EPBD.wise

BRINGING EUROPEAN BUILDING POLICY TO LIFE

An integrated monitoring, reporting and evaluation framework for effective EPBD implementation

Authors: Sriraj Gokarakonda, Denisa Diaconu, BPIE

Authors

Sriraj Gokarakonda and Denisa Diaconu, BPIE

Reviewers

Sibyl Steuwer, BPIE

Lukas Kranzl, TU Wien

Anita Terjek and Viola Kelemen, ÉMI

Graphic design

Helena Gil

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EXECUTIVE SUMMARY

Policies can be most effectively designed when their impacts are clearly understood. Monitoring, reporting and evaluation are therefore essential for effective implementation of the Energy Performance of Buildings Directive (EPBD).

Accurate estimation of renovation depth, rates and broader policy impacts has long been limited by the availability, quality and usability of building-related data. To overcome this challenge, the EPBD 2024 significantly strengthens monitoring and reporting requirements related to building renovation, energy performance and decarbonisation. The EPBD requires Member States to set up monitoring systems, submit periodic reports and contribute to EU-level evaluations, primarily through national building renovation plans (NBRPs) (Article 3) and databases on the energy performance of buildings (Article 22). It also requires the transfer of information from national energy performance of buildings databases to the EU Building Stock Observatory (Article 22(6)). While this may imply in some cases an initial investment in setting up the data and reporting infrastructure, an effective, joined up monitoring, reporting and evaluation system will in the medium and long term reduce efforts and costs.

The mandatory indicators in the NBRPs and EU Building Stock Observatory primarily focus on reporting the status quo of energy performance of the building stock and policies, as well as the level of ambition in the form of roadmaps, minimum requirements and thresholds. Optional indicators such as information on market barriers and failures can also be analysed more effectively once Member States have developed suitable methods to capture this information.

With this report, we propose a monitoring, reporting and evaluation (MRE) framework that builds on the existing requirements of the EPBD and allows for the evaluation of the policies against their objectives, making use of transparent evaluation criteria.

For example, it illustrates how national databases and data systems can be designed to capture indicators needed to properly evaluate the impact of the nationally implemented EPBD. This includes tracking the renovation depth and rates, assessing investment needs, and evaluating the performance of individual policy instruments over time. It shows how Member States can use the flexibility embedded in the EPBD to organise building-related data more effectively. The framework focuses on key policy instruments such as NBRPs, zero-emission buildings (ZEBs), minimum energy performance standards (MEPS), renovation passports, national trajectories for progressive building renovation and energy performance certificates (EPCs).

The proposed framework supports consistent reporting to the EU, while also being adaptable to national contexts. It greatly benefits from monitoring activities being aligned across governance levels (local, regional and national), as well as from promoting interoperability between databases. It also highlights the role of data governance, transparency, research and user feedback in strengthening the practical effectiveness of EPBD policy instruments. A supportive and enabling ecosystem is essential for implementing an integrated MRE framework. This includes making optimal use of existing building and energy-related databases, as well as developing comprehensive and interoperable building-related databases. For this purpose, Member States can learn from good examples of national-level building-related databases and research activities on national building observatories for EPBD compliance. Voluntary platforms such as Concerted Action EPBD also facilitate knowledge exchange, policy coordination and technical learning.

Key takeaways:

- Agile policymaking: Investing in an integrated MRE framework avoids lock-in effects and allows for flexible adaptations of policies over time. It turns monitoring and reporting from a compliance exercise into a strategic tool for effective policy delivery.

- Connecting objectives to indicators: A coherent and well-designed MRE framework will enhance data collection, quality and management.

- Efficient use of data: The national MRE frameworks should make use of existing data sources and databases. EPBD Article 22 should also be implemented in view of improving national MRE.

- Leveraging digital building logbooks: Digital building logbooks enable bottom-up monitoring by consolidating building-level information e.g. on metered energy consumption, construction materials and renovation.

- Concerted action: An integrated MRE framework will facilitate policymaking across different governance levels.

1 INTRODUCTION

The primary goal of the EPBD is to enable EU Member States to achieve a climate-neutral building stock by 2050. To help achieve this goal, the EPBD provides a variety of policy instruments and monitoring and reporting requirements for the Member States to track progress. Several articles of the directive, including national building renovation plans (Article 3) and databases for the energy performance of buildings (Article 22), require Member States to establish monitoring and reporting systems, submit periodic reports, and participate in EU-level evaluations.

These provisions establish a framework for monitoring, reporting and evaluating key performance indicators and data-driven renovation roadmaps, ensuring transparency and comparability. While the MRE framework requires Member States to provide an overview of implemented and planned policies and measures, it may not be sufficient to measure the success of individual policy measures. Measuring the success and effectiveness of individual policy instruments is often challenging due to their multiple objectives, interdependence, and the need to coordinate among multiple institutions to collect the necessary data. Furthermore, monitoring, reporting and evaluation are often treated separately and tend to happen at the end of the policy cycle, leading to data fragmentation and providing limited cumulative insights.

An integrated MRE framework can help close this gap by providing complementary information and enabling transparent, data-driven assessments. Such a framework helps to evaluate the impact of policies, highlighting progress and the needs for improvement. Within the EU's multilevel governance system, an MRE framework should incorporate the European, national and local levels. This will enable sub-national monitoring and reporting to be aggregated at national level, improving quality, consistency and accountability in the policymaking process. While national authorities implement the required systems, local authorities are usually better placed to capture the data. The current EPBD framework requires Member States to monitor and report at the national level, with evaluation taking place mainly at the EU level.

The EPBD.wise project aims to address the limitations of current MRE frameworks and provide comprehensive, data-driven insights. It helps Member States design, implement, monitor and evaluate EPBD policy instruments in a way that ensures effectiveness, avoids lock-in effects,

and aligns with the EU's long-term energy and climate targets. While other EPBD.wise reports[1] provide recommendations for implementing various EPBD provisions, this report aims to help Member States design and develop their own MRE frameworks, ensuring compliance with EPBD requirements and supporting the achievement of each policy instrument's intended outcomes. It will illustrate the existing EPBD MRE framework and requirements, tools, and data systems to enable coherent policy evaluation (see Figure 1). While building on the current provisions of the EPBD, the proposed framework is flexible and designed to maximise interaction and coherence between the EPBD's different policy instruments and with other EU legislation on buildings. It provides a clear structure for monitoring, reporting and evaluation, helping Member States to track policy outcomes, identify gaps and prioritise actions. The framework aims to transform the monitoring and reporting process from a compliance exercise into a strategic tool for effective policy delivery.

This report does not provide guidance on EPBD implementation or compliance but can be used alongside existing guidance on policy implementation[2]. Furthermore, this report only illustrates the MRE concept using the policy instruments within the scope of the EPBD.wise project. It is not intended to be an exhaustive MRE guide. Member States can choose to expand and apply the framework in a way that best suits their priorities and needs.

The report uses the following structure:

1. In Chapter 2, we establish a shared understanding of the key MRE concepts and the terminology used throughout the report.

2. In Chapter 3, we provide a comprehensive overview of the MRE requirements set out in the EPBD.

3. In Chapter 4, we propose the EPBD.wise MRE framework by using national building renovation plans (Article 3) as a vehicle for monitoring and reporting. We show how it can be applied to policy instruments such as minimum energy performance standards for non-residential buildings and trajectories for progressive renovation of the residential building stock (Article 9), zero-emission buildings (Article 11), renovation passports (Article 12) and energy performance certificates (Article 19).

4. In Chapter 5, we demonstrate why and how an enabling ecosystem is essential for effective MRE, and we provide examples of good practice.

5. In Chapter 6, we provide policy recommendations for designing, implementing and scaling up the integrated EPBD.wise MRE framework.

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1   Dx.2 country specific policy recommendations and Dx.3 policy guidelines summary

2   Such information can be obtained from the Commission's guidance on the EPBD, Delivering the EPBD: A guide towards better, affordable and more resilient buildings for all in Europe (BPIE), and Energy performance of buildings directive (EPBD) 2024 implementation guide (Efficient Buildings Europe).

The NBRP Annotated template provides further details and explanations on how to carry out monitoring, where and how to obtain the necessary data, and how to report to the Commission. An additional spreadsheet is offered for a better overview of reported indicators.

Commission's guidance on the recast EPBD (C/2025/4132)

Other implementation guides

- Delivering the EPBD – A guide towards better, affordable and more resilient buildings for all in Europe (BPIE)
- Energy performance of buildings directive (EPBD) 2024 implementation guide (Efficient Buildings Europe)
- EPBD.wise Dx.2 Country specific policy recommendations
- EPBD.wise Dx.3 Policy guidelines summary

These guides explain and interpret the various provisions of the EPBD, providing examples of good practice.

How to implement EPBD?

EPBD

Existing MRE requirements

How is EPBD.wise MRE framework useful for the Member States

EPBD.wise MRE framework

By translating existing EPBD requirements into a coherent evaluation logic, EPBD.wise helps Member States track outcomes, identify gaps, and prioritise actions–without adding new obligations. It turns monitoring from a compliance exercise into a strategic tool for effective policy delivery.

Article 3 of the NBRP and Annex II set out the MRE provisions that are integral to the EPBD.

Article 22 requires the creation of a national database for the energy performance of buildings and stipulates that its data be transferred to the EU BSO periodically.

Implementing Regulation (EU) 2025/1328 of 30 June 2025 provides common templates for the transfer of information from national energy performance of buildings databases to the EU Building Stock Observatory

Figure 1: EPBD.wise MRE framework in relation to the EPBD implementation guides and MRE requirements

The report targets:

- **National policymakers** – those designing, coordinating and overseeing the transposition and implementation of the EPBD and related renovation and decarbonisation policies.

- **Implementing authorities** – Managers and administrators in charge of EPBD implementation; and public agencies, ministries, and local administrations managing renovation programmes, financial instruments or technical assistance schemes linked to the EPBD.

- **Local authorities** – Municipalities, local and regional bodies that are involved in day–to–day policy implementation and data collection activities.

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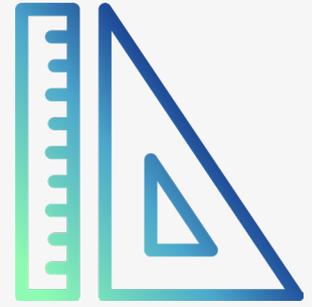
DEFINING MRE: KEY CONCEPTS AND APPROACHES

2.1 The policymaking process

Traditionally, the policymaking process has been represented as a cycle consisting of a series of steps. The classic formulation comes from Harold Lasswell (1956), who proposed that policy development can be understood as a sequence of stages: (1) agenda setting, (2) policy formulation, (3) decision-making, (4) implementation and (5) evaluation.

In this model (Fig. 2), 'agenda setting' refers to the first stage in the process when policy actors initially sense a problem and put forward a variety of solutions. 'Policy formulation' refers to the development of specific policy options within government; the range of possible choices is narrowed by excluding unfeasible ones, and various actors try to get their favoured solution ranked highly among the remaining few. 'Decision-making' is the third stage, in which formal actors in government adopt a particular course of action. In the fourth stage of 'policy implementation', governments put their decisions into effect using some combination of the tools of public administration. Finally, in 'policy evaluation', the results of policies are monitored by both state and societal actors. This often leads to the reconceptualisation of policy problems and solutions in the light of experiences encountered with the policy in question and the start of a new iteration of the cycle.

Figure 2: Traditional policy cycle (Lasswell, 1956)

Although a useful conceptual or analytical tool, the traditional policy cycle model has some limitations. The reality of policymaking is not as systematic and simple as the model suggests. In practice, policymaking is iterative, non-linear and shaped by multi-level governance, political negotiation and feedback loops.

Usually, within this type of policymaking process, MRE happens at the end of the cycle, offering little space to assess and improve the policy outputs during implementation or other phases. Ideally, MRE requirements would be defined from the outset and integrated throughout all phases of the policy process. Rather than being confined to a single final stage, MRE should become a continuous activity across the policy cycle. Effective governance relies on continuous feedback mechanisms and iterative assessments that enable policymakers to adjust interventions as conditions change, and new information becomes available. As shown in Fig. 3, an integrated MRE framework[3] and its strategic use throughout the policy cycle can improve policy effectiveness, accountability and transparency.
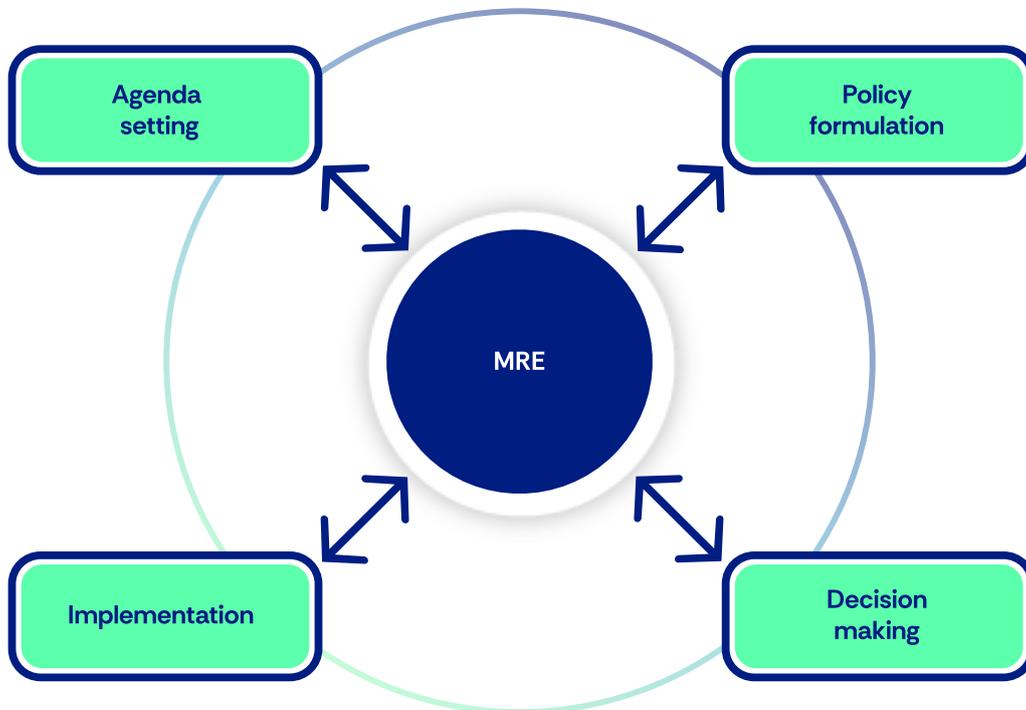
Figure 3: *An integrated policy cycle*

Building on this understanding of the policymaking process, the following sections examine the three concepts of monitoring, reporting and evaluation. Although often discussed collectively, each concept serves a distinct function within the broader governance framework and contributes differently to policy development, accountability and performance assessment. Having a clear understanding of their meaning and purpose is essential for determining how they interact throughout the policy cycle and how they can be strategically integrated to support more effective and transparent policymaking.

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3   Carolina R. Haddad, Anna Bergek. 2023 Towards an integrated framework for evaluating transformative innovation policy. Carolina R. Haddad, Anna Bergek. 2023 Towards an integrated framework for evaluating transformative innovation policy.

2.2 What is monitoring?

Monitoring represents a continuous and organised process of systematic data collection (or access) throughout the lifespan of an initiative (in this case, a public policy). Its main purpose is to detect any deviations from intended objectives at an early stage and provide timely information that can support corrective action. Rather than being a passive, end-of-cycle activity, monitoring generates evidence that can feed into subsequent evaluation and impact assessment exercises.[4]

Monitoring can also reduce uncertainty about policy performance. By producing structured information on how policies are being implemented, it helps policymakers and implementers understand whether the chosen instruments are being deployed as intended, whether resources are being used effectively, and whether the policy is on track to deliver its expected results.

Embedding monitoring throughout all stages of the policy process – starting from agenda setting and continuing through formulation, implementation and evaluation – ensures that information flows are continuous rather than episodic. Early-stage monitoring can inform problem definition and the selection of appropriate policy instruments; mid-stage monitoring can detect deviations and support corrective actions; and late-stage monitoring contributes to ex-post evaluation and long-term strategic planning.[5] In this way, monitoring becomes an integral part of a more dynamic and iterative policymaking process, strengthening accountability and transparency.

2.3 What is reporting?

Reporting refers to the structured communication of monitoring results and other information to authorities, institutions or the wider public. It translates data generated during different stages of the policy process into accessible and coherent information. In this sense, reporting can be understood as the transfer of knowledge between different actors, and often across governance levels, ensuring that those responsible for overseeing, coordination or decision-making have timely access to evidence.

The purpose of reporting on a public policy is to effectively communicate progress on milestones and objectives. By clearly presenting information on what has been achieved, what challenges have emerged and how resources have been used, reporting provides assurance to stakeholders about the status and performance of a policy. Reporting acts as a bridge between continuous monitoring activities and the strategic reflections that take place during evaluation. When reporting is regular and well-integrated, it creates a steady flow of feedback into the policymaking process, supporting adaptation and responsiveness rather than static, end-point assessments.

In an integrated MRE framework, reporting is not confined to the final stages of the policy cycle. By institutionalising reporting throughout the entire policy cycle, policymakers ensure that information circulates continuously and that evidence-based reflection becomes a central feature of governance.

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4   Jonas J. Schoenefeld, Mikael Hildén and Sara-Tuuli Siiskonen. (2025) The challenge of monitoring policy mixes for reducing emissions from buildings.
5   OECD (2024) Global Monitoring of Policies for Decarbonising Buildings. A Multi-level Approach.

2.4 What is evaluation?

Evaluation can be defined as the 'systematic and objective assessment of a planned, ongoing or completed intervention, its design, implementation and results'.[6] A central function of evaluation is to assess the effectiveness and impact of public policies. Determining whether a policy reaches its intended effects requires systematic examination at multiple points throughout the policy cycle. Regular evaluation is therefore essential for supporting continuous improvement and avoiding the persistence of ineffective or poorly targeted interventions. Without proper evaluation, it becomes difficult to understand the mechanisms through which a policy generates change, the conditions under which it succeeds or fails, and whether its effects can be replicated or scaled.

From an evaluation point of view, the policymaking process consists of the following main stages: (i) set the vision, (ii) define the KPIs; (iii) decide how to monitor, (iv) implement and monitor, (v) reflect and reconsider (Fig. 4). This perspective underscores evaluation not as an endpoint, but as an iterative process embedded in the full policy cycle and informed by continuous monitoring and systematic reporting.
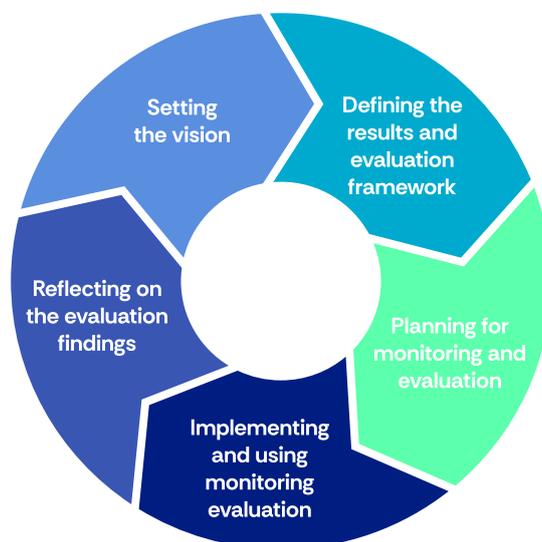
Figure 4: *Stages of policy evaluation (OECD, 2020)*

The evaluation process typically draws on a set of analytical criteria that guide the assessment. The OECD[7] recommends considering the following elements within the evaluation process:

a. **Relevance**: the degree to which the policy responds to the needs and priorities of the targeted beneficiaries.
b. **Effectiveness**: the extent to which the policy has achieved its objectives.
c. **Efficiency**: the cost-effectiveness of transferring inputs into outputs taking into consideration alternative approaches.
d. **Impact**: the cumulative and/or long-term effects of the policy, which may produce positive or negative, intended or unintended changes.
e. **Sustainability**: the likelihood that benefits derived from the policy will continue over time.

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6   OECD (2025) Implementation Toolkit for the OECD Recommendation on Public Policy Evaluation.
7   OECD (2020) Improving Governance with Policy Evaluation: Lessons From Country Experiences.

Rather than being confined to an ex-post assessment, evaluation becomes a continuous and anticipatory practice within an integrated MRE framework. Evaluation considerations should shape the policy from the outset, beginning with the definition of the problem, the articulation of the objectives and the selection of the indicators. As the policy evolves through design and implementation, evaluation draws on monitoring evidence and reporting outputs to assess progress, test assumptions and inform necessary adjustments. Embedding evaluation across the entire policy process creates structured flows of information, enabling policymakers to adapt interventions to changing conditions, ensure coherence with strategic goals and reinforce both the effectiveness and the credibility of public action.

What is the difference between monitoring and evaluation?

Although the terms 'monitoring' and 'evaluation' are often used together, they have different meanings. Monitoring checks progress against planned targets, answering the question has the target been met and to what extent? The aim is to track and adjust the process as it is unfolding. Evaluation, on the other hand, looks at how, for whom and why the objectives of a policy have been achieved and has the aim to help decision-makers assess whether a policy has reached the desired impact. However, policy monitoring is a crucial element of policy evaluation.

Monitoring:
Is the policy working as intended?

Issue → Input → Process → Output → Outcome → Impact

Evaluation:
Is the policy yielding the desired effect?
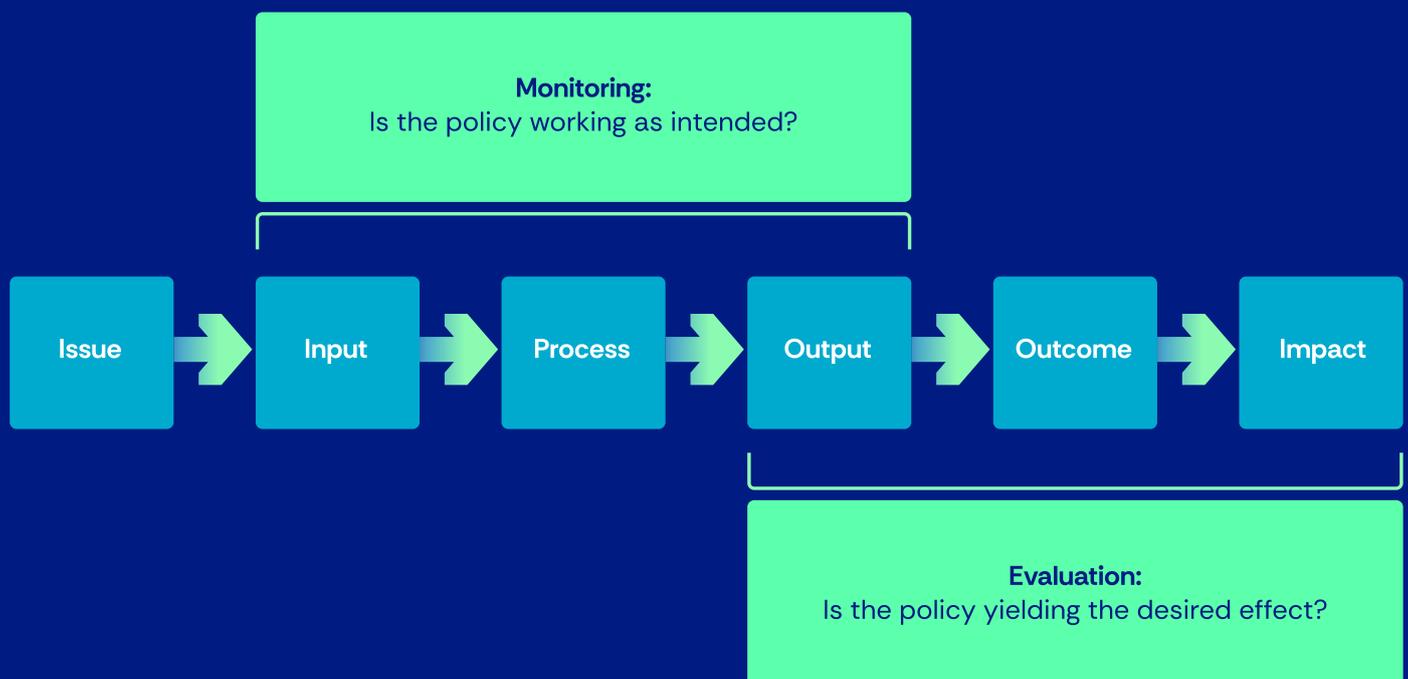
Monitoring, reporting and evaluation are closely linked to the different stages of the policy results chain: inputs, outputs, outcomes and impact (Fig. 5). Monitoring typically focuses on the early elements of this chain, by tracking the mobilisation of policy inputs (such as financial resources, administrative capacity or regulatory instruments) and the production of outputs (for example, adopted regulation, implemented programmes or delivered services). Reporting translates this information into structured and transparent accounts of progress, making intermediate results visible to policymakers and stakeholders. Evaluation goes further by assessing the causal relationship between these elements: it examines whether the observed outputs have contributed to the intended outcomes, whether those outcomes have generated broader societal impacts, and how effectively the public policy has performed overall.

Policy inputs

The resources that a policy needs in order to be implemented.
For instance, the inputs required for a renovation policy include budget, administrative staff, skilled workforce etc.

Policy outputs

The goods and services that are produced by a policy. For example, the outputs of a renovation policy could be the number of renovated buildings, the number of households that reduced their energy bill etc.

Policy outcomes

The changes brought about by the outputs of a policy. For instance, the outcomes of a renovation policy could be the reduced energy demand of the building stock or the decrease in GHG emissions from the buildings sector.

Policy impact

The way the outcomes make a change. For example, the impact of a renovation policy could be a a more healthy and comfortable living environment.

Figure 5: *Elements of policymaking*

Monitoring, reporting and evaluation should not be understood as separate mechanisms but as an integrated system. The effectiveness of each element depends on the others – robust evaluation requires high-quality monitoring data; meaningful reporting depends on well-designed indicators; monitoring is guided by the informational needs of evaluation.

3

OVERVIEW OF MRE REQUIREMENTS IN THE EPBD

This section provides an overview of MRE requirements as set out in the EPBD, focusing on the policy instruments within the scope of the EPBD.wise project: national building renovation plans, zero-emission buildings, minimum energy performance standards and national trajectories, renovation passports and energy performance certificates. We also consider the MRE requirements under the EPBD within the broader landscape of EU energy and climate governance, including their interaction with the EU Governance Regulation, highlighting where synergies exist and where additional alignment may be required.

3.1 National building renovation plans

According to Article 3 EPBD, Member States must prepare a national building renovation plan (NBRP). NBRPs are a central planning tool to guide Member States in their efforts to improve their building stock, and at the same time a reporting tool allowing the EU Commission to evaluate national EPBD implementation. In their NBRP, Member States show how they will decarbonise their building stock by 2050. A list of mandatory and optional indicators that Member States are required to report is provided in Annex II. The plans are also aligned with the national energy and climate plans under the Governance Regulation (EU) 2018/1999, ensuring consistency across EU climate and energy governance (see 3.6 Going beyond EPBD).

According to Article 3 and the corresponding Annex II, Member States are required to collect and structure data on NBRPs, aided by the [annotated template](#)**,[8] and report this data periodically to the European Commission for evaluation and feedback. In this way, EPBD provides a monitoring mandate and a reporting template (Annex II) with indicators that should be reported. This ensures comparability across Member States and enables EU-wide oversight. This obligation strengthens monitoring and reporting requirements at the national level and evaluation requirements at the EU level by linking national renovation targets to Commission assessments and State of the Energy Union reports.**

Member States are responsible for deciding how best to monitor and collect the data needed for reporting. Some of this information can come from individual policy instruments, such as EPCs, renovation passports, zero-emission building requirements and minimum energy performance standards. To facilitate the collection and use of some of this data, Member States are required to establish national databases on the energy performance of buildings (Article 22). These databases can integrate data from EPCs, inspections, renovation passports, smart readiness indicators, and calculated or metered energy consumption, providing a central source of information that can be used for reporting and monitoring purposes. Each NBRP should include the following (Figure 11 in chapter 4 provides a graphical overview of the MRE requirements under the EPBD):

- An overview of the national building stock for different building types, including their share in the national building stock, construction periods and climatic zones, based, as appropriate, on statistical sampling.

- A roadmap with nationally established targets and measurable progress indicators, including the reduction of the number of people affected by energy poverty.

- An overview of implemented and planned policies and measures, supporting the implementation of the roadmap.

- An outline of the investment needs for the implementation of the NBRP, the financing sources and measures, and the administrative resources for building renovation.

- The thresholds for the operational greenhouse gas emissions and annual primary energy demand of a new or renovated zero-emission building.

- Minimum energy performance standards for non-residential buildings on the basis of maximum energy performance thresholds.

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8   European Commission (2025) [NBRP annotated templates](#).

- National trajectory for the renovation of the residential building stock, including the 2030 and 2035 milestones for average primary energy use in kWh/(m^2.y).

- An evidence-based estimate of expected energy savings and wider benefits, including those related to indoor environmental quality.

Member States had to submit their draft NBRPs to the Commission by December 2025. Member States must also annex the details of the implementation of their most recent NBRP to the subsequent version, indicating whether the national targets have been achieved. The Commission will review them within six months, assessing the ambition, financing and consultations, and may issue country-specific recommendations. Final NBRPs are due by December 2026.

3.2 Zero-emission buildings

Zero-emission buildings (ZEBs) are the central long-term vision of the 2024 EPBD, forming the foundation for achieving a fully decarbonised building stock by 2050. Defined in Article 2(2) and operationalised in Article 11, the ZEB concept goes beyond traditional energy efficiency to include operational emissions, energy demand thresholds, and renewable and carbon-free energy usage. This aligns buildings with the EU's climate neutrality goals. The directive establishes performance-based thresholds, renewable and carbon-free energy sourcing regulations, and digitalisation features to ensure ZEBs contribute to decarbonisation, system flexibility and indoor comfort. The definition of ZEBs is closely linked to the Renewable Energy Directive (RED III), which establishes binding targets for renewable energy and sets out rules for self-consumption, on-site generation and district-level renewables, all of which underpin ZEB requirements. Together, the EPBD and RED III create a coherent framework for integrating renewable energy and efficiency in buildings. According to Article 7, ZEB standards will be the default requirement for new construction of public buildings from 2028 and of all new buildings from 2030. Additionally, deep renovations will progressively bring the existing stock towards zero-emission levels. According to the NBRP template, Member States should report the operational greenhouse gas emissions and annual primary energy use thresholds of new and renovated ZEBs (see Figure 6). In addition, they should report the number of buildings and total floor area renovated to zero-emission levels. This can be used as an indicator to evaluate the impact of the current policies.

Member States also have to develop a roadmap for reducing the cumulative global warming potential (GWP) of all new buildings over their complete life cycle. They must set targets for new buildings from 2030 and maximum limit values, detailed for different climatic zone and building typologies, with a progressive downward trend. While one of the EPBD's primary objectives is to maximise and accelerate the number of ZEBs, this should be facilitated by other policy instruments in the EPBD, such as MEPS and national trajectories, EPCs and renovation passports.
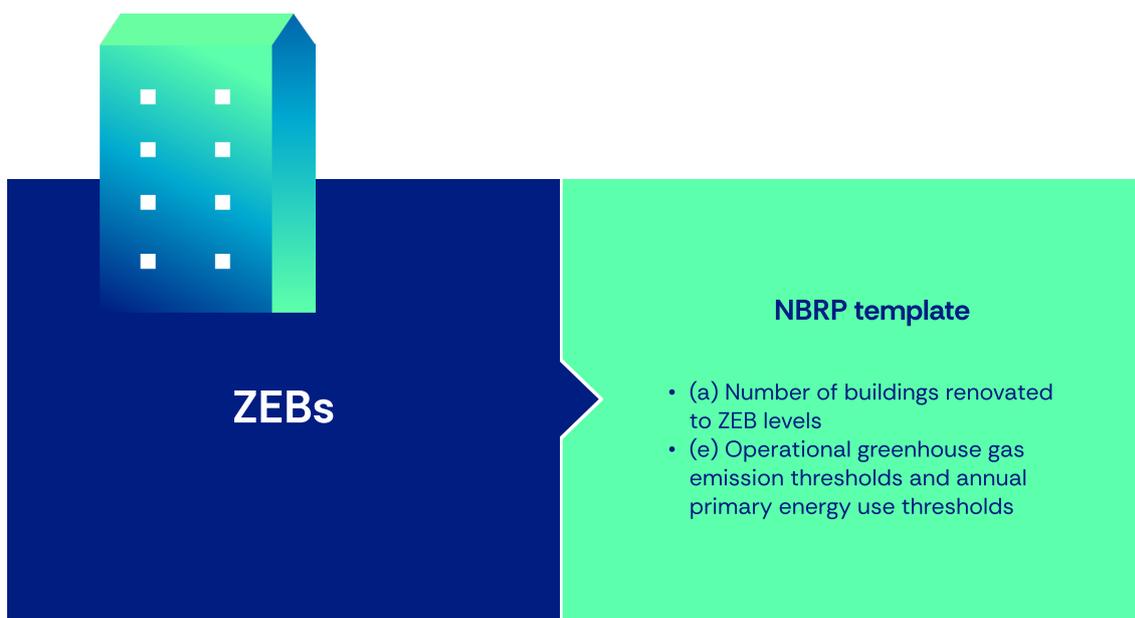
Figure 6: *Reporting requirements for ZEBs*

3.3 MEPS and national trajectory

EPBD Article 9 introduces minimum energy performance standards (MEPS) for non-residential buildings and national trajectories for residential buildings. These measures aims to create a highly energy-efficient and decarbonised building stock, transforming existing buildings into zero-emission buildings by 2050. For non-residential buildings, MEPS will progressively raise the performance requirements, ensuring that the worst-performing buildings are renovated first. For residential buildings, at least 55% of the decrease in average primary energy should be achieved by renovating the 43% worst-performing buildings.

According to the NBRP template, Member States must report the necessary policies and actions to enforce MEPS for non-residential buildings. Under Article 9(1), Member States must establish the maximum energy performance thresholds expressed in kWh/(m²·y) to ensure that buildings in the worst 16% of the national stock are renovated, increasing to the worst 26% by 2033. Member States may also choose to establish additional indicators of non-renewable and renewable primary energy use and operational greenhouse gas emissions, expressed in $kgCO_2eq/(m^2 \cdot y)$. Member States must also establish and report additional thresholds for 2040 and 2050 to ensure progressive alignment with the zero-emission building target by 2050. When reporting, Member States must detail the data sources, methodologies, exemptions and rationale for any category-specific thresholds.

Member States are required to report the national trajectory for residential buildings under Article 9(2). This includes average primary energy use expressed in kWh/(m²·y), with milestones for 2030, 2035, 2040, 2045 and 2050. They must also detail the annual number or floor area of buildings requiring renovation, ensuring that renovations of the worst-performing 43% of the residential stock contribute at least 55% of the total reduction in average primary energy use (see Figure 7).
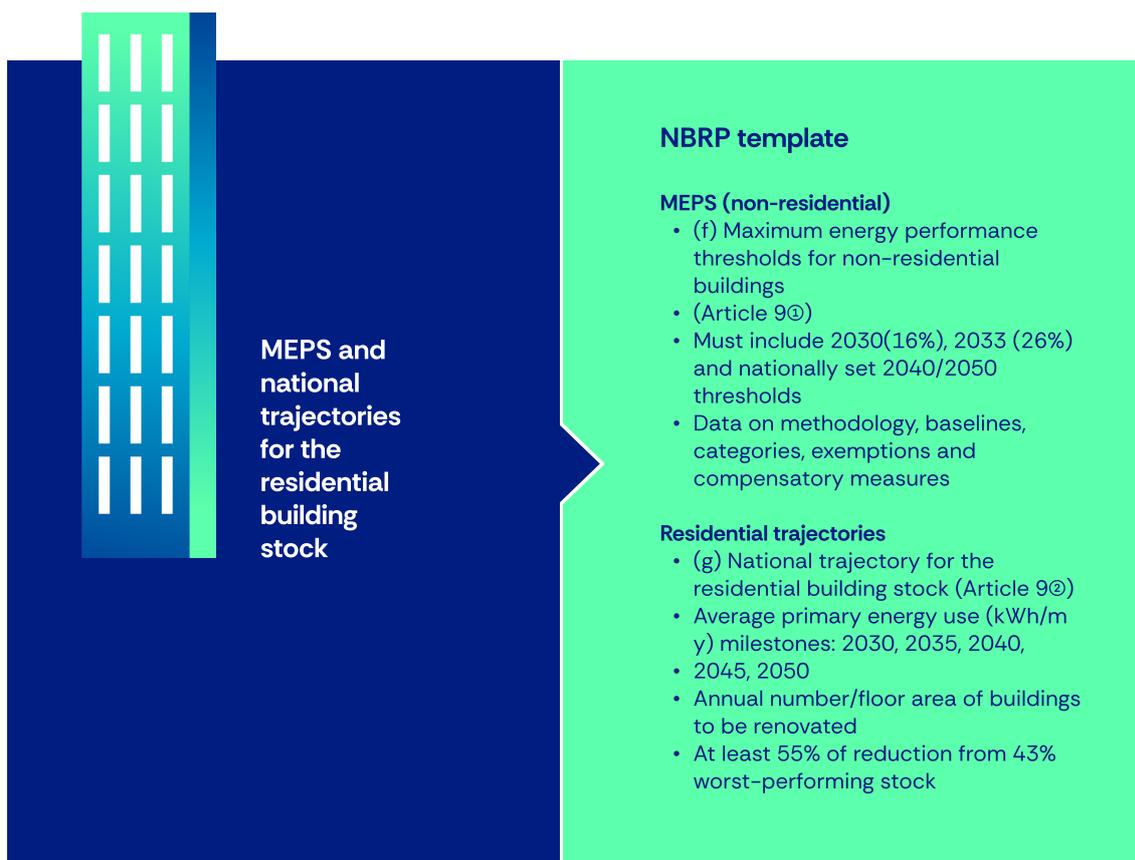
Figure 7: *Reporting requirements for MEPS and national trajectories*

3.4 EPCs

EPCs were introduced in the 2002 EPBD with the aim of promoting transparency and enabling prospective owners and tenants to compare building energy performance. Since then, their scope and ambition have evolved from basic disclosure tools into central policy instruments that support the EU's climate-neutral building strategy by providing advice, linking it to finance, or serving as a reporting tool. The EPBD introduces several enhancements to national EPC schemes, such as establishing a common scale of energy performance and a harmonised EPC template (Annex V) with several mandatory indicators to be included on the first page (including operational greenhouse gas emissions and, if available, life-cycle GWP). Member States need to follow a common visual identity and provide more detailed recommendations for improving the building's energy performance. The EPBD also strengthens digital accessibility (Article 20), public visibility (Article 21), data integration and consistency through dedicated EPC databases which become mandatory (Article 22), and robust quality assurance mechanisms via independent control systems (Article 27 and Annex VI).

Member States must create a national database of energy performance in buildings (Article 22) that can be connected to EPC databases. In turn, data from these national databases must be uploaded annually to the EU Building Stock Observatory (EU BSO) (see Figure 9). The information on renovation passports should then be transferred from this database to the EU BSO.[9] The EU BSO aggregates and analyses EPC data in order to track trends in building

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performance, renovation activity and compliance with efficiency standards. The EU BSO also provides valuable policy support, offering insights that inform the design and adjustment of energy efficiency measures at national and EU levels. By facilitating access to harmonised, reliable data, the EU BSO strengthens the capacity of stakeholders to assess and enhance the effectiveness of EPCs and related policy instruments.

In addition, the NBRP template should include the number of EPCs issued for each building type, their energy performance class and construction period. To ensure the quality of the EPC and renovation passport schemes, Articles 25–27 of the EPBD provide quality control measures. These can also be used to evaluate whether the policy objective of providing building owners with high-quality information and renovation recommendations is being met.

The data that must be collected and presented in the EPCs is given in Annex V of the 2024 EPBD recast.

The data that must be collected and reported to the EUBSO is given in the Article 5 and Annex 1 (table 2 to 17) of the implementing act to establish common templates for the transfer of the information to the EU Building Stock Observatory.

EPCS

Energy performance certificates are uploaded to the database for the energy performance of buildings (Art 20[8]).

NATIONAL DATABASE FOR THE ENERGY PERFORMANCE OF BUILDINGS

Member States must create a national database that collects data on the energy performance of individual buildings and the overall national building stock (Art 22[1]).

EU BSO

Each year, Member States must transfer data on the energy performance of buildings, including EPCs, from their national database to the EU Building Stock Observatory.

NBRP TEMPLATE

(a) Number of energy performance certificates per building type and energy performance class and construction period (optional)

● Monitoring
● Reporting

Figure 9: *Reporting requirements for EPCs*

3.5 Renovation passports

Renovation passports were introduced with the amending directive (EU) 2018/844 as "building renovation passports" in Article 19a and have been specified in much more detail under the 2024 EPBD. They are intended to accelerate deep renovation of the EU's building stock in a structured, affordable and data-informed manner. Defined in Article 12 and Annex VIII and contextualised in multiple recitals (notably 42–47), renovation passports serve as tailored,

expert-issued roadmaps for improving the energy performance of individual buildings – particularly through staged deep renovations leading to zero-emission status. According to Article 12, a renovation passport scheme must be established, but the implementation remains voluntary, unless the Member State decides to make it mandatory.

According to the NBRP template, Member States have to report on the establishment and use of renovation passports if they are used as a policy tool under "Overview of implemented and planned policies and measures—the promotion of deep renovation of buildings, including staged deep renovation", as set out in Article 12 and Annex VIII (see Figure 8).

According to Article 22, the databases for the energy performance of buildings must allow data to be gathered from all relevant sources, including renovation passports. Additionally, Member States can make provisions for renovation passports to be uploaded to the national database for the energy performance of buildings. The information on renovation passports should then be transferred from this database to the EU BSO.[10] To ensure the quality of the EPC and renovation passport schemes, Articles 25–27 of the EPBD provide quality control measures. These can also be used to evaluate whether the policy objective of providing building owners with high-quality information and renovation recommendations is being met.
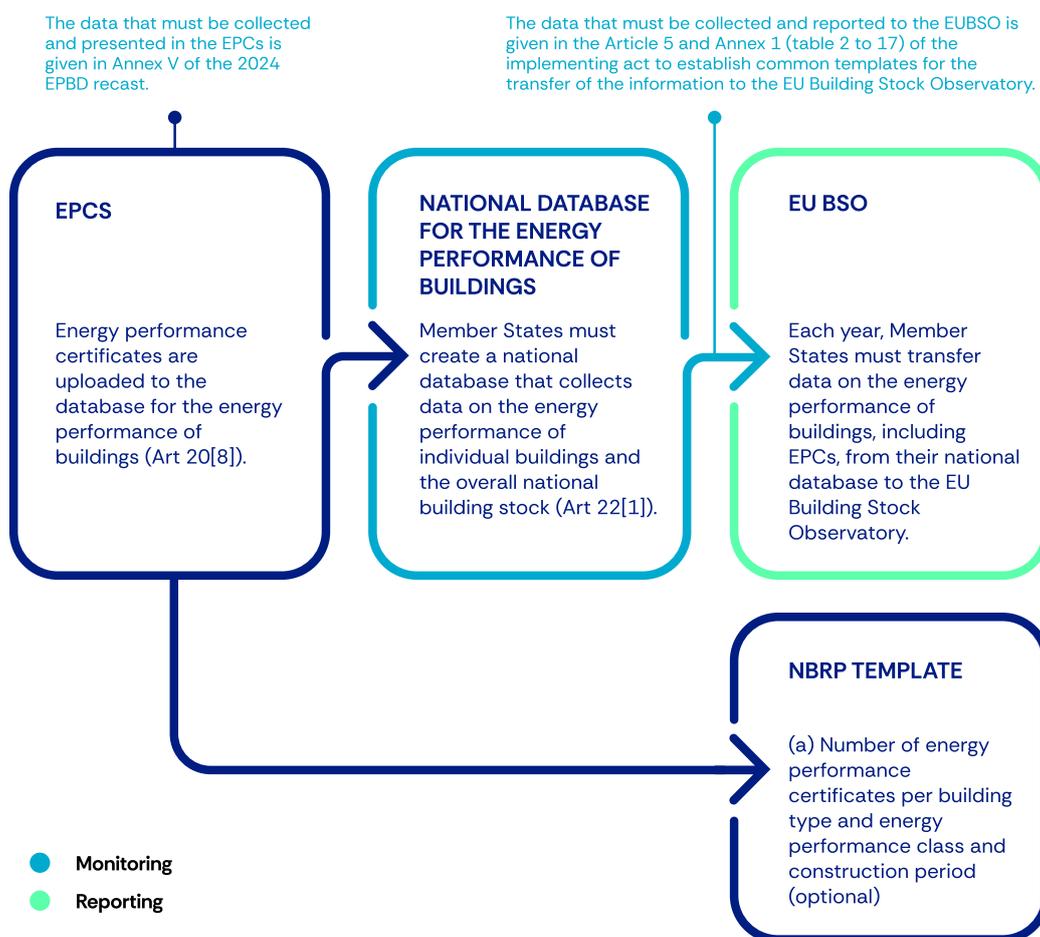
The data that must be collected and presented in the renovation passports is given in Annex VIII of the EPBD.

The data that must be collected and reported to the EU BSO is given in the Article 7 and Annex 1 (table 4) of the implementing act to establish common templates for the transfer of the information to the EU Building Stock Observatory.

RENOVATION PASSPORTS

Renovation passports can be uploaded to the database for the energy performance of buildings (Art 12[7]).

NATIONAL DATABASE FOR THE ENERGY PERFORMANCE OF BUILDINGS

Member States must create a national database that collects data on the energy performance of individual buildings and the overall national building stock (Art 22[1]).

EU BSO

Each year, Member States must transfer data on the energy performance of buildings, including EPCs, from their national database to the EU Building Stock Observatory.

NBRP TEMPLATE

(c) Implemented and planned policies & measures inclusion of RPs as a policy tool
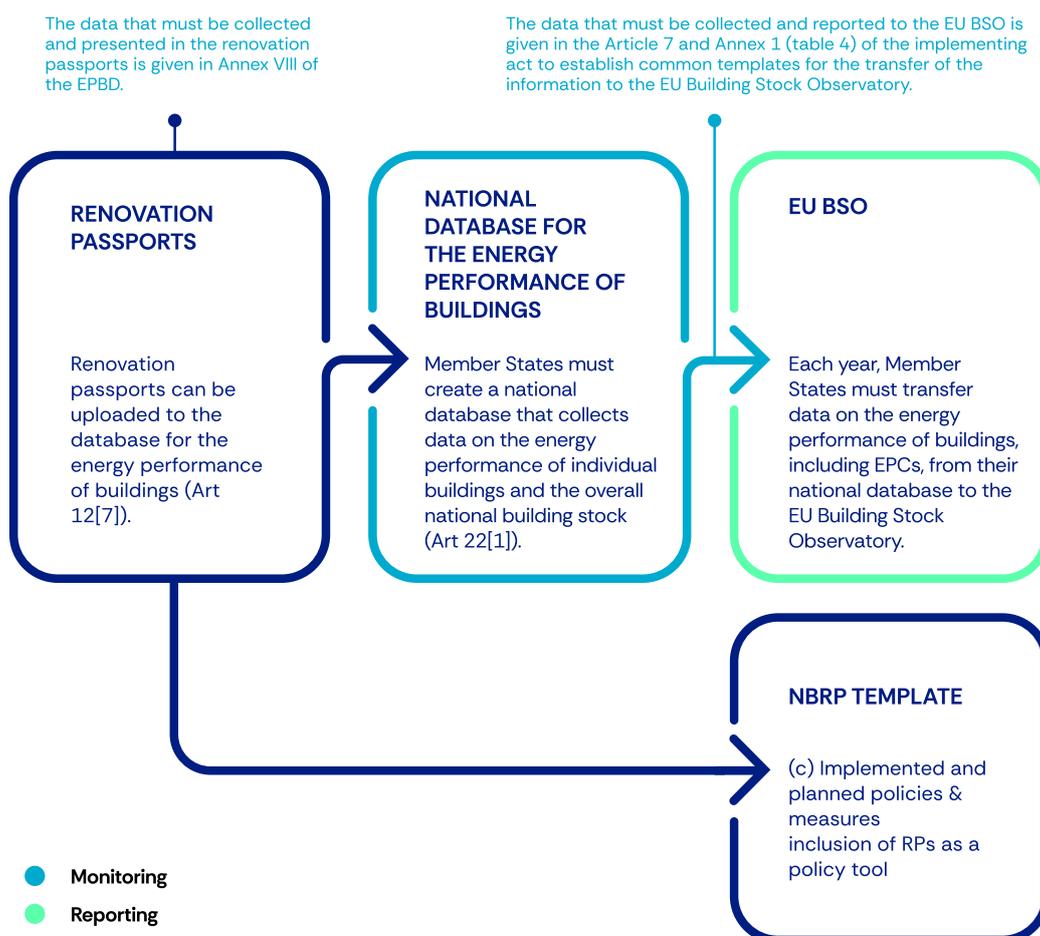
● Monitoring
● Reporting

Figure 8: Reporting requirements for renovation passports

10   As set out in Article 5 and Annex 1 – Table 2–17 of the Implementation Regulation (EU) 2025/1328 to establish common templates for transferring information from national energy performance of buildings databases to the EU Building Stock Observatory.

In conclusion, the EPBD provides a set of monitoring and reporting requirements for Member States, but leaves policy evaluation to happen entirely at EU level. However, Member States can still develop their own evaluation mechanisms and processes to make sure their policies achieve the targets and objectives set out in EPBD and beyond. Employing evaluation processes at the national level complements the flexibility the EPBD offers to Member States when choosing and designing their own policies and corresponds with the integrated MRE framework proposed in this report.

3.6 Going beyond EPBD

A whole ecosystem of EU-level MRE instruments for energy and climate policies sits alongside the EPBD, offering Member States a guiding framework for ensuring the effectiveness of their policies.

Since the launch of the Energy Union strategy in 2015, the European Commission has published several packages of measures and initiatives to ensure the effective implementation of policies to reach the EU energy and climate targets. To streamline processes and facilitate the implementation of the Energy Union, in 2018 it adopted the Regulation on the Governance of the Energy Union and Climate Action (the 'Governance Regulation'). Subsequently, in April 2021, the EU adopted the European Climate Law, which enshrines in law the goals for the EU to become climate neutral for 2050 and to reduce its net greenhouse gas (GHG) emissions by at least 55% by 2030 compared to 1990 levels. These two pieces of legislation are the building blocks of the EU's procedural climate governance as they define instruments, institutions and processes for developing, implementing, monitoring and evaluating energy and climate policies.

As an 'umbrella regulation', the Governance Regulation establishes a common governance system for EU climate and energy policy. It focuses on planning, but also addresses different aspects of monitoring and evaluation.

On planning, it specifically requires Member States to prepare mid-term national energy and climate plans (NECPs) every 10 years, and to update them every five years. The NECPs should detail how each Member State intends to achieve its 2030 climate and energy targets. The preparation of NECPs follows a staged approach, where the draft NECPs anticipate the formal submission of the final plans. This consists of an extensive process of coordination at national level, including public consultations with local and national stakeholders as well as constant dialogue and collaboration between Member States and the European Commission. Subsequently, the Commission provides individual feedback to Member States and asks to review the level of ambition in the final NECPs in cases where contributions are deemed insufficient.

To ensure coherence, NBRPs must be updated every five years in alignment with the NECP cycle. The alignment allows for consistent integration of building renovation strategies into broader climate and energy goals. NBRPs will follow a five-year revision cycle, with progress tracked through biennial NECP reports. The Commission will integrate the results into the annual State of the Energy Union report and the EU Building Stock Observatory. Figure 10 shows a schematic of the reporting and evaluation cycle.

First draft NBRP submission by Member States to the Commission **31 December 2025**

Commission evaluation of the first draft NBRP (six months)

First NBRP submitted to the Commission **31 December 2028**

Second draft NBRP submitted to the Commission **together with the draft NECP 1 January 2028**

Commission evaluation of the second draft NBRP

Second NBRP submitted to the Commission **together with the NECP 1 January 2029**

Every 5 years after 2028 updated **draft NBRP** submitted to the Commission together with the **draft NECP**

Commission evaluation of the draft NBRPs and NECPS

Every 5 years after 2029 updated **NBRP** submitted to the Commission together with the **NECP**

*Figure 10:* NBRP reporting schedule and cycle

Provisions on monitoring and evaluation[11] of policies are also included in the Governance Regulation. Starting 2023, every five years, the Commission must assess the ambition and consistency of Member States' national measures with the EU energy and climate targets. The assessment is based on NECPs and the biennial progress reports. The Commission is required to evaluate every two years each Member State's progress towards the objectives set out in its NECP, and to issue recommendations if progress is insufficient. Within six months of receiving the Commission's recommendations, a Member State must let the Commission know how it intends to address them. In addition to mandating the Commission to review NECPs and issue related guidance to Member States, the Governance Regulation prescribes action to be taken by the Commission in response to insufficient ambition and progress by individual Member States or collectively. The Commission may, for example, initiate infringement procedures against Member States breaching their EU law obligations.

The Commission also assesses the ambition, completeness and quality of NECPs at an aggregated level to verify whether their aggregated contribution will achieve the EU energy and climate targets. The Commission must regularly assess Member States' collective progress towards the EU energy and climate goals, as well as the consistency of EU measures with these objectives. Based on this assessment, the European Commission can also identify needs for additional EU energy policies and measures.[12]

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11 In addition to various monitoring and reporting obligations for the Commission and Member States related to the EU's internal climate and energy targets, the Governance Regulation addresses monitoring and evaluation by incorporating and amending the earlier Monitoring Mechanism Regulation to ensure the EU's compliance with the reporting obligations under the Paris Agreement.

12 In 2024, the Commission published an evaluation report on the functioning of the Governance Regulation, assessing the implementation of the legislation in light of five evaluation criteria: effectiveness, efficiency, coherence, relevance and EU added value. The report will provide insights that will feel into the upcoming revision of the Governance Regulation, planned for end of 2026.
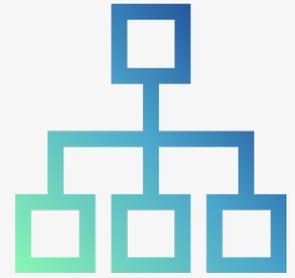
THE EPBD.WISE MRE FRAMEWORK

The EPBD encompasses a variety of policy instruments, all of which together contribute to the overarching goal of achieving a climate-neutral building stock across the EU by 2050. The success of the EPBD as a whole depends on the effective implementation and impact of each individual policy instrument. Although the Directive includes provisions on monitoring, reporting and evaluation, and Member States are required to monitor and report within the NBRP framework, the Commission carries out the evaluation. Nevertheless, Member States can use the same information for their own evaluations and complement it where necessary. The EPBD.wise MRE framework supports Member States in building on the existing EPBD MRE arrangements to assess the outcomes of individual policy instruments, identify gaps and prioritise actions, while minimising additional reporting and administrative effort.

According to Annex II(c) of the EPBD, Member States are required to provide an overview of implemented and planned policies and measures, including the entities responsible for implementation, expected impacts and implementation status. The EPBD.wise framework and its KPIs complement these requirements by systematically linking policy objectives to measurable indicators, while remaining fully aligned with Annex II. The framework also supports a more structured assessment of market failures and barriers, which may be reported as optional indicators under Annex II(a). Its purpose is to move existing MRE requirements beyond a compliance exercise and towards a more strategic tool for policy design and delivery. The EPBD.wise MRE framework is guided by two key ideas:

1. Support Member States in designing and implementing an integrated MRE framework to assess the effectiveness of EPBD policy instruments in achieving their intended objectives.

2. Use NBRPs and databases for the energy performance of buildings as the primary vehicles for MRE, integrating policy evaluation into existing monitoring and reporting structures and avoiding additional administrative burden for Member States.

The need for an integrated MRE framework

Beyond the technical requirements for monitoring and reporting under the EPBD, a key challenge is ensuring that policy measures deliver their intended outcomes. This requires understanding not only whether measures are in place, but also how they interact with other instruments and market conditions. The following examples illustrate how an integrated MRE framework can help Member States 1) operationalise and report on the optional indicators of instruments like EPCs, renovation passports and NBRPs, helping Member States to use NRBPs effectively and for their own policy evaluation purposes; and 2) collate information from multiple policy instruments in order to identify market failures and barriers and take corrective actions.

1   EPCs provide mandatory indicators, including energy performance class, primary and final energy use, operational greenhouse gas emissions, and life-cycle GWP. Some of these indicators are useful for reporting objectives of NBRPs and must be transferred to the EU BSO via the national databases. These indicators help to understand the energy performance of the current building stock, enabling Member States to monitor progress towards minimum energy performance standards, assess the distribution of the worst-performing buildings, and quantify reduction in the operational emissions. Optional EPC indicators, as listed in Annex V, such as detailed energy use by end use, smart readiness and overheating risk, as well as links to one-stop shops or financing schemes, provide useful information on the effectiveness of EPCs as a policy tool. This information can be used for policy evaluation purposes when Member States make these indicators operational.

Similarly, renovation passports (Annex VIII) include mandatory indicators on staged renovation roadmaps, energy savings, and funding information. Optional indicators, such as timing of renovation steps, investment costs, payback periods and alignment with minimum energy performance standards, enable evaluation of the practical deliverability and financial feasibility of deep renovations. These optional indicators help to track policy outcomes, including whether EPCs and renovation passports have enabled building owners to carry out staged, cost-effective renovations. Once suitable indicators have been operationalised, Member States will be able to monitor how EPCs and renovation passports connect building owners with practical support mechanisms, such as grants under the REPowerEU 'Renovate' initiative, loans from national energy efficiency funds and advisory services offered through regional one-stop shops. They will also be able to report on measures that improve affordability for vulnerable households, including targeted subsidies, phased payment schemes and energy efficiency upgrades in social housing.

2   Annex II(c)(e) requires Member States to report on planned one-stop shop networks under Article 18, including their coverage, services, delivery models, and outreach. However, whether one-stop shops trigger sufficient renovation activity to meet roadmap milestones does not only depend on their availability and services. Other policy instruments, such as EPCs, renovation passports and financing schemes, may trigger visits to one-stop shops. Alternatively, services from one-stop shops combined with additional information from other instruments may initiate the decision to renovate. When building owners approach a one-stop shop, chronological information can be captured, such as the dates of their first and subsequent visits, and the dates on which EPCs or renovation passports were issued. This information can then be used to determine whether these instruments act as enablers, prompting owners to take action. If there is a statistically significant time period between the issue date and the date on which building owners approach a one-stop shop, or if there is a significant discrepancy in the number of EPCs and renovation passports issued for

buildings in need of renovation and the number of visits to the one-stop shop, this will help Member States identify any additional barriers preventing building owners from visiting a one-stop shop earlier. This could be because information on one-stop shops is not widely available, they are hard to access, financial incentives are insufficient, building owners pursue renovation actions in other ways, or building owners generally lack the motivation to renovate their buildings.

Even when implemented correctly, policy measures may not achieve the desired outcome, due to external conditions and circumstances. It is therefore important to identify the underlying barriers and interactions affecting performance. This requires a methodology that translates policy objectives into KPIs and metrics that can be used to objectively evaluate outcomes. While the Annex II template specifies mandatory indicators, Member States can benefit from making optional indicators operational and developing additional ones to better capture these interactions and evaluate the effectiveness of individual policy measures. The effort required to identify and operationalise these indicators at the beginning of the policy cycle is minimal compared to the effort required to do so in the middle or at the end of the cycle.

Figure 11 provides an overview of the MRE requirements under the EPBD, with the NBRP indicators as a reference. Solid lines indicate the current EPBD requirements, while dotted lines highlight the proposed enhancements under the EPBD.wise framework. The figure illustrates the relationships between NBRP indicators, key EPBD articles and policy instruments, national databases (Article 22), EU-level reporting and evaluation processes. Table 1 complements the figure by detailing each EPBD requirement, showing both the current implementation and the enhancements proposed by EPBD.wise to support an integrated MRE framework.

Columns in Figure 11	EPBD requirements	EPBD.wise enhancements
1. Annex II template for NBRPs	List of the indicators, including the relevant policies and measures, which must be reported according to the NBRP and Annex II.	Include all relevant policies and measures within and beyond the scope of NRBPs.
2. Other policy instruments in the EPBD and related legislation (e.g., Energy Efficiency Directive – EED)		Identify policy objectives for individual instruments and define evaluation criteria (operational metrics/KPIs. Link the list of indicators to the relevant EPBD articles and other related legislation (e.g. EED).
3. Monitoring	Establish national databases for the energy performance of buildings (Article 22) that can connect with existing monitoring mechanisms, such as EPC databases, digital cadastre records and digital building logbooks, and link these databases to those for the energy performance of buildings.	Use the optional indicators and any additional MRE indicators (KPIs) to carry out a comprehensive evaluation of national policies. Capture additional data required by NBRP templates and KPIs developed within the EPBD.wise MRE framework in the national databases for the energy performance of buildings Link all existing building-related databases to the national databases (see examples in section 5.1 and 5.2). Optionally, establish separate databases for NBRP monitoring and reporting. Enhances scope and usefulness of monitoring for policy assessment and impact evaluation.
4. Reporting	Information for EU-level reporting.	Use information also for national-level reporting, feeding into national evaluation framework.
5. Evaluation	The commission evaluates the NBRPs.	Member States perform national-level evaluation of individual policies using the relevant indicators.

Table 1: Monitoring and reporting framework under EPBD with EPBD.wise enhancements
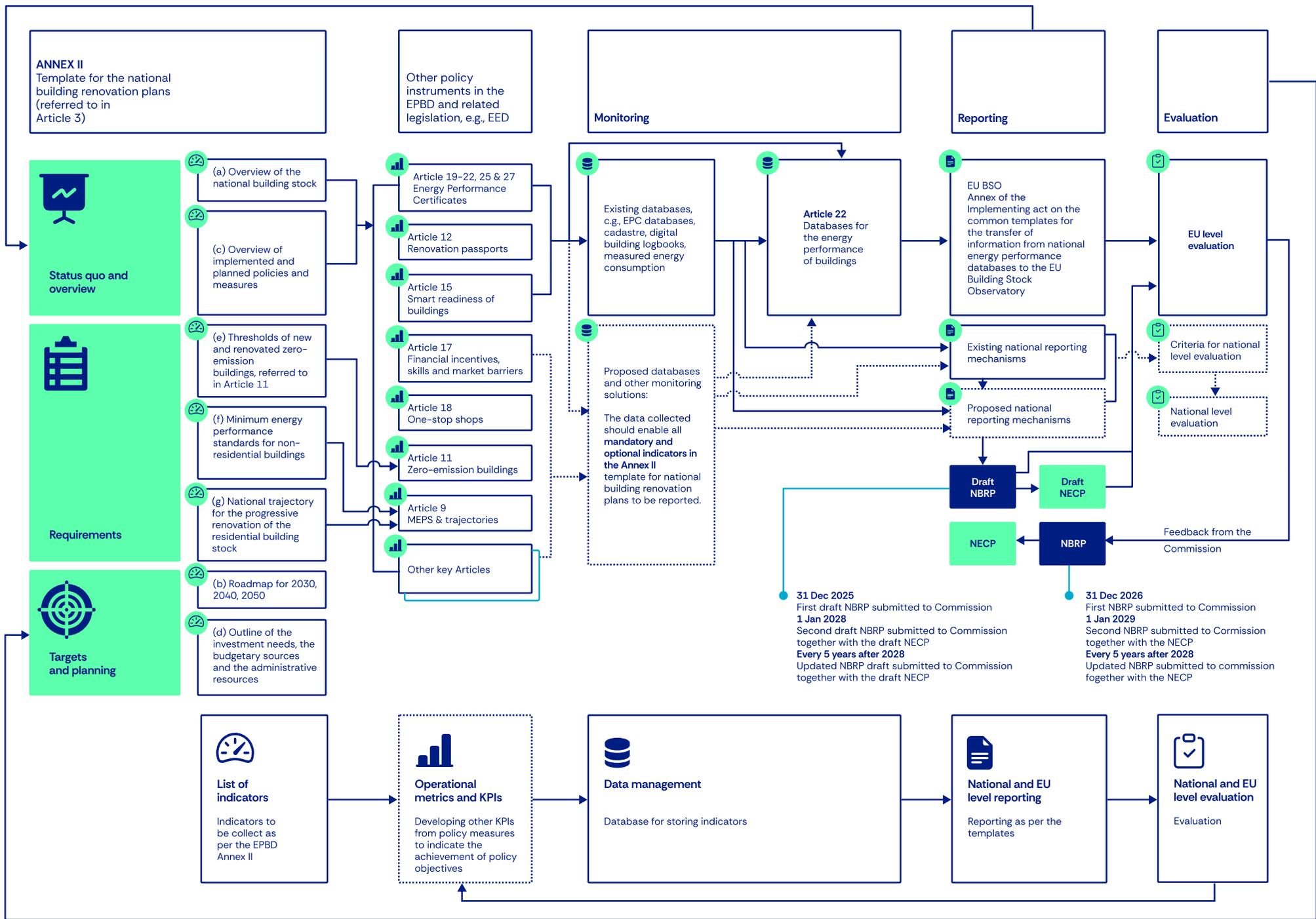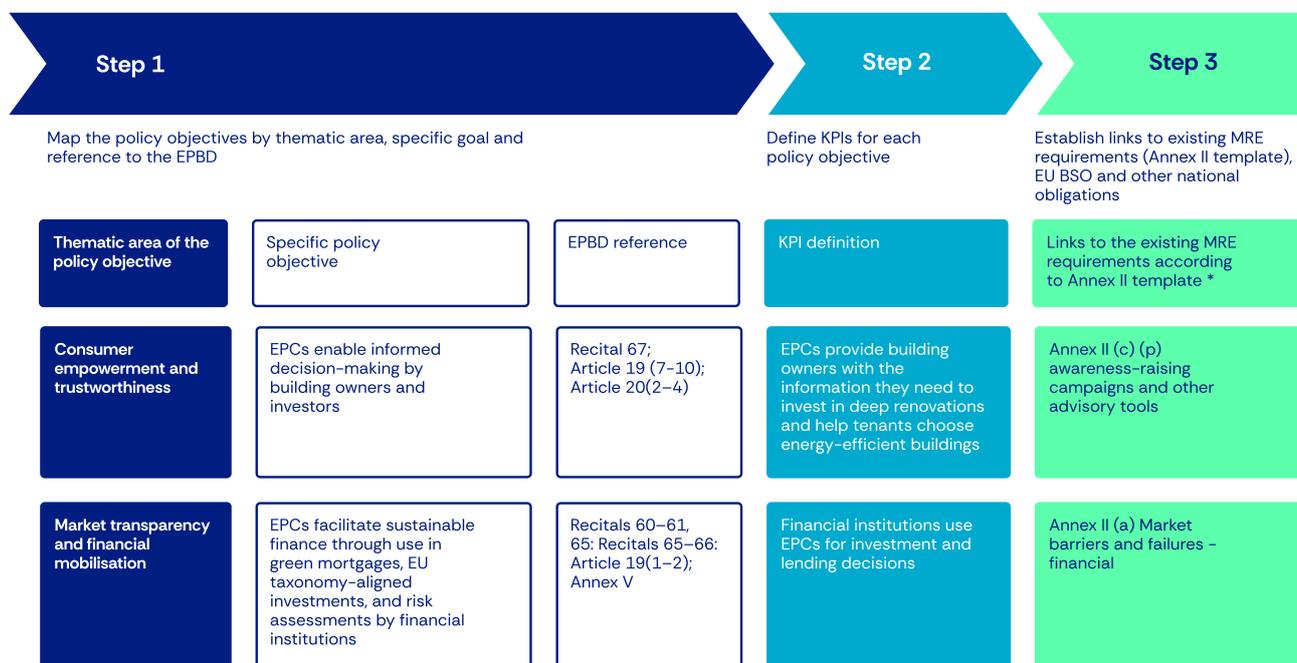
Figure 11: Monitoring, reporting and evaluation framework under EPBD with EPBD.wise enhancements

The proposed framework builds on a set of KPIs linked to each policy objective derived from the EPBD (see section 4.1). It defines indicators and metrics for policy evaluation, and specifies the data needed for effective monitoring and reporting of these indicators (see section 4.2). To simplify implementation, a pragmatic approach is outlined in section 4.4.

4.1 Identify the policy objectives and set the evaluation criteria

Firstly, we identify the objectives of the policy instrument as set out in the EPBD, and then we define the KPIs that indicate achievement of these objectives. The KPIs are developed through a three-step process:

1. We identify the policy objectives based on the EPBD text. Here, we provide a brief explanation of the policy instrument and its objectives. These objectives then inform the definition of the KPIs (i.e., policy outputs). [13]

2. We define KPIs that indicate the success of the policy objectives (KPI definition remains conceptual in this report and needs to be further developed at national level to become operational).

3. We indicate whether these objectives have been specifically identified for reporting in Annex II or its annotated template. This ensures that the proposed MRE framework fully integrates and supports existing MRE requirements while also enabling an additional layer of objective policy evaluation. Additionally, links to existing MRE requirements (e.g. EU BSO) and other national obligations can be included here.

Step 1			Step 2	Step 3
Map the policy objectives by thematic area, specific goal and reference to the EPBD			Define KPIs for each policy objective	Establish links to existing MRE requirements (Annex II template), EU BSO and other national obligations
Thematic area of the policy objective	Specific policy objective	EPBD reference	KPI definition	Links to the existing MRE requirements according to Annex II template *
Consumer empowerment and trustworthiness	EPCs enable informed decision-making by building owners and investors	Recital 67; Article 19 (7–10); Article 20(2–4)	EPCs provide building owners with the information they need to invest in deep renovations and help tenants choose energy-efficient buildings	Annex II (c) (p) awareness-raising campaigns and other advisory tools
Market transparency and financial mobilisation	EPCs facilitate sustainable finance through use in green mortgages, EU taxonomy-aligned investments, and risk assessments by financial institutions	Recitals 60–61, 65: Recitals 65–66: Article 19(1–2); Annex V	Financial institutions use EPCs for investment and lending decisions	Annex II (a) Market barriers and failures – financial

Figure 12: Deriving KPIs from policy objectives and linking them to Annex II reporting requirements (EPC example)

* Additionally, links to other MRE requirements (e.g. the EU BSO), other directives (e.g. the EED) and other national obligations can be included here.

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13 The policy objectives are intended to provide guidance and direction; they are not exhaustive. Member States may use this framework to include any additional objectives that best serve their needs.

Figure 12 illustrates the development of KPIs using some EPC policy objectives as examples. Table 5 in Annex I contains an extended version of the table, which illustrates the development of KPIs for other EPC policy objectives, as well as for other instruments (MEPS, EPCs and renovation passports).

The KPIs are then translated into objective evaluation criteria (i.e., policy outcomes). Evaluation methods (e.g. quantitative analysis, qualitative surveys and stakeholder feedback) are then developed to enable consistent, credible and, where possible, comparable assessments across Member States over time. The evaluation metrics capture and define the extent to which the policy objective has been successful (i.e., policy impact). KPIs and data points that indicate success can provide a pathway to transforming policy objectives into concrete data points for success, with as many steps as needed for providing the clarity of thought. Although they are not shown in the figure for brevity, other questions that may be clarified during this step include who conducts the evaluation, how often it is conducted, and how the findings are used and shared. Figure 13 shows these steps sequentially by using EPC policy objectives as an example, and Table 5 in Annex I provides examples of more policy objectives of the EPC and other instruments.

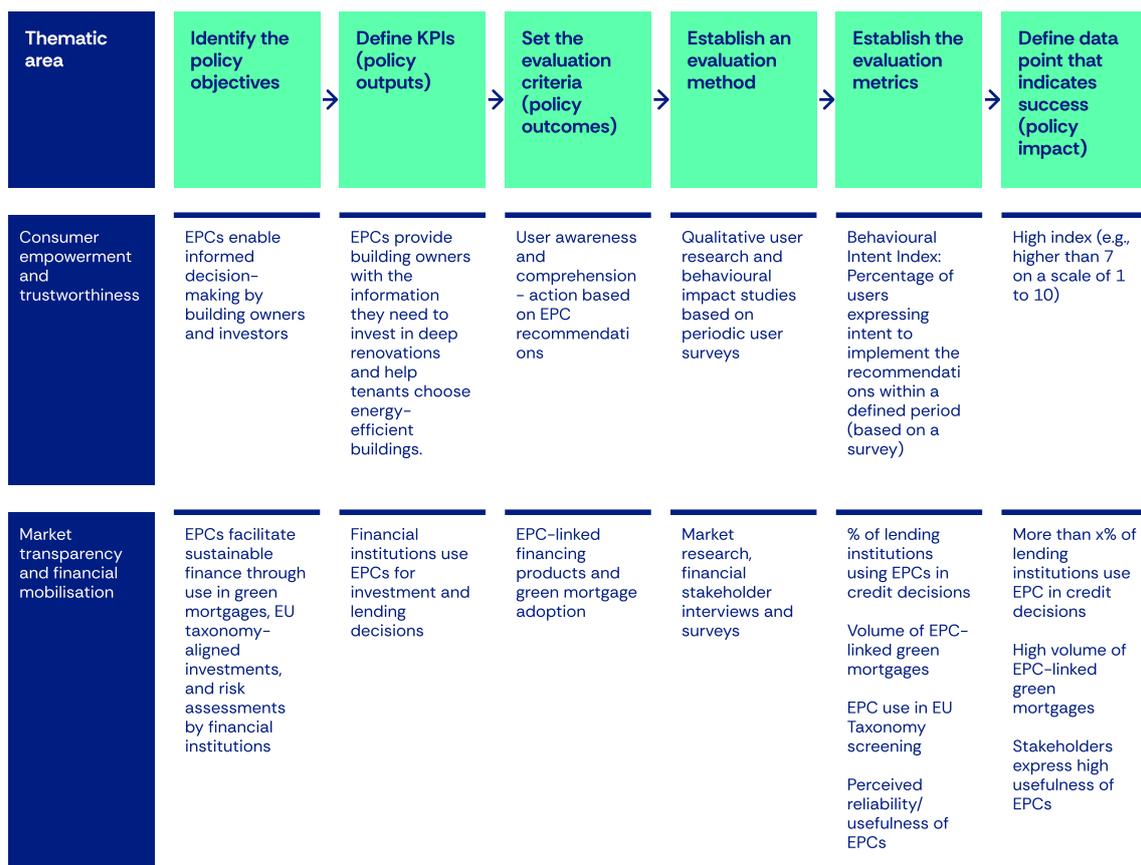| Thematic area	Identify the policy objectives	Define KPIs (policy outputs)	Set the evaluation criteria (policy outcomes)	Establish an evaluation method	Establish the evaluation metrics	Define data point that indicates success (policy impact)
Consumer empowerment and trustworthiness	EPCs enable informed decision-making by building owners and investors	EPCs provide building owners with the information they need to invest in deep renovations and help tenants choose energy-efficient buildings.	User awareness and comprehension – action based on EPC recommendations	Qualitative user research and behavioural impact studies based on periodic user surveys	Behavioural Intent Index: Percentage of users expressing intent to implement the recommendations within a defined period (based on a survey)	High index (e.g., higher than 7 on a scale of 1 to 10)
Market transparency and financial mobilisation	EPCs facilitate sustainable finance through use in green mortgages, EU taxonomy-aligned investments, and risk assessments by financial institutions	Financial institutions use EPCs for investment and lending decisions	EPC-linked financing products and green mortgage adoption	Market research, financial stakeholder interviews and surveys	% of lending institutions using EPCs in credit decisions Volume of EPC-linked green mortgages EPC use in EU Taxonomy screening Perceived reliability/ usefulness of EPCs	More than x% of lending institutions use EPC in credit decisions High volume of EPC-linked green mortgages Stakeholders express high usefulness of EPCs

Figure 13: *Linking policy objectives to KPI definition and success indicators (EPBD.wise integrated MRE framework)*

4.2 Design the monitoring framework

The monitoring framework establishes the data required to support the evaluation process. This involves defining the specific data points or values to be collected, as well as the format, frequency and storage method of the data. It also involves identifying who is responsible for generating, inputting and collecting the data. Monitoring also indicates whether the collected data is already mandated by the EPBD (e.g. links to Annex II or EU BSO). Figure 14 shows these steps sequentially by using EPC policy objectives as an example, and Table 5 in the Annex I provides examples of more policy objectives of the EPC and other instruments.
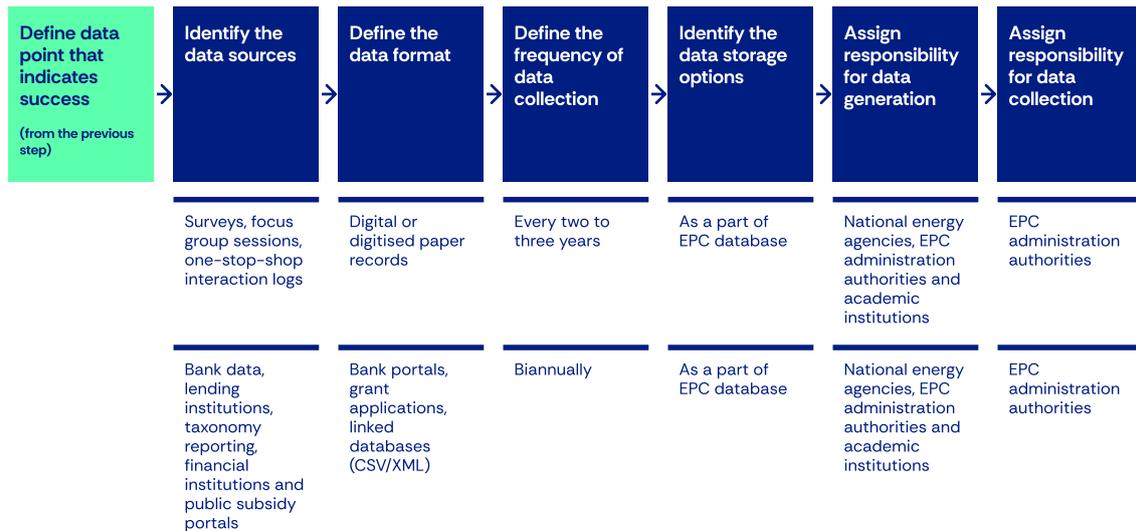
Define data point that indicates success (from the previous step)	Identify the data sources	Define the data format	Define the frequency of data collection	Identify the data storage options	Assign responsibility for data generation	Assign responsibility for data collection
	Surveys, focus group sessions, one–stop–shop interaction logs	Digital or digitised paper records	Every two to three years	As a part of EPC database	National energy agencies, EPC administration authorities and academic institutions	EPC administration authorities
	Bank data, lending institutions, taxonomy reporting, financial institutions and public subsidy portals	Bank portals, grant applications, linked databases (CSV/XML)	Biannually	As a part of EPC database	National energy agencies, EPC administration authorities and academic institutions	EPC administration authorities

Figure 14: *Monitoring the data required to support the evaluation process (EPBD.wise integrated MRE framework)*

4.3 Design the reporting framework

This step involves aligning data usage with reporting requirements. This involves identifying the reporting entity and frequency, linking reporting to EU or national compliance channels (whether mandatory, voluntary or proposed), and specifying the reporting format. This ensures that the resulting data is consistent and usable. Figure 15 shows these steps sequentially by using EPC policy objectives as an example, and Table 5 in the Annex I provides examples of more policy objectives of the EPC and other instruments. For simplicity, the figure does not show other aspects, including how data from different sources is aggregated and which body is responsible for carrying out the aggregation.
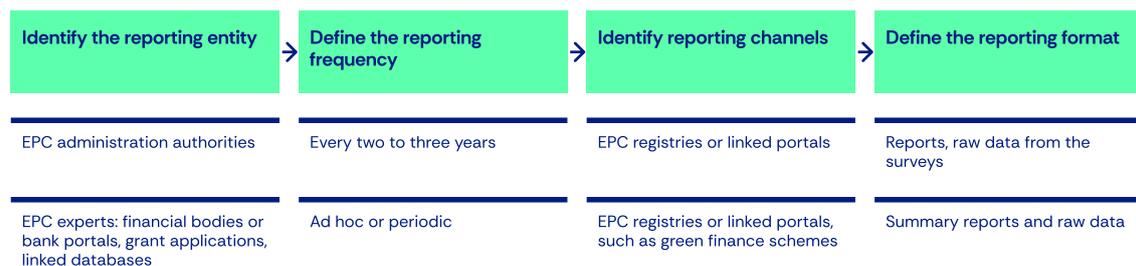
Identify the reporting entity	Define the reporting frequency	Identify reporting channels	Define the reporting format
EPC administration authorities	Every two to three years	EPC registries or linked portals	Reports, raw data from the surveys
EPC experts: financial bodies or bank portals, grant applications, linked databases	Ad hoc or periodic	EPC registries or linked portals, such as green finance schemes	Summary reports and raw data

Figure 15: *Reporting requirements (EPBD.wise integrated MRE framework)*

4.4 Implementation approach to MRE framework

This section sets out an implementation approach for the EPBD.wise MRE framework, covering both pre- and post-evaluation across the policy cycle. While the framework provides a structured basis for assessing the performance of EPBD policy instruments, its application should remain pragmatic and feasible for Member States. The implementation should incorporate the views of all stakeholders, obtained through engagement and consultation activities. An initial longlist of KPIs can be developed and subsequently narrowed down using a simple set of decision-support criteria to identify the most relevant indicators.

The prioritisation of KPIs depends not only on their suitability for assessing policy objectives and the importance of those objectives, but also on practical considerations such as data availability, the existence of supporting mechanisms, institutional readiness and administrative complexity. These criteria help anticipate the implementation effort associated with each KPI. The assessment can be repeated periodically to reflect changes in circumstances, for example where new or improved data sources become available. Table 2 presents an illustrative set of criteria, which can be expanded as needed.

Criteria	Definition	Score (0–5)	Weighting (%) (The total weighting of all the criteria should equal 100%)	Score × weighting
Importance	Level of importance of the policy objective	0 = Low importance, 5 = High importance	…	…
Data availability	Availability and quality of relevant data	0 = Not available, 5 = Fully available	…	…
Institutional fit	Readiness of existing systems to support implementation	0 = No infrastructure, 5 = Fully supported	…	…
Complementarity	Ability to work in synergy with other instruments	0 = Isolated, 5 = Highly complementary	…	…
Scalability	Scalability to more building types	0 = Easily scalable, 5 = Difficult to scale	…	…
…additional criteria…	…	…	…	…
Effort level for KPI	**Overall implementation complexity, administrative burden**			**Σ (score × weighting)**

Table 2: Criteria to shortlist the most relevant policy objectives and KPIs for the EPBD.wise MRE framework

5 ENABLING ECOSYSTEM FOR AN INTEGRATED MRE
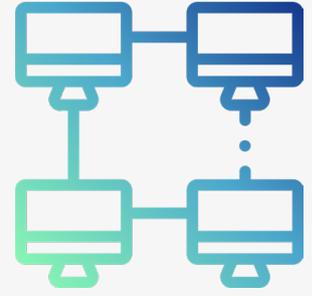
A supportive and enabling ecosystem is essential for implementing an integrated MRE framework. This includes making optimal use of existing building and energy-related databases, as well as developing comprehensive and interoperable building-related databases. Member States can learn from good examples of national-level building-related databases and research activities on national building observatories for EPBD compliance. Voluntary platforms such as Concerted Action EPBD also facilitate knowledge exchange, policy coordination and technical learning.

5.1 Existing EPC databases

EPCs are a well-established instrument under the EPBD. Some Member States also combine reports on the inspection of heating and air-conditioning systems with EPC databases (e.g. Italy and Portugal). EPC databases offer valuable lessons for strengthening MRE systems. Their widespread implementation across Member States shows how digitalisation, data interoperability, quality assurance, and integration with financial and policy frameworks can help with policy evaluation. The following examples provide transferable models based on the best practices of EPC schemes for new instruments, such as databases for the energy performance of buildings (Article 22).

1. **Linking EPCs to financing schemes:** In some countries, EPC data is linked to financial incentive schemes and green mortgage schemes, renovation loan programmes, and EU Taxonomy-aligned investment products to mobilise private financing for energy renovations. For example, in many EU countries, EPCs are mandatory for accessing renovation financing, and in some countries, they are required before and after

renovation.[14] In Portugal, the EPC database is used to assess the success of the country's renovation incentive programme by determining the overall impact of the proposed renovation measures across the programme as a whole, rather than at a building or application level.[15] It links the EPC database (which provides results on energy and CO_2 reductions) with grant-funded renovations, in order to evaluate 'actual' energy savings and adjust programme design.

2. **Enabling public access:** Some countries provide public access to anonymised EPC datasets for research and policy evaluation purposes. This promotes accountability, enhances transparency, and fosters innovation in data-driven building policy. In Greece, aggregated/anonymised data can be requested by institutions for research and analysis purposes and is provided by assigned government staff.[16] The Sustainable Energy Authority of Ireland provides researchers with the Building Energy Rating (BER) Research Tool, which offers downloadable statistical data on all construction and energy-performance characteristics captured through Ireland's BER scheme. This includes information on primary energy use and CO_2 emissions for key building services. [17]

3. **Ensuring data reliability and quality:** Some Member States have multi-layered quality control systems combining automated checks, field inspections and independent audits as required under Annex VI. Spain adopted a multi-layered approach combining automation, document control, field inspections and enforcement, ensuring EPC quality and compliance.[18] Many other countries, including Denmark, have implemented automatic data verification mechanisms.[19] Portugal's two-stage Quality Verification Scheme involves an on-site preventive inspection and automated checks before the issuance of an EPC, followed by a post-issuance correction phase involving summary and detailed verifications.[20] France's EPC quality control system categorises deviations as either critical or non-critical and defines audit points and verification methods. Deviation levels are determined by error counts and are linked to graduated sanctions ranging from corrective actions and retraining to suspension or licence withdrawal.[21] In some Austrian states, automated, system-integrated testing routines verify energy certificates, ensuring compliance with building regulations and housing subsidy requirements and supporting the approval process.[22] In Greece, EPC assessors are required to upload all input data collected on-site in XML format to the national 'BuildingCert' platform. This enables the online system to automatically calculate and recalculate EPC indicators, reducing errors and ensuring accurate energy performance certification.[23]

4. **Feedback mechanisms and user-centric design:** In Italy, the national energy agency ENEA collects data through the SIAPE (Information System on Energy Performance Certificates) platform. Its indicators cover core parameters from EPCs, as well as from inspections and controls of heating and cooling systems. These indicators support the

14 Gokarakonda and Bankert (2024) Accelerating deep renovation in the EU with renovation passports

15 ibid

16 Sriraj Gokarakonda, Maike Venjakob and Stefan Thomas (2020) EPC situation and cross-country comparison matrix.

17 Sustainable Energy Authority of Ireland (SEAI) National BER Research Tool

18 Aitor Domínguez Martin (2021) Implementation of the EPBD in Spain (Status in 2016)

19 Publications Office of the European Union (2023) Progress on the Implementation of Energy Performance Certificates in EU

20 Jonathan Volt et al. (2020) Energy Performance Certificates - Assessing Their Status and Potential

21 JORF n°0145 du 21 juin 2024

22 ZEUS-ZEUS – Online-Datenbank Zur Verwaltung von Energieausweisen

23 Ministry of Energy and Infrastructure – Register of Energy Inspectors & Archive of Energy Inspections

monitoring of the energy performance and technical compliance of the building stock. The indicators have been agreed with regions and key stakeholders, and the platform ensures interoperability with regional databases and provides user-differentiated access to detailed and aggregated data. Although limited and sporadic, some studies in Germany have examined the usefulness of EPCs in building owners' and tenants' decision-making processes regarding renovation and rental, using user surveys and feedback.[24] This enables feedback, transparency and policy evaluation.

5.2 National-level building-related databases and digital building logbooks

Building-related databases that provide an up-to-date, structured and detailed view of the building stock are essential for effective monitoring, reporting and evaluation. They link physical characteristics, energy performance, administrative records and renovation activities at a building level. By integrating data from multiple sources and tracking changes over time, these databases allow authorities to assess the implementation of policy instruments in practice, their reach and their results, moving beyond aggregate indicators. They support the design of targeted policies, the ongoing monitoring of compliance and ex post evaluation, while improving transparency and coordination across public bodies and market actors. Consequently, these databases are a vital foundation for the evidence-based implementation of the EPBD and national building renovation plans. Some good practice examples are listed below.

1. The National Buildings Database (BDNB), France

The Scientific and Technical Centre for Building (CSTB) National Buildings Database is a comprehensive, high-resolution tool for the French building stock, supporting policy implementation and scientific analysis. The database aggregates and cross-references data from more than thirty databases from public bodies.[25] Missing data is often filled with statistical estimates, and the quality of the estimates is labelled. The priorities of the platform include simplifying the planning of infrastructure and networks (water, electricity, fibre, etc.), identifying priority social housing for targeted interventions, modelling urban heat islands and facilitating the energy and broader ecological transitions. The database enables authorities to track energy performance improvements, prioritise deep renovation projects and evaluate the effectiveness of policy measures over time. It also supports tools such as renovation passports and platforms like Go-Rénove,[26] helping homeowners and building managers plan staged renovations that align with national decarbonisation targets. By linking granular, building-level data to regulatory frameworks, the CSTB database provides a critical foundation for evidence-based policymaking, ensuring that environmental and social objectives, such as reducing energy poverty, are addressed efficiently.[27] It also supports the monitoring, reporting and evaluation of measures under the EPBD and national building renovation plans. This ensures that policies are effective and aligned with France's broader energy and ecological transition goals.

24   Hermann Amecke (2011) The Effectiveness of Energy Performance Certificates – Evidence from Germany
25   The National Buildings Database (BDNB)
26   Go Rénove
27   CSTB (2023) Disruptive technology to meet the collective challenges of the building industry

2. Woningpas (Flanders, Belgium)

The Woningpas (Home Passport) is a digital building logbook that contains information held by the Flemish government on a property.[28] Citizens can access this information free of charge via an authenticated login. The Woningpas provides information on various topics, such as the location and layout of buildings, technical installations, environmental performance (including EPCs), soil contamination information, building permits, water and sewerage information, housing quality, glazing and insulation, flood sensitivity and access to amenities (Mobiscore). This information is bundled and provided by multiple public agencies, including the Flemish Energy and Climate Agency (VEKA), the Department of the Environment, the Public Waste Agency of Flanders (OVAM) and the Agency for Infrastructure in Education (AGION). Woningpas retrieves data from these providers via APIs and provides digital safes for storing attestations, plans and other documents. It also enables users to update the information, e.g. when renovation works are implemented. User feedback on Woningpas highlights strong appreciation for tailored renovation guidance, including financial information, collaboration opportunities, and practical, action-oriented insights, for example, how to engage with one-stop shops.[29] Users also express a desire for more proactive communication, particularly regarding regulatory requirements such as renovation obligations, MEPS and fossil-fuel phase-out measures, as well as guidance on how their renovation plans can meet these evolving regulations.

3. e-ehitus ([e-construction] (Estonia))

The e-Ehitus platform is Estonia's national digital building registry, originally established in 2002 to consolidate decentralised databases and improve transparency in the construction sector. The broader aim of the digital building logbooks enabled by the e-construction platform and 3D digital twin is to improve the accessibility and reliability of building life-cycle data, while promoting the use of building information modelling (BIM).[30] Major upgrades in 2014 and 2016 expanded interoperability through map services, links to external databases and the introduction of fully digital permit applications, after which paper submissions ceased. The platform has since added BIM-based permitting, digital usage permits and automated compliance checks. More detailed database queries can be requested via the public portal. A wide range of stakeholders, including insurers, banks, real estate agents and valuers, can access building information, particularly for due-diligence processes such as mortgage approvals and property transactions. The registry currently contains data on approximately 1.5 million buildings and items of infrastructure. Strict penalties for building without permits encourage the maintenance of accurate, up-to-date records.[31] The platform increasingly supports a life-cycle approach. It holds a broad set of data, including administrative information (location, ownership history, building use), geometry and size, construction materials, technical systems, fuel sources and renewable energy installations. Looking ahead, the e-ehitus platform aims to strengthen digital permitting, energy renovation processes and circularity-related data management. The registry can support monitoring, reporting and evaluation functions, and enable more targeted, evidence-based policymaking by providing public authorities with structured access to granular, life-cycle building data under clearly defined data governance and access rights.

28 Woningpas
29 Feedback from an interview with a Woningpas representative
30 e-ehitus (2024) 3D twin of the e-construction platform (E-ehituse platvormi 3D kaksik) & e-ehitus 3D Map User Manual (3D kaardi kasutusjuhend)
31 Building permit application and building notice for a building (Ehitusloa taotlus ja ehitusteatis hoonele) & BIM-based Building Permit Process

5.3 Research initiatives – The OBSERVE project

The OBSERVE project strengthens the implementation of MEPS and NBRPs by helping six Member States to develop national building observatories. These observatories consolidate data from existing data sources, such as EPCs, cadastral systems, household energy surveys and socio-economic indicators. By promoting common methodologies and ensuring data comparability, the project enables seamless integration with the EU BSO and provides national administrations with coherent, actionable data systems. These observatories support the development of realistic, enforceable and socially fair MEPS, and provide the analytical foundation for the preparation of robust NBRPs.[32]

To this end, the project maps national registries and parallel regional or municipal initiatives, examining technical datasets and the institutional frameworks governing data collection, validation and sharing. It then develops standardised data management protocols that allow countries to integrate diverse information sources into comprehensive national building databases. While these observatories are tailored to national administrative contexts, they are also aligned with EPBD and EU BSO requirements. This ensures that Member States use harmonised indicators, making progress on MEPS comparable across the EU. Beyond the technical aspects, OBSERVE enhances governance capacity by documenting best practices and supporting the establishment of long-term institutional arrangements for managing and collating high-quality building-related data. Although initially piloted in six countries, OBSERVE ultimately provides a scalable methodology for EU-wide data harmonisation and monitoring, which is critical for identifying the worst-performing buildings, designing targeted policies and delivering energy efficiency and social benefits.[33]

5.4 EU-level voluntary initiatives: CA EPBD

While Member States are responsible for implementing EPC MRE frameworks, Concerted Action EPBD (CA EPBD) plays a key enabling role by facilitating knowledge exchange, policy coordination and technical learning. Established in 2005, CA EPBD is a structured, collaborative platform that brings together representatives from national ministries and affiliated institutions across EU Member States and Norway to support the effective transposition, implementation and coordination of the EPBD. Its objective is to promote the sharing of information and experiences on national adoption and implementation. CA EPBD[34] helps interpret and operationalise EPBD provisions through thematic groups called central teams, which deal with all aspects of the EPBD and also focus on EPCs (CT2) and renovation passports (CT2 and CT3). Table 3 below shows some of the central teams and their focus areas relevant to the EPBD.wise project.

32 Stavros Spyridakos, Dimitrios Athanasiou and Shima Ebrahimi (2025) The OBSERVE project: supporting the development of mandatory energy performance standards and building renovation plans

33 EU Building Stock Observatory and OBSERVE project webinar (2025) Turning EPBD IV Guidance in to practice: The role of building performance data for Member States

34 Concerted Action EPBD Topics

Deep renovation and renovation passports	CT3 is dedicated to renovation of existing buildings, with a particular focus on achieving deep renovation goals. The team facilitates exchange of information on renovation passports, financing tools, and tracking the implementation of renovation measures against deep renovation targets. In this way, CT3 supports Member States in developing and delivering NBRPs.
Decarbonisation and zero-emission buildings	CT5 focuses on decarbonising buildings, with particular emphasis on transitioning to zero-emission buildings (ZEBs) as the new standard under the revised EPBD. CT5 assists Member States in adapting the ZEB framework to their respective national contexts by providing case studies, expert feedback, and systemic analysis on technical issues such as the energy efficiency first principle, integrating renewable energy sources, reducing operational GHG emissions, and energy flexibility in buildings. The team's work also covers roadmaps with measurable milestones, strategies for phasing out fossil fuel heating systems, and methods for calculating CO_2 emissions. CT5 collaborates with CT6, CT7 and CT8, as well as Concerted Action for the Renewable Energy Directive, CA RES, on renewable energy sources and Concerted Action for the Energy Efficiency Directive, CA EED.
MEPS and trajectories for progressive renovation	CT1 supports Member States in implementing the EPBD provisions on MEPS and the residential renovation trajectory (Article 9). CT1 covers residential and non-residential buildings and collaborates with CT2, CT3 and CT4 (Finance), as well as the CA EED. The team focuses on clarifying MEPS requirements, developing methodological approaches and sharing best practices to enable effective implementation, governance and evaluation.
Renovation passports and energy performance certificates	CT2 focuses on EPCs and building renovation passports. The CA EPBD database can support EPC MRE by offering structured, cross-national insights into implementation practices. It enables benchmarking, highlights common challenges such as fragmented databases or limited audit coverage, and is a discussion forum on the alignment with evolving EU standards. Beyond formal reporting, it provides qualitative intelligence – case studies, expert feedback and systemic analysis – that informs both national improvements and EU-level policy refinement.

Table 3: CA EPBD central teams and thematic topics

CA EPBD provides periodic country reports and thematic reports on the status of EPBD implementation, offering novel ideas and examples of good practice from the Member States (see Figure 16). Unlike formal regulatory mechanisms, its value lies in soft coordination and system-level support. The CA EPBD has also collaborated closely with equivalent platforms on the Energy Efficiency Directive (CA EED) and Renewable Energy Directive (CA RES), exploring the synergies between the three directives.

COUNTRY REPORTS

• Implementation of the EPBD
• Key Indicators & Decisions (KI&Ds)

THEMATIC REPORTS

• CT2 – Renovation passports and EPCs – comparative analysis and recommendations
• CT5 – Decarbonisation and zero –emission buildings
• …

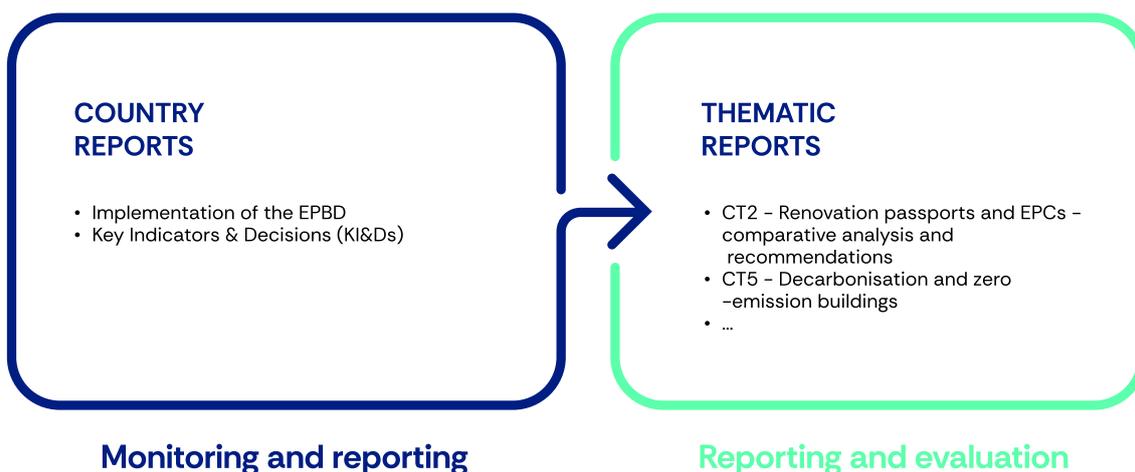**Monitoring and reporting**　　　　**Reporting and evaluation**

Figure 16: CA EPBD reporting mechanisms on the status of EPBD implementation

CONCLUSIONS

This report presents an integrated MRE framework that builds on the EPBD's monitoring, reporting and data-related provisions. Rather than introducing new requirements, the framework organises existing obligations into a structured, coherent approach that supports monitoring, reporting and evaluation of long-term policies.

1 **Agile policymaking: Investing in integrated MRE avoids lock-in effects and allows for flexible adaptations of policies over time. It turns monitoring and reporting from a compliance exercise into a strategic tool for effective policy delivery.**

While the EPBD sets minimum reporting requirements, it gives Member States flexibility to report optional indicators and to design and operate their own monitoring systems and databases. Taking advantage of this flexibility is crucial to ensure that EPBD data serves strategic decision-making as well as compliance purposes.

Supported by good practice examples, the framework encourages the use of structured feedback from users and stakeholders to improve the analysis of the practical functioning, usability and clarity of instruments such as EPCs, renovation passports and smart readiness indicators. Furthermore, it highlights transparency and data accessibility as key elements of effective monitoring, reporting and evaluation. Where consistent with data protection rules, the framework permits the use of anonymised datasets to support research, innovation and independent assessment. This increases the value of building-related data while reducing the duplication of effort in national evaluation and reporting processes.

2 **Connecting objectives to indicators: A coherent and well-designed MRE framework will enhance data collection, quality and management.**

The framework establishes a structured approach that links compliance monitoring with the evaluation of policy objectives by connecting data from multiple EPBD policy

instruments. It clarifies how information collected for reporting purposes can also be used to track renovation progress, oversee policy coverage interactions between instruments and estimate investment needs. By consolidating data collection and management practices, the framework illustrates how Member States can move from fragmented reporting towards a more coherent MRE system without necessarily extending beyond the scope of the Directive. Including optional indicators of NBRPs, EPCs and renovation passports at a national level to support the evaluation process enhances data resolution, quality and management.

3   **Efficient use of data: The national MRE frameworks should make use of existing data sources and databases. EPBD Article 22 should also be implemented in view of improving national MRE.**

The MRE framework should bring together all existing data sources and databases, rather than creating parallel or ad hoc reporting systems. This will help align information requirements across all building-related policies, increase policy coherence across instruments and improve the transparency of the policy-making process. EPBD Article 22 therefore acts as a strategic lever for strengthening the national MRE framework. While Article 22 establishes specific requirements on data collection and access, its effective implementation requires decisions on data governance, indicators selection, institutional responsibilities etc. that have implications beyond EPBD reporting alone. If approached strategically, An integrated MR&E framework enables Member States to elevate monitoring, reporting and evaluation from a compliance-driven process to an effective instrument for evidence-based policymaking.

4   **Leveraging digital building logbooks: Digital building logbooks enable bottom-up monitoring by consolidating building-level information e.g. on metered energy consumption, construction materials and renovation.**

Digital building logbooks bring together information gathered by various stakeholders and systems throughout a building's life cycle, creating a unified digital record. Where possible, Member States could use this data to supplement the MRE indicators. This would help minimise data redundancy and reduce the effort required for data collection, while also simplifying governance structures in terms of roles and responsibilities. It also facilitates consistent access to building data, supporting coordination and decision-making across the construction sector as digital building logbooks become more widely available over time.

5   **Concerted action: An integrated MRE framework will ease policymaking across different governance levels.**

The framework recognises that MRE activities involve multiple authorities and governance levels. It therefore emphasises the importance of clearly defined roles, responsibilities and data flows across local, regional and national administrations. By structuring monitoring and reporting pathways within the framework, monitoring activities carried out at sub-national levels can be aggregated and used more effectively at national level, supporting quality, consistency and accountability.

7

REFERENCES

Dx.2 country specific policy recommendations and Dx.3 policy guidelines summary

Carolina R. Haddad, Anna Bergek. 2023 Towards an integrated framework for evaluating transformative innovation policy. Carolina R. Haddad, Anna Bergek. 2023 Towards an integrated framework for evaluating transformative innovation policy.

Jonas J. Schoenefeld, Mikael Hildén and Sara-Tuuli Siiskonen. (2025) The challenge of monitoring policy mixes for reducing emissions from buildings.

OECD (2024) Global Monitoring of Policies for Decarbonising Buildings. A Multi-level Approach.

OECD (2025) Implementation Toolkit for the OECD Recommendation on Public Policy Evaluation.

OECD (2020) Improving Governance with Policy Evaluation: Lessons From Country Experiences.

European Commission (2025) NBRP annotated templates.

Gokarakonda and Bankert (2024) Accelerating deep renovation in the EU with renovation passports

Sriraj Gokarakonda, Maike Venjakob and Stefan Thomas (2020) EPC situation and cross-country comparison matrix.

Sustainable Energy Authority of Ireland (SEAI) National BER Research Tool

Aitor Domínguez Martin (2021) Implementation of the EPBD in Spain (Status in 2016)

Publications Office of the European Union (2023) Progress on the Implementation of Energy Performance Certificates in EU

Jonathan Volt et al. (2020) Energy Performance Certificates – Assessing Their Status and Potential

JORF n°0145 du 21 juin 2024

ZEUS-ZEUS – Online-Datenbank Zur Verwaltung von Energieausweisen

Ministry of Energy and Infrastructure – Register of Energy Inspectors & Archive of Energy Inspections

Hermann Amecke (2011) The Effectiveness of Energy Performance Certificates - Evidence from Germany

The National Buildings Database (BDNB)

Go Rénove

CSTB (2023) Disruptive technology to meet the collective challenges of the building industry

Woningpas

e-ehitus (2024) 3D twin of the e-construction platform (E-ehituse platvormi 3D kaksik) & e-ehitus 3D Map User Manual (3D kaardi kasutusjuhend)

Building permit application and building notice for a building (Ehitusloa taotlus ja ehitusteatis hoonele) & BIM-based Building Permit Process

Stavros Spyridakos, Dimitrios Athanasiou and Shima Ebrahimi (2025) The OBSERVE project: supporting the development of mandatory energy performance standards and building renovation plans

EU Building Stock Observatory and OBSERVE project webinar (2025) Turning EPBD IV Guidance in to practice: The role of building performance data for Member States

Concerted Action EPBD Topics

ANNEX

The table below illustrates how KPIs are derived from the policy objectives of the EPBD (see Table 4).

Zero-emission buildings				
Thematic area of the policy objective	**Specific policy objective**	**EPBD reference**	**KPI definition**	**Links to the existing MRE requirements according to Annex II template[35]**
1. Climate neutrality	Complete elimination of on-site carbon emissions from fossil fuels in new buildings or renovated ZEBs	Recitals 7, 20; Article 2(2); Article 11(1)	The elimination of fossil fuel-based heating and cooling systems in new buildings	(c) (f) the decarbonisation of heating and cooling, including through efficient district heating and cooling networks, and the phasing out of fossil fuels in heating and cooling with a view to a complete phasing out of fossil fuel boilers by 2040
	Transition from nearly zero-energy to zero-emission buildings	Recital 45; Article 7(1); Article 2(20)	The remaining fossil fuel-based heating and cooling systems in existing buildings are being phased out	
2. Energy efficiency and renewable energy integration	Reduce energy demand and maximise the use of renewables and carbon-free sources	Recital 22; Article 10, Article 11(7)	Share of energy from renewable or carbon-free sources in the building sector	(a) optional indicator – Share of renewable energy in the building sector (MW installed or GWh generated): on-site
3. Digitalisation, smart readiness and energy system integration	Complete elimination of on-site carbon emissions from fossil fuels in new buildings or renovated ZEBs	Recitals 7, 20; Article 2(2); Article 11(1)	The elimination of fossil fuel-based heating and cooling systems in new buildings	(c) (f) the decarbonisation of heating and cooling, including through efficient district heating and cooling networks, and the phasing out of fossil fuels in heating and cooling with a view to a complete phasing out of fossil fuel boilers by 2040
	Transition from nearly zero-energy to zero-emission buildings	Recital 45; Article 7(1); Article 2(20)	The remaining fossil fuel-based heating and cooling systems in existing buildings are being phased out	"

35   Additionally, links to other MRE requirements (e.g. the EU BSO), other directives (e.g. the EED) and other national obligations can be included here.

MEPS and national trajectories				
1. Decarbonisation of non-residential buildings (MEPS)	Drive large-scale renovation of worst-performing non-residential buildings	Article 9(1); Recitals 25–26	MEPS enables identification and renovation of worst-performing buildings and prioritises them for renovation	(c)(b) national minimum energy performance standards (f) Minimum energy performance standards for non-residential buildings
2. Progressive renovation of residential stock (trajectories)	Achieve fully decarbonised and zero-emission EU residential building stock sticking at least to a national renovation trajectory	Article 9(2); Recitals 27–29	The Member State demonstrates, through verified national data and monitoring systems, that the residential building stock follows or outperforms the reduction trajectory	(a) Number of buildings and total floor of the 43 % worst-performing residential buildings (g) National trajectory for the progressive renovation of the residential building stock
Renovation passports				
1. Structured investment planning and financial feasibility	RPs help to overcome the upfront cost barrier by enabling staged renovation	Recital 42; Article 12(5)	Availability of RP related financing	(b); (c) optional indicators
	RPs enable informed decision-making by building owners and investors	Article 12(4–5)	RPs provide building owners with the information they need to invest in deep renovations and help tenants choose energy-efficient buildings	(b); (c) optional indicators
	Ensure the accuracy, consistency and credibility of RP data through independent quality assurance and control mechanisms	Article 27	RPs are considered trustworthy by consumers (owners and investors) to make their decisions	(b); (c) optional indicators – renovation passports
	Support for worst-performing buildings and social equity	Article 12(2); Recitals 46	Availability of RP and energy poverty related financing	(c)(d) empowering and protecting vulnerable customers and the alleviation of energy poverty
2. Policy integration and governance	Interoperability and integration with EPCs and synergies with other instruments	Article 12(4,6–8); Article 17; Article 22	The degree to which RPs are integrated with digital building logbooks and one-stop shop portals, as well as other technical and financial assistance platforms	(b); (c) optional indicators – renovation passports
	Support for monitoring and renovation governance	Article 3(2); Recitals 41–44	RPs help Member States to plan and govern the NBRP more effectively	(b); (d) calculation of investment needs; EU BSO Table 22
		Recitals 24, 42; Article 19(9,10)	RPs help Member States to align with long-term climate targets	EU BSO Table 22
		EED Article 6(a) [36]	Number of RPs issued for public buildings	(a) Annual renovation rates: number and total floor area (m2) – public buildings (b); (c) optional indicators – renovation passports/public buildings

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36 The EED permits an alternative approach to the requirement for 3% of the total floor area of heated and/or cooled buildings owned by public bodies to be renovated each year and transformed into nearly zero-energy or zero-emission buildings. When renovation passports are introduced, renovation to a nearly zero-energy standard must be achieved by 2040 at the latest.

Energy performance certificates				
1. Consumer empowerment and trustworthiness	EPCs enable informed decision-making by building owners and investors	Recital 67; Article 19 (7–10); Article 20(2–4)	EPCs provide building owners with the information they need to invest in deep renovations and help tenants choose energy–efficient buildings.	(c) (p) awareness-raising campaigns and other advisory tools
	Ensure the accuracy, consistency and credibility of EPC data through independent quality assurance and control mechanisms	Recital 74: Article 25(1); Article 19(4); Annex VI	EPCs are considered trustworthy by consumers (owners and investors) to make their decisions.	(a) market barriers and market failures – awareness (c) (n) addressing market barriers and market failures
2. Market transparency and financial mobilisation	EPCs facilitate sustainable finance through use in green mortgages, EU taxonomy-aligned investments and risk assessments by financial institutions.	Recitals 60–61, 65: Recitals 65–66: Article 19(1–2); Annex V	Financial institutions use EPCs for investment and lending decisions	(a) Market barriers and failures – financial
3. Policy governance and renovation action	EPCs help trigger renovation action and ensure long-term alignment with climate goals	Recitals 24 & 67; Article 12(3); Article 19(5–10); Annex VIII	Together, EPCs and renovation passports facilitate and accelerate deep renovation of buildings	(c) the promotion of deep renovation of buildings, including staged deep renovation
	EPCs empower vulnerable households by helping them to reduce their energy consumption and take action to renovate their homes	Article 17 (18); Article 19 (4)	Number of EPCs issued to vulnerable households	(c) (d) empowering and protecting vulnerable customers and the alleviation of energy poverty (…)
	EPCs reflect awareness of the climate impact and life-cycle performance of buildings and building stock	Article 19(1), Annex V; Recitals 9, 65	Life-cycle GWP information provided on EPCs	Mandatory elements on the EPC's front page (a), (b), (c), (d), (e)
	Enable digitalisation and data interoperability	Articles 20(1), 22(1, 7); Recital 68	EPCs are interoperable with building logbooks, cadastres and other data systems.	(a) market barriers and market failures – technical (q) promotion of modular and industrialised solutions for construction and building renovation
	EPCs enable policy monitoring and governance integration	Article 22(1–6); Articles 3, 19; Recitals 3, 41, 68	Number of EPCs issued	(a) Number of EPCs issued, in particular for existing buildings

Table 4: *Deriving KPIs from policy objectives and linking them to Annex II reporting requirements*

The table below illustrates the framework discussed in Chapter 4, applying different policy instruments within the scope of the EPBD.wise project.

Objectives				Evaluation				Monitoring						Reporting				Effort level for KPI
Thematic area	Specific policy objectives	KPI	Links to the existing MRE requirements according to Annex II template[37]	Evaluation criteria	Evaluation method	Evaluation metrics	Data point or value that indicates success	Data sources	Data format	Frequency of data collection	Data storage (where and how?)	Responsible body for data generation/input	Responsible body for data collection	Reporting entity	Reporting frequency	Reporting channel / EU/national reporting linkages (mandatory/voluntary/proposed)	Reporting format	Overall implementation complexity, administrative burden
Energy performance certificates																		
Consumer empowerment and trustworthiness	EPCs enable informed decision-making by building owners and investors	EPCs provide building owners with the information they need to invest in deep renovations, and help tenants choose energy-efficient buildings.	NBRP (c)(p) awareness-raising campaigns and other advisory tools	User awareness and comprehension – action based on EPC recommendations	Qualitative user research and behavioural impact studies based on periodic user surveys	Behavioural Intent Index: Percentage of users expressing intent to implement the recommendations within a defined period (based on a survey).	High index (e.g., higher than 7 on a scale of 1 to 10)	Surveys, focus group sessions, one-stop-shop interaction logs	Digital or digitised paper records	Every two to three years	As a part of EPC database	National energy agencies, EPC administration authorities and academic institutions	EPC administration authorities	EPC administration authorities	Every two to three years	EPC registries or linked portals	Reports, raw data from the surveys	
	User perception on the accuracy, consistency and credibility of EPC [38]	EPCs are considered trustworthy by consumers (owners and investors) to make their decisions.	NBRP (a) market barriers and market failures – awareness & (c) (n) addressing market barriers and market failures	User awareness and comprehension – action based on EPC recommendations	Qualitative user research and behavioural impact studies based on periodic user surveys	Behavioural Intent Index: Percentage of users expressing intent to implement the recommendations within a defined period (based on a survey).	High index (e.g., higher than 7 on a scale of 1 to 10)	Surveys, focus group, one-stop-shop interaction logs	Digital or digitised paper records	Every two to three years	As a part of EPC database	National energy agencies, EPC administration authorities and academic institutions	EPC administration authorities	EPC administration authorities	Every two to three years	EPC registries or linked portals	Reports, raw data from the surveys	
Market transparency and financial mobilisation	EPCs facilitate sustainable finance through use in green mortgages, EU taxonomy-aligned investments, and risk assessments by financial institutions.	Financial institutions use EPCs for investment and lending decisions	(a) Market barriers and failures – financial	EPC-linked financing products and green mortgage adoption	Market research, financial stakeholder interviews and surveys	% of lending institutions using EPCs in credit decisions / Volume of EPC-linked green mortgages / EPC use in EU Taxonomy screening / Perceived reliability/usefulness of EPCs	More than x% of lending institutions use EPC in credit decisions / High volume of EPC-linked green mortgages / Stakeholders express high usefulness of EPCs	Bank data, lending institutions, taxonomy reporting, financial institutions and public subsidy portals	Bank portals, grant applications, linked databases (CSV/XML)	Bi-annually	As a part of EPC database	National energy agencies, EPC administration authorities and academic institutions	EPC administration authorities	EPC experts; financial bodies or bank portals, grant applications, linked databases	Ad hoc or periodic	EPC registries or linked portals, such as green finance schemes	Structured data format	
Policy governance and renovation action	EPCs help trigger renovation action and ensure long-term alignment with climate goals	Together, EPCs and renovation passports facilitate and accelerate deep renovation of buildings	(a) Market barriers and failures – awareness (c) the promotion of deep renovation of buildings, including staged deep renovation;		Qualitative user research and behavioural impact studies based on periodic user surveys	Behavioural Intent Index: Percentage of users expressing intent to implement the recommendations within a defined period (based on a survey).	High index (e.g., higher than 7 on a scale of 1 to 10)	Surveys, focus group sessions, one-stop-shop interaction logs	Digital or digitised paper records	Every two to three years	As a part of EPC database	National energy agencies, EPC administration authorities and academic institutions	EPC administration authorities	EPC administration authorities	Every two to three years	EPC registries or linked portals	Reports, raw data from the surveys	
	EPCs empower vulnerable households by helping them to reduce their energy consumption and take action to renovate their homes	Number of EPCs issued to vulnerable households	(c) (d) empowering and protecting vulnerable customers and the alleviation of energy poverty(...)	User awareness and comprehension – action based on EPC recommendations	Quantitative and qualitative	Number of EPCs issued to vulnerable households / Behavioural Intent Index: Percentage of users expressing intent to implement the recommendations within a defined period (based on a survey).	Quantitative: EPC database / Qualitative: High index (e.g., higher than 7 on a scale of 1 to 10)	Surveys, focus group sessions, one-stop-shop interaction logs	Digital or digitised paper records	Every two to three years	As a part of EPC database	National energy agencies, EPC administration authorities and academic institutions	EPC administration authorities	EPC administration authorities	Every two to three years	EPC registries or linked portals	Reports, raw data from the surveys	
	Enable digitalisation and data interoperability	EPCs are interoperable with building logbooks, cadastres and other data systems.	(a) market barriers and market failures – technical (q) promotion of modular and industrialised solutions for construction and building renovation	EPC databases and encourage interoperability with other databases	Number of databases, including cadastres, digital building logbooks and secondary materials databases, that are connected to and interoperable with the EPC registry	Quantitative – number of connections that have been established	At least # of connections have been established	EPC database	Machine readable	Annual	EPC registry or the national database for energy performance of buildings	National energy agencies, EPC administration authorities and academic institutions	EPC administration authorities	EPC administration authorities	Every two to three years	EPC registries or linked portals	Reports, raw data from the surveys	
	EPCs enable policy monitoring and governance integration	Number of EPCs issued	(a) Number of EPCs issued, in particular for existing buildings	–	Quantitative	Number of EPCs issued for existing buildings	At least # number of EPCs issued for existing buildings	EPC database	Machine readable	Annual	EPC registry or the national database for energy performance of buildings	National energy agencies, EPC administration authorities and academic institutions	EPC administration authorities	EPC administration authorities	Every two to three years	EPC registries or linked portals	Reports, raw data from the surveys	

37 Additionally, links to other MRE requirements (e.g. the EU BSO), other directives (e.g. the EED) and other national obligations can be included here.

38 This is in addition to the independent quality assurance and control mechanisms mandated by the EPBD

	Objectives			Evaluation				Monitoring						Reporting				Effort level for KPI
Thematic area	Specific policy objectives	KPI	Links to the existing MRE requirements according to Annex II template	Evaluation criteria	Evaluation method	Evaluation metrics	Data point or value that indicates success	Data sources	Data format	Frequency of data collection	Data storage (where and how?)	Responsible body for data generation/ input	Responsible body for data collection	Reporting entity	Reporting frequency	Reporting channel / EU/national reporting linkages (mandatory/ voluntary/ proposed)	Reporting format	Overall implementation complexity, administrative burden
Renovation passports																		
	RPs help to overcome the upfront cost barrier by enabling staged renovation	Availability of RP related financing	EU BSO (b); (c) optional indicators; calculation of (d) investment needs	RP-linked financing products and green mortgage adoption	Market research, financial stakeholder interviews and surveys	Percentage of buildings that have completed each stage of renovation (first, second, third, etc.).	Percentage of buildings that have completed at least first stage of renovation	One-stop-shops, lending institutions that rely on RPs, financial schemes linked to RPs	Machine readable, or paper format	Annually	National database for energy performance of buildings	RP issuers, banks or financial institutions	RP administration authorities.	RP issuers, financial bodies or bank portals, grant applications, linked databases	Ad hoc or periodic	NBRP/national reports	Reports, machine readable data	
	RPs enable informed decision-making by building owners and investors		RP administration authorities	RPs provide building owners with the information they need to invest in deep renovations, and help tenants choose energy-efficient buildings	User awareness and comprehension – action based on RP recommendations and data	Qualitative user research and behavioural impact studies based on periodic user surveys	NBRP (c)(p) awareness-raising campaigns and other advisory tools	Behavioural Intent Index: Percentage of users expressing intent to implement the recommendations within a defined period (based on a survey).	Surveys, focus group sessions, one-stop-shop interaction logs	Every two to three years	Digital or digitised paper records	As a part of RP database	National energy agencies, RP administration authorities and academic institutions	High index (e.g., higher than 7 on a scale of 1 to 10)	RP administration authorities	Every two to three years	RP registries or linked portals	
	Ensure the accuracy, consistency, and credibility of RP data through independent quality assurance and control mechanisms	RPs provide building owners with the information they need to invest in deep renovations, and help tenants choose energy-efficient buildings.	NBRP (a) market barriers and market failures – awareness & (c) (n) addressing market barriers and market failures	RPs provide building owners with the information they need to invest in deep renovations, and help tenants choose energy-efficient buildings	User awareness and comprehension – action based on RP recommendations and data	Qualitative user research and behavioural impact studies based on periodic user surveys	NBRP (c)(p) awareness-raising campaigns and other advisory tools	Behavioural Intent Index: Percentage of users expressing intent to implement the recommendations within a defined period (based on a survey).	Surveys, focus group sessions, one-stop-shop interaction logs	Every two to three years	Digital or digitised paper records	As a part of RP database	National energy agencies, RP administration authorities and academic institutions	High index (e.g., higher than 7 on a scale of 1 to 10)	RP administration authorities	Every two to three years	RP registries or linked portals	
	Interoperability and integration with EPCs and synergies with other instruments	The degree to which RPs are integrated with digital building logbooks and one-stop-shop portals, as well as other technical and financial assistance platforms.	(b); (c) optional indicators	Extent of digital and procedural integration between RP databases and digital building logbooks, one-stop-shop portals or financial assistance schemes	Quantitative review of system integration (API connections, shared data fields) Qualitative stakeholder interviews (one-stop-shop managers, RP issuers).	1. Integration rate: % of one-stop shop and financial schemes digitally interoperable with the RP database. 2. Functional interoperability index: Number of active data exchanges (e.g. funding links, application forms auto-filled). 3. Joint issue of EPCs and RPs	At least 70% of RP users access financing information through one-stop shop-linked interfaces by 2030	RP national platform logs One-stop-shop and financing portal databases. User interaction analytics Surveys of RP users and one-stop-shop advisors.	Digital, machine-readable (XML, JSON, CSV). Integration supported by common identifiers (e.g. building ID, owner ID)	Ad hoc or periodic or on demand	RP database	Automatic when systems are in place	National energy agencies (RP management)	RP issuers, financial bodies or bank portals, grant applications, linked databases	Ad hoc or periodic	NBRP/national reports	Reports, raw data from surveys and other machine readable data	
	Support for monitoring and renovation governance	RPs help Member States to plan and govern the renovation roadmap more effectively	(b); (d) calculation of investment needs; EU BSO Table 22	Extent to which RPs contribute to national and regional MRE of renovation progress and investment planning	Quantitative analysis of RP datasets integrated into national MRE systems. Comparison of RP-based renovation tracking vs. administrative or EPC-based data.	1. RP data utilisation rate: % of national renovation indicators (e.g. rate, depth, cost) derived from RP database. 2. Governance adoption index: Number of public authorities actively using RP dashboards or analytics tools 3. Investment calibration accuracy: Correlation between RP-derived cost estimates and actual financing allocations		RP national platform logs One-stop-shop and financing portal databases. User interaction analytics Surveys of RP users and one-stop-shop advisors.	Digital, machine-readable (XML/ JSON). Shared identifiers for building and renovation measures to ensure traceability.	Annual aggregation for MRE and NBRP reporting cycle	RP database	Automatic when systems are in place; RP administration authorities	National energy agencies; RP administration authorities	RP administration authorities	Annual or bi-annual	NBRP/national reports	Reports, raw data from surveys and other machine readable data	

	Objectives			Evaluation				Monitoring						Reporting				Effort level for KPI
Thematic area	Specific policy objectives	KPI	Links to the existing MRE requirements according to Annex II template	Evaluation criteria	Evaluation method	Evaluation metrics	Data point or value that indicates success	Data sources	Data format	Frequency of data collection	Data storage (where and how?)	Responsible body for data generation/ input	Responsible body for data collection	Reporting entity	Reporting frequency	Reporting channel / EU/national reporting linkages (mandatory/ voluntary/ proposed)	Reporting format	Overall implementation complexity, administrative burden
Zero-emission buildings																		
Climate neutrality and life-cycle decarbonisation	Complete elimination of operational fossil fuel emissions in new buildings	The elimination of fossil fuel-based heating and cooling systems in new buildings, and the phasing out of these systems in existing buildings	(e) Thresholds of new and renovated zero-emission buildings, referred to in Article 11	Share of ZEBs in the total building stock	Statistical analysis based on EPC records etc.	% of ZEBs in the total building stock	At least #% of ZEBs in the total building stock	EPC database, permits for new buildings and other buildings-related databases.	Digital, machine-readable (XML/JSON). Shared identifiers for building and renovation measures to ensure traceability	Ad hoc or periodic	National database for the energy performance of buildings							
	Transition to zero-emission buildings	The remaining fossil fuel-based heating and cooling systems in existing buildings are being phased out	(a) Annual renovation rates: number and total floor area (m2) to nearly zero-energy and/or to zero-emission building levels; (e) Thresholds of new and renovated zero-emission buildings, referred to in Article 11	Share of buildings renovated to ZEB levels; Share of buildings with fossil fuel-based heating and cooling systems	Statistical analysis based on EPC records etc.	% of buildings renovated to ZEB levels; % of buildings with fossil fuel-based heating and cooling systems	At least #% of buildings renovated to ZEB levels; % of remaining buildings with fossil fuel-based heating and cooling systems	EPC database and other sources	Digital, machine-readable	Ad hoc or periodic	National database for the energy performance of buildings							
Energy efficiency and renewable energy integration	Reduce energy demand and maximise the use of renewables	Increased share of renewable energy in the building sector's total energy consumption over time	(a) optional indicator – Share of renewable energy in the building sector (MW installed or GWh generated): on-site	Share of renewable energy in the building sector	Quantitative analysis	% of renewable energy in the building sector	At least #% of renewable energy in the building sector	Annual energy statistics; EPCs and other sources	Digital, machine-readable	Ad hoc or periodic	National database for the energy performance of buildings	National energy agencies, EPC administration authorities or EPC issuers	National energy agencies, EPC administration authorities	National energy agencies	Annually	NBRP/national reports	Reports, raw data in machine readable format	
Digitalisation, smart readiness and energy system integration	Enhance system flexibility and demand-response capacity	Relevant SRI indicator	(c)(m) the promotion of smart technologies and infrastructure for sustainable mobility in buildings;	ZEBs ensure the flexibility of a building's overall energy demand	Quantitative – ZEBs with demand flexibility	Number of ZEBs with demand flexibility	At least #% of ZEBs have demand flexibility	Relevant SRI indicator	Digital, machine-readable	Ad hoc or periodic	National database for the energy performance of buildings							
	Compatibility with smart technologies, building automation and renewable technologies	Relevant SRI indicator	(c)(m) the promotion of smart technologies and infrastructure for sustainable mobility in buildings;	ZEBs ensure the flexibility of a building's overall energy demand	Quantitative – ZEBs with demand flexibility	Number of ZEBs with demand flexibility	At least #% of ZEBs have demand flexibility	Relevant SRI indicator	Digital, machine-readable	Ad hoc or periodic	National database for the energy performance of buildings							
Minimum energy performance standards and trajectories																		
Decarbonisation of non-residential buildings (MEPS)	Drive large-scale renovation of worst-performing non-residential buildings	MEPS enables identification of worst-performing buildings and prioritises them for renovation	(c)(b) national minimum energy performance standards; (f) Minimum energy performance standards for non-residential buildings; (c) (n) addressing market barriers and market failures	Member States put in place measures to identify worst-performing buildings and ensure the 16% and 26% threshold targets, for example through EPCs and other instruments.	Qualitative – the number of measures; and quantitative – the type of measures	The number and type of monitoring mechanisms	At least # number of mechanisms and at least of # types	National EPBD transposition legislation. Public authorities responsible for EPBD implementation, and renovation in general including municipalities	This information is obtained from documentary sources and subsequently digitised and catalogued for MRE purposes	Ad hoc or periodic	NBRP reporting database. National database for the energy performance of buildings	National and regional governments	EPBD implementing authority (in particular Article 9)	EPBD implementing authority (in particular Article 3)	Annually	NBRP/national reports	Reports (digital or paper)	
Progressive renovation of residential stock (trajectories)	Ensure the decarbonisation of the EU residential building stock sticking at least to a national renovation trajectory	The Member State demonstrates, through verified national data and monitoring systems, that the residential building stock follows or outperforms the reduction trajectory	(a) Number of buildings and total floor area of the 43% worst-performing residential buildings; (g) National trajectory for the progressive renovation of the residential building stock	Member States put in place measures to identify the worst-performing buildings and to ensure the achievement of the target of a 55% reduction in energy consumption resulting from the renovation of the 43% worst-performing buildings.														

Table 5: Proposal for an integrated EPBD.wise MRE framework

EPBD.wise

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Agência para a Energia

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ENERGY RESEARCH

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Buildings Europe

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