iBRoad2EPC

Revamping the iBRoad2EPC concept

Lessons learnt from national experiences

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All of iBRoad2EPC's reports, analysis and evidence can be accessed from ibroad2epc.eu

EXECUTIVE SUMMARY

The iBRoad2EPC project, funded by the EU's Horizon 2020 programme (2021-2024), aims to bridge the gap between Energy Performance Certificates (EPCs) and renovation passports, thereby promoting the decarbonisation of the EU's building stock. By developing a flexible, modular and affordable renovation passport, the project has created a tailored approach to energy renovations, providing building owners with detailed, staged renovation advice. iBRoad2EPC has been implemented and tested in six pilot countries—Bulgaria, Greece, Poland, Portugal, Romania and Spain—providing valuable insights and lessons for wider uptake across the EU. This report focuses on the lessons learnt from national experiences with the iBRoad2EPC implementation with the aim of reviewing and improving the iBRoad2EPC concept. Key success factors of the project include:

Modular approach: iBRoad2EPC offers a Basic Module including staged deep renovation advice, and optional add-on modules providing additional information, such as Investment Cost Module, the Energy Demand Module, the Indoor Environmental Quality (IEQ) Module, the Smart Readiness Indicator (SRI) Module and the Measured Energy Performance Indicator (MEPI) Module. This structure allows for adaptability to various country contexts and integration with existing tools, enhancing its utility across diverse EU markets.

Ease of use: The iBRoad2EPC Assistant, an online tool for energy professionals, enables seamless user navigation and efficient creation of renovation passports. Users of this tool have found the pre-defined recommendations and data entry features useful. iBRoad2EPC allows the import of EPC data from XML or XLS files and provides an Application Programming Interface (API) to allow data exchange with third party software, such as EPC software, EPC databases, Digital Building Logbooks and other.

Suitability: Extensive field-testing has shown that iBRoad2EPC is particularly suitable for residential (single- as well as multi-family) and public/administrative buildings. The system's flexibility in adapting to national contexts, combined with the ability to integrate with existing EPC schemes, positions it as a valuable tool for accelerating energy-efficient renovations across the EU.

The iBRoad2EPC project has successfully developed a flexible and practical renovation passport model, which has been well received in the pilot countries. Member States can use and adapt this renovation passport model in terms of system integration, affordability, and automation. By addressing these areas and further adapting to national contexts, iBRoad2EPC has the potential to become a key tool in the EU's strategy to decarbonise its building stock, supporting both mandatory and voluntary renovation measures under the recast Energy Performance of Buildings Directive (EPBD). For the future, the project recommends further integration with existing frameworks, exploring new financing models, and extending the scope of iBRoad2EPC with additional modules to meet future regulatory needs and technological advances. Some of these areas to adapt and improve include:

Automation and data integration: Stakeholders highlighted the need to further automate data integration, in particular, linking the iBRoad2EPC Assistant to national databases and external systems such as Building Information Modelling (BIM), Geographic Information Systems (GIS) and other.

Module integration: Some of the optional modules, such as the MEPI, SRI and IEQ, are based on external excel spreadsheets that have to be downloaded, filled in and re-uploaded to the iBRoad2EPC Assistant. Future developments may incorporate related assessment modules as much as possible natively into the iBRoad2EPC Assistant without relying on external calculation tools.

Cost and energy poverty: The high upfront renovation costs are often discouraging building owners from undertaking deep renovations. iBRoad2EPC's effective use can maximise impact by guiding financing and thus tackling energy poverty. We recommend improving communication to ensure that stakeholders fully understand the benefits and applications of this tool. This will help improve its implementation and effectiveness.

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ABBREVIATIONS

API	Application programming interface
BIM	Building information modelling
DBL	Digital building logbook
EED	Energy efficiency directive
EPBD	Energy performance of buildings directive
EPC	Energy performance certificates
GIS	Geographic information systems
IEQ	Indoor environmental quality
MEPI	Measured energy performance indicator
NAC	National advisory committee
NBRP	National building renovation plans
RED	Renewable energy directive
SRI	Smart readiness indicator

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INTRODUCTION

Background and context of the iBRoad2EPC project

The renovation passport is a valuable tool for building owners and investors to make informed decisions. It provides high quality recommendations for staged deep renovations and an actionable framework to implement them. The 2024 recast of the Energy Performance of Buildings Directive (EPBD) introduces in Article 12 a framework for renovation passports as a voluntary tool for building owners to facilitate and simplify the renovation process, in particular the staged deep renovation.

The iBRoad2EPC project, funded by the EU's Horizon 2020 programme (2021-2024), aims to support the decarbonisation of the EU's building stock by bridging the gap between EPCs and renovation passports. This integration improves the effectiveness of EPCs in supporting staged energy renovations, offering a tailored, step-by-step renovation journey. The project has developed and tested an adaptable, modular and affordable model renovation passport that aims to meet the diverse needs of EU Member States. iBRoad2EPC can combine the strengths of EPCs and renovation passports into a single flexible tool or help Member States develop a standalone renovation passport. The adoption of a flexible, adaptable, and modular renovation passport can help Member States in complying with the different EPC and renovation passport provisions in the EPBD. It will also enable them to meet and effectively implement the mandatory and optional requirements set out in Annex VIII. This approach will also help Member States to better integrate EPCs and renovation passports, thereby encouraging building owners to undertake staged deep renovations.

The iBRoad2EPC concept in a nutshell

A market analysis of EPCs in the iBRoad2EPC pilot countries (Bulgaria, Greece, Poland, Portugal, Romania and Spain) revealed significant variations due to different political, legal and property market contexts, as well as inconsistencies in quality control and database systems [1]. Low reliability and trust in EPCs emerged as a common issue, with the exception of Portugal, hindering their full potential as a catalyst for decarbonisation. EPCs provide a comparison between buildings based on key indicators, typically energy demand, and reach millions of units per year across the EU (as shown on the left side of Figure 1). In contrast, renovation passports are at the other end of the spectrum (right side of Figure 1). iBRoad2EPC aims to fill market gaps and support the decarbonisation of buildings. The concept acts as a bridge between current EPC schemes and renovation passports, providing a flexible, modular and affordable approach that can adapt to local conditions and evolving regulations. This adaptability allows for market maturity, responds to evolving technological advances and regulatory frameworks, and balances market coverage with resource efficiency. Further details of the project concept are presented in the report *Conceptualising iBRoad2EPC*, which derives key principles and features of iBRoad2EPC from market analyses conducted in the six pilot countries. The report *iBRoad2EPC in depth* presents the concrete concept and methodology for the technical implementation of iBRoad2EPC.
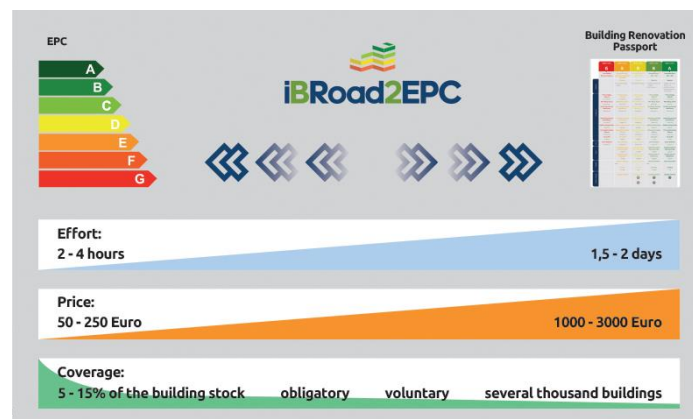

Figure 1: Strategic placement of iBRoad2EPC in relation to the existing EPC and the renovation passport with consequences for effort and cost to issue and market penetration.

The iBRoad2EPC is issued on the basis of an on- site visit by a trained energy expert. It offers by default a Basic Module that provides staged deep renovation advice as an output. Additional optional modules can be added progressively and currently include the Investment Cost Module, the Energy Demand Module, the Indoor Environmental Quality (IEQ) Module, the Smart Readiness Indicator (SRI) Module and the Measured Energy Performance Indicator (MEPI) Module (see Figure 2). These modules provide additional information to the output of the Basic Module, e.g. on thermal, visual and acoustic comfort and indoor air quality, on investment and maintenance costs, and other.

The iBRoad2EPC Assistant is an online back-end tool that can be used by energy experts to create the iBRoad2EPC output, guiding them through data entry and editing processes. It is a standalone web application with user-friendly input features, including dropdown menus and prefabricated text fields. It comprises components such as standard front-end, database and output structures, offering both basic and optional additional modules. The Assistant can be accessed online or via an API, allowing integration with third-party software, such as EPC software. It also allows import of data from XML or XLS files, reducing input requirements. The wizard produces standardised online but printable output documents that are easier to navigate and update than paper formats. Customers receive their iBRoad2EPC as an additional page with a URL or QR code in their enhanced EPC. The process of adapting iBRoad2EPC to the implementing countries is described in the report *Specification for the iBRoad2EPC software tools Report on adaptation requirements for roll-out countries*, which presents concrete adaptations in the six pilot countries. This process can serve as a model for other countries wishing to implement iBRoad2EPC in the future. Furthermore, the project report *Accelerating deep renovation in the EU with renovation passports* provides concrete measures to accelerate deep renovation in the EU by maximising the use of iBRoad2EPC. Based on the analysis of the role of EPCs and renovation passports in the Renovation Wave, the EPBD recast, the EED, and the RED, it provides recommendations for improving their implementation or amending the regulatory framework to promote deep renovation and how to best use iBRoad2EPC for this purpose.
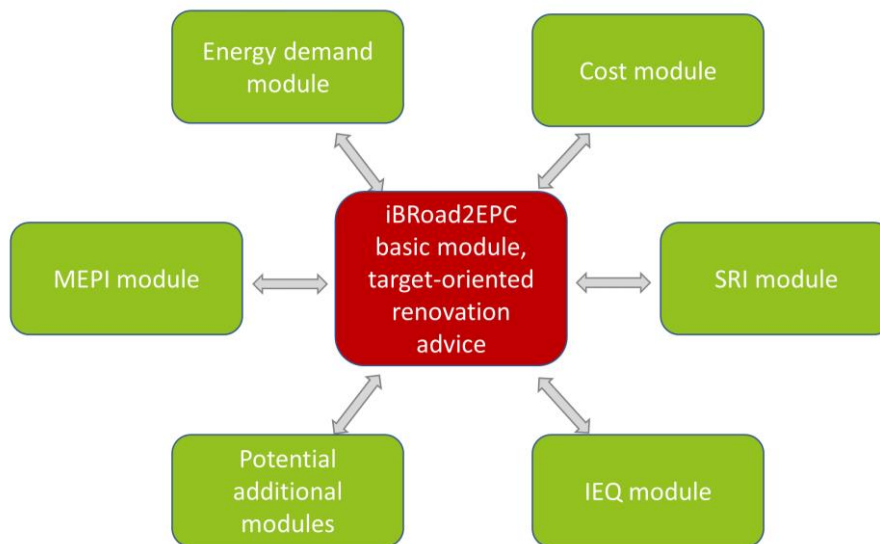
Figure 2: iBRoad2EPC modular approach

The iBRoad2EPC was designed to be visually appealing and communicate its independent, product-neutral audit to building owners, emphasising its robustness, quality, and value proposition. The graphic design prioritised user-centeredness, clarity for all audiences, and motivation to engage with the content. It also aimed to develop a uniform brand design adaptable for various media (print, web, app) and ensure ease of use. The iBRoad2EPC was made available in both online and print formats, allowing implementing countries to choose the most suitable option. Both versions contain the same information, though the online version offers more intuitive navigation [2].

What to expect from this report

The objective of this report, *Revamping the iBRoad2EPC concept: lessons learnt from implementation*, is to revise the iBRoad2EPC concept based on the lessons learnt from the deployment and implementation of iBRoad2EPC in six pilot countries - Bulgaria, Greece, Poland, Portugal, Romania and Spain - over the course of three years. The aim is to reflect on the lessons learnt from the project, to suggest possible improvements and to enable the dissemination of the results beyond the pilot countries.

Who is this report for

This report is intended for stakeholders involved in the design and implementation of Article 12 and Annex VIII of the EPBD on the renovation passports. These include policy makers, energy agencies, building energy experts and auditors, public authorities, training providers, and software developers. This report is a concise synthesis of the reflections of similar actors in the six pilot countries and their insights into the design and implementation of iBRoad2EPC into existing policy frameworks over the past three years.

Methodology

The report draws on the insights from extensive stakeholder interaction and feedback throughout the project. In particular, it draws on the results of the iBRoad2EPC field tests, the fourth round of National Advisory Committee (NAC) meetings where the results of the field tests were discussed, and the wider stakeholder roundtables held in the pilot countries, as described in the report *iBRoad2EPC perspectives #1 — Stakeholders views on iBRoad2EPC adoption*.

During the three years duration of the iBRoad2EPC project, 202 energy experts were trained to issue the iBRoad2EPC output document. Of the trained energy experts, 47 participated in the field test and issued 58 iBRoad2EPCs for residential and non-residential buildings, with a special focus on public buildings. The experiences of the experts and the building owners/managers were the subject of a questionnaire survey. To ensure a thorough and objective evaluation of the iBRoad2EPC field test, feedback was collected from three key groups: building owners, pilot country partners and energy experts. While building owners and pilot country partners were surveyed once, energy experts were surveyed twice, one following their iBRoad2EPC training and another after the field test. The questionnaires covered general information about the respondent and the building, as well as technical aspects such as the concept, issuance process, clarity, feasibility and usefulness of iBRoad2EPC. Although the same core questions were asked of all groups, the emphasis varied: energy experts focused more on technical feasibility and user experience, while pilot country partners and building owners focused on knowledge transfer and ease of implementation. In total, 34 questions were posed to building owners, of which 38 responded; 39 questions were posed to building professionals, of which 47 responded; and 16 questions were posed to country partners. However, not all of the respondents to the surveys answered all of the questions.

The National Advisory Committees (NACs) in each of the six implementing countries (Bulgaria, Greece, Poland, Portugal, Romania and Spain) are composed of key external stakeholders in the national EPC and renovation passport frameworks and are chaired by country leaders. The NAC members are experts from various public and private sectors, including energy and sustainable energy agencies, renewable energy agencies, housing and urban development agencies, ministries responsible for energy, transport and buildings and for the implementation of EPCs, urban and local bodies (ULBs), construction chambers, financial institutions, professional associations of energy auditors, engineers and facility managers. Through discussions, they support in the identification of local needs and guide the project activities. The NACs aim to adapt the common methodology to national/regional needs. They met at least four times during the project

The stakeholder roundtables consisted of experts similar to those in the NACs but included a wider group of stakeholders including policy makers, industry, academia, professionals and consumer representatives. The roundtables were held online, in person or in a hybrid format and lasted between 1 and 2 hours. In total, more than 250 participants took part in these events. The results of the field test were presented to the

participants, followed by a question and answer session on the benefits and challenges of implementing the renovation passport and the role of iBRoad2EPC in achieving this.

Note: *As the survey questions following the field tests mostly collected graded responses (e.g. on a scale of 5 from very easy to very difficult) on the ease of use or understanding or usefulness of various modules and features of iBRoad2EPC, it is difficult to directly assess the areas for improvement from these responses alone. Overall, the responses gave a positive assessment of iBRoad2EPC. However, the field test also provided the opportunity to fill in free text. There is also additional feedback from roundtables and NAC meetings. While this feedback may not be broadly representative, a nuanced reading of such feedback provides opportunities to improve iBRoad2EPC.*

LESSONS LEARNT REGARDING THE IBROAD2EPC CONCEPT, FEATURES AND FUNCTIONALITIES

Positioning of iBRoad2EPC

The iBRoad2EPC is designed to bridge the gap between Energy Performance Certificates (EPCs) and building renovation passports, with its positioning between these two tools playing a crucial aspect of its design. EPCs are driven by national legislation and are designed to be issued at low cost and in large numbers to achieve widespread uptake. They are usually requested by building owners when they are renting or selling a building or when they are planning to apply for funding for renovation. In the latter case, owners need detailed planning support for the renovation. The market for building renovation passports on the other hand is much smaller, reaching only thousands or tens of thousands per year [1]. The design of iBRoad2EPC gives Member States the flexibility to decide where to place it on the scale between the EPC and the renovation passport, allowing for different tailored solutions. However, there is limited scope to adjust the balance between issuance costs and market reach. A key decision in the implementation of iBRoad2EPC is whether it will be mandatory or voluntary for building owners, as this will affect its positioning on the spectrum between EPCs and renovation passports.

How useful is it?

The vision for iBRoad2EPC and its position between the EPC and the Renovation Passport spectrum was developed for each pilot country with input from national partners, NACs and lessons learnt from consultations with public authorities. This was primarily based on the existing EPC frameworks and estimates of the additional cost, effort and market coverage that iBRod2EPC would bring (Figure 3).

Both Poland and Portugal proposed to keep the cost and effort of the iBRoad2EPC very low, i.e. very close to the cost and effort of issuing EPCs, and therefore proposed to position the iBRoad2EPC very close to the EPC. However, the stark contrast is that in Portugal the EPC is already well advanced with high quality recommendations, whereas in Poland the only concern is the additional cost and lack of potential funding for iBRoad2EPC. In Portugal there are many advanced tools that facilitate energy efficiency interventions in buildings and iBRoad2EPC was seen as a potential universal tool that combines these different tools. In addition, there were several potential funding programmes that could be used and linked to iBRoad2EPC, making them more useful and reducing the cost of renovation.

In Bulgaria, a detailed energy audit is required to issue an EPC. Given the already considerable cost and level of detail associated with the EPC, it is proposed that iBRoad2EPC does not involve significant additional cost and effort. iBRoad2EPC could serve as a supporting tool to help energy experts mitigate some of the costs by providing a comprehensive methodology together with a user-friendly toolbox (e.g. pre-developed recommendation texts will be available for auditors to use as a basis for the energy audit and EPC process).

In Greece, it is proposed to introduce iBRoad2EPC in two stages. The first stage will include a basic version of the software, which will include the necessary functions and modules. This version will be offered at a lower cost in order to make it more accessible to the majority of building owners. The second stage will be a more advanced and comprehensive version of the software, including additional modules, to be offered at a freely negotiable price between the recipient and the energy expert. It is anticipated that the basic version of iBRoad2EPC will cost slightly more than the official cost of issuing an EPC. There were several potential funding programmes that could be used and linked to iBRoad2EPC.

In Romania, it is suggested that the Romanian iBRoad2EPC is closer to an EPC than a renovation passport in terms of additional cost and effort, although this was very difficult to assess.

In Spain, iBRoad2EPC was positioned in closer proximity to the EPC, with the aim of providing a tool that requires less effort and cost to implement. However, among all the pilot countries, Spain's position is the one closest to the right end within the EPC and BPR spectrum. Additionally, special emphasis was placed on communicating the results to the owners in a clear and understandable way.

The willingness to pay for iBRoad2EPC, when issued together with an EPC, varies widely among building owners, with those willing to pay (about 72%) a premium over the EPC ranging from 25% to 200%. Concurrently, most energy experts believe that the iBRoad2EPC should cost between 25% and 100% more than the EPC, although the range is from free to 200% extra cost (see *iBRoad2EPC field test results*).

The integration of iBRoad2EPC into National Building Renovation Plans (NBRPs) and the broader policy landscape in different countries is proposed to be guided by specific trigger points, which are aligned with those of the Energy Performance Certificate (EPC), while reflecting unique national contexts, regulatory frameworks and renovation strategies. In countries such as Poland, Portugal, Romania and Spain, iBRoad2EPC is initially proposed to be implemented on a voluntary basis, as outlined in the recast EPBD, which introduced requirements for renovation passports. However, it may become mandatory under certain conditions, such as for public buildings, for access to public funding, or in response to future legislation. This approach provides flexibility while encouraging gradual adoption, particularly in countries such as Poland where EPC enforcement is limited. A key driver for iBRoad2EPC adoption in all countries is the link to public funding. In Portugal and Romania, for example, obtaining an iBRoad2EPC may be required to access public funding for building renovation, ensuring strategic planning and alignment with national funding mechanisms. iBRoad2EPC provides a roadmap for incremental improvements. In Romania, iBRoad2EPC is seen as facilitating staged financing, especially for deep energy renovations, while in Bulgaria it is seen as essential to support staged renovations under the new EPBD requirements, especially when deep renovations cannot be completed in one phase. Flexibility in the implementation of iBRoad2EPC was highlighted as a critical success factor. The tool should integrate seamlessly with existing EPC schemes and be adaptable to different levels of detail and cost depending on market needs. For example, in countries with advanced EPC schemes, iBRoad2EPC was seen as an extension that should complement and build on existing tools rather than duplicate efforts.
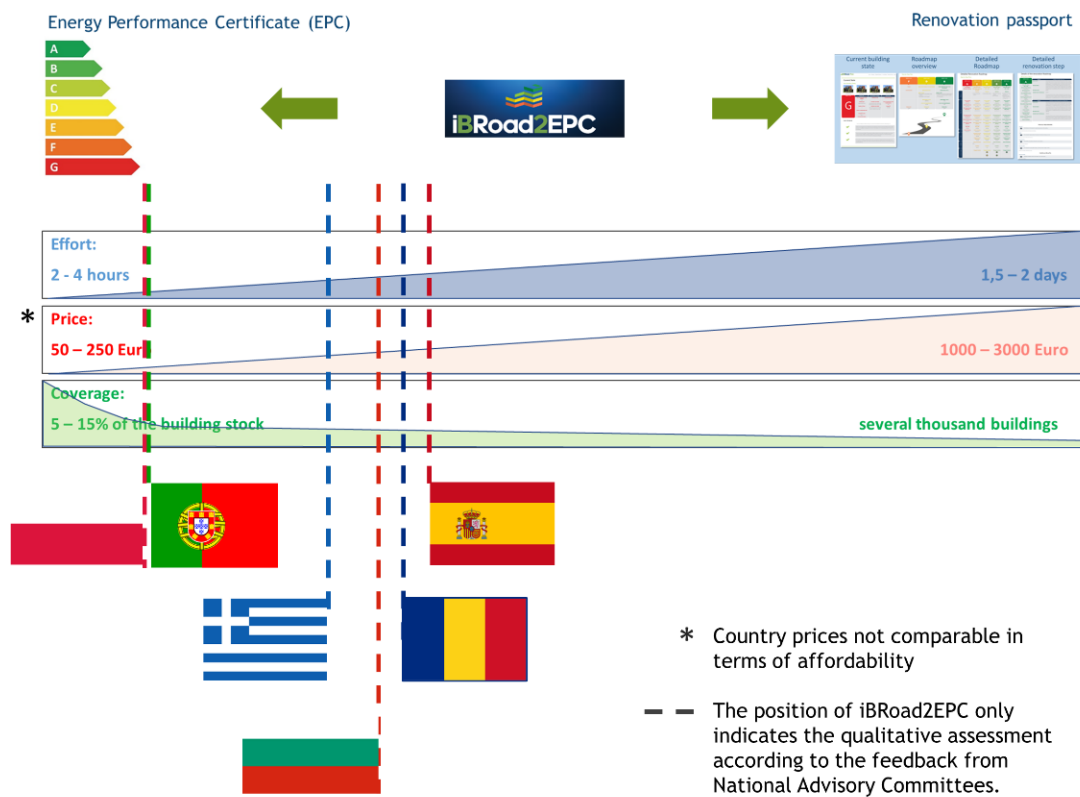

Figure 3: Strategic positioning of the iBRoad2EPC in relation to the existing EPC and the Renovation Passports, with implications for the effort and cost of issuance and market penetration in the pilot countries (Qualitative assessment according to the feedback from National Advisory Committees)

What can be improved?

Across the six partner countries, the key challenge identified was to balance the added value of iBRoad2EPC with the need to keep costs and effort low while maximising coverage. Most countries emphasised the importance of minimising additional costs compared to the existing EPC system. This was particularly important in contexts where the EPC is already perceived as costly or complex, e.g. where full energy audits are required to issue an EPC, as adding further financial or procedural burdens could reduce uptake.

The overarching consensus was that iBRoad2EPC should not significantly increase costs beyond the current EPC framework, which iBRoad2EPC achieved reasonably well. This was seen as essential to ensure the accessibility and attractiveness of the tool to both building owners and energy professionals. In countries where the EPC is already considered to be expensive, e.g., due to the requirement to carry out an energy audit, the introduction of iBRoad2EPC as a supporting tool to the EPC and audit process, rather than a stand-alone tool, was favoured, as this can mitigate the high cost of EPCs.

While the iBRoad2EPC, with its modular approach, is designed to provide more comprehensive guidance for long-term renovation, there was a strong preference to offer at least the iBRoad2EPC Basic Module, as a low-cost version. This approach allows for wider adoption while still providing value, particularly in markets with limited financial support. A more detailed and expensive version could be made available as an option for those who wanted it, but the general trend was to keep the basic offering affordable.

Recommendations

Any Member State considering the implementation of the iBRoad2EPC renovation passport would be well advised to first examine its national objectives and priorities, its building stock characteristics, and its potential integration with existing EPC schemes. Having established its role within the broader context of the EPC and renovation passport scheme, the second key consideration is how to adapt the iBRoad2EPC tools and functionalities to suit the specific needs of the Member State.

The integration of iBRoad2EPC into national frameworks is also closely linked to each country's efforts to align with the broader objectives outlined in the EPBD recast, particularly in the context of National Building Renovation Plans (NBRPs). The tool is seen as a means to support the ambitious renovation targets and long-term energy efficiency goals set by the EPBD. iBRoad2EPC is generally seen as a tool that can help secure financing and achieve renovation targets. Furthermore, the optimal placement of the iBRoad2EPC within the spectrum of EPCs and individual renovation passports depends on the specifics, in particular the price and effort of issuing iBRoad2EPC, and the potential coverage of the building stock with iBRoad2EPC (see Figure 4).

The iBRoad2EPC pilot countries have used this approach to identify priorities and enablers for national implementation. Their initial results of this approach have been captured in the iBRoad2EPC report *Initial national guidelines* and have been revised following the implementation of the iBRoad2EPC in pilot countries as captured in the report *iBRoad2EPC perspectives #2 — Public authorities views on the integration potential*.
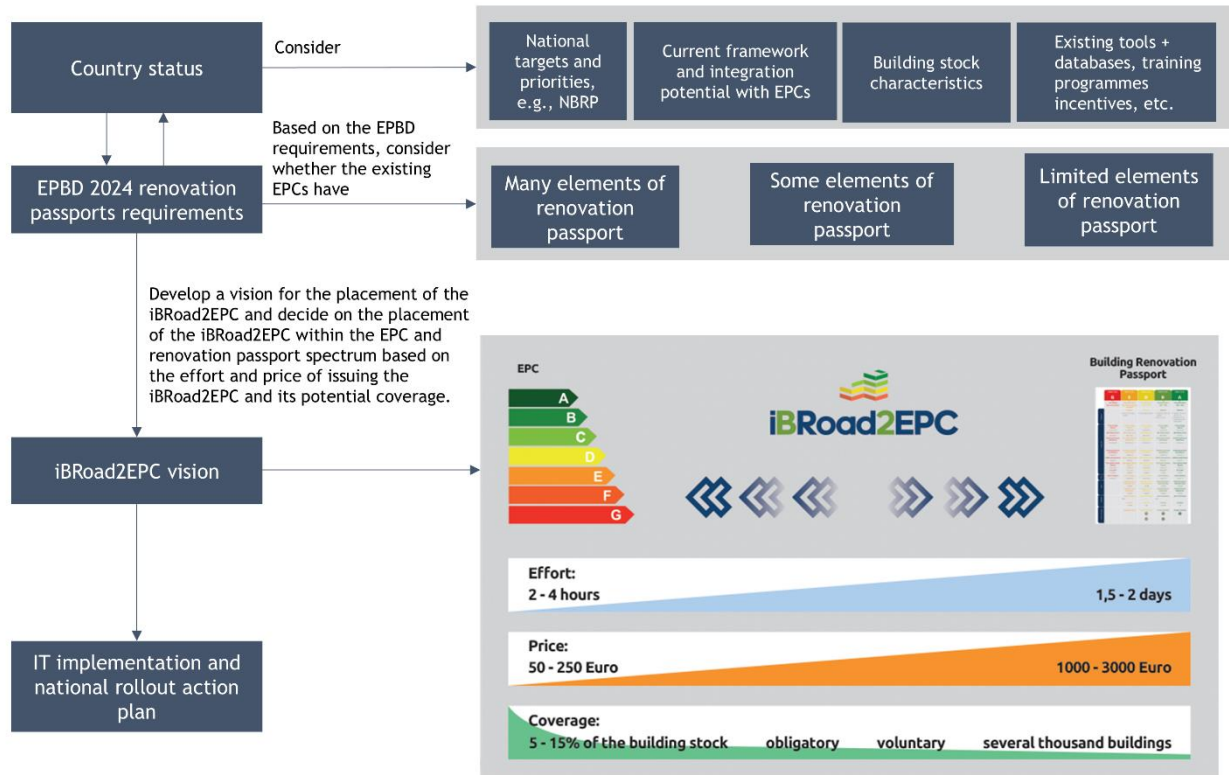
Figure 4: Positioning of iBRoad2EPC

Other EU countries can learn from the diverse approaches to iBRoad2EPC implementation. By adapting the tool to fit their national contexts, balancing costs and market reach, integrating it with existing tools, and simplifying the user experience, countries can effectively bridge the gap between EPCs and building renovation passports, promoting energy-efficient renovations while managing costs.

Flexibility in implementation: iBRoad2EPC offers flexibility, allowing each country to adapt the tool to its specific context by positioning it between EPCs and building renovation passports. This customisation ensures that iBRoad2EPC can address national priorities, whether focused on wide dissemination (like EPCs) or in-depth renovation planning (like building renovation passports). Countries should carefully assess where to place iBRoad2EPC on this spectrum based on their existing energy performance policies and frameworks.

Balancing costs and outreach: One of the critical decisions is whether iBRoad2EPC should be voluntary or mandatory, as this will determine its cost and market penetration. Poland and Portugal illustrate contrasting approaches: Portugal, with its advanced EPC system, integrates iBRoad2EPC as a cost-effective tool linked to existing financial programmes, while Poland is more concerned with funding challenges. This highlights the importance of securing financial support to make the tool more accessible.

Integration with existing tools: Countries like Portugal have shown how iBRoad2EPC can be leveraged as a universal tool by integrating it with other advanced energy efficiency tools. This approach not only makes iBRoad2EPC more versatile but also reduces additional costs. Other countries can benefit by linking iBRoad2EPC to existing systems and financial programmes to enhance its usefulness and cost-efficiency.

Staged introduction for greater accessibility: Greece's proposal of a two-stage rollout—offering a basic, affordable version followed by a more advanced option—provides a model for making iBRoad2EPC accessible to a broader range of building owners. This staged approach can help other countries cater to diverse market needs, encouraging uptake among both small building owners and those planning comprehensive renovation of a large area.

Cost and effort considerations: Countries like Bulgaria, Greece, Romania and Spain emphasise the need to align iBRoad2EPC with the existing EPC framework to avoid significant additional costs and effort. They view

iBRoad2EPC as a supporting tool to help energy experts streamline their work, minimising extra costs while providing valuable resources. This suggests that aligning iBRoad2EPC with existing certification processes can reduce barriers to adoption. Already, Bulgaria and Spain have provided proof of concept of this alignment and interoperability.

Simplifying the customer journey: The priorities identified for Spain to support the national roll-out place particular emphasis on making iBRoad2EPC user-friendly and easy to understand, and can serve as a model for other countries. These priorities include raising awareness of the need for deep renovation, creating a user-friendly platform with reliable information on deep renovation embedded in the EPC system, simplifying financial management and facilitating funding, defining the market approach for promoting the iBRoad2EPC tool and ensuring integration with existing national databases and tools. Clear, accessible tools can enhance building owner engagement and encourage more widespread adoption, particularly if complex energy reports are simplified for easier comprehension.

iBRoad2EPC on-site visit and template

The iBRoad2EPC is issued on the basis of an on-site visit by a trained energy expert, which is also a requirement of the 2024 EPBD recast. To help energy assessors collect data efficiently, minimise errors and save time, and develop a first draft of the renovation plan in consultation with the building owners, iBRoad2EPC has developed a checklist and a template for collecting input data during the site visit.

The checklist helps issuers during the on-site visit by providing fourteen questions covering the building owner's renovation plans, the building's technical condition, component lifespan, and future legal obligations. It ensures that issuers gather all the necessary information to accurately issue the iBRoad2EPC.

A blank template enables energy assessors to work with building owners during the site visit to develop a renovation strategy, incorporating their ideas and plans. This template helps to record details such as the year of construction, previous improvements and renovations for each group of components. It also includes sections for the whole building and its occupants, with time steps arranged in columns specific to each Member State. Future obligations, such as legal requirements to phase out fossil fuel boilers, minimum energy performance requirements and carbon neutral building targets, are pre-populated for the relevant years. Issuers can use the template to follow the checklist and assign renovation measures to specific time periods.

How useful is it?

Building owners participating in the field test found the discussions with the energy expert about the potential benefits of renovation and the current condition of their building to be the most valuable. Many also appreciated the information on the advantages of a long-term renovation plan and working with the expert to outline this plan during the on-site visit. Most energy experts found the iBRoad2EPC template easy to understand and use after the training. They found the visit very useful for gathering information on potential future renovations and assessing the current condition of the building. Many also found it helpful in explaining the benefits of long-term renovation to the owners and understanding their needs.

What can be improved?

However, energy experts felt that the usefulness of iBRoad2EPC could be improved by (although they may be highly specific to a partner country)

- Extending and better adapting the template for non-residential buildings
- Including information on domestic appliances

Recommendations

Most energy experts and building owners found an on-site visit useful for a variety of reasons that are centred around efficient information collection and facilitating better planning. Based on the stakeholder feedback,

Figure 5 shows our enhanced approach to the iBRoad2EPC on-site visit and template, including one new recommendation.
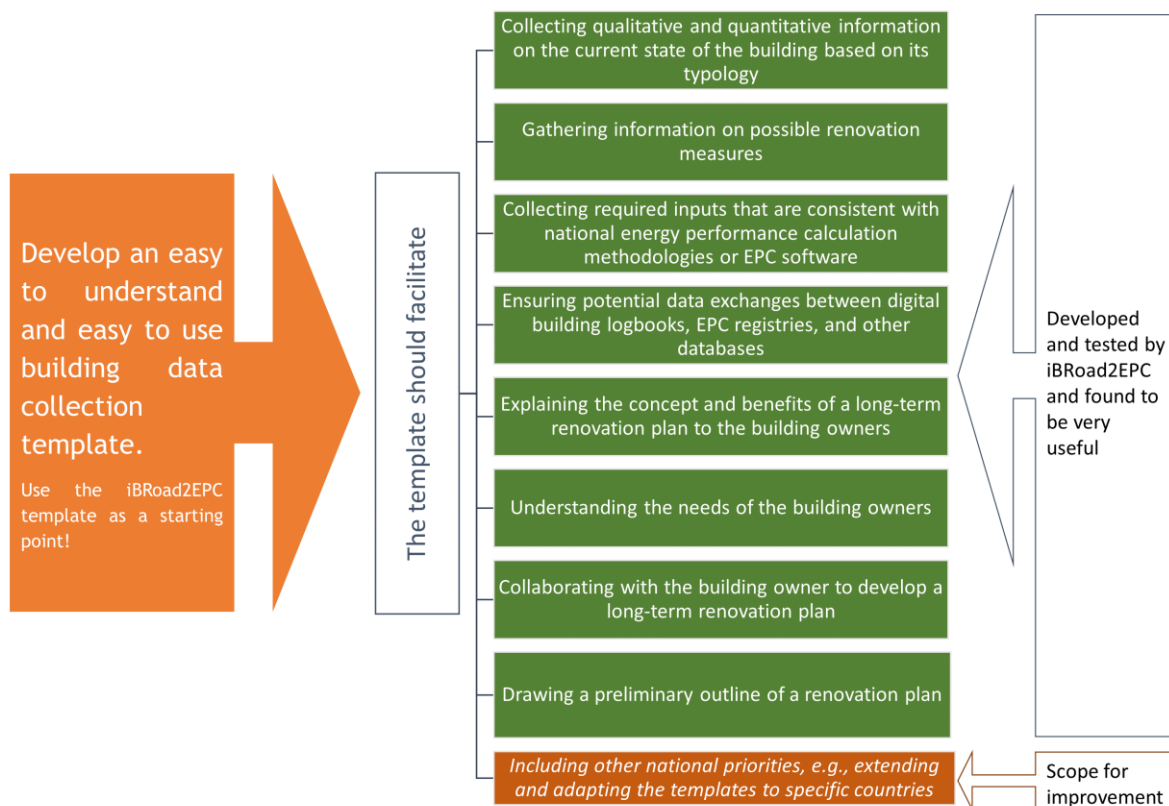
Figure 5: Enhanced approach to the iBRoad2EPC on-site visit and template, including one new recommendation

Issuing the iBRoad2EPC

The on-site visit is the first key step in issuing an iBRoad2EPC. While there is some preparatory work beforehand, it is mainly organisational. Ideally, experts review available building data, study floor plans, and assess space for installations prior to the visit. With experience, the visit itself can be carried out efficiently. After collecting all the necessary data during the site visit, the experts use the appropriate software to calculate the EPC and transfer the data from the EPC to iBRoad2EPC. They also use external spreadsheets for the assessment of IEQ, SRI and MEPI that are integrated in iBRoad2EPC. In consultation with the building owner, the expert then draws up the long-term renovation plan. This involves comparing different renovation strategies for the building, selecting renovation measures, and assigning them to individual steps in the long-term renovation plan. During this process, the building's energy performance is calculated using existing EPC software and data is then entered into the iBRoad2EPC Assistant to generate the iBRoad2EPC renovation roadmap.

How useful is it?

Based on the results from field testing of iBRoad2EPC, on an average, the iBRoad2EPC took around 10 hours to complete, in addition to the seven hours required to complete the EPC, which includes the on-site visit. The experts have found the iBRoad2EPC Assistant easy to use and the iBRoad2EPC issuance process efficient. They also found working on the basic and energy demand modules to be more efficient and easier than working on the SRI or IEQ modules.

What can be improved?

Although 70% of the experts compared different renovation plans, only a third of them did so on their own initiative. The remaining experts did so at the request of the building owner or occupier. One of the reasons

for this could be the effort involved in performing multiple energy performance assessments of the building using the EPC software and transferring this information to the iBRoad2EPC Assistant. This also depends on the ease with which the EPC software handles parametric calculations. Overall, the handling of parametric calculations and the automation of data input from the EPC software to iBRoad2EPC may encourage experts to compare different renovation plans more often and on their own initiative.

Recommendations

Automating the data input process from the EPC software to the iBRoad2EPC Assistant is an efficient way to improve the issuance process and reduce the time required. iBRoad2EPC already provides a blueprint for this, see Figure 6. The data automation is already tested in Bulgaria (XLS), Portugal and Spain (XML) and proves to increase efficiency. Although this is beyond the scope of iBRoad2EPC, the output process can be made easier if the EPC calculation software can handle parametric calculations efficiently.

iBRoad2EPC Assistant

The iBRoad2EPC Assistant is an online tool designed for energy professionals to create standardised renovation passports as a web-based output, which is both printable and available in an online version (digital format), making them easier to navigate and update. iBRoad2EPC compiles data from a single PostgreSQL database. For **"conceptual understanding"**, this database can be understood as two different databases—a content database and a building database, each of which can be adapted to different countries and languages without changing its structure. The content database can be further categorised, only for **"simplified understanding"**, into: the Image/Icon section, which stores country-specific graphics, such as energy classes in specific colour codes as well as icons and symbols that represent certain building-specific features; the Measures section, which contains descriptions of renovation measures that issuers can select and edit; the Measure Specification section, which contains the technical details of the renovation measures, predefined by the implementing countries to align with national building sector targets; the Notes section, which stores notes related to the sequence of renovation measures and helps to avoid lock-in situations; and the Text section, which contains all static texts such as welcome messages. In addition, the MEPS/Regulations section provides a preview of future regulatory requirements, including European and national energy performance standards.

The iBRoad2EPC Assistant has a customisable user interface and can be adapted to the different needs of the Member States, including renovation measures and climate zones, to specific pilot countries and to support different building types. The actual energy-related calculations are performed by the national EPC software. The iBRoad2EPC simply provides various user-friendly input masks into which the output from the national EPC software can be manually entered by the energy expert. The Assistant guides energy experts through data entry and editing, simplifies the assignment of renovation measures and allows easy customisation of default texts iBRoad2EPC also allows the import of EPC data from XLS and XML files, as tested in Bulgaria (XLS), Portugal and Spain (XML), and provides an Application Programming Interface (API) to allow data exchange with third party software, such as EPC software, EPC databases, Digital Building Logbooks and other (see Figure 6). However, this is a proof of concept and has not been implemented by any of the pilot countries as yet. In addition, iBRoad2EPC can be exported to digital building logbooks, enriching these databases with information on future energy status. For example, iBRoad2EPC is linked to the *iBRoad building logbook*. This will help in the bottom-up evaluation of renovation strategies, complementing top-down approaches such as National Building Renovation Plans (NBRPs).

iBRoad2EPC Issuance Process
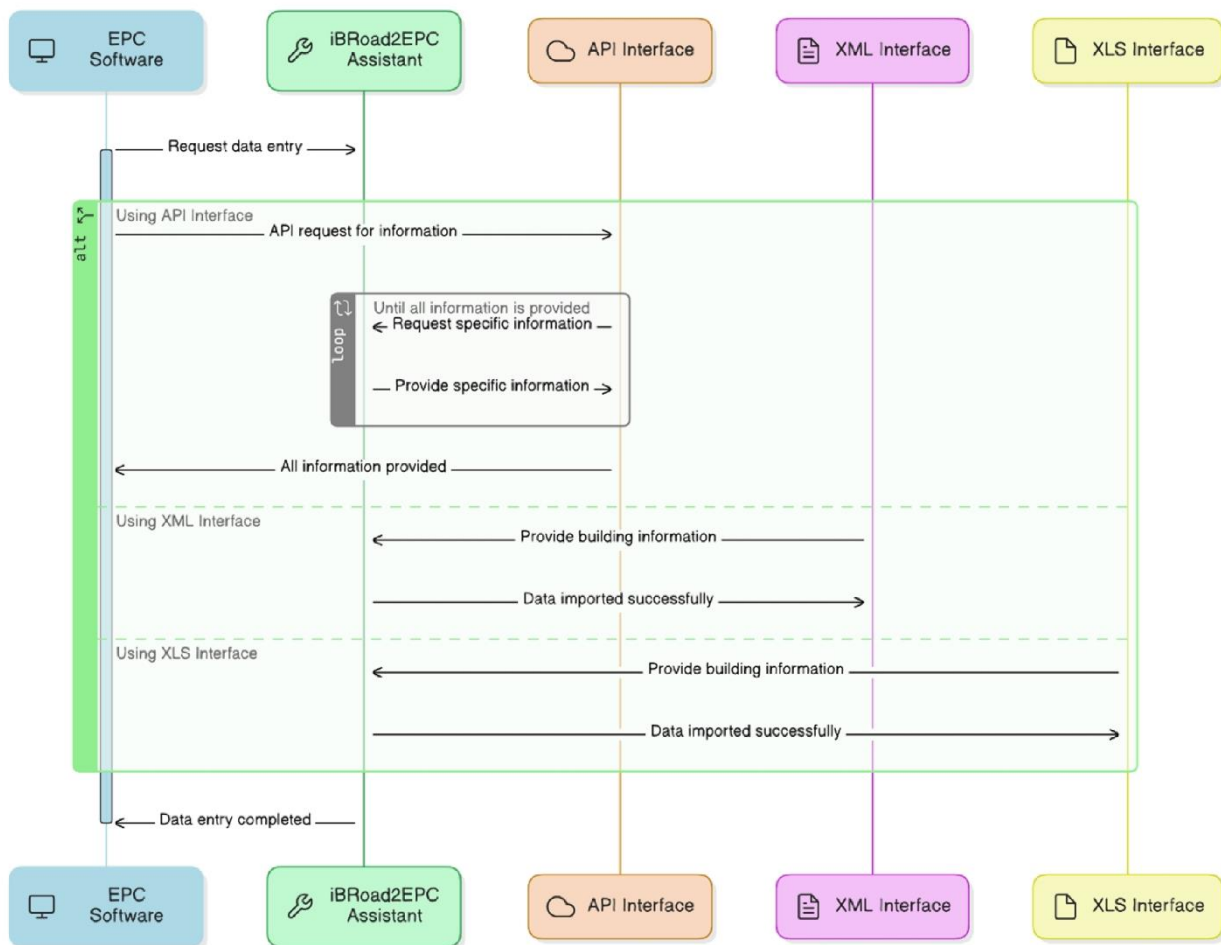
Figure 6: iBRoad2EPC issuance process. Source: ifeu

How useful is it?

Most of the energy professionals found the structure, organisation and categorisation of the database behind the iBRoad2EPC Assistant very useful. In particular, they found the following features very useful: the pre-defined lists of recommendations, the text block with an automatic description of the renovation measures and the possibility to overwrite the recommendations and text description, the technical details and notes on the measures, and the understanding and editing of future legal requirements.

Spain has tested the XML integration and found that 50% of the mandatory fields related to project details, 83% of the mandatory fields related to the current condition of the building and 55% of the mandatory fields related to renovation steps can be automatically pre-populated in the iBRoad2EPC Assistant. In addition, integrating the Excel file with the iBRoad2EPC Assistant significantly streamlines the EPC issuance process for Bulgarian auditors. By uploading this file, auditors can automatically populate necessary data fields, saving time and reducing manual input. The integration extracts recommended energy-saving measures from the file, placing them directly in the "ASAP" step for quick implementation. XML and XLS data integration between iBRoad2EPC and EPC software or databases were the most preferred options.

Experts found that iBRoad2EPC is suitable for many building typologies. Although several viable plans might be proposed for a building, the iBRoad2EPC must settle on a single final strategy. The process does not specify how these options should be compared, but 70% of experts reviewed multiple plans before choosing

the final one. In particular, they found it very suitable for residential (single- and multi-family) and public/administrative buildings.

What can be improved?

A common theme across countries is the need to link iBRoad2EPC to national EPC databases and other relevant platforms to enable automatic data retrieval and pre-filling of forms. This approach reduces manual effort, increases accuracy and ensures that the most up-to-date information is used in the iBRoad2EPC process. In Bulgaria, for example, linking iBRoad2EPC to the EPC database maintained by SEDA would allow automatic data retrieval from an Excel file used by auditors, thus simplifying the issuance process. Similarly, Portugal highlights the importance of linking iBRoad2EPC to the EPC XML file to allow automatic pre-filling of energy calculations and renovation measures.

Thus, although, data exchange can take place in various forms, overall, the use of XML files as a standardised format for data exchange between the iBRoad2EPC Assistant and EPC software tools is highlighted as a preferred approach. Countries such as Spain and Bulgaria note that a significant proportion of iBRoad2EPC data fields could be imported directly from EPC XML files, reducing the workload for energy experts. However, challenges still remain with this approach. The output in the form of XML files from national EPC software is not standardised in most countries, i.e. the organisation of the data within the XML file can be very different for different software. This requires additional programming to map specific fields or to accommodate differences in data structures.

Stakeholders and NAC members suggested further ways to improve the integration of the iBRoad2EPC Assistant with other tools and instruments. This will make it easier to input data into the iBRoad2EPC Assistant and make the outputs of the iBRoad2EPC more useful. In the future, the iBRoad2EPC Assistant could potentially be integrated with building data sources at different levels—building, city, regional or national. At the building level, this could include input from BIM models; at the city, regional or national level, it could draw on geographic or statistical information systems; at the national level, it could incorporate building cadastre data. For example, GIS data on district heating networks could eventually help the iBRoad2EPC Assistant specific recommendations on district heating sources. In addition, integration with funding and financing programmes could enhance the capabilities of the tool. To make the output of iBRoad2EPC more useful, iBRoad2EPC could also be linked to the one-stop-shops and databases for energy performance of buildings.

Some stakeholders have suggested improvements to the graphical user interface and visualisation of the iBRoad2EPC, including

- Allowing different heating and cooling energy systems and the option to select different years of construction/installation for each;
- Allowing duplication of a project.

Recommendations

Identify potential existing or future databases, registries or information systems that can be linked or integrated with iBRoad2EPC as shown in Figure 7.
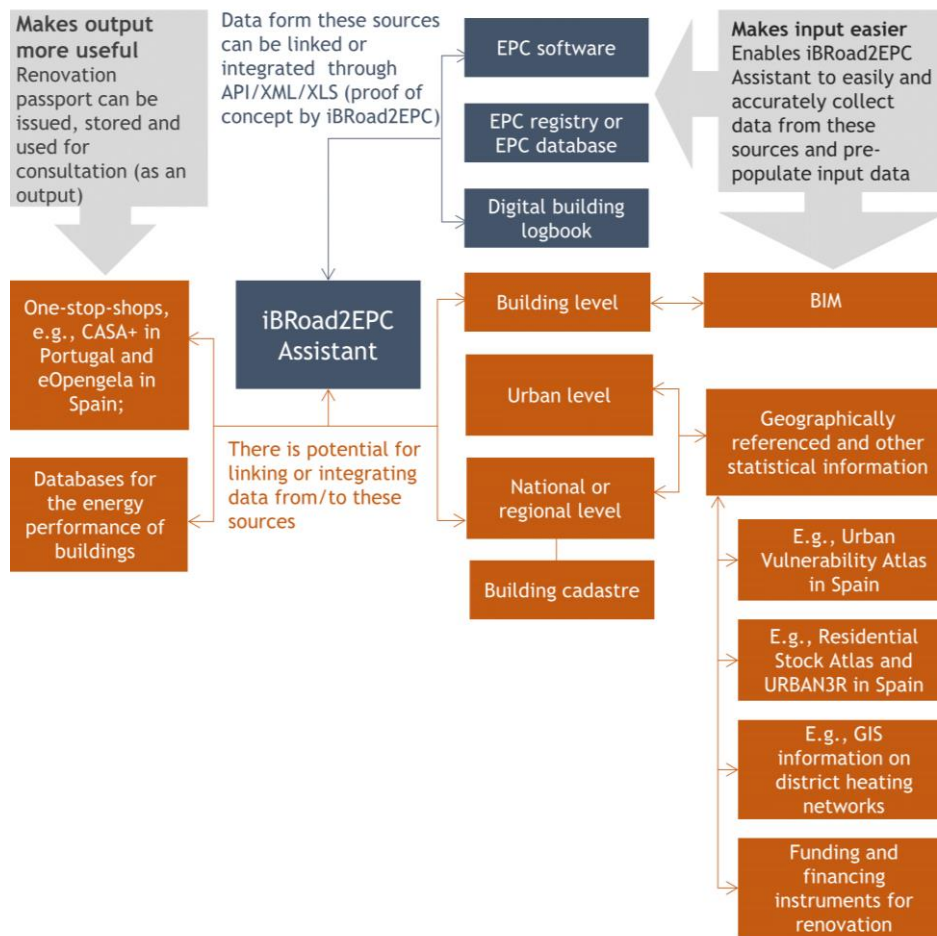
Figure 7: Suggestions for future iBRoad2EPC data integration and automation

Modular approach

The Basic Module requires an on-site visit and offers renovation recommendations from a predefined list, which can be edited by the energy expert. This allows the expert to customise the type and sequence of renovations for the specific building, helping to avoid lock-ins during step-wise or staged renovations. A key aspect of these recommendations is their long-term focus, promoting step-by-step renovations aligned with national decarbonisation and climate goals [1]. The mandatory and indispensable part of the iBRoad2EPC, and by extension the Basic Module, is a set of core features, including essential technical information for building owners, as well as a standardised methodology, layout, and software infrastructure. These fundamental elements are required in every iBRoad2EPC and are designed to address the guiding questions that iBRoad2EPC answers, as shown in Table 1.

Table 1: Guiding questions of the Basic Module of the iBRoad2EPC[2]

Guiding questions for the Basic Module	iBRoad2EPC approach
What? **Which renovation measures are recommended until complete renovation of the building?**	Based on the on-site visit and together with the building owner, the issuers decide which building components or technical building equipment need to be renovated or renewed.
When? When should the single renovation **measures** be carried out **as part of a comprehensive net zero** strategy? What is the preferable order?	Each implementing country can define the time steps so that they are aligned with the overarching building strategy. The issuers decide which building component is to be renovated by which time step.
How? **What are the basic technical specifications of the renovation measures? How can the target state of the individual building be aligned with the national climate targets for the building sector?**	The technical specifications of the renovation measures proposed in iBRoad2EPC are derived from the national building strategy (NECP, LTRS, NBRP).
What to beware of? **What legal requirements will the building need to fulfil in the future?**	Milestones and targets included in iBRoad2EPC are derived from national and European laws or directives. In addition, it is possible for the issuers to adapt or propose additional steps.
What to pay attention to? **How can single renovation steps build a meaningful whole without lock-in situations?**	Aspects that need to be taken into account to prevent lock-in situations appear automatically based on the sequence of measures.

The advanced version builds on the basic module by optionally and modularly incorporating additional features, currently any of the following modules: Investment Cost Module, Energy Demand Module, Indoor Environmental Quality (IEQ) Module, Smart Readiness Indicator (SRI) Module or Measured Energy Performance Indicator (MEPI) Module. It also provides the option to link to an EPC database, a DBL, and other relevant tools or databases [1].

How useful is it?

Experts appreciated the ability to add and edit renovation measures, with the energy demand module being well received. Technical details and notes were also rated as very or extremely useful by the majority of experts. Many experts also found it useful to be able to overwrite automatically generated blocks of text. Overall, 78% of the experts found the features of iBRoad2EPC extremely useful. Besides that, stakeholders found the modular approach very useful and more likely to be adopted by the market. Among the optional modules, the majority of the building owners and experts found the IEQ module most useful and informative, followed by the SRI module. The MEPI module was not included in the field test survey questions, as it was developed after the questions were sent out. However, experts preliminary feedback was that the data necessary to assess measured energy performance is difficult to access.

What can be improved?

The SRI, IEQ and MEPI modules are based on external excel calculation spreadsheets and are not natively built into the Assistant. Energy experts can download the spreadsheets through the link available in the iBRoad2EPC Assistant, complete it and then upload it back into the Assistant. Although the process itself is

not perceived as difficult, energy experts have identified this as a potential area for improvement This may also be due to the fact that the SRI and IEQ calculation methodologies themselves require too much input data that may not be readily available. In addition, although the MEPI module was found to be useful, it was poorly received due to difficulties in obtaining reliable monthly metered energy consumption data in some countries.

The investment cost module, which provided details of investment costs, maintenance costs and available funding, was favoured by the building owners. However, energy experts found that, despite this information, most building owners were often reluctant to renovate because of high up-front costs. Suggestions from stakeholders to mitigate this included adopting neighbourhood or energy community project approaches rather than renovating individual buildings to bring down the costs, increase the return on investment and gain trust and acceptance of the communities.

Recommendations

The first way to improve iBRoad2EPC is to use its modular approach to make it compliant with the 2024 EPBD recast, in particular the provisions of Article 12 on renovation passports and the requirements for renovation passports set out in Annex VIII. As we have found in the report *Accelerating deep renovation in the EU with renovation passports*, the iBRoad2EPC model renovation passport already complies with all the provisions of the Article 12, meets 19 of the Annex VIII requirements and partially meets the remaining 14 requirements or can include them as optional modules. At the same time, it should be ensured that all existing national legal requirements and building sector decarbonisation objectives are considered. iBRoad2EPC already provides a model for this, which the Member States can customise and update according to their needs.

Stakeholders suggested that the tool should be easily adaptable to cater for changes in the regulatory framework, e.g. changes in future obligations, MEPS, etc., and technological developments.

In addition, they recommended the inclusion of a link to available One-Stop-Shops (OSSs) from where building owners can get further actionable support in carrying out the renovation.

iBRoad2EPC has tested various modules and how they are integrated into the iBRoad2EPC Assistant. In general, optional modules could be designed, developed and integrated natively into the iBRoad2EPC Assistant to increase their usability and acceptance by energy experts.

The stakeholders made several suggestions for additional modules, which can be developed based on

- Ensuring compliance with the EPBD, in particular Article 12 on renovation passports and Annex VIII on requirements for renovation passports, such as renewable energy resources and life cycle greenhouse gas emissions.
- Building regulations or building performance indicators, such as water efficiency, acoustic rating
- Other existing information and indicators on EPCs, such as summer thermal comfort
- Passport triggers and other (multiple) benefits of deep renovation, such as accessibility.
- National priorities and readiness, such as Building Information Modelling (BIM) or 3D modules, Digital Building Logbook (DBL) module and Electric Mobility module.

Based on the overall feedback, Figure 8 shows a graphical representation of the proposed overall and enhanced iBRoad2EPC approach to modularity, including improvement recommendations.
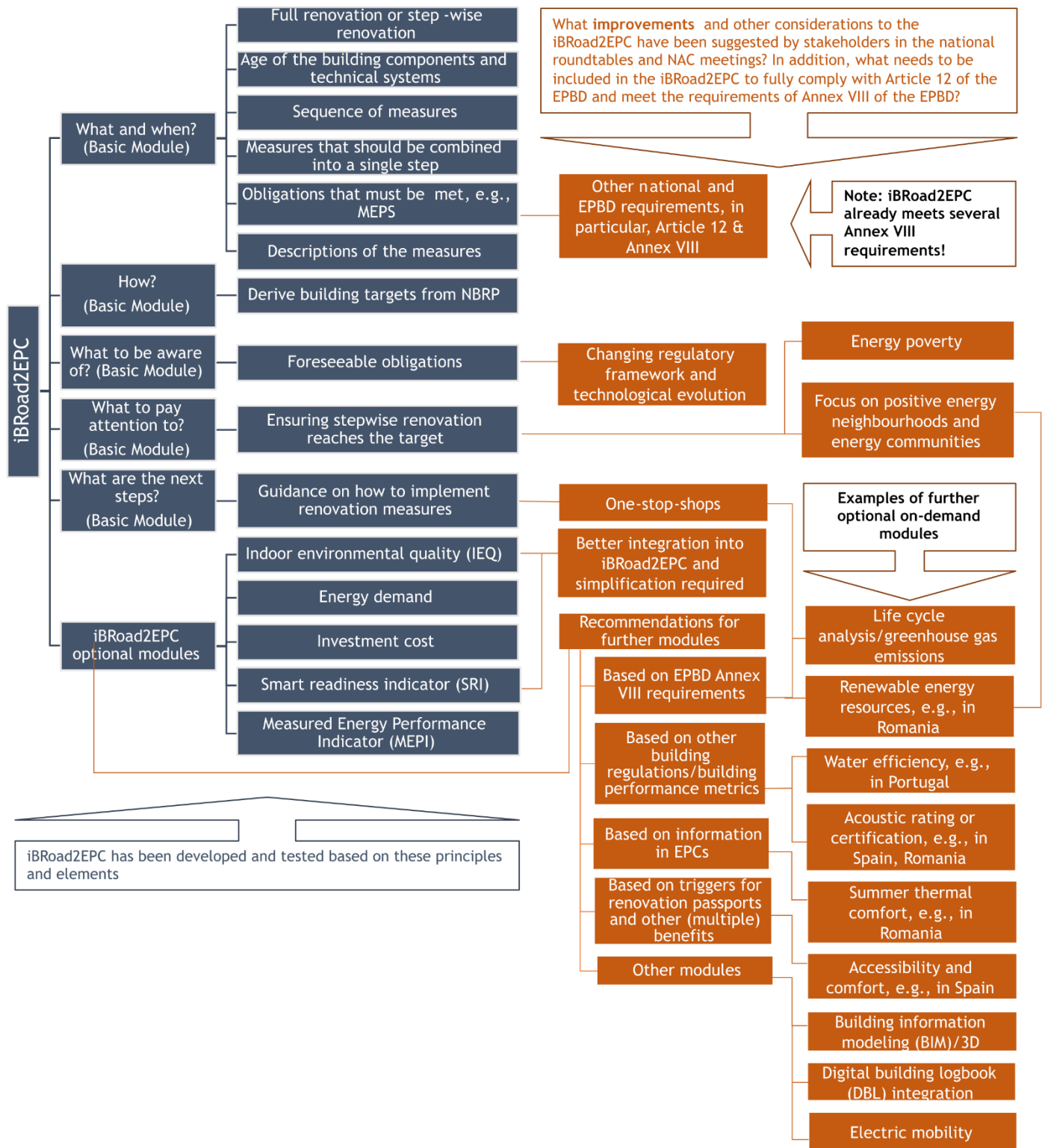
Figure 8: Graphical representation of the proposed overall and enhanced iBRoad2EPC approach to modularity, including improvement recommendations

Considerations on training packages

The training for experts is designed to give energy professionals a comprehensive understanding of the iBRoad2EPC approach, methodology, and issuance process, as well as its added value for customers. In addition to supporting the field test, it also helps gather insights for the eventual integration of iBRoad2EPC into national EPC issuer training programmes. This will ensure that staged renovation is systematically considered in both EPC issuance and energy consulting services. Part of the training toolkit is also an iBRoad2EPC handbook to guide energy auditors through the process of issuing a renovation passport. It compiles objectives, procedures and instructions. An evaluation dedicated to the training sessions is conducted to capture participants' experiences and gather feedback, which is presented in the report *Evaluation of iBRoad2EPC training*.

How useful is it?

The majority of energy experts (99%) gave positive feedback on the iBRoad2EPC training. This was consistent across all countries and applied to both the training content and the overall organisation and delivery of the sessions. A common suggestion across countries is to integrate iBRoad2EPC as an additional module within existing training frameworks, e.g. for EPCs. This approach makes use of existing training structures, making integration more feasible and cost-effective. For example, Portugal and Romania both propose to integrate iBRoad2EPC into existing training programmes for energy auditors, using existing infrastructure to minimise disruption and resource allocation.

What can be improved?

Some stakeholders also pointed out that iBRoad2EPC can be used to address the issue of energy poverty. Indeed, iBRoad2EPC was conceptualised and developed to be able to assist in tackling energy poverty and in the design of appropriate financing measures, if properly used by the authorities. This message may be better explained during the training sessions to the energy experts and public authorities so that the tool is effectively utilised for the above purposes in practice.

Recommendations

The iBRoad2EPC handbook was found to indeed enhance the training. However, experts suggested different improvements summarised below.

Successful implementation of iBRoad2EPC training was often seen to depend on adapting national regulations and certification standards for independent experts. Countries with more rigid regulatory frameworks face difficulties in fully integrating new tools such as iBRoad2EPC into mandatory training courses. This suggests that updating national standards and regulations is critical for seamless adoption.

In scenarios where existing training frameworks are inadequate or non-existent, such as in Poland, there is a need to develop specialised training programmes solely for iBRoad2EPC. This approach addresses the lack of a structured training system and prepares trainers specifically for iBRoad2EPC, although it may be more costly and require the establishment of new training infrastructures.

Field tests and practical experience show that while some countries, such as Spain, initially leaned towards a stand-alone renovation passport model, the practical integration and uptake of iBRoad2EPC is more effective when closely aligned with existing EPC training. This balance ensures that iBRoad2EPC remains relevant and practical for professionals already familiar with EPC concepts.

The integration of iBRoad2EPC into existing training programmes should be adaptable to the specific needs of each country. For example, Spain's approach of potentially integrating iBRoad2EPC into public and private training organisations reflects a flexible strategy. This adaptability allows for customisation based on local training practices and regulatory environments. Working with established training organisations and integrating iBRoad2EPC content into their existing programmes can increase uptake and add value for both organisations and trainees.

The existing iBRoad2EPC handbook was suggested to be further improved for example by including more detailed approaches to the country's climate zones (where relevant) and building stock, to the unique regulatory and market environment, especially on regional level for countries organised in a more federal system. Furthermore, more examples tailored to different local conditions can increase usefulness of the handbook.

A thorough report on the evaluation of the iBRoad2EPC training framework and the necessary adaptation based on the evaluation is presented in the report *Evaluation of iBRoad2EPC training;* please refer to it for further details.

REVAMPING THE IBROAD2EPC CONCEPT: ADAPTATIONS AND BUSINESS MODEL PROPOSALS FOR WIDER ADOPTION

iBRoad2EPC is positioned as the bridge between existing EPC schemes and (future) building renovation passports that take a further step to present an individual renovation journey over time (i.e. staged deep renovation). That is, Member States can include iBRoad2EPC in the EPCs, enhancing the EPC with features of a renovation passport, or introduce iBRoad2EPC as a standalone full renovation passport. The concept of the full renovation passport was developed based on the principles and lessons learnt during the predecessor project _iBRoad_. The iBRoad2EPC concept proposes a Basic Module that can be expanded with additional modules as needed. This modular approach allows for the gradual enhancement of national EPC systems, adapting to market developments and specific needs. It is designed to increase market coverage, promote deep renovations, and balance the synergies and trade-offs between market coverage, cost and effort required. This is presented in detail in _Conceptualising iBRoad2EPC_.

During the course of the project, the Commission published the recast of the Energy Performance of Buildings Directive (2024 EPBD recast) on 24 April 2024. The 2024 EPBD recast introduces significant and stringent provisions for EPCs and introduces, under Article 12, a framework for renovation passports as an additional voluntary tool to provide a clear roadmap for staged deep renovations. Article 12 introduces renovation passports based on a common framework as given in Annex VIII which sets out the requirements. By the time of publication of the 2024 EPBD recast, iBRoad2EPC has already developed a model renovation passport that complies with Article 12 and meets many requirements listed in Annex VIII. A detailed analysis of how Member States can use iBRoad2EPC to implement the framework for renovation passports can be seen in the report _Accelerating deep renovation in the EU with renovation passports_.

Based on the feedback from stakeholders, NACs and field test results, most stakeholders agree that iBRoad2EPC is a very useful tool to develop a long term plan for building renovation. The modular approach, ease of use and other features of the tool were well received. Most national stakeholders positioned iBRoad2EPC close to the EPC, rather than as a stand-alone renovation passport. It was mostly seen as a voluntary tool that could be integrated into the EPC. However, it may be made mandatory in specific cases, e.g. to obtain public funding for renovation.

The original concept of iBRoad2EPC should be adapted to be in line with the latest developments with regard to the publication of the recast of the EPBD and its implementation. In addition to ensuring strong integration with other building information tools and databases, the EPBD mandates the creation of a national database for the energy performance of buildings (Article 22), where EPCs and renovation passports can be linked. Member States are also required to establish databases for EPCs. iBRoad2EPC should aim to integrate seamlessly with these databases to facilitate data entry and keep records up to date. For example, renovation measures can be recorded as they are implemented, ensuring accurate and current information (see Figure 9).

The guiding question is how to align the scope of the renovation passport with the strategic interests of different stakeholders. For example, banks are more likely to lend for major renovation projects if a passport is in place, as it provides assurance that deep renovation will be carried out, helping banks to meet their key performance indicators (KPIs). This also optimises their annual reporting, providing clear incentives and benefits for the stakeholders involved.

Currently, market-led initiatives such as renovation passports, carbon neutral roadmaps and digital building logbooks are often developed from the bottom up. This approach can lead to misalignment, particularly for large portfolio holders such as social housing associations. There is little top-down coordination, and a key issue is the lack of a standardised core of building information. Without this, there is fragmentation - different renovation passports for the same property, different KPIs and incompatible modules. It's vital to establish a core dataset that is compatible and allows for the development of additional modules. Aligning the core dataset with certain key elements is therefore essential to meet the data needs of different modules and ensure consistency across different systems.
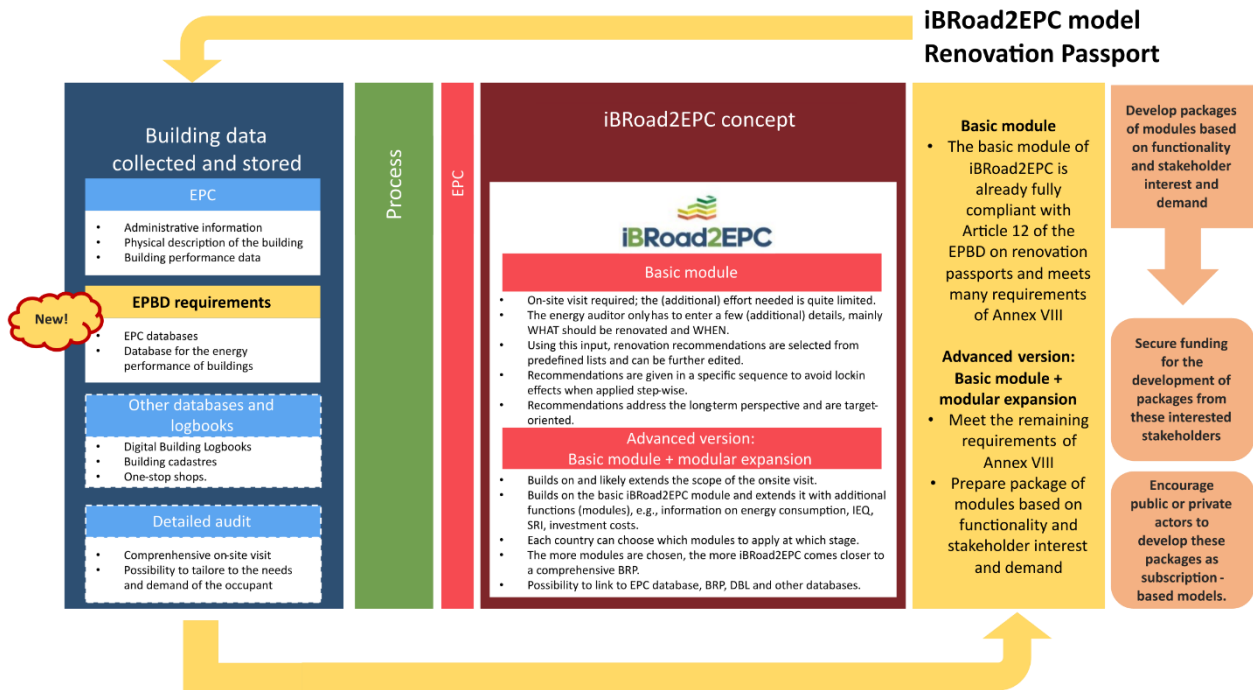
iBRoad2EPC model Renovation Passport

Building data collected and stored

EPC
- Administrative information
- Physical description of the building
- Building performance data

New!

EPBD requirements
- EPC databases
- Database for the energy performance of buildings

Other databases and logbooks
- Digital Building Logbooks
- Building cadastres
- One-stop shops.

Detailed audit
- Comprehensive on-site visit
- Possibility to tailore to the needs and demand of the occupant

Process

EPC

iBRoad2EPC concept

iBRoad2EPC

Basic module
- On-site visit required; the (additional) effort needed is quite limited.
- The energy auditor only has to enter a few (additional) details, mainly WHAT should be renovated and WHEN.
- Using this input, renovation recommendations are selected from predefined lists and can be further edited.
- Recommendations are given in a specific sequence to avoid lockin effects when applied step-wise.
- Recommendations address the long-term perspective and are target-oriented.

Advanced version: Basic module + modular expansion
- Builds on and likely extends the scope of the onsite visit.
- Builds on the basic iBRoad2EPC module and extends it with additional functions (modules), e.g., information on energy consumption, IEQ, SRI, investment costs.
- Each country can choose which modules to apply at which stage.
- The more modules are chosen, the more iBRoad2EPC comes closer to a comprehensive BRP.
- Possibility to link to EPC database, BRP, DBL and other databases.

Basic module
- The basic module of iBRoad2EPC is already fully compliant with Article 12 of the EPBD on renovation passports and meets many requirements of Annex VIII

Advanced version: Basic module + modular expansion
- Meet the remaining requirements of Annex VIII
- Prepare package of modules based on functionality and stakeholder interest and demand

Develop packages of modules based on functionality and stakeholder interest and demand

Secure funding for the development of packages from these interested stakeholders

Encourage public or private actors to develop these packages as subscription-based models.

Figure 9: Changes proposed to the original conceptualisation of iBRoad2EPC in the context of EPC evolution and related instruments

The iBRoad2EPC basic module is already fully compliant with Article 12 and meets many of the requirements of Annex VIII. The advanced version, comprising the basic module and a modular expansion, can be further developed to meet the remaining requirements of Annex VIII. To increase the practical and financial viability and usefulness of optional modules, they may be developed as packages of modules based on functionality and stakeholder interest and demand. In this way it is also easy to identify the interested stakeholders who will fund their development. Funding for modules can be secured on a case-by-case basis and potentially shared between stakeholders with similar interests. Public or private actors also have the opportunity to develop these packages as subscription-based models. This can create demand and encourage competition among interested parties to develop additional modules and ensure that both the iBRoad2EPC basic module and the additional modules remain affordable (see Figure 10).

SS

Development of a business case for iBRoad2EPC
Packages of modules can be developed based on functionality and stakeholder interest and demand. In this way, funding for modules can be secured on a case-by-case basis and potentially shared between stakeholders. This can reduce the cost not only of the potential additional modules, but also of the Basic Module.

Tag: Included in the
- Package for financial actors and investors
- …

Tag: Included in the
- Package for building owners
- Package for utility providers
- …

Tag: Included in the
- Package for building owners
- Package for public health authorities
- …

Tag: Included in the
- Package for building owners
- Package for public authorities
- …

Energy demand module

Cost module

MEPI module

iBRoad2EPC basic module, target-oriented renovation advice

SRI module

BIM or 3D module

Water efficiency

IEQ module

Life cycle GWP

Potential additional modules

Acoustic rating module

Accessibility module

Figure 10: Proposal for the development of business case for iBRoad2EPC

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iBRoad2EPC

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