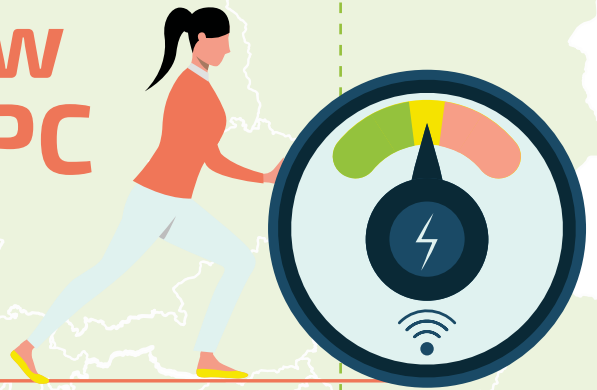


X-tendo



Advancing energy performance certificates to next generation
Recommendations to integrate new features into EPC schemes



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PURPOSE

To strategically support Member States in meeting the requirements set up under the recast of the [Energy Performance of Buildings Directive \(EPBD\)](#) – currently under negotiation – it is crucial to realise the full potential of energy performance certificates (EPCs) as effective information tools. This means making EPCs a catalyst for energy renovations and transforming them into a reliable asset benefiting policymakers, public authorities and end-users (building owners, tenants, utilities, developers, financial institutions and other users). EPCs are increasingly being used for monitoring and enforcement of building policy such as the new minimum energy performance standards, so their quality and reliability should be increased.

This briefing is targeted at policymakers at EU and Member State level, public authorities (government or public advisory bodies at national, regional or local level) and institutions (e.g. national energy agencies, certification bodies) responsible for the design, implementation and management of EPCs.

It is built on the main results of the [X-tendo](#) project and provides recommendations on how to take EPC schemes to the next level. The project developed 10 innovative EPC features. Five features are new indicators that can be added to certificates: (1) [smart readiness](#), (2) [comfort](#), (3) [outdoor air pollution](#), (4) [real energy consumption](#), (5) potential of [district energy](#) connection. A further group of five features is related to the better use and handling of EPC data: (6) quality assurance through [EPC databases](#), (7) [digital building logbooks](#), (8) [enhanced recommendations](#) for building owners, (9) advice on [financing options](#), and (10) new and more effective [one-stop-shops](#). The main aim of these features is to extend the functionality and quality assurance of EPCs while enhancing their interaction with other initiatives, such as one-stop-shops, digital building logbooks, smart readiness indicator etc. This is done via a modular web-based [toolbox](#) that, for each feature, consists of (i) concept and methodology, (ii) calculation and assessment tools, and (iii) support materials to guide the implementation.

¹ Proposed under article 9 of the [EPBD recast](#), the EU minimum energy performance standards (MEPS) are a system to require the renovation of the worst-performing buildings: those in EPC classes G or F.



CHALLENGES AND DIRECTIONS

EPCs have improved incrementally since their introduction; nevertheless, they need to become more reliable and visible, with easy-to-understand information, to fully realise their benefits. The changes proposed in the EPBD recast rightfully recognise the need to address the remaining issues concerning their quality, consistency and perceived trust. Stakeholders have questioned the reliability of EPCs but, at the same time, EPCs have had significant market penetration and impact on real estate transactions, increasing the market value² of energy-efficient buildings and supporting a shift towards a low-energy sector. Good practices³ have shown that an EPC can become more than just an information tool and can prompt decisions to improve the building stock, creating social, economic and environmental benefits. EPCs could help overcome persistent information deficits concerning e.g. real energy performance, smartness levels, tailored renovation measures, indoor and outdoor environment conditions and financial advice for renovation, and empower policymakers with better data on the building stock to enable monitoring the impact of policies and financial support schemes. The recast proposal tightens the provisions related to EPCs that would provide significant push to multiply the current renovation rate of 1% and renovate over 35 million buildings by 2030 to foster deep renovation, as set out under the [European Green Deal](#) and [Renovation Wave](#).

All Member States have the opportunity to update and converge their EPC schemes or systems towards a more harmonised calculation methodology, indicators, cost, quality control measures, recommendations, and a centralised register. EPCs can be an instrument for policymakers to improve the performance of the existing building stock and foster deeper renovation. To realise these additional benefits, EPC regimes must first be properly implemented, well managed and supported by effective compliance mechanisms. From this basis, the schemes can evolve with the changing needs of the real estate market or building users and consider elements such as enhanced indoor comfort, reducing air pollution and financing options alongside energy consumption analysis to increase their usability. EPCs have the potential to make these elements visible so that they can be better factored into real estate decision-making and hence drive a value differentiation, raising further the market value of energy-efficient and healthy buildings.



² [Impact of EPC on the property value \(Concerted Action\)](#)

³ BPIE (2020), [Energy Performance Certificates: Assessing their status and potential](#)

X-TENDO APPROACH TO UPGRADING EPC SCHEMES

To accelerate energy renovations, the next-generation EPC must provide its end-users with improved and actionable information. Building characteristics, such as smartness, metered energy consumption, indoor environmental quality or the interaction with the district energy system, are insufficiently covered in current EPC schemes. Recognising these needs, significant revisions have been proposed in Article 16 (ex-Article 11) of the EPBD on the system of certification for energy performance of buildings. Adapting the existing methodologies with new elements such as digital building logbooks and EPC databases would make information exchange faster and easier, as well as improve the EPC's role as an information tool.



The X-tendo project⁴ assessed several aspects of EPCs and how a balance could be achieved within competing priorities such as (a) performance gap in asset vs measured ratings, (b) diversity of calculation methodologies, (c) quality control, (d) balancing cost and quality, (e) training and upskilling of assessors, and (f) user-friendliness of EPCs. Implementing new features will require policymakers to consider the impact of the new functionalities on cost, quality assurance and usability of the certificates. For each of the 10 X-tendo features, a standardised approach was used in their development built on the [cross-cutting criteria](#) of **(1) quality and reliability**, **(2) user-friendliness**, **(3) economic feasibility** and **(4) compliance with international standards**.

Each X-tendo feature is distinct in its application and will entail careful planning for its implementation across the Member States. After testing the new features, X-tendo experts recommended in the [implementation guidelines](#) whether and how the features could be replicated in Member States, based on a careful consideration of national contexts and evaluation of options for their EPC schemes. All the features build on existing EPC data inputs and partly require additional data inputs that may entail some training and effort from EPC assessors.




⁴ BPIE (2020), [Energy Performance Certificates: Assessing their status and potential](#).

TEN X-TENDO FEATURES AND THEIR RELEVANCE TO THE EPBD

The 10 features developed by X-tendo provide a promising direction to advance existing EPC schemes. These features were tested in nine countries – **Portugal, Romania, UK (Scotland), Greece, Denmark, Poland, Austria, Italy and Estonia** – that represent 43% of the EU population and 40% of the EU building stock.⁵ The stakeholders, in particular the EPC assessors and implementing bodies such as energy agencies and assessors' associations who tested the features in practice, provided useful insights on drivers and barriers for the features' adoption and success.⁶ [An end-user survey](#)⁷ (with owners and tenants) confirmed a significant interest in these features.









Smart readiness indicator

	 What EPBD recast proposes	 What X-tendo provides	 How it can help (importance/benefits)
Smart readiness indicator	Article 13 mandates the introduction of the SRI as a voluntary rating and reinforces the SRI for large non-residential buildings as of 2026. A new Article 14 specific to building data ensures that the building owner, tenant and manager or third parties can have access to building systems' data. New rules on data interoperability and access to data are to be laid down by the Commission by means of an implementing act.	A common SRI assessment framework and calculation tool tailored for EPCs.	It is recommended to integrate the simplified SRI method with the EPC to limit additional costs and provide complementary information. The assessment can be used for new market opportunities and innovative business models. The X-tendo SRI methodology supported the development of the EU official methodology (detailed SRI) by focusing on EPC-related aspects.

⁵ Statistics include the UK




⁶ BPIE (2022), [Implementation guidelines and replicability potential of the innovative features for the next generation EPCs](#)

⁷ Conducted in Portugal, Denmark, Romania, Greece, Poland

	 What EPBD recast proposes	 What X-tendo provides	 How it can help (importance/benefits)
 Comfort indicator	<p>Article 8 advises that Member States carry out energy efficiency upgrades to improve indoor environmental conditions, and there is an indication in Article 10 that renovation passports and building renovation roadmaps should include wider benefits related to health and comfort.</p>	<p>Indoor environmental quality assessment and calculation tools: (i) Comfort Operational Rating Procedure (CORP), and (ii) Comfort Asset Rating Procedure (CARP).</p>	<p>The feature provides a harmonised methodology for all Member States with a time- and cost-effective assessment of indoor environment quality in existing and new buildings. It can be an important driver for real-estate transactions by owners and other end-users considering indoor comfort in their decision-making.</p>
 Outdoor air pollution	<p>Article 16 (Annex V) suggests introducing an indicator for emissions of operational fine particulate matter (PM2.5) on EPCs.</p>	<p>Outdoor air pollution assessment and calculation tool with two components: (i) Local Air Pollution Contributor Index (LAPCI), and (ii) Indoor Air Purity Index (IAPCI).</p>	<p>The feature provides a methodology to calculate emissions of pollutants from buildings including PM2.5, PM10, NOx, SOx and CO and to include more detailed data on emissions in EPCs. It can help public authorities to track emissions of pollutants from buildings and support the development of climate mitigation and adaptation policies.</p>
 Real energy consumption	<p>Article 4 (Annex I) emphasises the use of 'metered' energy consumption alongside calculated energy consumption. Member States are asked to ensure that the typical energy use (for space heating, space cooling, domestic hot water, ventilation, built-in lighting and other technical building systems) is used representing actual operating conditions, reflecting typical user behaviour.</p>	<p>Measured Energy Performance Indicator (MEPI) assessment and calculation tool.</p>	<p>The feature reflects the real energy use of the building translated to standard conditions of climate and use typical for the type of building. The feature can provide a realistic view on the expected energy consumption and allow end-users to credibly monitor their own energy consumption, giving the opportunity to improve building elements and systems but also to adjust or alter user behaviour.</p>









District energy

	 What EPBD recast proposes	 What X-tendo provides	 How it can help (importance/benefits)
<p>Article 16 foresees to include information in EPCs on the feasibility of adapting heating systems to operate at more efficient temperature settings. It also mandates Member States to take measures to supply buildings with district heating or cooling. Annex I requires accounting of district heating benefits by using certified primary energy factors in the calculation methodology.</p>		<p>District energy indicator calculation tool with two parameters: (i) carbon efficiency and energy resources mix of nearest district heating plant, and (ii) economic feasibility to connect a building to a low-temperature district heating network.</p>	<p>This feature can help end-users to compare the benefits of district heating vs. their heating. It can be useful for public authorities to monitor supply temperatures to buildings and regulate these accordingly. It can also show if the building's heating system is oversized and if it can be redesigned during renovation.</p>






EPC databases

<p>Article 19 asks Member States to set up a national database for the energy performance certificates of buildings, to gather data on the overall energy performance of the building stock. Databases should be interoperable and integrated with other administrative databases containing information on buildings, such as the national building register and digital building logbooks. Annex VI outlines requirements for quality control and validity checks.</p>	<p>EPC database methodology consisting of scripts (risk-based routines) for automated control systems for EPCs.</p>	<p>The methodology shows how to the effectiveness of quality checks and enable selection of EPCs for manual quality control. EPC assessors can be trained to avoid repeating commonly identified errors, resulting in higher quality EPCs. It can act as powerful instrument for public authorities, if used to identify and target homes where renovation support is most urgently needed.</p>
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	 What EPBD recast proposes	 What X-tendo provides	 How it can help (importance/benefits)
 Building logbook	<p>Article 19 identifies the 'digital building logbook' as a common repository for all relevant building data, including data related to energy performance such as the EPC, renovation passports and SRI. The building logbook aims to facilitate informed decision making and information sharing within the construction sector, among building owners and occupants, financial institutions and public authorities.</p>	<p>Implementation guide for logbooks with three elements: (i) data template with an overview of data model (protocols for data capture and sharing), (ii) logbook functionalities and benefits with cost drivers and potential challenges, (iii) data governance requirements (both legal and technical such as GDPR, intellectual property rights etc.).</p>	<p>The data enclosed in the logbook will indicate source and reliability of data: (i) EPC data, (ii) general and administrative documentation, (iii) official documentation, permits etc., (iv) building plans, (v) maintenance/renovation works, (vi) energy performance documentation, energy bills, financial information etc.</p>
 Enhanced recommendations	<p>Article 16 states that EPCs should include recommendations for the cost-effective improvement of energy performance and reduction of greenhouse gas emissions. There is a specific focus on measures major renovation or elements independent of the building envelope or systems.</p>	<p>Method and tool to enhance quality of recommendations, providing a more detailed assessment of the costs and non-energy benefits of potential low-carbon building improvements.</p>	<p>This feature is designed to display the recommendations and the co-benefits end-users will get from renovation measures, and to support them in taking key decisions. It can also be linked to national financial and technical support available, helping end-users to access this support.</p>
 Financing options	<p>Article 16 outlines the need to provide detailed information on financing possibilities to the owner or tenant or advice to increase the climate resilience of the building.</p>	<p>Guidelines for identification and assessment of financial sources that can be linked and integrated with the EPC.</p>	<p>This feature includes the identification of available financing options or sources, linking EPC data with the underwriting of finance and effective communication with building owners/users. It can boost the perceived usefulness of EPCs, increase impact on renovation and help public authorities to develop effective financial measures.</p>



One-stop-shops

 What EPBD recast proposes	 What X-tendo provides	 How it can help (importance/benefits)
<p>Articles 8-10 and 15 on existing buildings outline the need for stronger provisions to overcome the barriers to renovation and mobilisation of financial incentives with one-stop shops accessible to all stakeholders. A stronger emphasis is seen on deeper renovations supported with higher financial incentives and technical support via one-stop-shops.</p>	<p>Guidelines on how to set up or upgrade a one-stop-shop and link EPC data in order to boost the market for existing buildings' renovation.</p>	<p>This feature helps building owners to access financial mechanisms (grant and support schemes) and find service providers. It provides an efficient guide to the renovation chain, making the renovation process streamlined and easier. One-stop-shops provide a better way to analyse EPC data, increasing owners' awareness of EPC relevance and needed improvement actions.</p>

POLICY RECOMMENDATIONS FROM X-TENDO

Achieving a balance between regulatory targets, voluntary standards and support measures is necessary to achieve the decarbonisation goals of the building sector set under EU policies. The EPC is the only mandatory policy instrument that is embedded in Member States' policies and widely known by end-users. The proposed changes to the EPBD emphasise that better coverage of the building stock with EPCs is a precondition for their improvement, but at the same time Member States would need to ensure that they are affordable and accessible. The EPBD recast proposal also mentions that the EPC should provide additional information to the owner or tenant to foster renovation of the building sector. This would provide a necessary push to unlock private and public funding and subsidies.



R1. Establish stronger links between EPCs, EPC databases, building renovation passports, digital building logbooks and one-stop-shops.

- Member States should consider EPCs as part of a bundle of instruments (e.g. one-stop shops, building renovation passports, digital building logbooks). Data exchange will be essential to their success and Member States should develop common data formats for seamless integration.
- National EPC databases are a must and should be digitally accessible to all instruments.
- EU guidance is needed to establish common principles to design new instruments, in view of the need for data exchange.



R2. Use new features to implement and track the progress on policies and support in enforcing mandatory standards by using EPCs for compliance.

- New features can support Member States to achieve compliance with the EPBD and to implement policies.
- The new features can be used to implement policies such as minimum energy performance standards, achieve national policy goals such as increased renovation rates, unlock financing, advance digitalisation and smartness, and improve information on energy performance and sustainability of buildings.
- Integrating new features in national policy and mandatory standards promotes acceptability and reliability and involves a more active use of EPC data.
- EPC national methodologies should be clear in describing the approach for assessing new features and using common calculation tools to standardise the level of demand.



R3. Set up more ambitious and rigorous quality checks in EPCs and EPC databases, and increase consistency within and between databases.

- Independent control systems should be set up to ensure EPC data is of high quality and available in machine-readable formats.
 - An interface should be provided to connect national databases with quality monitoring programmes.
 - Functionalities can be developed to give assessors feedback on typical faults from EPC databases. Insights from typical faults in EPC issuing process should be fed back into the training of EPC assessors.
 - It is essential to harmonise quality assurance standards at EU level and make provisions for compliance within Member States.
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R4. Adopt digitalisation, standards, methods and tools that promote transparency and accountability in the EPC system.

- Digitalisation of the EPC and database is a precondition for success.
 - Redundant EPC systems (e.g. non-intuitive design of energy labels for owner/tenant, purely paper-based formats that are not connected with digital EPCs, unnecessary bureaucratic procedure for certification) should be phased out, and continuous access provided through digital and interoperable databases, increasing transparency, accountability and trust.
 - Member States should promote more collaborative and open-source knowledge systems (e.g. open source software/ code) for EPCs.
 - New features should be included in national public procurement procedures (e.g. tenders, contracts competitive bidding etc.) to make them visible and acceptable to consumers.
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R5. Conduct cost-benefit analysis to adapt new features to local market needs.

- Member States should conduct a preliminary cost-benefit analysis at the national level, taking into account the specificities of the building stock, legal boundaries, potential reuse of existing infrastructure and cost burden of introducing the new procedures for each new feature.
 - Methodologies using X-tendo features can be adapted (e.g. smart readiness indicator and comfort have two methods, a simple and detailed) for customised application and integration into EPC schemes for different building typologies, climates and building use.
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R6. Enhance user-friendliness of the new assessment methods and results.

- It is important to ease the assessment process (difficulty, average time) while integrating new features to reduce complexity and avoid overloading assessors, which could pose risks to the quality, cost, and reliability of EPCs.
- Additional information from new features presented on the first page of EPC must not burden the end-user. Information such as sub-indicator results can be added in the annex. End-users highlighted user-friendly presentation of results as an important driver for the uptake of new features during the testing in the project.



R7. Member States must put in place the conditions to quickly adopt new EPC features and promote their wider benefits (health, economic and environmental).

- National communication channels and other national programmes should promote the application and use of new features in EPCs, while also creating awareness on wider benefits of renovation and how these are linked to the features.
- The use of new features and tools in EPCs (such as comfort, outdoor air pollution and enhanced recommendations) should be supported through increased investments and financial schemes extending the wider benefits of renovation, such as health, job creation, growth of businesses etc.



R8. Further clarify data governance rules to enable data sharing.

- Data handling of new features needs to consider data protection laws (GDPR) and avoid business models based on trading data – data should be owned by the homeowner. The interoperability protocol must be clear between the EPC database and other instruments, such as one-stop-shops and digital building logbooks, that require an exchange of information between public actors, the homeowner and private actors.
- Member States should review their national regulations to enable a safe environment for EPC data exchange and spell out more clearly the rules for data protection and security, in particular for a fully operational logbook and one-stop-shop environment. They must interpret GDPR uniformly with respect to building-related data (e.g. processing information and sharing of personal data in EPCs) and provide recommendations for amendments to the law (if necessary).

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