European Association for Storage of Energy

EASE Briefing on Energy Performance of Buildings Directive

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Energy Performance of Buildings Directive Briefing

Preface

This briefing focuses on the Energy Performance of Buildings Directive (recast) with a Date of Entry into force of 30 May 2024. It is divided into the following chapters:

- Chapter 1 offers an overview of the Directive, detailing its background and scope.
- Chapter 2 serves as a guide to the Directive, highlighting key provisions by topic.
- Chapter 3 explores specific topics and provisions in greater detail, making special reference to their impact in the energy sector.
- Annexes present a comprehensive framework and methodologies aimed at improving the energy performance, sustainability, and regulatory compliance of buildings within the EU.

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Chapter 1: Overview

1.1. Introduction

This briefing provides an overview of key provisions under the revised Energy Performance of Buildings Directive (EPBD) and their implications in the energy sector, particularly focusing the role of energy storage. The revised Directive was approved by the European Parliament's plenary and the Council on April 2024, marking the end of the legislative process, and was published in the EU Official Journal on 10 May 2024.

The EPBD revision complements the overarching energy efficiency legislation by targeting the construction sector, which represents 40% of Europe's final energy consumption. Currently, 75% of buildings in Europe are deemed inefficient, with a goal of achieving zero emissions from all buildings by 2050. Despite this target, 85-95% of existing buildings are expected to remain operational by 2050, highlighting the modest annual rate of energy renovation at approximately 1%.

1.2. Background

Building on the Fit for 55 package, the European Commission's (EC) communication of 18 May 2022 introduced the REPowerEU plan. The plan proposes additional actions to save energy, diversify supplies, accelerate Europe's clean energy transition, and combine investments and reforms. It includes new legislative proposals and targeted recommendations to enhance energy efficiency and savings. The revision of Directive 2010/31/EU forms an integral part of this package.

1.3. Context and Scope of File

On 15 December 2021, the European Commission adopted a legislative proposal to revise the EPBD. Initially introduced in 2010 and subsequently amended in 2018 as part of the Clean Energy Package, these amendments required all Member States to develop detailed long-term building renovation strategies. The latest proposal, approved on 12 April 2024, builds upon the 2018 regulatory framework and mandates that all new EU buildings achieve zero emissions by 2030, with public buildings leading this transition from 2028 onwards.

Chapter 2:Connecting Topics to Provisions

2.1. The Beginners' Guide to Energy Performance of Buildings Directive Topics

The Directive consists of 38 Articles and 10 Annexes. The following table lists the key provisions for each topic. The table below provides an overview of the provisions in the EPBD:

Topics	Provisions
1. National Building Renovation Plans	Article 3; Annex II
2. New buildings	Article 7
3. Existing buildings	Article 8
4. Minimum energy performance standards	Article 9; Article 9a
5. Zero emission building / nearly zero-energy building	Article 11
6. Renovation passport	Article 12
7. Infrastructure for sustainable mobility	Article 14
8. Technical building systems	Article 13
9. Smart readiness of buildings	Article 15; Annex IV
10. One-stop shops	Article 18
11. Energy performance certificates	Article 19

Note that this briefing focuses on provisions that can have an impact on energy storage technologies.

Chapter 3: Key Topics

3.1. Zero-Emission Buildings (ZEBs)/ Nearly Zero-Energy Buildings (nZEBs)

The revised Directive introduces a new perspective on buildings, envisioning them as zero-emission entities. These buildings would have minimal energy demand, no on-site carbon emissions from fossil fuels, and zero or negligible operational greenhouse gas emissions. To align with this vision, it is proposed that all new buildings should be designed as zero-emission buildings by 2030. Furthermore, existing buildings should be renovated to meet the zero-emission standard by 2050.

Zero-emission building

- Zero-emission buildings do not produce on-site carbon emissions from fossil fuels and meet national energy performance thresholds.
- These buildings should have the ability to respond to external singals and adjust its energy consumption, production, or storage, subject to economic and technical feasibility.
- Zero-emission buildings are characterised by their minimal energy needs primarily fulfilled by renewable energy sources, either on-site or nearby.
- The maximum threshold for total primary energy use in zero-emission buildings should be set at least 10% below the established level for nearly zero-energy buildings at the Member State level.

Nearly zero-energy building

- All new buildings.

Deep renovation

- Despite not being defined in Union law, deep renovation refers to a renovation process that aligns with the 'energy efficiency first' principle and concentrates on the building's essential elements. The objective of a deep renovation is to transform a building or building unit into an energy-efficient structure.

Renovation passport

- A renovation passport is a customised roadmap designed for the deep renovation of a specific building. This passport outlines a maximum number of steps aimed at significantly enhancing the building's energy performance

Worst-performing buildings

- These buildings are characterised within the bottom 43% of the national building stock in terms of energy performance. They exhibit the lowest energy efficiency, thereby contributing significantly to energy consumption and environmental impact.

3.1.1. New Buildings

Member States shall ensure all new buildings adhere to zero-emission standards. This requirement is phased in:

- **Public buildings:** mandatory compliance from 2028.
- **All buildings:** mandatory compliance from 2030.

3.1.2. Existing Buildings

Existing buildings are the ones targeted for long-term upgrades to achieve zero-emission status by 2050, requiring substantial renovations to improve energy efficiency and reduce emissions. The Directive allows a gradual approach to achieving this goal, with Member States developing national implementation plans outlining specific retrofitting details and timelines. Key elements of this phased approach include:

- Member States shall develop and implement national plans outlining strategies and timelines for retrofitting existing buildings.
- Stakeholders across various sectors, including construction, finance, and energy, will collaborate to facilitate a smooth and successful transition.

Not to overlook

Public awareness campaigns will be launched to educate building owners about the benefits and available support for improving their existing buildings.

Alterations to existing buildings do not reclassify them as new buildings. Therefore, any changes made to existing buildings should aim to improve their energy efficiency and reduce emissions, even if they do not fully meet the zero-emission standard.

3.1.3. Zero-Emission Buildings

Zero-emission buildings are the ones that shall not cause as on-site carbon emissions from fossil fuels. They shall meet their energy needs through various options:

- **On-site or nearby renewables:** solar thermal, geothermal, solar photovoltaics, heat pumps, hydroelectric power, or biomass.
- **Renewable energy communities:** participate in communities that provide renewable energy.
- **Efficient district heating and cooling:** connect to networks powered by renewables or waste heat.
- **Other carbon-free sources:** explore options like nuclear energy or carbon capture & storage.

Not to overlook

Energy derived from combusting renewable fuels within the building's boundaries qualifies as on-site renewable energy.

Timeline:

Provisions	Timeline
After the first delegated act is adopted, the Commission has the power to adopt delegated acts to amend Annex III, with the goal of setting a Union framework for the national calculation of life-cycle GWP to achieve climate neutrality.	By 31 December 2025
Member States must publish and notify the Commission of 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. These targets should consider a progressive downward trend and include maximum limit values for different climatic zones and building typologies. These maximum limit values should align with the Union's objectives to achieve climate neutrality.	By 1 January 2027
New buildings owned by public bodies must be zero-emission. The life-cycle Global Warming Potential (GWP) must be calculated and disclosed through the building's energy performance certificate. for all new buildings larger than 1000 square meters.	From 1 January 2028
Member States to convert the building into a nearly zero-energy building.	Before 1 January 2030
Member States should aim to shift or transform the building into a zero-emission building.	As of 1 January 2030
All new buildings must be zero-emission. The life-cycle Global Warming Potential (GWP) must be calculated and disclosed for all new buildings.	From 1 January 2030

3.2. Technical Building Systems

Technical building systems are essential systems within a building responsible for its functionality and comfort, including **heating and cooling**; **ventilation**; **hot water**; **lighting**; **building automation and control systems**. Key elements inherent to these technical building systems include:

- Energy-saving technologies: smart controls, high-efficiency equipment, and integrate renewable energy.
- Holistic approach: focus on overall energy performance of systems, not just individual components.
- Proper installation and maintenance: ensure correct installation, appropriate sizing, and regular adjustment for optimal efficiency.
- Hydronic balancing: optimised distribution of heating and cooling systems for efficiency (where applicable).
- Application to new and existing buildings: these requirements apply to both new construction and significant renovations of existing buildings.

Member States are required to implement system requirements for optimising the energy use of these technical building systems with the aim to improve overall building energy performance.

3.2.1. New and Renovated Buildings

Member States shall require new and renovated buildings, where technically and economically feasible, to be equipped with:

- **Smart monitoring:** electronic monitoring systems that track energy use, alert owners/managers of issues, and suggest maintenance needs.
- **Efficient controls:** systems that optimise energy generation, distribution, storage, and usage, including water heating. These systems should adapt to external factors like weather to further improve efficiency.
- **Renewable energy storage:** Member States are encouraged to incentivise storing renewable energy within buildings, promoting self-sufficiency.

Not to overlook

By incentivising energy storage integration in buildings, Member States enhance energy efficiency, promote self-sufficiency with renewables, and enable real-time monitoring for maintenance needs.

3.2.2. Transition from Fossil Fuels

To promote the transition from fossil fuels, Member States may provide with funding and/or incentives to:

- Encourage the switch from fossil-fuel-based heating and cooling systems to non-fossil-fuel-based heating and cooling systems.
- Establish national plans for phasing out gas and oil boilers in existing buildings, aligning with boiler replacement schedules. The Commission will issue further

guidance on fossil fuel boiler definition and technical specifications for monitoring and control systems.

3.2.3. Non-Residential Buildings

Member States shall establish requirements to ensure non-residential buildings are equipped with building automation and control systems (BACS) where technically and economically feasible to efficiently manage energy use. BACS offer significant demand flexibility by managing heating, ventilation, and lighting systems, creating opportunities to integrate energy storage solutions that optimise energy use and store excess renewable energy during peak production times. These systems can also be integrated with renewable energy sources like solar panels to optimise usage and reduce reliance on grid electricity, potentially lessening the need for large-scale storage solutions.

Additionally, awareness campaigns and information resources should be created to educate citizens and businesses about the benefits of smart buildings and clean technologies.

Not to overlook

As buildings become more energy-efficient and rely increasingly on renewable energy, the demand for flexible and reliable energy sources like storage is expected to grow. BACS developed with future storage technologies in mind will enable quicker integration when necessary, ensuring that non-residential buildings remain efficient and sustainable.

Timeline:

Provisions	Timeline
Non-residential buildings with an effective rated output for heating systems, air conditioning systems, or combined space heating and ventilation systems of over 290 kW should be equipped with these systems.	By 31 December 2024
Non-residential buildings with an effective rated output for heating systems, air conditioning systems, or combined space heating and ventilation systems of over 70 kW should be equipped with these systems.	By 31 December 2029

3.3. Minimum Energy Performance Standards

Minimum Energy Performance Standards (MEPS) are introduced to promote energy efficiency and stimulate large-scale renovations of existing buildings. These standards require buildings to meet specific energy performance criteria, typically triggered during major renovations or

key market events like property transactions (sale, rental, donation, or change of purpose within the cadastre or land registry of a building). Key elements:

- Stimulation of large-scale renovations, addressing challenges such as split incentives and co-ownership structures that economic incentives alone cannot fully address.
- Focus on entire building systems, not just individual components, ensuring a holistic approach.
- Harmonised tools and standards to ensure consistency and avoid market fragmentation.

Member States will define implementation details, including criteria for defining "major renovation" and energy performance thresholds.

Not to overlook

MEPS can drive the adoption of on-site renewable energy generation and storage, helping buildings meet higher energy performance standards and reduce grid reliance. Integrating these systems ensures a stable energy supply, optimises energy usage, and offers economic incentives like subsidies and tax benefits. Additionally, it supports grid stability, reduces peak demand pressures, and aligns with national and EU climate targets.

3.3.1. Major Renovation

MEPS offer flexibility for Member States to define what constitutes a "major renovation", taking into consideration the following concepts:

- **Building envelope surface area:** a specific percentage threshold can be set for renovations impacting this area.
- **Building value:** actuarial or reconstruction cost (excluding land value) can be used to define the scope of major renovations.

Energy performance requirements should focus on entire technical building systems, not just standalone components. Harmonised instruments, such as testing methods and energy efficiency classes under Directive 2009/125/EC and Regulation (EU) 2017/1369, should be used to set these requirements. This approach aims to ensure market coherence and minimise fragmentation.

Not to overlook

This flexibility allows for targeted improvements on the most impactful parts of the building while maintaining cost-effectiveness.

3.3.2. Methodology

Member States shall apply a methodology, as outlined in Annex I, which sets a common framework for calculating building energy performance. This methodology should go beyond thermal characteristics and consider:

- Urban heat island effect;
- HVAC systems;
- Renewable energy sources;
- Building automation and control;
- Heat recovery and smart solutions;
- Passive cooling and heating;
- Shading, indoor environmental quality;
- Natural light and building design.

3.3.3. Energy Performance of Buildings Calculation

Key recommendations for Member States on the energy performance of buildings calculation include:

- Annual and dynamic performance calculation:
    - Ensure calculations reflect actual operating conditions and allow verification through metered energy.
    - Utilise detailed time-steps (monthly, hourly, or sub-hourly) for comprehensive analysis beyond heating/cooling seasons.
- Utilisation of available technologies:
    - Promote the adoption of energy-saving technologies with short payback periods, such as thermostatic control valves and heat recovery systems.
    - Combine outputs from various sources within the same system for accurate assessment.
- Cost-optimal minimum requirements:
    - Develop a framework for determining cost-optimal minimum energy performance standards.
    - Consider both energy and emission performance, including external costs and carbon pricing.
- Incentivising on-site renewables:
    - Implement measures that reward maximizing on-site renewable energy use.
    - Include the benefits of on-site renewables, such as electric vehicle charging, in calculation methodologies.

The Commission is tasked with establishing and updating a comparative methodology framework for determining cost-optimal energy performance requirements in new and existing buildings undergoing significant renovation, including individual building elements. The framework, subject to periodic review, should consider both energy and emission performance, accounting for environmental and health externalities, as well as factors like the Emissions Trading System (ETS) extension and carbon prices. Additionally, efforts to incentivise on-site renewables should be explored and implemented.

Not to overlook

Focusing on whole-building systems and dynamic performance stimulates the use of storage to optimise energy consumption and incorporate renewables as part of a larger energy system. Additionally, having a complete performance methodology enables for a data-driven strategy that influences storage integration decisions to improve efficiency and reduce emissions.

Timeline:

Provisions	Timeline
Member States shall: • Renovate 16% of the worst-performing non-residential buildings • Achieve a 16% reduction in the average primary energy use of the residential building stock.	By 2030
Member States must renovate 26% of the worst-performing non-residential buildings.	By 2033
Member States should achieve a 20-22% reduction in the average primary energy use of the residential building stock.	By 2035

3.3.4. Non-Residential Buildings

Minimum energy performance standards for non-residential buildings should be established at Union level and should prioritise the renovation of the worst-performing buildings, which hold the highest potential in terms of decarbonisation and extended social and economic benefits. Certain building categories can be exempted, such as historical, agricultural, or military buildings.

Member States are required to establish minimum energy performance standards to ensure that non-residential buildings do not exceed a specified maximum energy performance threshold. This threshold is expressed by a numeric indicator of primary or final energy use in kWh/ (m2.y). Key elements:

- **EU-level standards:** the focus in renovating the worst-performing buildings first will prioritise maximum impact for decarbonisation and societal benefits (such as poverty alleviation).
- **Member State implementation:** each country will determine specific thresholds based on primary or final energy use through national building renovation plans.

The **classification based on energy classes** in **non-residential buildings** has been removed from the final text. It is proposed that each State independently sets limits on primary energy consumption. This should be based on the condition of its building stock as of 1 January 2020. These defined segments can then be translated into national Energy Performance Certificate (EPC) classes for effective communication with consumers.

Energy performance certificates (EPCs) will be used to verify compliance with the performance standards. Limited exemptions can be granted for specific situations like planned demolition or hardship, but with strict criteria to avoid abuse. If exemptions are granted, equivalent energy improvements must be achieved elsewhere in the non-residential building stock.

Member States have discretion in **disaster response measures** which may include the following:

- Selecting primary or final energy metrics to express thresholds in.
- Implementing temporary adjustments during natural disasters to prioritise energy renovation of damaged buildings.

Timeline:

Provisions	Timeline
All non-residential buildings must achieve an energy performance below the 16% threshold (based on 2020 levels).	By 2030
The threshold will further tighten to 26%, driving continuous improvement.	By 2033

3.3.5. Residential Buildings

Member States shall establish a national trajectory that leads to a reduction in the average primary energy use of the residential building stock. 55% of the decrease in the average primary energy use will need to be achieved through the renovation of worst-performing residential buildings. Member States should have the flexibility to choose tools such as:

- **Minimum energy performance standards:** to establish specific energy efficiency levels.
- **Technical assistance:** support for homeowners in planning and executing renovations.
- **Financial support measures:** subsidies, tax breaks, or loans to incentivise renovations.

Each Member State shall establish a national plan to:

- Reduce average primary energy use in residential buildings by 55% with focus on worst-performing ones.
- Achieve intermediate milestones at five-year intervals, starting in 2030.
- Ultimately transform the entire residential building stock into "zero-emission" by 2050.

Timeline:

Provisions	Timeline
Average primary energy use must be reduced by at least 16%.	By 2030
Average primary energy use must be reduced by 20-22%.	By 2035
Levels maintained or reduced further every five years.	From 2040

3.4. Solar Energy in Buildings

Member States are mandated to ensure the deployment of **suitable solar energy installations**, considering technical, economic, and functional feasibility. Key elements include:

- Defining and publicly disclosing national-level criteria for implementing these obligations, with possible exemptions for specific building types, maintaining the principle of "technological neutrality". Stakeholders should be included in establishing these criteria to address electricity network stability concerns.
- Promoting solar energy installations through renovation plans, integrating them with other activities such as building envelope renovation, system replacement, and infrastructure installation for electric vehicles, heat pumps, or automation systems.
- Ensuring prompt implementation of solar photovoltaics and solar thermal technologies, especially when combined with energy storage systems.

Not to overlook

MEPS promoting on-site renewable energy generation creates a natural demand for storage to manage fluctuations in renewable energy availability and store excess energy for later use.

Timeline:

Provisions	Timeline
All new public and non-residential buildings with a useful floor area over 250 m² should have suitable solar energy installations.	By 31 December 2026

All existing public buildings with a useful floor area larger than 2000 m² should have suitable solar energy installations. Existing non-residential buildings with a useful floor area larger than 500 m² undergoing major renovation or actions requiring an administrative permit for building renovations, works on the roof, or the installation of a technical building system should have suitable solar energy installations.	By 31 December 2027
All existing public buildings with a useful floor area larger than 750 m² should have suitable solar energy installations.	By 31 December 2028
All new residential buildings and new roofed carparks physically adjacent to buildings should have suitable solar energy installations.	By 31 December 2029
All existing public buildings with a useful floor area larger than 250 m² should have suitable solar energy installations.	By 31 December 2030

3.5. Energy Poverty and State Aid

The implementation of minimum energy performance standards requires a supportive structure that includes technical assistance and financial incentives, particularly for vulnerable households. The standards developed at the national level are not equivalent to "Union standards" as defined in State assistance regulations. However, Union-wide minimum energy performance standards could be considered "Union standards." In compliance with the new State Aid Rules:

- Member States may provide State aid for building renovations to meet Union-wide energy performance standards until these standards become mandatory.
- Once these standards are obligatory, Member States can continue to grant State aid for renovations of buildings and building units under the Union-wide energy performance standards, provided the renovation aims at a higher standard.

Not to overlook

This comprehensive approach ensures that minimum energy performance standards are backed by necessary support mechanisms while allowing flexibility in State aid, thus promoting renovations that surpass minimum requirements. By targeting the renovation of poorly performing buildings, significant energy efficiency gains are achieved, often necessitating solutions like energy storage to meet stringent standards and optimise energy usage. Plus, imposing deadlines for renovations fosters a sense of urgency, prompting building owners to explore comprehensive energy solutions such as storage to meet compliance within specified timeframes.

In light of example, leveraging waste heat from domestic hot water systems reduces overall energy demand, with smaller-scale storage systems further enhancing efficiency. Integrating

storage solutions into entire building systems ensures a holistic approach to energy management, considering building needs, renewable energy integration, and overall usage patterns. Consistency in tools and standards across the EU facilitates the development and integration of storage solutions, leading to cost-effective options widely available for buildings.

3.5.1. Financial Incentives, Skills Development, and Market Barriers

The Directive covers financial incentives, skills development, and market barriers related to renovations, addressing the need for adequate financial support and other challenges such as the shortage of skilled workers and market obstacles that may impede implementation.

The Commission is tasked with adopting a delegated act to establish a comprehensive portfolio framework. This portfolio, which financial institutions can use voluntarily, aims to encourage these institutions to increase the funding provided for energy performance renovations.

3.6. One-Stop-Shops for Energy Performance of Buildings

Member States are required to establish technical assistance facilities serving as one-stop-shops for building energy performance matters. These facilities should be accessible nationwide to ensure widespread availability of energy performance assistance. Key elements include:

- Offering technical assistance accessible to all stakeholders involved in building renovations, including homeowners, administrative personnel, financial actors, and businesses of all sizes, especially microenterprises and small- to medium-sized enterprises.
- Ensuring a more effective and efficient renovation process, leading to improved energy efficiency and sustainability in our built environment. They may also be involved in district renovation programmes.

Not to overlook

Establishing tools like one-stop shops for comprehensive energy renovation services is necessary, as financial resources alone are insufficient for meeting renovation requirements. An approach in which one-stop shops provide technical assistance and are easily accessible to all stakeholders involved in building renovations ensures that all parties involved have access to the necessary support and resources, resulting in a more effective and efficient renovation process.

3.7. Energy Performance Certificates (EPCs)

Energy Performance Certificates (EPCs) have become essential tools for evaluating building energy efficiency since their introduction in 2002. Member States are mandated to establish a certification system for building energy performance, incorporating standardized EPCs. Key aspects include:

- Addressing existing disparities in national EPC scales and formats to promote comparability across the EU.
- Implementing a unified grading scale (A-G) and standard template for EPCs throughout the European Union.
- Facilitating improved utilisation of EPCs by financial institutions for directing investments toward energy-efficient buildings and renovations, and supporting the EU Green Taxonomy, which relies heavily on EPCs.

All buildings offered for sale or rent must have an EPC, prominently displaying the energy class in advertisements, facilitating informed decision-making by prospective buyers or tenants. EPCs should provide easily accessible and informative data on various energy performance indicators, potentially including indoor environmental quality and life-cycle Global Warming Potential (GWP).

3.7.1. Requirements for EPCs

EPCs shall fulfil the following requirements:

- Transition period: granting additional time for member states to adapt existing EPC schemes to new standards.
- Mandatory for all: requiring all buildings for sale or rent to have an EPC, providing accurate information on energy performance indicators.
- Inclusion with renovation passports: Member States shall allow integration of EPCS with renovation passports, offering property owners the option to combine these documents to streamline renovation planning and execution.

3.7.2. Renovation Passports and EPCs

Member States are mandated to establish schemes for renovation passports, offering homeowners a tool to track building improvements and energy efficiency gains. Annex VIII outlines specific requirements for renovation passports, promoting informed renovation decisions and facilitating access to financing.

Member States can maintain their existing system for zero-emission buildings designated as 'A0' before the revised EPBD implementation, ensuring transparency and comparability of building energy performance across the EU.

Not to overlook

This comprehensive approach ensures transparency, comparability, and informed decision-making regarding building energy performance across the EU, promoting energy efficiency and sustainability.

3.7.3. Deep Renovation

While officially undefined in Union legislation yet, 'deep renovation' aims to transform buildings into near-zero-energy structures initially, eventually progressing towards becoming zero-emission buildings. Deep renovations may take the form of staged renovations or one-step renovations. Both approaches have advantages and disadvantages:

- **Staged:** more manageable financially and less disruptive, but careful planning is crucial to avoid hindering future progress.
- **One-step:** potentially more cost-effective and generates fewer renovation emissions, but requires significant upfront investment and can be disruptive.

Not to overlook

Deep renovations present an opportunity to enhance indoor air quality, improve living conditions for vulnerable groups, increase climate resilience, and ensure accessibility for people with disabilities.

A deep renovation, while primarily intended for energy efficiency, may also provide an opportunity to address a variety of other issues, such as improving indoor environmental quality and the living conditions of vulnerable households, increasing climate and disaster resilience (including seismic resilience), ensuring fire safety, removing hazardous substances such as asbestos, and improving accessibility for people with disabilities.

3.7.4. Renovation passports and EPCS

Renovation passports offer a comprehensive roadmap for staged deep renovations, assisting property owners and investors in planning the optimal timing and scope for interventions. As such, the use of renovation passports should be promoted and made available as an optional tool for building owners across all Member States. However, it's essential for Member States to ensure that renovation passports do not impose a disproportionate burden. Renovation passports promote the standardisation of energy efficiency scales through:

- **Member State flexibility:** freedom in designing the specific energy efficiency scale within the A-G range.
- **Maintaining existing systems:** a grandfathering clause allows countries that already designate zero-emission buildings as 'A0' to keep their current system.

3.8. Smart readiness of buildings rating

The **Smart Readiness Indicator (SRI)** is a tool designed to assess and enhance the capacity of buildings to utilise Information and Communication Technologies (ICT) and electronic systems. Its primary function is to adapt the operation of buildings to align with the needs of occupants and the grid, thereby improving energy efficiency and overall building performance.

The SRI informs building owners and occupants about the benefits of automation and electronic monitoring, aiming to instil confidence regarding the tangible savings that can be achieved through these functionalities.

Not to overlook

Particularly beneficial for large buildings, the SRI's implementation in other buildings is discretionary for Member States, ensuring flexibility to suit varying building types and regional conditions. The SRI proves to be especially advantageous for large buildings with substantial energy demands. However, for other buildings, the implementation of a rating scheme for assessing the smart readiness of buildings is proposed to be discretionary for Member States. This approach ensures flexibility and adaptability to the specific needs and conditions of different types of buildings across various regions.

To prevent third parties from incurring excessive administrative costs, it is essential that Member States facilitate the full interoperability of services and data exchange within the Union. This will ensure a seamless flow of information, promoting transparency and efficiency in the smart building services market.

3.8.1. Methodology

The proposed methodology should consider features such as:

- Smart meters;
- Building automation and control systems;
- Self-regulating devices for indoor air temperature regulation;
- Built-in home appliances;
- Recharging points for electric vehicles
- Energy storage detailed functionalities.

The interoperability of these features, as well as their benefits for indoor climate condition, energy efficiency, performance levels, and enabled flexibility, should also be taken into account. Member States should encourage the use of digital technologies for briefing, simulation and management of buildings, including with regard to deep renovations. The methodology shall take into account features such as the possible existence of a digital twin of the building:

- **Digital building twins** are computer models that mirror the real-time performance of a physical building. They integrate data from sensors, smarts meters, and other sources to provide a holistic view of energy consumption, temperature, humidity, occupancy, and more. When a digital building twin is available, it should be considered, especially for the smart readiness indicator. This will ensure a more accurate and efficient assessment of a building's energy performance and readiness for smart technologies.

Digital twins go beyond traditional building management systems by:

- **Providing comprehensive data and monitoring:** they offer a deeper understanding of building behaviour and real-time data on key performance indicators.
- **Enhanced management and optimisation:** utilising this comprehensive data for optimised energy use, proactive maintenance, and early identification of potential issues.
- **Informed investment decisions:** guiding strategic investments in energy efficiency upgrades and smart technologies to maximise benefits and return on investment.

The final text encourages Member States to:

- Invest in creating digital twins for new and existing buildings and utilise them for data-driven decision-making and energy optimisation.
- Advocate for policies and incentives that promote the widespread adoption of this transformative technology.

Not to overlook

The revised text mentions the importance of a building's overall energy demand flexibility, including its capacity to participate in active and passive as well as implicit and explicit demand response, and its ability to store and release energy back to the grid, for instance, through flexibility and load shifting capacities and energy storage.

The text places importance in Member States actively promoting and supporting the installation of energy storage systems coupled with on-site renewable energy. This strategy not only encourages self-consumption but also fosters renewable energy communities in buildings where the new Minimum Energy Performance Standards (MEPS) will be applicable.

3.8.2. Requirements

The Commission will report on the SRI testing phase, then adopt a delegated act mandating its application in large non-residential buildings, advancing energy efficiency and smart readiness.

3.9. Infrastructure for sustainable mobility

3.9.1. Co-located storage with EV charging

The Directive lays down the criteria for infrastructure for sustainable mobility. Key measures for optimising EV charging in buildings include:

- **Recharging points**: for every five parking spaces, at least one recharging point should be installed. This will facilitate the use of electric vehicles and contribute to reducing carbon emissions.
- **Pre-cabling and ducting:** to future-proof these buildings, it is recommended that at least 50% of the car parking spaces are equipped with pre-cabling. Additionally, ducting – which refers to conduits for electric cables – should be installed for the remaining parking spaces. This will enable the easy installation of additional recharging points for electric vehicles, electrically power-assisted cycles, and other L-category vehicle types at a later stage.

Encouraging building-integrated charging at buildings leverages cost-effective slow charging and enables:

- **Energy storage potential:** integration with building energy management systems for optimised energy use.
- **Smart charging services:** integration with smart charging services for efficient grid management.
- **Bidirectional charging:** potential for EVs to feed energy back to the grid, further enhancing flexibility.
- **Building codes as drivers:** building codes establish clear requirements for charging infrastructure in both residential and non-residential buildings, accelerating the transition to clean energy.

Not to overlook

The final text encourages Member States to remove obstacles like split incentives and administrative complexities faced by individuals installing charging stations is crucial for wider EV adoption.

3.9.2. Union-level electromobility requirements

Pre-establishing requirements at Union-level mandates for installing recharging points and outfitting parking spaces is a short-term strategy to encourage electric vehicle adoption. Additionally, it lays the groundwork for cost-effective scalability over the medium to long term.

Wherever technically possible, Member States shall guarantee that recharging points are accessible to persons with disabilities. This inclusive approach ensures that the benefits of electromobility are available to all citizens, thereby promoting a more sustainable and equitable future.

3.9.3. Smart and bidirectional recharging for energy system integration

Smart recharging and bidirectional recharging are key enablers for integrating energy systems within buildings. Recharging points, particularly at locations where electric vehicles are parked for extended durations (e.g., residential or workplace parking), play a significant role in this integration.

In scenarios where bidirectional charging can facilitate a greater incorporation of renewable electricity into the transport sector and the overall electricity system, such functionality should be made accessible. This approach not only optimises energy use but also promotes the widespread adoption of electric vehicles, contributing to a more sustainable and efficient energy landscape.

3.9.4. Pre-cabling for electrically power-assisted bicycles and l-category vehicles

Given the rising sales of electrically power-assisted bicycles and other L-category vehicles, it is essential to facilitate the future installation of recharging points. Therefore, it is recommended that pre-cabling for these vehicles be mandated in new residential buildings.

Where it is technically and economically viable, pre-cabling or ducting should be required in residential buildings undergoing significant renovations. This approach will ensure the necessary infrastructure is in place to support the growing electromobility trend, contributing to a more sustainable and efficient energy future.

Not to overlook

Electric vehicles are anticipated to play an important role in the decarbonisation and efficiency enhancement of the electricity system, primarily through the provision of flexibility, balancing, and storage services, especially via aggregation. Therefore, the potential of electric vehicles to integrate with the electricity system and contribute to system efficiency and further absorption of renewable electricity should be fully leveraged.

Charging in relation to buildings is of particular importance, as this is where electric vehicles are regularly parked for extended periods. Particularly slow charging is cost-effective, and the installation of recharging points in private spaces can offer energy storage to the associated building and integration of intelligent recharging services and bidirectional recharging and system integration services in general.

Exploring the strategic placement of energy storage in near areas with dense EV charging points can improve grid stability and energy management, but requires careful assessment by relevant stakeholders.

Timeline:

Provisions	Timeline
For all non-residential buildings with more than 20 car parking spaces: • Installation of at least one recharging point for every 10 car parking spaces or ducting for at least 50% of spaces. • Provision of bicycle parking spaces representing at least 15% of average or 10% of total user capacity of the building.	By 1 January 2027
For buildings owned or occupied by public bodies: • Installation of pre-cabling for at least 50% of car parking spaces. Member States may postpone the implementation of this requirement until 1 January 2029 for all non-residential buildings that have been renovated in the two years prior to the date of entry into force of this Directive.	By 1 January 2033
The Commission shall publish guidance for fire safety in car parks.	By 31 December 2025

3.9.5. Vehicle-to-Grid

The integration of Vehicle-to-Grid (V2G) capabilities in newly established private recharging points presents a significant opportunity to advance sustainable energy management. By working together, the National Regulatory Authority (NRA) and relevant stakeholders can ensure that V2G technology is incorporated strategically and effectively. Specific benefits of V2G for private recharging:

- **Cost savings for EV owners:** V2G allows owners to sell stored energy back to the grid during peak times, potentially reducing their electricity bills.
- **Improved grid stability**: V2G can help balance supply and demand on the grid, reducing the need for additional power plants and contributing to a more resilient energy infrastructure.
- **Reduced reliance on fossil fuels:** by utilising stored EV energy instead of traditional sources, V2G can contribute to a cleaner energy mix and lower greenhouse gas emissions.

The NRA and stakeholders are encouraged to:

- Conduct a feasibility study to assess the potential for V2G integration in private recharging points.
- Develop pilot programs to test and demonstrate the benefits of V2G in real-world settings.
- Create supportive policies and Regulations that incentivise V2G adoption and ensure its smooth integration into the existing energy system. By taking these steps, the NRA

and stakeholders can play a key role in unlocking the potential of V2G technology and accelerating the clean energy transition.

3.9.6. Public procurement of EV charging points

It is suggested that Member States should promote public procurement to facilitate the setup of charging points within public buildings. This can be realised by lowering the benchmark to 10 parking spaces for the establishment of a single charging point, coupled with the provision of pre-cabling infrastructure for existing buildings under the ownership or occupation of public bodies.

It is incumbent upon Member States to ascertain that the recharging points possess the capability for smart charging and, if suitable, bidirectional charging. These recharging points ought to function based on communication protocols and standards that are non-proprietary and non-discriminatory, thereby guaranteeing interoperability and adherence to any legal standards and protocols.

Not to overlook

The introduction of new charging points for electric vehicles can potentially cause congestion on the existing electricity network. In certain instances, this could necessitate costly grid reinforcement. EVs inherently possess the capability to store energy and subsequently supply it back to the system, thereby providing support to the grid through flexibility services or energy shifting. However, a significant number of charging points currently lack this functionality.

3.10. National Building Renovation Plans

Member States are required to establish a National Building Renovation Plan (NBRP), replacing the previous long-term renovation strategies. This plan aims to renovate the national inventory of both residential and non-residential buildings, encompassing both public and private sectors. The overarching objective is to transform these buildings into a highly energy-efficient and decarbonised building stock by 2050.

The NBRP shall include a roadmap with national targets for 2030, 2040, and 2050 concerning the annual energy renovation rate. The focus of these plans should be twofold: securing adequate financing and ensuring the availability of skilled workers to execute building renovations. This includes:

- Establishing national building renovation targets within in accordance with renovation plans.

- Provide a detailed outline of financing measures. This should include an estimation of the investment needs and the administrative resources required for the successful implementation of their building renovation plans.

To guarantee the comparability of national building renovation plans, Member states shall adopt a harmonised template ensuring a consistent approach across all plans.

3.10.1. Integration and Submission of National Building Renovation Plans

The revised Directive emphasises the importance of aligning National Building Renovation Plans (NBRPs) with Integrated National Energy and Climate Plans (NECPs) as outlined in Regulation (EU) 2018/1999. This ensures coordinated progress towards national and EU climate goals.

Challenges

NBRPs and NECPs exist separately, potentially hindering harmonisation of efforts and progress reporting.

Proposed solution

Member States shall review and revise existing NBRPs to ensure alignment with their NECPs. The Commission should actively provide timely and relevant recommendations to support effective plan implementation. Additionally, NBRPs should be intrinsically linked with NECPs, ensuring:

- **Combined reporting**: biennial reporting under the Regulation should reflect progress on both plans and their contribution to national and EU targets.
- **Synchronised timing**: NBRP submission dates should align with NECP submission and updates. The Commission, with expert input, can offer country-specific recommendations on both draft and final NBRPs within six months of submission.

Not to overlook

Integrating National Building Renovation Plans (NBRPs) with National Energy and Climate Plans (NECPs) offers several benefits. It enhances coherence by aligning the plans, streamlining efforts, and fostering coordinated progress towards climate goals. Transparent reporting improves accountability, while country-specific recommendations provide targeted support for improvement. The revised Directive emphasises the importance of this alignment but offers flexibility in implementation.

Continuous monitoring and evaluation are essential to assess the effectiveness of this linkage in achieving climate targets. To this end, the Commission, consulting with the expert

committee, under Article 30, can issue country-specific recommendations within six months of the initial draft submission of the building renovation plan.

Timeline:

Provisions	Timeline
Building Renovation Plans should be included as part of the integrated national energy and climate plan, with the first submission due by 31 December 2026.	By 31 December 2026
The second draft of the building renovation plan should be submitted alongside the second draft of the integrated national energy and climate plans.	By 2028
Under the stipulations of Regulation (EU) 2018/1999, Member States are required to submit their building renovation plans along with details on the implementation of national targets to the Commission.	Every five years
The Commission, in its annual State of the Energy Union report, will include a comprehensive progress report on the renovation of the national stock of buildings, based on the information provided by the Member States	Every two years

3.11. Decarbonisation of Heating and Cooling in Buildings

The Directive highlights the urgency to reduce fossil fuel dependence in building heating and cooling systems, which account for two-thirds of building energy use. Member States are urged to phase out fossil fuels in their National Building Renovation Plans (NBRPs) by 2040, promoting renewable energy alternatives and considering district heating/cooling networks. Financial incentives for efficient hybrid systems and waste heat recovery from domestic hot water systems are recommended. A legislative framework based on emissions, fuel type, or renewable energy share can further support these efforts.

Challenges

Buildings significantly contribute to greenhouse gas emissions due to their reliance on fossil fuels for heating and cooling. This reliance hinders decarbonisation efforts, as two-thirds of heating and cooling energy still comes from fossil fuels.

3.11.1. Phase-Out of Fossil Fuel Boilers

Member States are tasked with prioritising the complete phase-out of fossil fuel boilers in heating and cooling systems by 2040 within their NBRPs. This strategy shall include:

- **Promoting renewable energy alternatives:** heat pumps, solar thermal, biomass (with sustainability considerations), and geothermal systems.
- **Considering district heating/cooling networks:** utilising existing infrastructure and economies of scale for efficiency.
- **Providing financial incentives:** encourage installations of hybrid systems with a significant renewable energy share (e.g., boiler + solar thermal/heat pump).
- **Harvesting waste heat from domestic hot water systems:** a simple and cost-effective energy conservation measure.
- **Establishing a clear legal framework:** based on emissions, fuel type, or minimum renewable energy share for heating at the building level. This supports national phase-out policies and incentivises compliance.

Stakeholders across policymakers, industry, and building owners must collaborate to overcome implementation challenges and accelerate the transition to renewable energy solutions. Benefits include:

- **Reduced greenhouse gas emissions:** significant contribution to climate change mitigation goals.
- **Improved energy efficiency:** lower energy costs for building owners and reduced strain on the grid.
- **Increased use of renewable energy:** promotes energy security and independence from fossil fuels.
- **Economic opportunities:** stimulates growth in renewable energy technologies and associated jobs.

3.11.2. District Level Approach

The Directive outlines the benefits of approaches focusing on entire districts or neighbourhoods. This can increase the cost-effectiveness of renovations for related buildings (like housing blocks) and facilitates coordinated implementation of comprehensive solutions. Such larger-scale strategies can potentially benefit energy storage in two ways:

- **Shared storage infrastructure:** District-level approaches might enable sharing storage resources between multiple buildings, reducing individual costs and maximising utilisation.
- **Optimised energy management:** Collaborative planning can consider shared energy needs and renewable energy resources across the district, leading to more strategic storage deployment for collective benefit.

Not to overlook

The revised Directive strongly advocates for including energy storage solutions directly within NBRPs. This means considering storage during the planning process, which offers several

benefits. Firstly, behind-the-meter storage can manage peak demand, stabilize renewable energy output, and provide grid flexibility. Secondly, it enhances energy usage in buildings by enabling efficient use of on-site renewables, reducing grid reliance, and potentially meeting stricter energy performance standards. Finally, integrating storage solutions into NBRPs provides clear direction and incentives, encouraging investment in storage technologies and signalling commitment to stakeholders.

Timeline:

Provisions	Timeline
No financial incentives should be given by Member States for the installation of stand-alone boilers powered by fossil fuels, except for those selected for investment before 2025 under the Recovery and Resilience Facility, the European Regional Development Fund, and the Cohesion Fund.	From 2025

Conclusion

The revised Directive exhibits a strong commitment to the renovation of both residential and non-residential buildings, with specific mentions of energy storage as a key component in achieving fully decarbonised buildings by 2050. Energy storage solutions not only enhance the energy efficiency measures detailed in the Directive, but they also ensure a reliable energy supply, facilitate the integration of renewable energy sources, and lead to additional energy savings. As such, they play an essential role in advancing the energy sector and achieving the goal of decarbonised buildings.

Also, it is important to note that robust Minimum Energy Performance Standards (MEPS) play a significant role in the decarbonisation of Europe's housing stock and the alleviation of energy poverty. The smart readiness of buildings rating is another crucial aspect, with the proposed methodology taking into account a variety of features. These include smart meters, building automation and control systems, self-regulating devices for indoor air temperature Regulation, built-in home appliances, recharging points for electric vehicles, energy storage, and detailed functionalities.

Furthermore, the revised Directive encourages Member States to foster the development of one-stop shops or equivalent mechanisms. These platforms are expected to be beneficial and could attract investments in energy storage, as they would provide comprehensive information about financial incentives.

Moreover, the text underscores that Member States bear the responsibility of implementing strategies to ensure that all new residential buildings, as well as those undergoing significant renovations, are equipped with efficient control systems. These systems are designed to optimise the operations of energy generation, distribution, storage, and usage. This provision highlights the commitment to enhancing energy efficiency in the residential sector through the use of energy storage systems.

By 2040, states are required to completely phase out the use of fossil fuels for heating and cooling. Furthermore, subsidies for standalone fossil fuel boilers must be discontinued by 2025.

Annexes

- Annex I: Common general framework for the calculation of the energy performance of buildings (referred to in article 4).
- Annex II: Template for the national building renovation plans (referred to in article 3).
- Annex III: Calculation of life-cycle GWP of new buildings pursuant to article 7(2).
- Annex IV: Common general framework for rating the smart readiness of buildings.
- Annex V: Template for energy performance certificates (referred to in article 19).
- Annex VI: Independent control systems for energy performance certificates.
- Annex VII: Comparative methodology framework to identify cost-optimal levels of energy performance requirements for buildings and building elements.
- Annex VIII: Requirements for renovation passports.
- Annex IX: Part A – Repealed Directive with list of the successive amendments thereto (referred to in article 36.)
- Annex IX: Part B – time-limits for transposition into national law and dates of application (referred to in ANNEX.)
- Annex X : Correlation table Article 36.

Notes

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About EASE:

The European Association for Storage of Energy (EASE) is the leading member - supported association representing organisations active across the entire energy storage value chain. EASE supports the deployment of energy storage to further the cost-effective transition to a resilient, carbon-neutral, and secure energy system. Together, EASE members have significant expertise across all major storage technologies and applications. This allows us to generate new ideas and policy recommendations that are essential to build a regulatory framework that is supportive of storage.

For more information please visit www.ease-storage.eu

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Disclaimer:

This content was elaborated by EASE and reflects a consolidated view of its members from an energy storage point of view. Individual EASE members may adopt different positions on certain topics from their corporate standpoint.

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