EPBDwise

BRINGING EUROPEAN BUILDING POLICY TO LIFE

Development of Energy Performance Certificates: Policy Guideline Summary

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About EPBD.wise

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

For more information, visit the **EPBD.wise website.**

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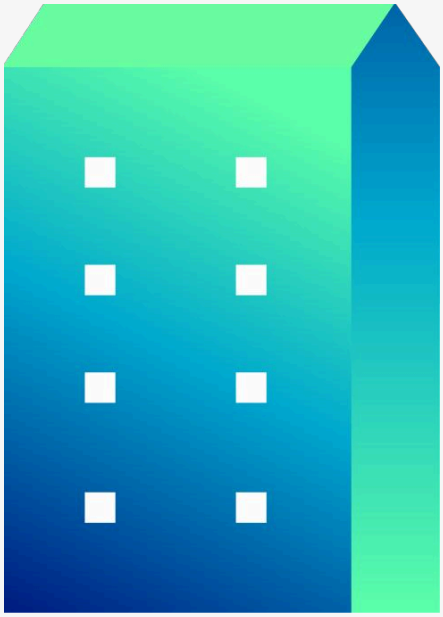
EXECUTIVE SUMMARY



This document provides an operational framework to support Member States in upgrading energy performance certificate (EPC) systems as a key instrument for implementing the recast Energy Performance of Buildings Directive (EPBD). Based on the EPBD.wise analysis of Bulgaria, Greece, Hungary and Poland, it confirms that EPCs must be positioned at the centre of EU building policy delivery, supporting enforcement of minimum energy performance standards, national building renovation plans, zero-emission building (ZEB) targets, renovation financing and policy monitoring.

The comparative assessment highlights that Member States, irrespective of their institutional context, face **common structural bottlenecks**: insufficiently integrated EPC databases, weak quality assurance and professional capacity, limited actionability of recommendations, and low public awareness. At the same time, implementation maturity varies significantly across countries and EPC system components, underlining the need for **differentiated and sequenced policy responses.**

To respond to this challenge, the deliverable introduces a **replication and clustering framework** structured around four policy pillars: governance, core EPC scheme, support functions and communication/perception. Clear implementation levels and tailored recommendations allow Member States to **self-position**, prioritise reforms and deploy proportionate measures aligned with EPBD requirements, based on **concrete good practices identified**.

A series of general recommendations can be derived from this work:

- **Consolidate EPC databases and governance** by introducing or upgrading centralised, interoperable registers that cover the entire building stock. Ensure data quality and clearly allocate institutional responsibilities for EPC management and enforcement, supported by data exchange protocols when there are regional responsibilities.
- **Standardise EPC calculation methods and indicators** by using harmonised input data and primary energy metrics (i.e., thresholds for primary energy use per unit of reference floor area per year, in kWh/(m²·y), anchored on the ZEB definition), alongside operational greenhouse gas indicators. Develop transparent rescaling rules, supported by digital tools with automated validation, to enable smoother integration with rescaled A–G classes and database requirements. Refine monthly and annual averages and other fixed assumptions by calibrating them against national building stock data, while exploring hybrid approaches that use hourly profiles for high-impact buildings.
- **Strengthen the design of EPC recommendations** by moving from generic, checklist-type measures to building-specific, cost-effective renovation packages that are sequenced over time. These should be explicitly linked to one-stop shops, renovation passports and financial support schemes, while using renovation passports for additional information on recommendations. They should feature graphic roadmaps to ZEB 2050 standards with cost/savings estimates per step, tailored to the building owner.
- **Establish structured training and accreditation for EPC experts** by creating national registers, delivering compulsory initial training with practical components, and introducing examinations that combine written and practical assessment of core EPBD and building-physics topics, post-certification training and recertification.
- **Introduce independent EPC quality control systems** by setting up statistically robust sampling of certificates, risk-based sampling, automated software checks, and onsite checks (including virtual means if applicable). Priority should be given to pedagogical and specific support to independent experts, backed by clear penalty regimes for non-compliance and feedback loops to improve tools and training.
- **Develop national EPC communication and awareness strategies** by launching multi-channel campaigns that explain benefits beyond administrative compliance, visibly linking EPCs to renovation incentives and advisory services, and showcasing real renovation case studies and achieved savings. Pair rescaling with targeted communication campaigns to improve public perception, familiarising users with the new A–G classes through clear comparisons with existing labels, highlighting benefits like better renovation guidance and financing access.
- **Embed EPCs in monitoring, reporting and evaluation frameworks**, ensuring that EPC data is systematically used to assess policy effectiveness, renovation uptake and progress towards zero emission buildings.

This document provides policymakers with a **practical, country-profile-specific and policy-aligned tool** for strengthening EPC systems. By bridging EU-level objectives with national implementation realities, it contributes directly to accelerating building renovation, improving policy effectiveness and achieving the EPBD's long-term objective of a **zero-emission building stock.**

LIST OF

ABBREVIATIONS AND ACRONYMS

CPD	Continuing professional development
EPBD	Energy Performance of Buildings Directive
EPC	Energy performance certificate
GHG	Greenhouse gas
MEPS	Minimum energy performance standards
NBRP	National building renovation plan
ZEB	Zero-emission building

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INTRODUCTION

1.1 Scope, objectives and structure

This report presents a summary of policy guidelines for energy performance certificate (EPC) systems, in light of the Energy Performance of Buildings Directive (EPBD) requirements. It builds upon the in-depth analysis of four focus countries (Bulgaria, Greece, Poland and Hungary) conducted previously in EPBD.wise. The report synthesises findings and derives a replicable framework recognising the diversity of implementation contexts across countries.

For context, a brief analysis of the interactions between EPCs and other EPBD policy instruments is presented. Subsequent chapters focus on policy needs and priorities identified in the focus countries, replication decision tools, and clustering of countries based on different criteria. The final section includes a summary of monitoring and reporting recommendations to ensure smooth implementation.

1.2 Summary of interactions between EPCs and other policy instruments

EPCs are pivotal to EPBD policy instruments: they provide support for compliance verification with minimum energy performance standards (MEPS), can be issued jointly with renovation passports (in which case, renovation passport measures replace EPC recommendations for energy performance improvement), anchor zero-emission building (ZEB) definitions in class A, identify class G worst-performing buildings for national building renovation plans (NBRPs) and Article 9(2) target achievement, feed machine-readable data into digital building logbooks, can trigger financial support especially for vulnerable households, and underpin quality controls and public awareness. Through centralised databases, EPCs enable evidence-based planning, monitoring of renovation trajectories, targeting of energy poverty, and interoperability across building, neighbourhood, local and national levels. If EPC databases are representative for the whole building stock, they can also support the definition of MEPS thresholds and national trajectories.

The following table summarises the overall interactions between EPCs and other EPBD policy elements and their respective policy implications:

Table 1: Interactions between EPCs and other EPBD policy elements

Policy instrument / element	Functional level	Primary function	Interaction with EPCs	Policy implications
Minimum energy performance standards (MEPS)	Regulatory enforcement	Define and enforce minimum energy performance thresholds for buildings	EPCs can be used to check compliance with MEPS; energy classes (A-G) can be directly linked to MEPS thresholds; representative EPC databases can support MEPS thresholds and national trajectories	EPCs operationalise MEPS by providing measurable, comparable performance data for enforcement
Renovation passports	Building-level execution and target alignment	Provide stepwise renovation roadmaps for individual buildings	EPCs can be issued jointly with renovation passports; renovation passport improvement measures may replace EPC recommendati ons in some cases	EPCs and renovation passports together guide and track deep renovation, aligning building upgrades with policy targets
Zero-emission buildings (ZEBs)	Strategic benchmark	Set a common energy performance and low or no carbon emissions standard (Class A)	EPC energy classes are anchored to ZEB definitions; Class A corresponds to ZEB; EPCs signal ZEB achievement	EPCs communicate ZEB status and progress, supporting national and EU decarbonisation goals
National building renovation plans (NBRPs)	National strategy	Define national trajectories and targets for building stock	EPCs identify worst-performing buildings (Class G) and track progress towards NBRP targets, in particular Article 9 (2) targets for worst-performing residential buildings	EPCs provide data for planning, monitoring, and reporting under NBRPs and Article 9 (2).

Policy instrument / element	Functional level	Primary function	Interaction with EPCs	Policy implications
Digital building logbooks	Data integration	Aggregate building data for policy and financing	EPCs are integrated into digital building logbooks, providing standardised, machine-readable performance data	EPCs enable interoperability and data-driven policy/funding decisions
Quality assurance and control	System reliability	Ensure reliability and validity of EPCs	EPCs are subject to independent control systems, third-party verification and statistical sampling	EPCs' credibility and policy impact depend on robust quality control
Financial support and affordability	Social equity	Support vulnerable households and promote uptake	EPCs may trigger financial support; affordability measures are linked to EPC issuance and recommendati ons	EPCs help target and monitor financial support, ensuring equitable policy implementation
Public information and awareness	Communication	Raise awareness and promote energy efficiency	EPCs serve as the main communication tool for building energy performance, including greenhouse gas (GHG) emissions,	EPCs drive public engagement and informed decision-making

1.3 Wrap-up of policy needs and priorities in EPBD.wise

Previously in the EPBD.wise project, several main categories of policy needs were identified for EPC systems across focus countries: rescaling and calculation methodology; databases; training and auditor capacitation; quality control; integration of other indicators/schemes; recommendations; and communication/perception.

Building on the EPBD.wise analysis and policy needs identification, a set of common policy priorities for strengthening EPC systems in Member States can be identified, irrespective of the specific institutional context.

The most frequent priorities include simplifying and improving EPC calculation methodologies and software tools; redesigning and rescaling EPCs; reinforcing and modernising national EPC databases; investing in sustained training and upskilling of experts; strengthening quality-control mechanisms; integrating new indicators and schemes (such as the smart readiness indicator) into EPCs; improving the design and actionability of renovation recommendations; and launching communication and awareness-raising strategies to enhance public perception of EPCs and their usefulness.

These priorities reflect both structural needs (for example fragmented databases or outdated methodologies) and operational challenges linked to the day-to-day practice of issuing, auditing and using EPCs. They should be interpreted as a menu of intervention areas for Member States to consider when planning the upgrade of their national systems.

Looking across the focus countries, the national priorities point first to a set of common, urgent intervention areas. All countries underline the need to strengthen EPC quality-control mechanisms and to improve communication, public perception and the usefulness of EPC recommendations, which therefore emerge as the primary starting points for reform. In addition, three of the four focus countries explicitly call for changes to EPC design, layout and rescaling, while two focus countries also prioritise improving EPC databases and simplifying the calculation methodology, suggesting further layers of intervention that can follow once the core gaps are addressed.

1.4 Replication methodology

The replication approach is grounded in a clustering methodology that groups EU Member States based on systemic characteristics, recognising that effective replication depends on matching recommendations to implementation contexts.

The replication model is organised into four categories, further subdivided into eight specific factors, each with defined implementation levels and corresponding recommendations:

1 Governance

a. Management of the EPC system

2 Core EPC scheme

a. Database
b. Rescaling
c. Calculation methodology
d. EPC recommendations

3 Support

a. Training and auditor capacitation
b. Quality control

4 Communication

a. Public awareness

This structure allows countries to conduct a self-assessment, identify priority areas for intervention, and sequence actions accordingly. Countries can position themselves and use this self-assessment to determine the most appropriate recommendations, considering their level of implementation for each factor, and explore concrete good practices for inspiration.

2

CLUSTERING AND RECOMMENDATIONS FOR REPLICATION

This chapter provides a comprehensive framework for replicating EPC improvements across EU Member States, structured around four core categories: **governance**, **core EPC scheme**, **support**, and **communication/perception**, detailed in the next chapter. The methodology follows a three-step process designed for applicability:

1. **Self-assessment of implementation levels** (2.1)

   Each factor within these categories is described through two distinct implementation types, with objective criteria and detailed explanations that enable any Member State to position its EPC system accurately.

2. **Tailored replication guidelines** (2.2-2.3)

   Good practices are presented and then, for each factor and implementation level, recommendations are provided, synthesising priority measures aligned with EPBD requirements and derived from EPBD.wise analysis.

3. **Practical application** (2.4)

   In this section, four illustrative country types are given as examples, each representing a different overall level of maturity of the EPC system.

The framework ensures solutions are both EPBD-compliant and contextually relevant, clustering EU Member States by implementation similarity while linking solutions to identified policy needs.

2.1 Categories and implementation level by factor

In the tables below, each factor has two implementation levels, with objective criteria derived from EPBD.wise analysis.

Level names are factor-specific, reflecting fundamental qualitative differences. In practice, national frameworks will likely not fit exactly with the choices provided, so the user should choose the level that seems closest to the current status.

The different levels of implementation are based on several documents. For the factors 'Management system', 'Database', 'Rescaling', 'Quality control' and 'Training and auditor capacitation', the cross-country analysis made in CA-EPBD [1] was used as a reference. The 'Calculation methodology' factor was based on the JRC Technical Report Progress on the implementation of energy performance certificates in EU [3] and 'EPC recommendations' on Cross-country comparison of format and nature of recommended improvements in different EPCs from crossCERT project [4] and QualDeEPC report on local EPC situation and cross-country comparison matrix [5]. 'Public awareness' is based on the policy guidelines developed under EPBD.wise, corresponding to the various focus countries, [6] [7] [8] [9]. In general, [5] was used as a basis for characterising the various factors.

2.1.1 Governance

Table 2: Characterisation of implementation levels for Governance

Factor	Level	Characterisation
Management system	Centralised	• Single national authority oversees issuance, database and quality control • Unified monitoring
	Decentralised	• Regional/local authorities issue EPCs • Fragmented databases

2.1.2 Core EPC scheme

Table 3: Characterisation of implementation levels for core EPC scheme

Factor	Level	Characterisation
Database	Extensive	• Centralised; • Representative of building stock
	Limited	• Basic/fragmented coverage • Not representative of building stock
Rescaling	High	• A-G/A+-G/A++-G or similar scales
	Low	• No letter scale or very different

Factor	Level	Characterisation
Calculation methodology	Dynamic/advanced	• Monthly, hourly or sub-hourly intervals • Typical or real use profiles • Calculates need, delivered or primary energy • Reference building approach
	Streamlined	• Seasonal averages • Fixed values on class boundaries indicator • 1 or 2 building categories with different class boundaries [4]
EPC recommendations	Adjusted to the building or building unit	• Specific measures • Costed/payback estimates • Linked to one-stop shop/financing
	Generic	• Generic measures • No costs/benefits • No link to one-stop shop/financing

2.1.3 Support

Table 4: Characterisation of implementation levels for support

Factor	Level	Characterisation
Training & Auditor capacitation	Advanced	• Mandatory post-certification training • Regular recertification • Rigorous examinations
	Intermediate	• Voluntary post-certification training • Mandatory initial training • Written and practical examinations
	Basic	• No post-certification training or sporadic training • Experience-based qualifications • Few experts/million inhabitants
Quality control	Extensive	• Desk controls + site visits + EPC recalculation • Digital automatic control + data input thresholds • Penalty points for errors + 0-100% verification coverage
	Limited	• No systematic checks + self-declared validity • Compliance only via methodologies/training • No consequences for errors + little verification

2.1.4 Communication/perception

Table 5: Characterisation of implementation levels for communication/perception

Factor	Level	Characterisation
Public awareness	High	• Strong public acceptance/trust of EPCs • One-stop shop integration
	Low	• Seen as bureaucratic cost • Low acceptance

2.2 Good practices supporting replication

This section links the good practices identified in EPBD.wise with the factors proposed in this guideline (database, rescaling, calculation methodology, EPC recommendations, training and auditor capacitation, quality control and public awareness), showing how each practice can support countries in moving towards higher implementation levels.

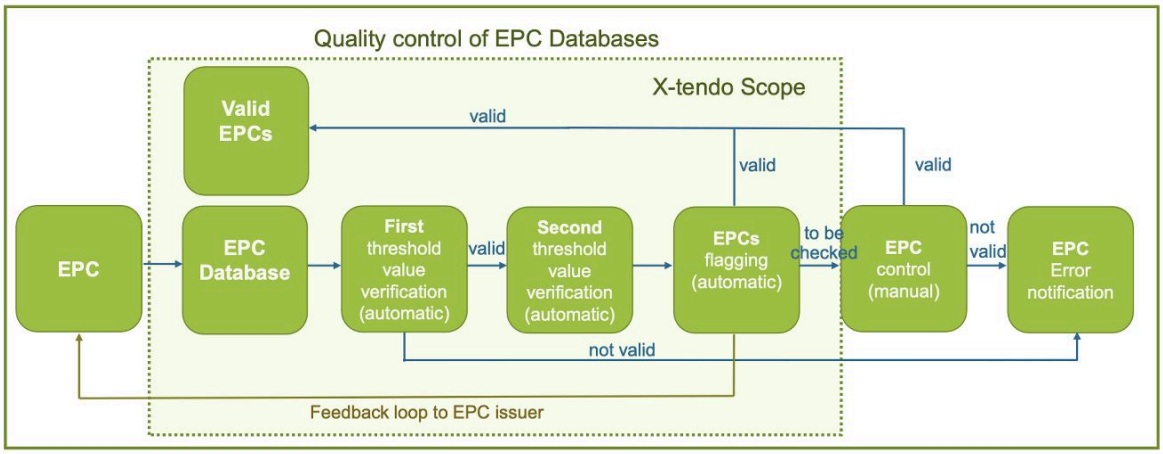
Database

Several good practices show how EPC databases can support achieving higher levels of database implementation [1]:

Figure 1: Portugal examples of EPCs and data use

- Portugal's multi-purpose EPC system relies on a central database with more than 2.5 million certificates, unique EPC identifiers and around 300 variables per building, which are used for estimating renovation investment needs and supporting financial instruments. This illustrates an advanced implementation level, where the database is fully exploited beyond compliance.

Figure 2: X-tendo quality control workflow for EPC databases



- The X-tendo toolbox treats EPC databases as a key innovation area, proposing common data models and automated quality-control checks (e.g. threshold rules and flagging of suspicious EPCs). Countries with a limited implementation level can use these specifications to harmonise data structures and progressively link the EPC register to other national databases.

These practices support replication by showing how to move from a simple registry of certificates to an integrated, multi purpose data infrastructure that supports renovation planning and financing.

Rescaling

While none of the EPBD.wise good practices deals exclusively with rescaling, several provide elements that help countries implement the new A–G scale [1]:

- Denmark's owner-oriented EPC shows how a redesigned certificate layout, with clear graphic representation of energy classes and dynamic visualisation of the impact of recommended measures, can make a new scale more understandable and acceptable for owners.
- The X-tendo toolbox includes features on enhanced recommendations, real energy consumption and comfort, which can be combined with rescaled labels so that the new classes are not perceived only as stricter ratings, but as part of a richer decision-support tool.

Countries planning rescaling can combine the technical work on class thresholds with user-centred redesign of the EPC layout and content, using these examples as references.

Calculation methodology

Several projects and practices offer guidance for the calculation methodology [1]:

Figure 3: X-tendo toolbox: next-generation EPC indicators integrated with energy performance standards and rescaled methodology

- X-tendo toolbox provides methodological specifications for next generation EPCs, including integration of indicators such as smart readiness, comfort, outdoor air pollution and real energy consumption, together with guidance on consistency with energy performance standards. This supports countries that want to evolve from purely theoretical, static methods towards more comprehensive and potentially hybrid approaches.
- The survey of related projects in D5.1 (e.g. D²EPC, EPC RECAST, U CERT, ePANACEA, EDYCE) documents dynamic or operational EPC approaches, links between EPCs and renovation passports, and ways to incorporate life cycle or comfort indicators into the assessment.

These experiences show how to upgrade calculation methodologies in a modular way, aligning with the recast EPBD without having to rebuild the whole system at once.

These good practices illustrate progressively more advanced implementation levels, from incremental improvements of existing monthly methods to full integration of dynamic data and additional indicators.

EPC recommendations

This factor is directly supported by several good practices [1]:

- Denmark's owner-oriented EPC provides prioritised, costed packages of measures, with estimates of energy savings and budgets, and guides owners through the implementation pathway. Recommendations are specific, staged and linked to expected impacts.
- Portugal's multi-purpose EPC uses recommendations as an entry point for financial incentives (tax benefits, grant schemes, low-interest loans) and for monitoring the effect of renovations before and after works. This shows how recommendations can become a central operational element, rather than a generic annex.
- The X-tendo toolbox includes an 'enhanced recommendations' feature, with methodological guidance on how to generate more actionable, user friendly proposals, including links to financing and one-stop shops.
- Beyond national examples, the NextGen EPC Cluster has also provided common guidance on how recommendations should evolve in the recast EPBD context [10]:
    - QualDeEPC calls for much clearer requirements on assessors to formulate renovation recommendations that are explicitly consistent with deep renovation pathways and with the long-term objective of reaching zero-emission levels by 2050. In practical terms, this implies moving from generic lists of measures to structured packages that indicate target classes, stages, and pre- and post-renovation performance, ideally aligned with renovation passports where these exist.
    - TIMEPAC stresses that recommendations for the cost-effective improvement of energy performance and the reduction of operational greenhouse gas emissions should preferably be formulated at whole-building level, rather than as isolated component measures.

Together, these practices help countries move from basic, generic lists of measures towards tailored, sequenced renovation pathways, potentially integrated with renovation passports.

Training and auditor capacitation

Training and auditor capacitation is strongly illustrated by examples from Sweden and, indirectly, Ireland [1]:

- Sweden's EPC expert training programme defines entry requirements (education and experience), mandatory training and examinations, and continuing professional development (CPD) for EPC experts. This corresponds to a high implementation level where assessor competence is systematically managed.
- Ireland's quality assurance framework combines a competency framework (training standards, occupational standards and mandatory CPD) with targeted audits and mentoring visits, turning quality control into a learning process rather than only an enforcement tool.

Countries at lower implementation levels can use these models to gradually introduce minimum qualification requirements, structured training curricula and CPD obligations, and to link training outcomes with quality control results.

Quality control

Quality control is one of the factors best covered by the good practices in D5.1.

- Portugal's quality assessment system applies multiple verification models (on site accompanied visits, aggregated checks, summary and detailed verifications) and classifies non compliance by severity, with potential sanctions including cancellation of certificates and referral to the energy authority.

This demonstrates a mature, independent control system aligned with the EPBD requirements on statistical confidence and share of verified EPCs.

- Ireland's quality assurance system uses a risk-based audit selection, combines random and targeted checks, and is underpinned by a code of practice and disciplinary procedures, while also offering mentoring and feedback to assessors.

Figure 4: Classification system for audit findings of non-compliance in Ireland

Severity of non-compliance	Penalty points	Revocation of EPC
Compliance	0	No
Severity 3	1	No
Severity 3 (Advisory)	0	No
Severity 2	2	Yes
Severity 2 (Advisory)	0	Yes
Severity 1	3	Yes
Severity 1 (Advisory)	0	Yes

These practices show the progression from basic, largely formal checks to sophisticated, risk based and learning-oriented quality assurance frameworks and can be directly used as templates for replication.

Communication

Finally, several practices support public awareness/communication [1]:

Figure 5: Homepage of one-stop shop in Scotland

- Home Energy Scotland's one-stop shop provides personalised advice, information on EPCs and energy efficiency options, and links to financial support, supported by communication campaigns and community outreach, achieving high satisfaction and measurable energy and cost savings. This represents a high implementation level, where EPC related information is embedded in a broader service offer.
- Denmark's owner-oriented EPC layout, with clear visualisations, budgets and online resources, is explicitly designed to make EPCs more understandable and to motivate owners to act.
- The X-tendo toolbox includes features on EPC communication, user friendliness and one-stop shops, providing ready to use materials and guidelines for awareness campaigns and improved certificate design.

These examples illustrate how countries can progress from minimal, regulatory-driven awareness to proactive, multichannel strategies that position EPCs as a useful tool for households and market actors and can counter disinformation campaigns that sometimes obfuscate a transparent construction sector and policy effectiveness.

2.3 Recommendations by factor

After selecting the appropriate level of implementation for each factor, the most suitable recommendations for the country profile should be identified. The list of recommendations is tailored but not exclusive, allowing for exploration beyond the levels of implementation initially chosen.

The cross-country analysis made in CA-EPBD [1] was used as a reference for the 'Management system' recommendations. The policy guidelines developed under EPBD.wise [6] [7] [8] [9] were a main reference for all the remaining factors.

The document "Development of Renovation Passports: Policy Guideline Summary" [11], also developed under EPBD.wise, was used as inspiration for some of the recommendations under the 'EPC recommendations' factor.

Table 6: Recommendations and good practices linked to the implementation levels

Category	Factor	Implementation level	Recommendations	Good practices
Governance	Management system	Centralised	• Use a single national authority (ministry, agency or regulator) as the formal manager of the EPC scheme, responsible for the core rules, templates and national register, even when implementation is supported by technical bodies (such as energy agencies or institutes). • Where regional or local administrations are involved, formalise how they contribute (e.g. support to inspections, advice to owners, data collection) while keeping the legislative and methodological backbone clearly at national level. • Ensure that national technical agencies act as methodological hubs – developing tools, guidance and training – without fragmenting responsibilities for the official certificate and registry.	--
		Decentralised	• In countries where both central and regional governments share responsibilities, define explicitly which functions are done at national level and which are left to regions. • Require all regions to comply with a common minimum framework for EPCs (scale, core indicators, data access rules), so that certificates remain comparable nationwide even if processes and IT systems differ. • Set up permanent coordination structures between the national government and regional authorities to exchange data, align future changes and avoid divergence in how EPC obligations are implemented on the ground. • Make sure that there is a common visual identity for all EPCs irrespective of different regional approaches. (Art. 19.3)	--

Category	Factor	Implementation level	Recommendations	Good practices
Core EPC scheme	Database	Extensive	• Keep the EPC database fully centralised and coherent, ensuring that it continues to cover a large share of the building stock and remains the single reference for EPC data, quality control and policy monitoring. • Further enrich the data model by integrating EPCs with inspection records, renovation passports, smart readiness indicator assessments and, where available, metered consumption, so that the database can support MEPS design, NBRPs, and targeting of worst-performing buildings and energy-poor households. • Enhance interoperability and open access by providing anonymised, machine-readable datasets for public use, and regulated access for owners, public authorities, financial institutions and researchers through user-friendly online interfaces.	Portugal's multi purpose EPC database; X tendo toolbox
		Limited	• Develop and implement a phased upgrade roadmap for the EPC database, moving from fragmented or basic registers towards a single, centralised system that gradually becomes representative of the building stock (starting with priority segments such as public buildings or large renovations). • Redesign the database structure to incorporate all mandatory EPBD indicators (primary energy, operational GHG emissions, on-site renewables, indoor environmental quality-related fields) and to allow linkage with other national registers (cadastre, subsidy schemes), ensuring that legacy EPC records are migrated and cleaned where feasible. • Use database modernisation to embed quality control and validation at source, by integrating automatic checks into EPC software, enabling risk-based sampling and third-party verification, and clarifying institutional responsibilities for data governance and maintenance.	

Category	Factor	Implementation level	Recommendations	Good practices
Core EPC scheme	Rescaling	High	• Implement/maintain EPC rescaling in full alignment with the recast EPBD, ensuring a harmonised A–G scale where class A corresponds to ZEB standard, class G captures the worst-performing share of the national building stock as defined in the NBRP, and classes are evenly distributed across the scale. • Regularly evaluate thresholds as the stock improves to better anticipate cost-optimality impacts and future adjustment needs.	Denmark's owner oriented EPC; X-tendo toolbox
		Low	• Plan and execute the transition to the harmonised A–G scale by the EPBD deadline, using national stock data to define robust thresholds and to transparently explain changes to owners, market actors and authorities. • Use the rescaling exercise as a trigger to review calculation methodology and database design, so that new classes, indicators and MEPS links (e.g. identification of class G and F buildings) are consistently reflected in EPC software, registers and communication materials. • Pair rescaling with targeted communication campaigns to improve public perception, familiarising users with the new A–G classes through clear comparisons with existing labels, real-world examples and messaging that highlights benefits like better renovation guidance and financing access.	
Core EPC scheme	Calculation methodology	Advanced	• Ensure integration of EPBD-mandated indicators (primary energy in kWh/(m².y), operational GHG emissions, on-site renewables), while exploring hybrid approaches that leverage hourly profiles for high-impact buildings. • Focus on establishing absolute performance thresholds anchored on the ZEB definition.	X tendo; D²EPC; EPC RECAST; U CERT; ePANAC EA

Category	Factor	Implementation level	Recommendations	Good practices
Core EPC scheme	Calculation methodology	Streamlined	• Upgrade the simplified methodology to align with EPBD primary energy requirements (kWh/(m².y)), refining monthly/annual averages and fixed assumptions through calibration with national stock data. • Develop supporting digital tools with automated validation for typical-use profiles and fixed inputs, reducing auditor errors and enabling smoother integration with rescaled A–G classes and database requirements.	X tendo; D²EPC; EPC RECAST; U CERT; ePANAC EA
Core EPC scheme	EPC recommendations	Adjusted to the building or building unit	• Upgrade current recommendations by adding cost and payback period estimates for each measure. • Establish direct links to national one-stop shops and financing schemes for renovation implementation. • Implement a mini audit within the certification phase explaining how savings estimates are derived. • Integrate renovation passports as an optional extension of EPC recommendations, featuring graphic roadmaps to ZEB 2050 standards with cost/savings estimates per step.	Denmark's owner oriented EPC; PT multi purpose EPC; X tendo; NextGen EPC Cluster
		Generic	• Transform generic measures into structured renovation packages with basic cost orientation ranges. • Add links to national financing programmes and one-stop-shop contact information. • Include mandatory EPBD Annex V indicators: primary energy performance, GHG emissions, on-site renewables. • Evolve to building-type-specific packages (residential, non-residential, public), linking to legal obligations (MEPS, Art. 6 EED) and wider benefits (indoor environmental quality, climate adaptation).	

Category	Factor	Implementation level	Recommendations	Good practices
Core EPC scheme	Training and auditor capacitation	Advanced	• Make post-certification training mandatory with regular recertification cycles. • Implement rigorous examinations covering 25+ topics. • Institutionalise continuous professional development per EPBD Article 26.	Sweden's EPC expert training; Ireland's CPD framework
		Intermediate	• Introduce voluntary post-certification training with points/refreshers system. • Mandate initial training 40+ hours with practical exercises. • Require written and practical exams.	
		Basic / non existent	• Establish national certification registry replacing experience-based. • Launch structured initial training programmes. • Subsidise training to increase the number of experts.	
Core EPC scheme	Quality control	Extensive	• Strengthen existing independent systems with risk-based sampling and automated software checks. • Expand third-party verification coverage beyond 20% minimum. • Promote cross-border best practice exchange. • Prioritise pedagogical and specific support to independent experts and feedback loops to improve tools and training,	Portuguese quality assessment; quality assurance of EPCs in Ireland
		Limited	• Establish independent control system ensuring 90% statistical validity/95% confidence. • Enforce penalties for non-compliance, and third-party verification ≥20% when delegated. • Replace self-declared validity with systematic random sampling/site inspections (using virtual means when applicable).	

Category	Factor	Implementation level	Recommendations	Good practices
Communication	Public awareness	High	• Strengthen existing trust through targeted campaigns linking EPCs to tangible benefits (energy savings, property value increase, one-stop shop access). • Integrate EPC visibility into one-stop shops and real estate platforms with interactive tools. • Promote cross-border best practices exchange on maintaining high awareness levels.	Home Energy Scotland; Danish layout
		Low	• Develop national awareness strategies with multi-channel campaigns (TV, social media, YouTube) explaining EPC benefits beyond bureaucracy. • Link EPCs visibly to financing incentives and one-stop shop services in all communication materials. • Launch consumer-targeted campaigns showing real renovation case studies and cost savings.	

2.4 Decision tool example

To illustrate a possible decision-making tool, this section presents four illustrative country types, each representing a different overall level of maturity of the EPC system:

- **Country type 1** - low implementation in all categories
- **Country type 2** - only EPC support functions and communication are more developed
- **Country type 3** - core EPC scheme is relatively advanced
- **Country type 4** - well developed across all categories.

These country types are not meant to provide a perfect fit for any given Member State, but rather to offer intuitive reference points so that countries can position themselves close to one of these profiles and identify the most relevant recommendations and good practices, independently of whether their EPC governance is centralised or decentralised.
To improve the visual perception of the implementation level of each factor, red colour is used for low implementation levels and green for high implementation levels. Recommendations are always shown in a darker green and good practices in grey.

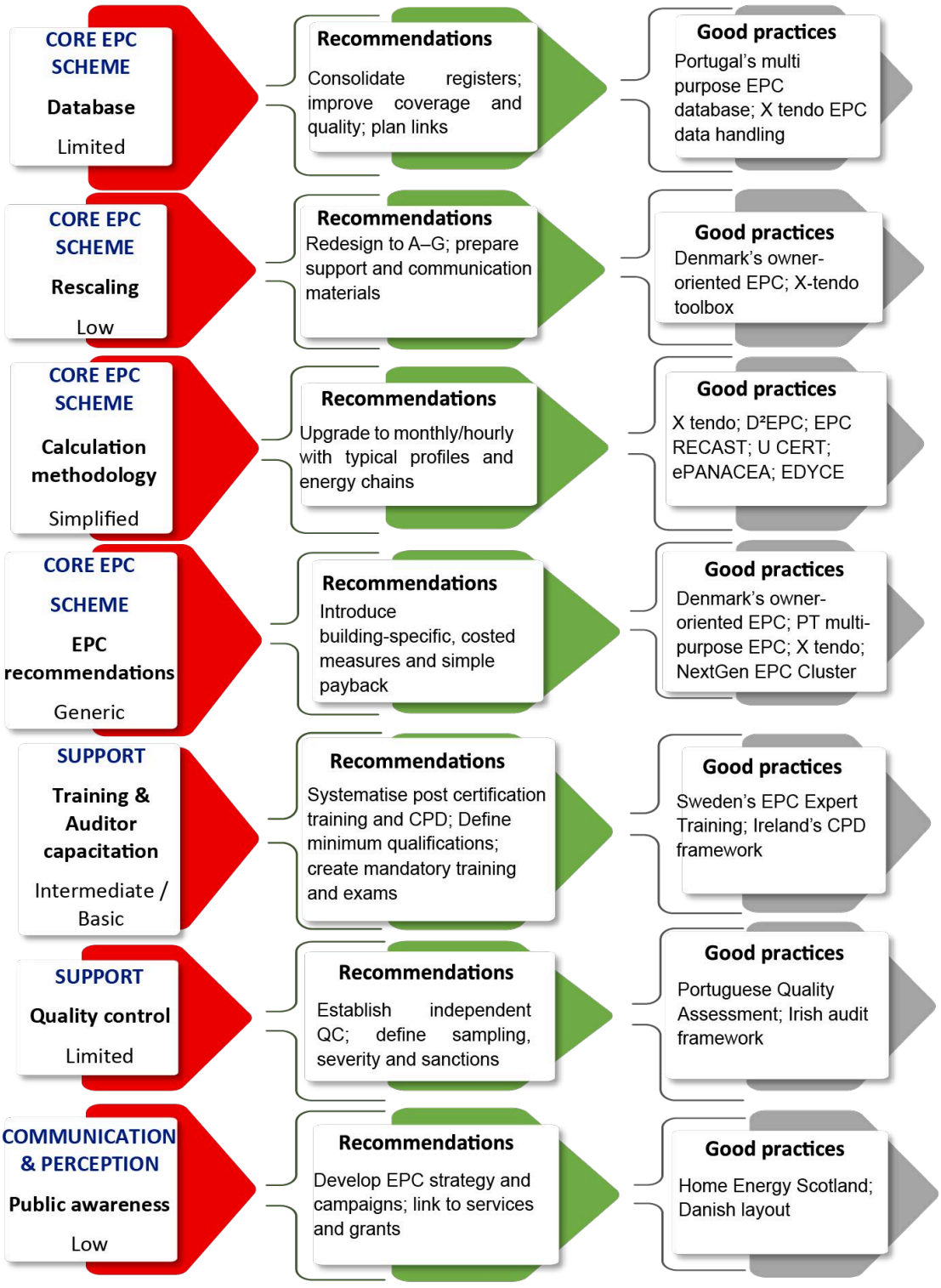
Country type 1
Low implementation in all categories

Key

Low implementation level

High implementation level

Figure 6: Country type 1 example



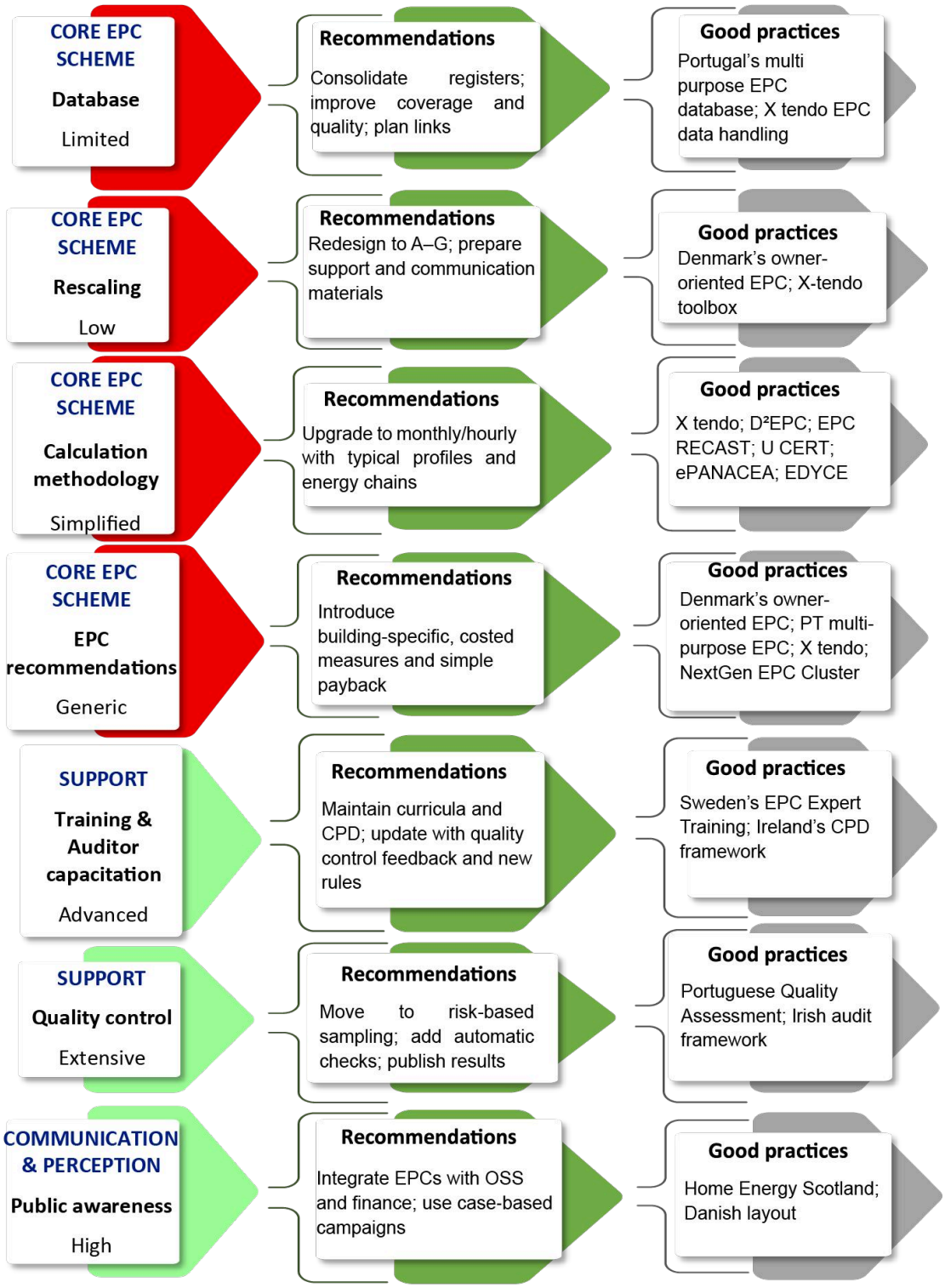
Country type 2
High implementation in Support and Communication & Perception

Key

Low implementation level

High implementation level

Figure 7: Country type 2 example

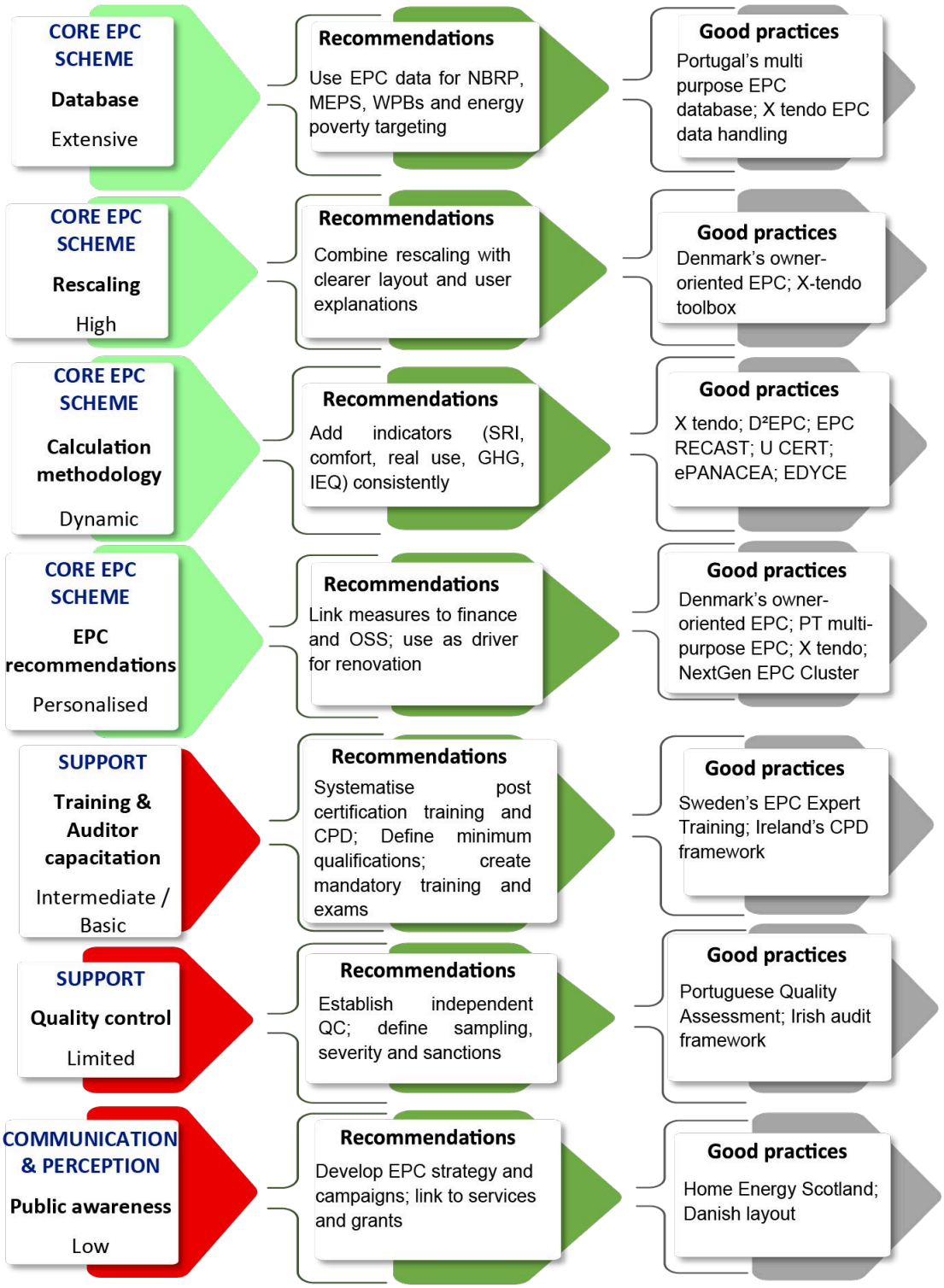


Country type 3
High implementation in Core EPC Scheme

Key

- Low implementation level
- High implementation level

Figure 8: Country type 3 example



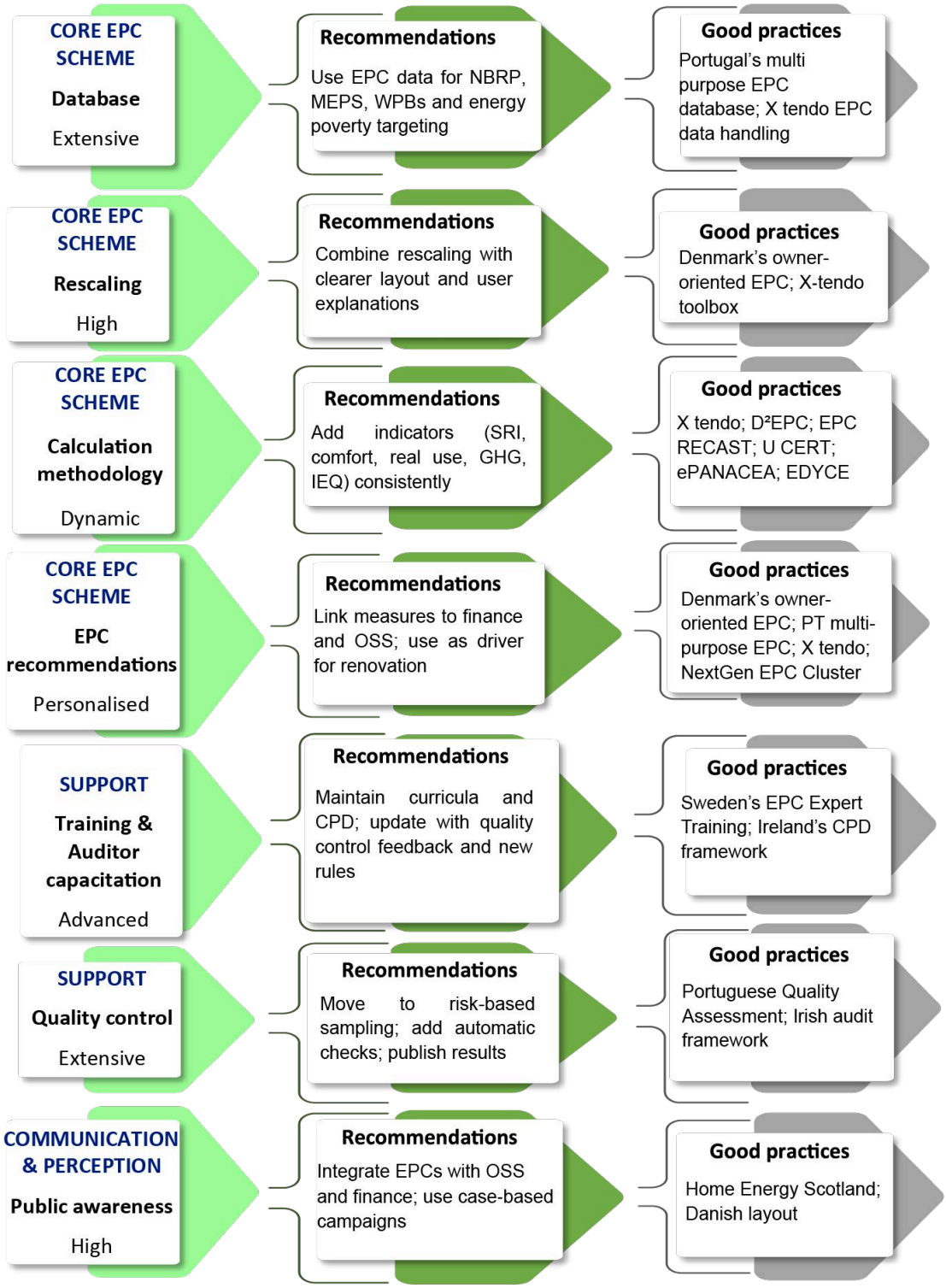
Country type 4
High implementation in all categories

Key

Low implementation level

High implementation level

Figure 9: Country type 4 example



3

MONITORING, REPORT AND EVALUATION

Effective monitoring, reporting and evaluation are essential to ensuring that EPC schemes fulfil their central role within the EPBD. As emphasised in the EPBD.wise report An Integrated Monitoring, Reporting and Evaluation Framework for Effective EPBD Implementation [12], EPCs are not merely compliance documents but pivotal data generating instruments for tracking progress in renovation, energy performance, zero emission pathways, and policy coherence across the building sector. Details on specific policy objectives, key performance indicators, and monitoring, reporting and evaluation requirements for EPCs can be found in that report. Some common highlights for EPC schemes are:

Monitoring: Monitoring needs to ensure EPC data – including energy classes, primary energy indicators, operational GHG emissions, recommendations and building characteristics – is continuously collected, validated and fed into national databases. These databases must integrate EPCs with inspection data, renovation passports, smart readiness indicator data and measured building consumption where available.

Reporting: Member States must ensure transparent, harmonised annual reporting to the national building performance database and the EU Building Stock Observatory. This allows EPC based indicators to inform NBRPs, MEPS implementation, ZEB uptake, and financial planning at national and EU levels.

Evaluation: Evaluation checks how EPCs support actionable insights. In line with the EPBD.wise monitoring, reporting and evaluation framework, examples of what the evaluation should assess include:

- The quality and statistical validity of issued EPCs (quality control)
- The effectiveness of EPC recommendations in triggering renovations
- The impact and support provided by EPC schemes on policy objectives such as MEPS and trajectories compliance, energy poverty alleviation, financing schemes and progress toward zero-emission buildings.

4

CONCLUSIONS

This deliverable translates the analytical work of EPBD.wise into practical and transferable policy guidance for the development and replication of EPC systems across EU Member States. Drawing on the detailed assessment of Bulgaria, Greece, Hungary and Poland, it demonstrates that EPCs are no longer standalone compliance documents, but core enabling instruments within the recast EPBD. When properly designed, EPCs operationalise minimum energy performance standards, support national building renovation plans, anchor zero-emission building definitions, feed digital building logbooks, and enable the targeting and monitoring of financial support and energy poverty measures.

The comparative analysis confirms that, despite different national contexts, Member States face recurrent and structurally similar challenges. These include fragmented or under-utilised EPC databases, insufficient quality control and auditor capacitation, generic and weakly actionable recommendations, and low public awareness and trust in EPCs. At the same time, countries progress unevenly across different dimensions of EPC systems, which makes uniform policy solutions ineffective.

Monitoring, reporting and evaluation play a critical role. EPC schemes must be treated as dynamic, data-generating systems that continuously inform policy design and adjustment. Robust databases, systematic quality control and harmonised reporting are essential to ensure statistical validity, support evidence-based renovation strategies, and track progress towards climate neutrality under the EPBD.

Overall, this report provides an operational toolkit that bridges EPBD requirements with national implementation realities. By combining structured self-assessment, tailored recommendations and proven good practices, it supports Member States in strengthening their EPC systems in a way that is both EPBD compliant and adapted to their specific starting points. This can help accelerate building renovation and the transition to a zero-emission building stock.

Recommendations for future EPC improvements

Looking ahead, several cross cutting priorities emerge for the further evolution of EPC systems in Europe:

- **Consolidate EPC databases and governance** by introducing or upgrading centralised, interoperable registers that cover the entire building stock. Ensure data quality and clearly allocate institutional responsibilities for EPC management and enforcement, supported by data exchange protocols when there are regional responsibilities.
- **Standardise EPC calculation methods and indicators** by using harmonised input data and primary energy metrics (i.e., thresholds for primary energy use per unit of reference floor area per year, in kWh/(m²·y), anchored on the ZEB definition), alongside operational greenhouse gas indicators. Develop transparent rescaling rules, supported by digital tools with automated validation, to enable smoother integration with rescaled A–G classes and database requirements. Refine monthly and annual averages and other fixed assumptions by calibrating them against national building stock data, while exploring hybrid approaches that use hourly profiles for high-impact buildings.
- **Strengthen the design of EPC recommendations** by moving from generic, checklist-type measures to building-specific, cost-effective renovation packages that are sequenced over time. These should be explicitly linked to one-stop shops, renovation passports and financial support schemes, while using renovation passports for additional information on recommendations. They should feature graphic roadmaps to ZEB 2050 standards with cost/savings estimates per step, tailored to the building owner.
- **Establish structured training and accreditation for EPC experts** by creating national registers, delivering compulsory initial training with practical components, and introducing examinations that combine written and practical assessment of core EPBD and building-physics topics, post-certification training and recertification.
- **Introduce independent EPC quality control systems** by setting up statistically robust sampling of certificates, risk-based sampling, automated software checks, and onsite checks (including virtual means if applicable). Priority should be given to pedagogical and specific support to independent experts, backed by clear penalty regimes for noncompliance and feedback loops to improve tools and training.
- **Develop national EPC communication and awareness strategies** by launching multi-channel campaigns that explain benefits beyond administrative compliance, visibly linking EPCs to renovation incentives and advisory services, and showcasing real renovation case studies and achieved savings. Pair rescaling with targeted communication campaigns to improve public perception, familiarising users with the new A–G classes through clear comparisons with existing labels, highlighting benefits like better renovation guidance and financing access.
- **Embed EPCs in monitoring, reporting and evaluation frameworks**, ensuring that EPC data is systematically used to assess policy effectiveness, renovation uptake and progress towards zero emission buildings.

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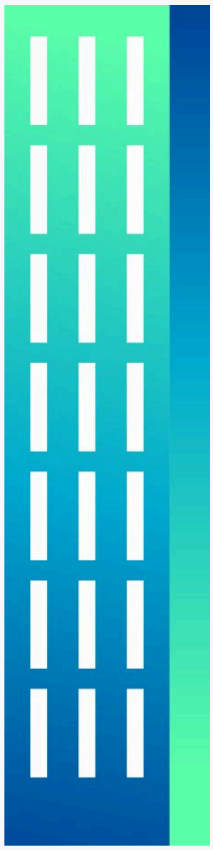

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