office building will be used for a maximum of 2 years;
- the office building has been disowned or purchased under the Expropriation Act;
- the office building does not use energy to regulate the indoor climate;
- the measures required to achieve energy label C have a payback period of more than 10 years.

France: MEPS in the rental sector and the Tertiary Decree

Residential MEPS

The Government planned a series of strong measures to prohibit the rental of housing consuming too much energy (so-called "thermal sieves"). The measure gradually applies to more buildings over time to allow households to anticipate the planning of a deep energy renovation.

2022

From January 2022, all landlords are required to display a price range for the annual energy consumption in real estate advertisements. As of August 24, 2022, rents are frozen for energy class F and G dwellings.

2023

Prohibition to rent dwellings consuming more than 450 kWh/m² per year in final energy.

2025

Prohibition to rent energy class G buildings (> 420 kWh/m² per year).

2028

The rental ban extends to energy class F houses and apartments.

2034

The rental ban extends to energy class E houses and apartments

While some actors pushed back against the measure when it was announced, it was successfully communicated by the government using a 'fight energy poverty/indecent housing' narrative. It is also important to coordinate the launch of new standards and the EPC rescaling to provide clarity on the level of performance to achieve.

Non-residential buildings

France adopted a 'tertiary decree' in 2018. The decree is aimed at owners and tenants of tertiary buildings. All buildings or business premises for tertiary use with an operating surface area greater than or equal to 1,000 m² are concerned.

The surface area considered can be cumulative if the building accommodates several businesses, or if the site is made up of several buildings. Temporary constructions, places of worship and buildings for defence, civil security or internal security of the territory are exempt.

The regulation requires a reduction in final energy consumption by applying one of these two methods:

- reducing the final energy consumption of the building by 40% by 2030, 50% by 2040, and 60% by 2050, compared to a reference year which cannot be earlier than 2010;
- Achieving a level of energy consumption fixed in absolute value for each type of activity.

To achieve these objectives, different actions can be implemented by owners:

- improving the energy performance of buildings;
- installing high-performance equipment and putting controls and active management systems in place for these devices;
- changing the behaviour of occupants.

Photo: Shutterstock (Sunsetman)

Photo: Autodesk

3 Smart and technology equipped buildings

The EPBD recast 2024 builds on the previous Directive and increases requirements for technical building systems (TBS) and building automation and control systems (BACS). It also goes further to encourage digitalisation in buildings.

TBS and BACS are crucial to the overall energy performance of buildings and must be installed and maintained to remain effective under dynamically varying conditions. The main function of TBS is to provide heating, cooling, ventilation, hot water, and built-in lighting in buildings. Their interactions with the building envelope and their operation and maintenance over time have a big effect on overall energy use, on occupant well-being and comfort, and on our chances of achieving long-term decarbonisation goals.

Technical Building Systems and Building Automation and Control Systems

Articles 2, 13, 15, 19, 23, 24

Why it matters

The use of TBS and BACS in buildings has slowly increased in recent years but the potential for wider rollout remains very high. Basic control functionalities that help to deliver significant energy savings, health and comfort benefits are still missing in most buildings, despite short pay-back times. It was therefore essential to revise and update the provisions of the EPBD to reflect this technical progress and market failures through new provisions in Articles 13, 15, 19, 23 and 24.

The efficiency of TBS can drop significantly when they are not properly serviced, maintained and optimised under typical usage conditions. It is beneficial for owners to regularly inspect heating and cooling installations to detect technical problems and inefficiencies faster. More comprehensive building management systems can auto-detect such issues and communicate remotely to control centres for fast and automated service and repair.

Several studies demonstrate that the final energy demand of buildings can be reduced significantly by optimising TBS (ECOFYS 2017) in addition to investments on the envelope. Yet this potential is largely untapped. In addition, in large buildings, the energy performance of TBS over time can drop significantly when they are not properly serviced and maintained. Finally, there is a need to match theoretical energy performance with actual energy performance. The use of BACS to optimise the performance of TBS under real-life conditions, or typical usage conditions, is crucial in this regard.

The increased emphasis that successive changes to building regulations have brought to improving the energy performance of buildings means that it is more important than ever to enhance the synergies between active and passive approaches to improving energy performance. It is now possible, thanks to the increased performance of buildings, to go further than creating comfortable and healthy indoor environments to enhance the potential for buildings to interact with energy grids and to function as key energy hubs at district levels.

The Smart Readiness indicator (SRI) will add value by providing a reliable description of the systems in the building, and how the latter can support building occupants in controlling indoor conditions. The indicator will also highlight the building's ability to act as a key component in the overall energy system. It will encourage the uptake of other essential digital tools such as Building Information Modelling and Digital Building Logbooks.

Technical building Systems (TBS) in the EPBD – Article 2, 13

TBS encompass the main energy consuming and generating units: HVAC equipment, domestic hot water equipment, built-in lighting, BACS, on-site renewable energy generation, and energy storage.

To reduce demand and decarbonise the building stock, the EPBD sets performance and optimisation requirements for these systems (Article 13).

- Member States must set **system requirements**, on the overall energy performance, the proper installation, and the appropriate dimensioning, adjustment and control of TBS which are **installed in new or existing buildings**[22].
- Member States must take the necessary measures to ensure that when a technical building system is retrofitted or replaced, the energy performance of the whole system is optimised.
- Member States must ensure that the requirements they set for TBS to reach at least the latest cost-optimal levels.

For provisions related to the phase-out of fossil fuels in buildings, please go to Chapter 4 of this Guide.

Building Automation and Control Systems (BACS) in the EPBD– Article 13

The opportunity to better manage energy flows and to better control indoor environments within highly performing buildings will deliver greater comfort, better living, studying, and working conditions and lower costs when the systems are properly and regularly adjusted. The resulting increased productivity and well-being will boost profitability and our economy.

The new EPBD sets requirements regarding temperature control, indoor air quality monitoring and control, as well as new provisions regarding demand-side flexibility. Please find the specific provisions in the table x.

22. Following Annex I, Member States follow the product-related primary energy efficiency requirements based on ERP Directive 2009/125.

Table 1: BACS requirements in the EPBD 2024

	New buildings	Existing buildings
Residential	Buildings must be equipped with self-regulating devices for the separate regulation of the **temperature.** From 29 May 2026, buildings to be equipped with the following: • continuous electronic **monitoring** that measures systems' efficiency and informs building owners or managers in the case of a significant variation and when system servicing is necessary; • effective **control functionalities** to ensure optimum generation, distribution, storage, use of energy and, where applicable, hydronic balance; • a capacity to **react** to external signals and adjust the energy consumption.	The **installation of self-regulating devices** must be required **when heat or cooling generators are replaced**. From 29 May 2026, buildings undergoing a **major renovatio**n to be equipped with the following: • continuous electronic **monitoring** that measures systems' efficiency and informs building owners or managers in the case of a significant variation and when system servicing is necessary; • effective **control functionalities** to ensure optimum generation, distribution, storage, use of energy and, where applicable, hydronic balancing; • a capacity to **react** to external signals and adjust the energy consumption. Member States may require the installation of **measuring and control devices for the monitoring and regulation of indoor air quality** in residential buildings.

	New buildings	Existing buildings
Non residential	Must be equipped with **self-regulating devices** for the separate regulation of the **temperature**. ZEB equipped with **measuring and control devices for the monitoring and regulation of indoor air quality.** Must be equipped with **building automation and control systems**, as follows: • by **31 Dec 2024**, buildings with an effective rated output for HVAC systems of **over 290 kW**; • by **31 Dec 2029**, buildings with an effective rated output for HVAC systems of **over 70 kW**.	The installation of **self-regulating devices** must be required **when heat or cooling generators are replaced**. The building must be equipped with **measuring and control devices for the monitoring and regulation of indoor air quality** when it undergoes a **major renovation.**

BACS must be capable of:

- continuously monitoring, logging, analysing, and allowing for adjusting energy use;
- benchmarking the building's energy efficiency, detecting losses in the efficiency of technical building systems, and informing the person responsible for the facilities or technical building management about opportunities for energy efficiency improvement;
- allowing communication + being interoperable with TBS;
- by 29 May 2026 monitoring of Indoor Environmental Quality (IEQ).

Good practice

The French BACS decree

On July 21, 2020, France adopted a BACS decree which requires new and existing non-residential buildings to be equipped with building automation and control systems before January 1, 2025.

An amending decree published in April 2023 broadened the base of non-residential buildings subject to this obligation. Any building with HVAC equipment with a nominal output greater than 70 kW is now covered.

Owners can be exempted if they present a study demonstrating that the installation of such a system, or its connection with the technical systems on site, is not feasible with a return-on-investment time of less than 10 years, after deduction of public financial support.

- Building owners must install a BACS when the heating/cooling installation is shared between a non-residential building and a residential building if the power of the system used for the non-residential part exceeds the thresholds of 70 kW;
- An inspection of the BACS must be carried out every 5 years, starting January 1, 2025. Following the installation of a new system or the connection of equipment, this period is shortened to 2 years.

The EPBD recast 2024 reinforces HVAC inspections – Articles 23, 24

Regular inspections are key to maintaining the performance of a building over time. The EPBD focuses on mid- to large-size HVAC systems.

Requirements

- Mandatory regular inspections of accessible parts of heating, ventilation, and air-conditioning systems with a rated output > 70kW;
- Inspection reports must include the results of the inspection and recommendations to improve the performance of the inspected system.

Inspections frequency

- For systems with a rated output over 70 kW, at least every 5 years;
- For systems with a rated output over 290 kW, at least every 3 years.

Assessment of the

- Components of the inspected system;
- Efficiency of the inspected system;
- System size;
- Feasibility to operate under different and more efficient temperature settings, and;
- Feasibility to reduce on-site use of fossil fuels.

Exemptions

- For building with mandatory BACS;
- For TBS covered by an energy performance criterion or a contractual arrangement specifying an agreed level of energy efficiency improvement, or that are operated by a utility or network operator.

Photo: Schneider Electric

Encouraging the uptake of the Smart Readiness Indicator and digital tools

Articles 15, 19, Annexes I, IV, V

Smart Readiness Indicator (SRI)

What is it?

The SRI is a tool to assess the capacity of a building to adapt to the needs of the occupant when it comes to indoor environmental quality, flexibility, and energy performance.

Timeline

- By 31 June 2026: The European Commission must submit a report to the European Parliament and the Council on the testing and implementation of the smart readiness indicator, based on the available results of the national test phases and other relevant projects;
- By 30 June 2027: If the results of the test phase are positive, the European Commission must adopt a delegated act requiring the application of the common Union scheme for rating the smart readiness of buildings, to non-residential buildings with an effective rated output for HVAC systems of over 290kW.

How does it work?

The scheme would require non-residential buildings above 290kW to have an inspector grade the building's "smart readiness". This assessment consists of a checklist in the form of a grid, looking into "impact criteria" across "domains".

Table x: Title goes here

	Energy efficiency	Maintenance and fault prediction	Comfort	Convenience	Health, well-being and accessibility	Information to occupants	Energy flexibility and storage
Heating	%	%	%	%	%	%	%
Cooling	%	%	%	%	%	%	%
Domestic hot water	%	%	%	%	%	%	%
Ventilation	%	%	%	%	%	%	%
Lighting	%	%	%	%	%	%	%
Dynamic building envelope	%	%	%	%	%	%	%
Electricity	%	%				%	%
Electric vehicle charging		%		%		%	%
Monitoring and control	%	%	%	%	%	%	%

Source: X-tendo

Each combination has “services”, with functionality levels. Cumulatively, these rank the building as 0% to 100% ready to: optimise energy efficiency, adapt to users, and adapt to the grid.

The Smart Readiness Indicator is currently being officially tested in 13 EU countries: Austria, Belgium (Flanders), Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Poland, Slovenia, and Spain.

EU support for Member States

The European Commission developed several implementation tools for national authorities and SRI assessors, including SRI digital calculation tools developed by EU-funded projects. More information here: SRI implementation tools (europa.eu).

Digital tools

Recent years have seen the uptake of software and hardware which play a key role in gathering data and optimising the design, operations, management, and maintenance of buildings. These technologies enable users to simulate, evaluate and optimise life-cycle carbon emissions, energy performance and overall functioning of a building from the concept phase to the construction and renovation phases.

The EPBD 2024 recast encourages the uptake of 2 of them:

Digital twins

- Member States must make simplified procedures for updating an energy performance certificate available where a building digital twin is in place;
- The SRI methodology must consider the possible existence of a digital twin of the building.

Energy-efficiency metering technologies

- The definition of 'meter' now covers energy efficiency metering;
- Metered energy can be used for the calculation of energy performance of buildings (Annex I);
- It becomes an optional item to be displayed on EPCs (Annex V).

Photo: Istock (Scyther5)

Efficient Buildings Europe's recommendations

Expand the definition of TBS to include electrical installations

The decarbonisation of buildings via electrification is contingent on the quality and capacity of electrical installations in buildings. Up-to-date and adequately dimensioned electrical installations are a pre-requisite to the integration of the required highly energy efficient devices, such as **heat pumps, solar PV, battery storage, EV recharging points, and Building Automation and Control Systems**.

In practice, when heat pumps, solar PV, and EV-recharging points are to be installed in buildings, one of the first questions of professionals (planners, installers) is always about the status of the electrical installations. This measure would work hand in hand with the following provisions: the replacement of obsolete and inefficient TBS, optimisation of their performance, the solar mandate, the phase-out of fossil fuels in buildings, inspections etc...

Encourage the uptake of Building Information Modelling (BIM)

The public sector can lead by example and incorporate BIM requirements in public procurement. Public construction projects could nudge companies into using new technologies and training their workforce.

Facilitate the uptake of the measured savings methodology

The EPBD's definitions and revamped Annex I open the door to the use of energy efficiency meters. An EU accreditation scheme for energy-efficiency metering technologies can guide Member States regarding how "measured savings" can be implemented in practice.

In its guidance, the European Commission should support the gradual introduction of "measured" savings, via higher subsidies or dedicated projects. "Real performance" mechanisms should also be encouraged via public subsidy schemes for renovation and energy savings obligations. Additional clarification is needed to ensure that "measured" savings can be gradually introduced and can exist in parallel with "calculated" savings. Such technologies will provide a precise picture of the energy performance of a building and make the energy performance certificate schemes more reliable.

Inspections: an opportunity to improve

We encourage Member States to set a requirement to implement the recommendations within a three-year period, accompanied by a verification process.

IEQ parameters in use phase vs. design phase

When implementing IEQ requirements in national building legislation, it is important to differentiate between IEQ parameters to be monitored during the use phase of a building (e.g., CO_2 and temperature) and other IEQ parameters which should be factored in during the design phase of a building project (e.g., lighting/daylight, acoustics).

Encourage the hourly calculation method

Metered energy used for the purposes of calculating the energy performance of buildings should require readings of hourly intervals and must differentiate between energy carriers. This is a key provision to allow the full decarbonisation of the building stock and phase in demand side flexibility technologies.

Good practices

SRI in Poland

The OTE Project focuses on developing a methodology to implement SRI testing in Poland. Activities are led by the Department of Power Electronics and Automation of Energy Processing Systems (WEAIiIB) AGH-University of Science and Technology in Kraków.

In the industrial research phase of the OTE Project completed in May 2024

- the SRI calculation sheet v4.5 tool dedicated to the implementation of the test phase in EU Member States was localised (Polish language introduced);
- audit sheets and a methodology for performing building audits were developed;
- 9 buildings differing in terms of year of construction, equipment with technical installations and the level of automation of comfort installations were tested.

In the next phase of the project - pre-implementation work - training materials for auditors will be prepared and training of SRI auditors will be conducted both on-site and remotely. It is planned to train approximately 50 people.

More information here (in Polish) - https://inzynierbudownictwa.pl/polska-w-fazie-testow-wskaznika-sri-w-europie-w-ramach-projektu-obserwatorium-transformacji-energetycznej-ote/.

BIM in Spain

Spain developed a state-of-the-art BIM Plan to integrate BIM into public procurement projects, which could be replicated to phase in the use of this technology. The Plan is an internal instruction, mandatory for the contracting authorities of the National Public Administration and its dependent bodies, and a recommendation for contracting authorities in the rest of the State public sector entities.

- It only applies to public contracts above a certain estimated contract value;
- It is designed as a progressive milestones calendar, from 2024 to 2030;
- It requires 5 increasing levels of BIM implementation, clearly defined by the BIM Plan for Public Procurement, to be reached in the progressive calendar milestones.

Estimated contract value thresholds	Compulsory application date			
	1 April 2024	1 October 2025	1 October 2027	1 April 2030
Equal to or greater than €5,538.000*	Early level	Intermediate level	Advanced level	Integrated level
Less than €5,538.000* and equal to a greater than €2,000.000*	Recommend early level	Early level	Intermediate level	Advanced level

Source: Ministerio De Transportes Y Movilidad Sostenible de España

Photo: Istock(Fahroni)

4 Beyond energy efficiency – decarbonised and healthy buildings

The EPBD recast 2024 expands the scope of the original text to address several sustainability as well as social and health aspects of buildings. Acknowledging the multiple benefits and drivers of energy renovations, as well as the multifaceted European Green Deal objectives, the text now includes provisions on whole-life carbon, renewable energy sources, and indoor environmental quality.

Whole Life Carbon (WLC)

Articles 1, 2, 7

What is WLC and why it matters

WLC emissions are the entire amount of carbon produced by any built asset, throughout its entire lifespan. To fully decarbonise our built environment, we need the tools to measure the WLC implications of the designs we develop and the buildings we fund and use.

"Every aspect of construction produces a potential carbon impact, so identifying where the emissions enter the life cycle of construction is the only way to make a credible carbon accounting within the built environment. WLC emissions result from the form, materials, construction methods, and operation of a building over its entire life, including its demolition and disposal." [23]

Whole life carbon emissions can be divided into 2 categories: embodied and operational:

- Embodied emissions encompass the greenhouse gas emissions associated with the non-operational phase of a project, namely the emissions released through extraction, manufacturing, transportation, assembly, maintenance, replacement, deconstruction, disposal, and end-of-life aspects of the materials and systems that make up a building (cradle to grave).
- Operational emissions are produced by the building's day to day occupancy, use, and maintenance.

Addressing both is crucial to achieving climate neutrality, particularly when it comes to new builds. As operational emissions decrease thanks to stricter energy reduction and decarbonisation requirements, embodied emissions will represent a proportionally higher share of the building stock's carbon footprint.

WLC awareness, measurement and limits are key at EU level to allowing owners, tenants, investors, industry players, and architects to discuss and agree on the most sustainable solutions to make our buildings compliant with a net zero pathway. A common EU approach ties energy efficiency and decarbonisation together with circular economy principles.

23. Whole Life Carbon: what is it and how do we reduce it? - Arup

What is in the EPBD?

The calculation and disclosure of the life-cycle Global Warming Potential (GWP) of buildings is now in the scope of the Directive (Article 1§2 e). The text includes a definition of WLC and life cycle GWP (Art 2§24 and 25).

For new buildings (Article 7), Member States must ensure that the life-cycle Global Warming Potential is calculated and disclosed through the energy performance certificate of the building.

- as of 1 January 2028, for all new buildings with a useful floor area larger than 1,000 square meters;
- as of 1 January 2030, for all new buildings.

The Commission is already working on Delegated Acts to set out a Union framework for the national calculation of life cycle GWP. The first Delegated Act should be adopted by 31st of December 2025.

By 1 January 2027 Member States must publish a roadmap detailing the introduction of limit values on the total cumulative life cycle GWP of all new buildings and set targets for new buildings from 2030. This roadmap must consider a progressive downward trend, as well as maximum limit values, detailed for different climatic zones and building typologies.

Photo: Kauf Insulation

Efficient Buildings Europe's recommendations

Do not reinvent the wheel

Efficient Buildings Europe encourages member states to use the EU LEVEL(s) framework to draft their national roadmaps - (cf Annex III of the EPBD recast).

The methodology must be agreed at EU level

EU harmonisation of GWP calculation and reporting methodology according to EN 15978 should be required across the block to level the playing field between various technologies and products.

Avoid national fragmentation which would require international manufacturers to provide local Environmental Product Declarations (EPDs) with an average CO_2 footprint.

All life cycle stages should be considered, as well as all components, solutions, and materials, including equipment.

Encourage the emergence of a skilled workforce

A reporting requirement for all new buildings regarding GWP as of 2030 requires skilled building certifiers of GWP, proper methodologies and software in line with EN 15978. Best practice & methodologies are needed, as this provision is very challenging due to the insufficient number of building certifiers.

Ensure coherence with other EPBD provisions

Encourage a wide understanding of the role of operational and embodied carbon and their interactions at the national level. A low carbon building needs, first, to be a highly efficient building (nZEB / ZEB).

Encourage market players to act proactively

- Organise voluntary pilot projects ahead of setting the national thresholds. See for example the E+C- label experiment undertaken in France in 2016-2019, enabling to test how to reduce operational and embodied carbon at the same time;[24]
- Prepare markets to develop the data needed for assessing GWP at building level.

24. Le label E+C- Qualitel | Professionnels

What now? The World Green Building Council designed 5 steps for Member States to get started [25]

1) Develop and issue detailed guidance for national industry on life cycle GWP reporting, including a methodology aligned with Annex III of the EPBD and the European Commission's anticipated EU-wide framework for life cycle GWP reporting, expected by the end of 2025.

2) By May 2026 - Ensure that the EPBD dates for mandatory life cycle GWP reporting are transposed into national legislation, these being life cycle GWP reporting required for all new large buildings as of 2028, and for all new buildings as of 2030.

3) Establish a national building database (if it doesn't already exist) suitable for life cycle GWP data.

4) By the start of 2027 - use existing data on pilot projects and national building stock to develop a roadmap setting out:

a. the introduction of limit values on the total cumulative life cycle GWP of all new buildings;

b. life cycle GWP targets for all new buildings from 2030 (set as aspirational targets for industry front-runners, higher than limit values). Limit values and targets should follow a progressive downward trend and be differentiated according to different building typologies and climatic zones.

5) Adjust national EPC framework to accommodate disclosure of life cycle GWP.

Photo: Velux

25. World Green Building Council, 2024 WorldGBC-GWP-factsheet.pdf

Good practices

The Danish example

New climate requirements were integrated into the Danish Building Regulations on January 1, 2023. Most newly constructed heated buildings now must include a Life Cycle Assessment (LCA). The LCA evaluates the environmental impact of buildings by examining processes, materials, and energy use over a set period (50 years in this case).

An LCA is essential for obtaining an occupancy permit for newly constructed buildings covered by these regulations. Additionally, buildings with an area exceeding 1,000 square meters must meet a predefined threshold limit. These requirements stem from the National Strategy for Sustainable Construction (2021), a long-term political framework aimed at significantly reducing CO_2 emissions in the Danish construction sector. Moreover, the threshold limit will be progressively lowered every two years until 2030, with the first reduction scheduled for 2025. The new average limit value of 7,1 kg CO_2e/m²/year is more ambitious than the Danish National Strategy for Sustainable Construction from 2021 mandates.

To raise the ambition level of the agreement, the range of new constructions subject to the CO_2e limit value has been broadened. By 2025, this limit will extend to holiday homes and unheated buildings larger than 50m², such as parking garages and warehouses. Tiny houses will be classified under the limit value for single-family homes.

For apartment buildings, office buildings, institutions, and other construction types, the limit will now also apply to extensions. However, for single-family homes, row houses, tiny houses, and holiday homes, only extensions exceeding 250 m² will be subject to the limit.

This approach aims to ensure that single-family homes, apartment buildings, and social housing do not shoulder a disproportionately large share of the costs associated with the construction sector's green transition.

The French example

Since January 2022, all new buildings in France must comply with a dual requirement:

- A maximum CO_2 threshold for the GWP (Global Warming Potential) of building components and HVAC systems;
- A maximum CO_2 threshold for the GWP of energy use – promoting low-carbon energy sources.

A strict calendar was introduced for the period 2022-2031 to tighten requirement levels on building components and energy use. Values and tightening calendars depend on building typology (detached houses vs apartment buildings) and are planned to reach 8.3 $kgCO_2/m^2$/year for building components, and 4.0 kg/m^2/year for energy use by 2031.[26]

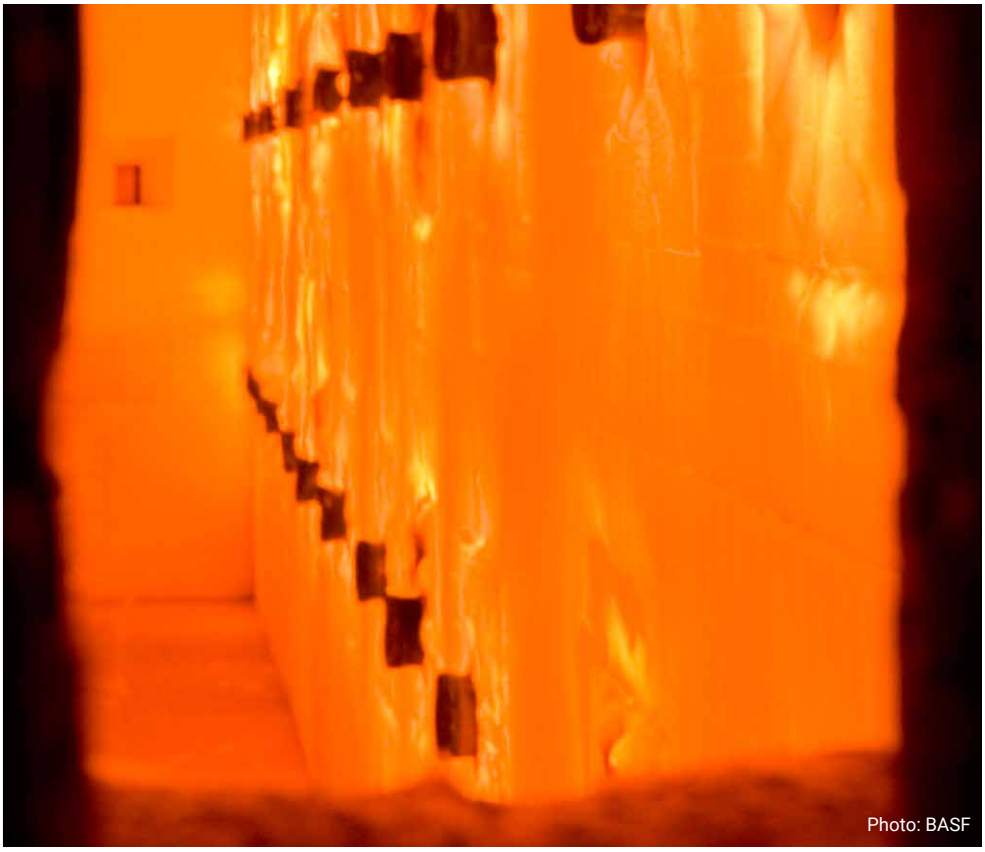


Photo: BASF

26. https://www.ecologie.gouv.fr/sites/default/files/documents/2021.02.18_DP_RE2020_EcoConstruire_0.pdf

Phasing out fossil fuels in buildings

Articles 11, 10, 13, 17, 23, Annex II

Phasing out fossil fuels in heating and cooling – Articles 11, 13, 17, 23, Annex II

Why it matters

The current geopolitical situation underscores the importance of reducing reliance on imported fossil fuels. By prioritising efficient buildings, the EU can lessen its vulnerability to price fluctuations and supply disruptions, strengthening its energy security.

Today, around 75% of our heating and cooling needs are supplied from fossil fuel sources.[27] In 2022, the European Union imported 62.5% of the energy it consumed – the highest level of dependency since at least 1990[28], negatively affecting our trade balance. EU energy imports averaged €600bn during the energy price crisis.[29] This directly hurts European households and businesses and benefits untrustworthy trade partners.

In the buildings sector, fossil fuels are mainly consumed in individual boilers and fossil-based district heating and cooling systems. They need to be quickly phased out to protect households from energy price spikes and achieve the EU's climate objectives. Beyond economics and climate, fossil fuels in buildings have proven to be a serious hazard for occupants. Indoor leakages in oil and gas combustion technologies have a dramatic impact on health, as recently demonstrated.[30]

The Energy Efficiency Directive (EED) addresses the progressive decarbonisation of district heating and cooling in the EU and the Renewable Energy Directive (RED) introduces a target for renewable energy in heating and cooling and buildings. However, much remains to be done to phase out individual oil and gas boilers.

The EPBD recast 2024 partially addresses this gap with new requirements.

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27. Renewable energy for heating & cooling up to 25% in 2022 - Eurostat (europa.eu).

28. Germany, EU remain heavily dependent on imported fossil fuels | Clean Energy Wire.

29. The euro in the field of energy (europa.eu).

30. Leaks, pollution, and emissions: New lab tests shatter claims of hydrogen benefits for homes - ECOS (ecostandard.org).

What is in the EPBD?

From 1 January 2025, Member States cannot provide any financial incentives for the installation of stand-alone boilers powered by fossil fuels (Article 17), except for those selected for investment, before 2025:

- As part of the Recovery and Resilience Facility;
- In the European Regional Development Fund;
- As part of the National CAP strategic plans.

Member States are encouraged "to replace stand-alone boilers powered by fossil fuels in existing buildings, in line with the national phase-out plans for fossil fuel boilers" (Article 13). This provides a legal basis to all governments willing to phase out this technology.

Zero Emission Buildings must not produce any on-site emissions from fossil fuels (article 11).

While this revision fell short of a hard ban on gas boilers, Member States must still put policies aiming at a complete phasing out of fossil fuel boilers by 2040 in their National Building Renovation Plans. (Annex II).

Finally, inspections of heating systems must include a basic assessment of the feasibility of reducing on-site use of fossil fuels (Article 23).

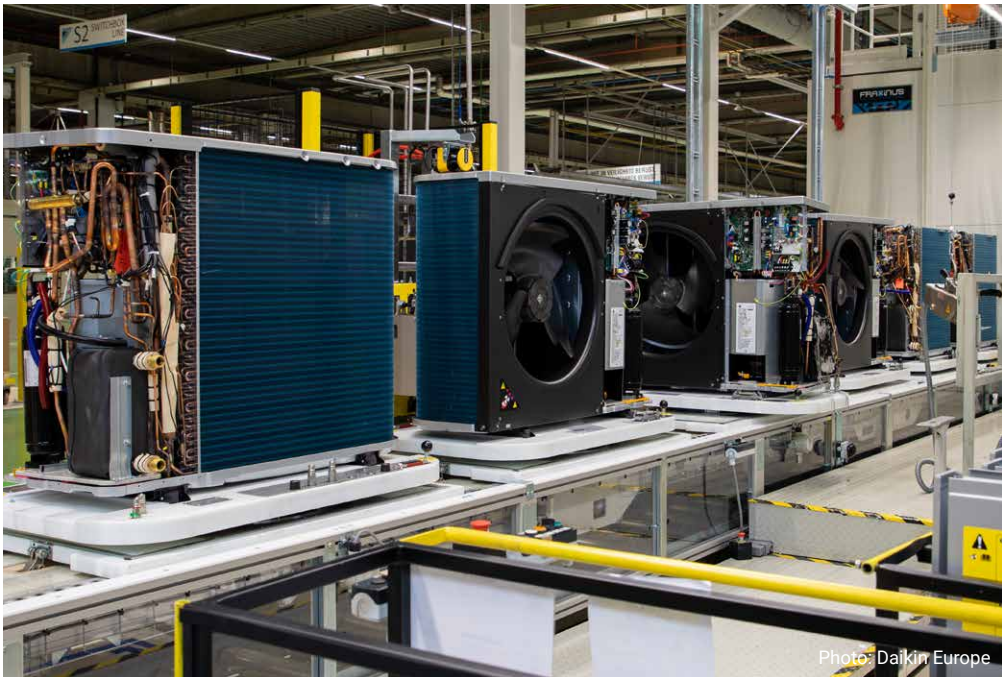

Photo: Daikin Europe

Efficient Buildings Europe's recommendations

Adopt a ban on fossil fuel boilers to give long-term visibility to citizens and business

The EPBD recast 2024 provides a legal basis for the phase-out of fossil fuel boilers. A complete ban at national level, with sufficient lead time and support for envelope works and clean heating and cooling alternatives will help citizens and businesses to plan their transition to zero-emission buildings. Long-term visibility, proper information and financial support are essential to foster public acceptance.

Delaying a complete ban on the use of fossil fuels in buildings will make it more costly and technically difficult to switch. The ban should cover the use of fossil fuel boilers in buildings, either in their hybrid or non-hybrid form, in their system or unit configuration.

In this context, the renovation passport can play an important role in securing a timely phase-out and ensuring the correct sizing of the new heating (and cooling) system to the demand.

Coordinate energy renovations with the switch to decarbonised HVAC systems

Provisions on performance requirements for buildings and decarbonised heating and cooling systems now stand in three different texts (The EPBD, RED and EED, respectively):

- The EPBD sets standards for the elements of the buildings' envelope, encourages energy renovations and switching to individual decarbonised heating and cooling solutions;
- The EED mandates the establishment of heating and cooling decarbonisation plans and sets a timeline for the decarbonisation of district heating and cooling;
- The RED sets renewable energy targets in heating and cooling and in the building sector.

These provisions might be managed by different civil servants or even different teams or ministries. Coordination will be key to ensure proper dimensioning of the systems and timely sequencing of the works.

NBRPs must drive this coordination and bring short- and long-term coherence to the renovation and decarbonisation efforts in the building sector.

Good practice

Poland: Regional “anti-smog” laws (in Polish "Uchwały antysmogowe")

Poland recently adopted anti-smog regional laws. Focusing on air quality, these regulations represent a good first step towards a total fossil fuel ban. They may be adopted by provincial assemblies based on Article 96 of the 27 April 2001 Environmental Protection Law.

These resolutions create new requirements on existing heat sources and the installation of heating systems in new buildings. They can focus on the use of solid fuel boilers (coal, biomass) and can either be total or partial bans on the use of worst performing devices. They can also prohibit the use of specific fuels, such as coal or wood, or indicate minimum quality requirements that these fuels must meet.

Resolutions may specify:

- The area in which restrictions or bans are introduced;
- The types of entities or installations for which restrictions or bans are introduced;
- The types or quality of fuels permitted for use or whose use is prohibited or the technical parameters / technical solutions/ emission parameters of installations in which fuels are burned;
- The method or use of fuels subject to the restrictions specified in the resolution;
- The restriction or prohibitions time;
- The obligations of entities covered by the resolution to the extent necessary to control the implementation of the resolution.

More information here - Uchwały antysmogowe - Polski Alarm Smogowy - Razem o czyste powietrze.

Solar energy in buildings – Article 10

Why it matters

Solar photovoltaic (PV) and solar thermal are increasingly popular technologies, allowing citizens and businesses to decarbonise their energy consumption and act as prosumers. The EPBD recast 2024 will further increase this trend, mandating the installation of solar technologies on new, non-residential, and public buildings.

The EPBD solar mandate is the opportunity to make sure that some pre-conditions are met to make the best use of these technologies, ensure safety for users and prepare the ground for a more efficient energy system in which buildings can become energy hubs – not only adapting their energy demand to supply-side signals, but also storing and producing electricity.

What is in the EPBD?

Member States must ensure that all new buildings are designed to optimise their solar energy generation potential.

2026 31/12

- On all new public and non-residential buildings with useful floor area > 250 m²

2027

- On existing non-residential buildings with useful floor area > 500 m², where the building undergoes a major renovation or an action that requires an administrative permit for building renovations, works on the roof and the installation of a technical building system
- On all existing public buildings with useful floor area > 2,000 m²

2028 31/12

- On all existing public buildings with useful floor area > 750 m²

2029 31/12

- On all new residential buildings, on all new roofed carparks physically adjacent to buildings

2030 31/12

- On all existing public buildings with useful floor area > 250 m²

Efficient Buildings Europe's recommendations

Driving synergies between efficiency, climate adaptation and solar installations

- The installation of PV/solar thermal should only happen on well-performing buildings. This will ensure the **proper dimensioning of the system**.
- **Roofs should be structurally sound and able to support the additional weight of the solar installation**. Roofs must be insulated before solar thermal/PV is installed. This would ensure citizens and businesses will not be asked to remove the solar installation to meet higher energy performance standards. Renovation Passports should provide guidance on these requirements, in accordance with Article 10 §4.
- National solar mandates should take account of **alternative roof uses, Indoor Environmental Quality (IEQ) parameters, and space constraints:**
  - > Solar mandates should take account of the need for IEQ as it is a growing consideration post-COVID, driving renovation decisions (better living conditions, daylight/ventilation in attic apartments etc…), attic transformation into living places;
  - > **Climate adaptation** measures should be considered – Green roofs / white roofs;
  - > Exploit synergies with other systems;
  - > PV and solar-thermal installations should be **dimensioned/designed with other TBS in mind**. This will impact the balance between available surface and expected electricity and water-heating needs;
  - > Coordinating installation with a heat pump/a battery/an EV helps with **interoperability, improving the potential for flexibility**;
  - > The installation of a solar PV/Thermal system should be linked to a **retrofit of the electrical installation** when needed.

The renovation passport is an ideal tool to help consumers and businesses secure these synergies.

Creative solutions could be designed to incentivise both efficiency, climate adaptation, and the deployment of rooftop solar:

- combined support schemes, financing both energy renovations and the installation of solar – such as a tax break, a premium, a grant etc…;
- Adapting solutions to the building (BIPV, Solar tiles);
- Co-location of solar installations and green roofs – so called bio-solar roofs.

Indoor Environmental Quality

Articles 1, 2, 5, 7, 8, 13, 20, 23, Annexes

Why it matters

The long-term performance of our buildings will depend on their resilience and their ability to meet the needs and expectations of residents and users. A building can only be energy efficient in the long-term when providing a healthy and comfortable living and working environment throughout the year.

Health is a crucial benefit of energy-efficient buildings, as highlighted by recent research by the International Energy Agency.[31] Beyond energy savings, energy efficiency measures provide multiple benefits such as better indoor environmental quality, greater comfort, improved health and well-being as well as increased productivity. These additional benefits have a non-negligible positive economic impact. Energy renovations also help tackle energy poverty by reducing households' energy bills and improving living conditions. In addition, these co-benefits represent important incentives for consumers to undertake deep or staged deep, energy renovation projects next to the energy savings.[32]

However, there is currently still a significant lack of data and methodologies to evaluate the broader benefits of energy efficiency improvements. This hinders our ability to quantify these benefits and conduct the cost-benefit analyses needed to fully account for the multiple benefits of energy efficiency .

A large majority of people spend more than 90% of their time indoors. Many Europeans live in unhealthy buildings and suffer from poor daylight and indoor climate:

- In 2012, nearly 100,000 European citizens lost their lives due to indoor pollution, and in 2022 15,000 Europeans died during a heatwave;[33]
- One in four Europeans live in buildings with indoor air quality below the national standard. 30m citizens across the EU have insufficient access to daylight.[34]

This leads to adverse effects on health, well-being, and productivity. The implementation of the EPBD offers a unique opportunity to tackle these issues and improve living standards across Europe.

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31. Multiple Benefits of Energy Efficiency – Analysis - IEA.

32. Comprehensive study of building energy renovation activities, Navigant, 2019.

33. Ibid.

34. Ibid.

What is in the EPBD?

Indoor Environmental Quality (IEQ) provisions have now been incorporated across numerous articles of the EPBD. It is defined as "…the result of an assessment of the conditions inside a building that influence the health and wellbeing of its occupants based upon parameters such as those relating to the temperature, humidity, ventilation rate and presence of contaminants." (Art 2§66) By including the term "such as" in the definition of IEQ, the definition remains broad and, when being implemented, IEQ can therefore encompass several features that were not directly referred to in the revision, for example daylight and acoustics. See European IEQ standard EN-16798-1 for more detailed recommended levels.

The Directive encourages Member States to include an estimate of the indoor environmental quality benefits in their National Building Renovation Plans (Annex II c) i)).

The Directive also requires that Member States to "take account of optimal indoor environmental quality" when setting minimum energy performance requirements (Art 5§1).

For new buildings, the Directive requires that member states address "the issues of optimal environmental quality" (Art 7§6). For existing buildings, the Directive requires that member states address "the issues of indoor environmental quality" when carrying out renovations (Art 8§3).

In reference to technical building systems, member states "shall set requirements for the implementation of adequate indoor environmental quality standards in buildings in order to maintain a healthy indoor climate" (Art 13§4).

Member States shall further "require non-residential zero-emission buildings to be equipped with measuring and control devices for the monitoring and regulation of indoor air quality. In existing non-residential buildings, the installation of such devices shall be required, where technically and economically feasible, when a building undergoes a major renovation. Member States may require the installation of such devices in residential buildings" (Art 13§5).

Photo: Shutterstock (Cineberg)

Efficient Buildings Europe's recommendations

Introduce ambitious IEQ requirements

Member States should follow recommended levels for IEQ parameters using the European Standard EN-16798-1 as guidance. The current EPBD definition does not specifically mention all IEQ parameters listed in the standard.

Start collecting data where available to better track IEQ-related data

Recommendation by BPIE in Healthy Buildings Barometer: Include healthy buildings indicators in the building stock observatory (BSO) and encourage their integration into national policy instruments (e.g. legislation, advisory, financing, building tools, renovation plans).

IEQ parameters in use phase vs. design phase

When implementing IEQ requirements in national building legislation, it is important to differentiate between IEQ parameters to be monitored during the use phase of a building (e.g., CO_2 and temperature) and other IEQ parameters which should be factored in during the design phase of a building project (e.g., lighting/daylight, ventilation, acoustics).

Advertise IEQ benefits

- The benefits from improved IEQ should be linked to each step of the renovation passports. This would help citizens and businesses to accurately assess the multiple benefits stemming from their projects;
- In awareness-raising campaigns: Improved IEQ is often a driver for people to conduct energy renovations. Advertising the wider benefits of efficient buildings will speak more directly to people's concerns;
- Energy renovation works in public buildings like schools and hospitals should promote/advertise the IEQ improvements.

Ensure direct health externalities are also factored into the new methodology for cost-optimal levels

The current wording indicates that only health externalities of energy use should be addressed within the new methodology. This needs to be extended so that wider benefits not related to energy use - such as the impact of a healthy indoor climate through e.g. better daylight conditions, better soundproofing or better indoor air quality - are factored in to be able to properly quantify the multiple benefits of energy efficiency.

Invest in skills & capacity building as part of EPBD implementation:

Introduce and expand existing education and training programmes for professional development courses aimed at equipping both practitioners and decision-makers with the necessary skills on how to integrate the new IEQ indicators alongside building parameters.

Good practices

IEQ requirements already in place at national level

As an example, multiple EU countries (e.g. BE, DK, FR) have already introduced IEQ requirements to limit overheating risk in residential and non-residential buildings. Most of these requirements aim at limiting the number of overheating hours by considering heat waves climate data (either current or projected).

Integrating IEQ information in EPCs

The iBRoad2EPC project developed simple modules to complete national EPCs with information on IEQ. These modules can be integrated as plug-ins in national EPC software. See here for more information: D3.1-Exploring-innovative-indicators-for-the-next-generation-EPC-features.pdf (x-tendo.eu).

Photo: Aldes

Photo: Velux

5 Enabling Framework

Targets and objectives are key to set the general direction of travel and provide long term clarity to the efficient buildings' ecosystem. However, these targets are not enough to improve the performance of our building stock on their own. Several 'building blocks' will need to be in place to unlock the thousands of individual decisions required to achieve European and national objectives.

Each project requires clear and trustworthy information and guidance, sufficient financing – public and or private – and skilled contractors to execute the work. This section investigates the new EPBD provisions addressing these questions and presents good practices from various Member States.

Financing / Access to financing schemes

Articles 3, 9, 17, Annex III

Why it matters

More public AND private investments are needed to reach European climate and energy goals in the buildings sector: Recent research by the think tank I4CE shows that "doubling energy renovation rates implies an increase in energy renovation investments. Climate investment needs for the EU to achieve these objectives are estimated at 168 billion euros per year between 2024 and 2030. The EU economy has invested 74 billion euros in 2022 in energy renovation, giving a climate investment deficit of 94 billion euros for the building system. Investments in deep renovation account for 18% of these investment needs. These investment needs concern both residential and non-residential buildings equally." [35]

'Can we afford these ambitious EPBD targets?' has been one of the most debated questions during the negotiations of the 2024 recast of the Directive. A first step to open the discussion on energy efficiency financing is to reverse the perspective and realise we cannot afford inefficient buildings. **Years of inaction on energy efficiency in the building sector are dramatically impacting household and public finances.** Energy bills have tripled in some Member States compared to previous years,[36] exposing millions to the risks of energy poverty and/or the inability to make mortgage payments. This becomes a credit risk for banks, as demonstrated by the European Central Bank (ECB) climate stress test from 2022.[37]

A recent assessment by Bruegel indicates that around 4% of the EU GDP (around €500 billion) has already been spent by Member States on subsidising energy bills. This amount is greater than the Commission's own assessment of how much would be needed per year to double deep energy renovation in the EU.[38]

That being said, access to adequate finance remains critical to unlock the multiple benefits of efficient buildings. This section looks into new EPBD provisions on the topic and the latest research on funding needs and availability.

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35. I4CE Climate Investment deficit report, 2024.

36. DW, Germany: Consumers can expect heating bills to at least triple (2022).

37. European Central Bank's climate risk stress (2022).

38. Renovation Wave: The estimated amount needed per year to double deep energy renovation in the EU is €250 billion, representing about 1.5% of EU GDP.

What is in the EPBD?

The EPBD 2024 recast addresses public financial support through several provisions in Article 17:

- The Directive contains a clear obligation for Member States to provide appropriate financing and support measures and stimulate private investments, in line with building renovation plans and 2050 goals;
- Member States shall provide safeguards for tenants and aim to distribute benefits between owners and tenants when providing financial incentives.

The Directive also set several principles for the use of public financing:

- Member States must aim to increase the leverage factor of public financing – the 'grant only approach' should be reserved for the worst performing households and cases in which access to private financing is limited;
- Public financial incentives must be designed to address 3 priority groups/actions: vulnerable households, worst-performing buildings, and deeper renovations;
- Public money should be used in a cost-effective way: incentives should be linked to the results delivered. To achieve this objective, support should include information and technical support.

The Commission will report on the effectiveness and appropriateness of financing instruments both at the EU and national level, for the purpose of improving the energy performance of buildings, in particular the worst-performing ones (assessment to be submitted by 31/03/2025).

Financial support measures must be linked to the objectives of the Directive and presented in the National Building Renovation Plan – due by December 2025.

Private financing is also addressed by the Directive: The European Commission is expected to adopt a Delegated Act providing a comprehensive portfolio framework for voluntary use by financial institutions and to increase financing volumes provided for energy performance renovations.

Efficient Buildings Europe's recommendations

Ensure continuity in national financing schemes to support efficient buildings

- **National-level funding for energy efficiency and renovation measures should provide long-term certainty**. This would break the stop-and-go cycles preventing the consolidation of a sustainable efficient buildings' ecosystem. Numerous programmes have been announced and revised in recent years to support renovation works: *Sanierungsscheck* in Austria, *Ma Prime Renov* in France, the *Superbonus* in Italy, *Clean Air Programme* in Poland… Nonetheless, **national funding schemes** lack stability and long-term certainty (e.g., CEE in France). Long-term visibility (e.g., on the total budget, type of renovation works covered, and financial support for each renovation step) would encourage households to undertake renovation projects and incentivise contractors to hire and train workers and equipment manufacturers to invest in new production facilities. It is a prerequisite to the successful implementation of the EPBD.
- More should be done to **properly plan public investments** in this sector. The design and publication of the NBRPs in 2025 is the perfect occasion to provide long-term visibility and link funding streams to specific targets and policy measures, such as MEPS in 2030-35.
- With forecasted total investment needs of over €3.5 trillion by 2030[39], the energy renovation market cannot be upscaled with public financing alone. Member States must help unlock private financing by encouraging the emergence of new financing tools, such as zero-rate loans or by incentivising new financing models, such as the pay-for-performance model. Private financing for renovation efforts could go through ESCOs, coupled with measured performance. Such financing schemes could also support compensating CO_2 emissions (i.e., credit to renovation), monetising the positive contribution of energy efficiency measures in preventing and/or reducing grid congestion.

NBRPs are a place to discuss how to balance and fine-tune different support schemes, alongside a more granular analysis of needs according to economic profiles.[40]

Engage with the European Energy Efficiency Financing Coalition / national hubs

The European Commission and Member States recently launched the European Energy Efficiency Financing Coalition. The latter aims to create a favourable market environment for energy efficiency investments and to scale up the private funding needed in energy

39. COM/2020/662 final.

40. Climate Strategies offered a breakdown on the need and type of public funding needed per economic profile: Engaging Retail Lenders in Home Renovation | Climate Strategy & Partners.

efficiency to help achieve the EU's energy and climate targets for 2030 and 2050. It will work towards facilitating the implementation of energy efficiency financial instruments and schemes under EU funding programmes and promoting these programmes to facilitate further private investment in energy efficiency projects.

Member States are strongly encouraged to create national hubs gathering relevant ministries, financial actors, and the efficient buildings' ecosystem e.g. product manufacturers, contractors etc... These hubs will develop a shared understanding of the EED and EPBD's objectives and foster collaboration towards their achievement.

Unlock private funding through new financial tools

European residential buildings are estimated to be worth €17 trillion and house 220 million homeowners. There are around €7 trillion of mortgages in Europe, and therefore there is €10 trillion of home equity against which owners could borrow for the deep renovation and transformation which most of these buildings require by 2050[41]. These savings must be unlocked efficiently, and an 'EU Renovation Loan' could play this role.

To make European housing affordable and sustainable, the EU must deliver on its commitments to provide financing options to vulnerable homeowners for whom energy costs are unsustainable. In this regard, EU financing tools should be used to deliver low-cost, long-term financing options to homeowners, together with the EIB and EU budgetary support.

EU Renovation Loans can be offered to underserved families and backed by an EU guaranteee[42]. InvestEU provides an EU guarantee to four existing "policy windows" whose deployment is supported by the EIB group. A fifth "policy window" is needed for building renovations.

More information here: Engaging Retail Lenders in Home Renovation | Climate Strategy & Partners.

41. Climate Strategy and Partners - The European Renovation Loan: An innovative financial instrument to Repower EU, 2022.

42. For example, in Ireland, the Home Energy Upgrade Loan Scheme is established and offered by the Strategic Banking Corporation of Ireland (SBCI) and benefits from a guarantee that has been provided by the European Investment Fund (EIF) and European Investment Bank (EIB) and supported by the Government of Ireland. The scheme provides low interest loans to Irish households.

Link financing programmes and One Stop Shops

Member States are asked to set the right framework conditions and incentives for deep renovation and staged deep renovation. This is a key aspect of decarbonising our building stock in preparation for the transition.

Technical assistance via, for example, One-Stop-Shops, will ensure that resources are used in the best way, as well as ensure the optimal sequencing of renovation steps. Additional guidance and clarification of this aspect e.g., providing a priority list of energy efficiency measures that reduce energy needs in buildings is crucial, also factoring in multiple benefits of energy efficiency. Technological neutrality and the Energy Efficiency First principle should be core pillars of any provision.

Introduce Mortgage Portfolio Standards (MPS)

The EPBD recast 2024 introduces a definition of Mortgage Portfolio Standard (MPS) - a new mechanism that encourages banks to increase the median energy performance of their mortgage portfolio.

MPS is a tool with considerable potential as it can funnel more capital into energy-efficient renovations and boost the energy renovation rate. At the same time, the MPS can help banks to align their portfolios with Taxonomy-compliant activities and fulfil their Green Asset Ratio, as well as managing the climate transition risks they face in their mortgage portfolio.

Several banks such as ING, SEB or BNP Paribas have already developed their own Mortgage Portfolio Standard programmes. The European Banking Authority recently supported this concept, explaining that this would help to de-risk portfolios and improve the resilience of the banking sector.

Article 17(10) requires the Commission to adopt a Delegated Act to elaborate the concept of MPS. For this, a clear and well-defined methodology is necessary for guiding financial institutions in setting targets to improve the energy efficiency of their lending portfolios. The proposed methodology should ensure that the portfolio targets set by mortgage lenders are **science-based, measurable, and time-bound**. Furthermore, it is crucial to encourage lenders to prioritise the identification and renovation of the worst-performing buildings within their portfolios.

More information here.

Energy efficiency metering will reduce risk and improve access to finance

Using sensors and machine learning, digital solutions already exist today for the measurement of in-use energy performance of a building. Based on those digital energy efficiency meters, the energy performance of a building can be measured before and after renovation to showcase the demand for specific renovation measures and measure the improvement afterwards.

These technologies also help to guarantee the performance of energy renovations and reduce the associated risk. This could attract new financial players, facilitate taxonomy and sustainability compliance reporting, and lower the cost of finance for the sector.

Photo: Saint Gobain

Good practices

Czech Republic: 'Renovate grandma's house' programme

The Czech Republic has a long-standing experience in energy renovation financing. It recently complemented its successful subsidies programme with affordable loans.

Programme Benefits and Additional Support Options

The basic support covers up to 50% of direct implementation costs, with a cap of one million CZK. This amount is paid in advance, and applications can be submitted via a form on the State Environmental Fund website (https://novazelenausporam.cz/).

The programme also supports other energy-saving initiatives, such as installing photovoltaic systems, replacing outdated heat sources, and implementing controlled ventilation with heat recovery. Applying for these additional subsidies within the same application allows access to a combined bonus of CZK 10,000. Additionally, applicants may receive a family bonus of CZK 50,000 per child and a 10% bonus of the total subsidy amount if they are in designated regions.

This subsidy programme prioritises the renovation of older properties over new construction, especially for those lacking sufficient financial resources. Funds are disbursed in advance, sometimes even before work begins.

Recipients receive financial support upfront and, starting in March 2024, can also apply for a favourable loan to cover the remaining costs. Combined with the subsidy, this loan aims to cover renovation expenses with minimal upfront capital required from the household.

Subsidised loans for insulation and renovation of old buildings

Starting in March 2024, applicants can apply for long-term subsidised loans in addition to the subsidy. Terms for these loans will be defined during 2024, with interest rates expected between 3% and 4%.

The initiative provides for loan repayment through small instalments, reimbursing the full amount over 20 or more years. This enables households to reduce immediate housing costs and benefit from lower energy bills in the long run.

Financing for these subsidised loans will be provided equally by the SEF (funded by the Modernisation Fund), construction companies, and financial institutions. This combined approach results in halved interest rates, with a fixed rate for at least five years. For 2024, the maximum APR is set at 3.5%.

Ireland: The Home Energy Upgrade Scheme

The Irish authorities recently launched a government-backed low-cost loan programme to upgrade the energy performance of buildings.

The purpose of the loan must be to carry out home energy upgrade works that are also grant-aided through the Sustainable Energy Authority of Ireland (SEAI). Citizens can borrow from €5,000 to €75,000 for a term of up to 10 years. Loans are available through participating finance providers, including banks and some credit unions. The interest rates will be significantly lower than those generally available in the market but will differ among the finance providers.

The Home Energy Upgrade Loan Scheme is established and offered by the Strategic Banking Corporation of Ireland (SBCI) and benefits from a guarantee that has been provided by the European Investment Fund (EIF) and European Investment Bank (EIB) and supported by the Government of Ireland.

Benefits

- Loans can help spread the cost of energy upgrades over a period of time, making it easier to balance repayments against savings on bills;
- Streamlined process for grant and loan applications;
- Approved loans can be drawn before works begin for deposits or milestone payments;
- Flexibility to spend up to 25% of the loan on non-energy related works (e.g., redecorating your home).

Key features

- Lower interest rates;
- Flexible terms of up to 10 years;
- Loans from €5,000 to €75,000;
- Loans are unsecured (i.e., there is no charge taken over the property as is the case with a mortgage);
- Full terms and conditions and a list of participating finance providers are available on the SBCI website.

More information here: Home Energy Upgrade Loan Scheme (seai.ie).

France: MaPrimeRénov'

MaPrimeRénov is a public subsidy programme accessible to all building (co) owners. It focuses on housing occupied as a main residence (by the owner himself or by a tenant) and is designed to help finance energy renovations.

The subsidy is adapted based on revenue – the lower the income, the higher the grant. Owners must work with certified contractors to access the grant.

Applicants must choose between 3 sub-programmes:

- Renovation per action, which finances single renovation steps. The programme finances clean heating and hot water solutions (from €400 to €11,000) and insulation works (from €15 to €75 per m²);
- The 'accompanied path' focuses on deep renovations. It helps applicants carry out large-scale work offering grants up to €63,000;
- The 'support for co-ownerships' programme offers 30% funding for a renovation saving at least 35% of the energy consumption, and 45% funding for a renovation saving at least 50%. The aid is capped at an amount of work of €25,000 per dwelling.

Since 2020, MaPrimeRénov' has helped with the renovation of more than 2.3 million homes, including 268,143 deep renovations, generating a total of more than €32 billion. The programme is now well-known, and progress has been made to combat fraud and increase the number of certified advisors. However, it remains a rather unstable framework with almost yearly changes in the overall budget and actions financed.

One-stop-shops (OSSs)

Articles 2, 18

Why it matters

One-Stop-Shops are core elements of a functional energy renovation ecosystem. Run by either public or private entities, their role is to guide citizens and businesses through their renovation journey, providing expertise, contacts and sometimes access to financing.

The 2024 recast EPBD introduces a dedicated Article on one-stop shops. It acknowledges their essential role in supporting the implementation of other provisions, such as MEPS (Article 9§4b), and establishes connections between one-stop shops and other tools like EPCs and renovation passports. These synergies are intended to increase the use of one-stop shops. EPCs and renovation passports must now include the contact information of relevant one-stop shops as a mandatory element (Article 19§10, Annex V, and Annex VIII). Additionally, when an issued EPC is below class 'C', building owners will be invited to seek renovation advice at a one-stop shop (Article 19§13).

What is in the EPBD?

Member States are required to establish and operate technical assistance facilities, including one-stop shops. Private stakeholders can be involved in the setting up of one-stop shops.

One Stop Shops established under Article 22(3), point (a) of the Energy Efficiency Directive 2023 recast can be used to meet the requirements of this Article.

Member States must ensure that technical assistance facilities are available across their territory by establishing at least one one-stop shop:

- per 80,000 inhabitants;
- per region;
- in areas where the average age of the building stock is above the national average;
- in areas where Member States intend to implement integrated district renovation programmes;
- in a location that can be reached within less than 90 minutes of average travel time, based on the means of transport that is locally available.

What kind of support should OSSs provide?

- streamlined information on technical and financial possibilities and solutions to households, SMEs including microenterprises, and public bodies;
- holistic support to all households, with a particular focus on households affected by energy poverty and on worst-performing buildings, as well as to accredited companies and installers providing retrofit services, adapted to different housing typologies and geographical scope;
- support covering the various stages of the renovation project.

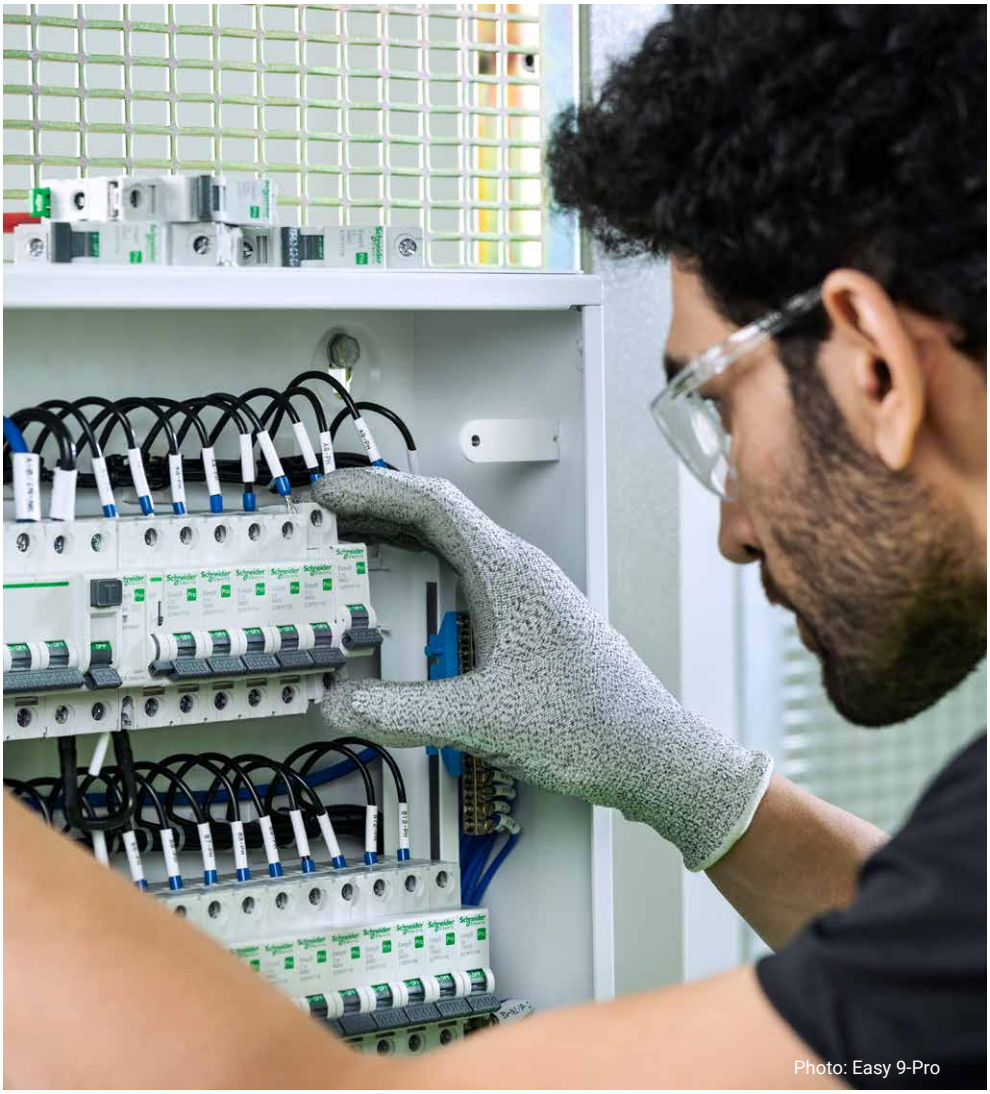

Photo: Easy 9-Pro

Efficient Buildings Europe's recommendations

Plan the development of OSSs

The lack of experts who can provide holistic advice is still a major bottleneck for the upscaling of the energy renovation market. A long-term approach is needed to plan the development of OSS, train advisors, establish links with reliable contractors and financing institutions (e.g., in Czechia alone: a rough estimate shows that 125 one stop shops would need to be created). EU programmes such as ELENA should build on the knowledge from previously financed projects and provide dedicated support for the roll out of such structures.

Provide long term funding for the structures

One Stop Shops have proven their effectiveness. However, they often suffer from limited funding over time, leading to a loss of skills. Energy Cities found that OSS usually need about 5 years to show clear results. This does not always coincide with local political mandates and interests.

Link One Stop Shops and financial institutions

One Stop Shops are hubs of expertise aggregating energy renovation projects. Member States should ensure strong links between them and the financing community as the two can be mutually beneficial: OSS can provide a pool of projects and ensure the quality of works through their connections with certified contractors, while banks can provide the remaining funds needed.

Photo: Shutterstock (Alexander Denisenko)

Good practices

Denmark: The BetterHome initiative

BetterHome was an industry-driven one-stop-shop model, which proved successful in boosting demand for holistic energy renovations in Denmark. The model was launched in 2014, and it was profitable after just three years, with 200 projects in 2016. Understanding that renovating a building is a big commitment, this model created a burden-free experience for the building owner and offered a service that went beyond replacing building components. The success of the home-owner-centric business model can be explained by the advanced service-oriented role of the installers. BetterHome trained and guided the installers on how to approach the customer, from the first contact to the finalisation of the process. In support, BetterHome also simplified and structured the renovation process for the installer, through supportive and innovative digital tools, enabling a better outcome for all involved.

Bulgaria: The MultiHome Project

The recently established **MultiHome Project** will support the decarbonised and low-emission integrated renovation of residential buildings in Plovdiv Region by piloting an **integrated home renovation model**.

The Energy Agency of Plovdiv, along with the Municipality of Plovdiv and local branch representatives (businesses, industry, housing sector), will design, harmonise and establish a **cooperation model with the local stakeholders offering a wide range of administrative, legal, technical, financial, social and networking expertise that will be embedded in a Service Hub and Platform** serving as knowledge and capacity hub, renovation advisor and match-maker, and renovation tracker. The MultiHome Service Hub and Platform will support **real-life integrated EE and RES single- and multi-family innovative renovation actions in over 1,700 dwellings** and inspire more new pilots to move forward.

Finally, the **MultiHome project will be piloted in the Municipality of Plovdiv** as the regional centre and second largest Bulgarian city, but will **reach out, expand and upscale through** 5 municipalities in the region within the project lifetime and to all 17 municipalities in 5 years after the project. It will propose **inter-regional replication to other 2 regions** with the aim to transfer and replicate its model.

Use the results from EU projects

- X-tendo, X-tendo documents and describes approaches to set up or upgrade one-stop-shops and link EPC data into it to boost the energy renovation market. See more here: One Stop Shops X-tendo Toolbox;
- EU PEERS: a project that aims to support the development and promotion of Integrated Home Renovation Services (IHRS) as key tools for accelerating residential energy renovation in the European Union. EU Peers plans to create a European Community of Practice comprising IHRS practitioners and other members, with the goal of strengthening and expanding the IHRS concept. See more information here: Community Life (eu-peers.eu).

Efficient Buildings Europe Members (2024)

Technologies improving energy efficiency in buildings are already available. They lower energy bills, improve living conditions and empower building owners and tenants across Europe.

Building envelope

- Floor insulation
- Wall insulation
- Roof insulation
- Air tightness membrane / seals
- Automated blinds
- Blinds and shutters
- Glazing
- Roof windows
- Cool roof covering

Technical building systems & appliances

- Heat pump
- Mechanical ventilation
- Humidity-sensitive air inlets
- Efficient lighting
- Efficient taps and shower
- District heating and cooling
- Solar panels
- Smart EV charging
- Rainwater harvesting
- Battery storage
- Smart meter

Controls/Digital tools

- Room Thermostat
- Building management system: Edge control
- Cloud technologies
- Remote controls
- Digital twin

Efficient Buildings Europe

Efficient Buildings Europe

Efficient Buildings Europe

Rond Point Schuman, 6-8th floor

1040, Brussels, Belgium

efficientbuildings.eu

Efficient Buildings Europe @Efficient_Bldgs

For further information:

Rémi Collombet, Head of EU Policy | +32 (0) 499 88 57 93 | remi.collombet@efficientbuildings.eu