



iBRoad2EPC field test results



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Executive summary

The iBRoad2EPC energy consultancy tool combines the key elements of a Building Renovation Passport - a targeted roadmap for long-term renovation that avoids lock-in effects - with the broad reach of Energy Performance Certificates (EPCs). A field test in six pilot countries (Bulgaria, Greece, Poland, Portugal, Romania and Spain) examined how target groups perceived the concept, processing tool, graphic design and consultancy content of iBRoad2EPC.

Prior to the field test, 202 energy experts were trained to issue the iBRoad2EPC output document. The evaluation of the training¹ showed predominantly positive feedback: 86 % of participants said they saw potential in merging iBRoad2EPC and EPCs, while 91 % said they would offer an iBRoad2EPC to their clients.

Of the energy experts trained, 48 participated in the field test and issued 57 iBRoad2EPCs for residential and non-residential buildings, with particular focus on public buildings. The experiences of the experts and the building owners/managers were the subject of a questionnaire survey.

The feedback from the building owners indicated a largely positive reception:

- 70 % of the owners and 85 % of the experts said that iBRoad2EPC provides the building user/owner with very or extremely useful information. 78 % of the owners and 87 % of experts said that iBRoad2EPC provided building owners with an outline of a long-term renovation plan for their building.
- 98 % of the experts and 83 % of the building owners found the detailed description of single renovation steps very or extremely useful.
- The description of preparatory measures for later renovation steps achieved the highest number of “extremely useful” votes (17 votes, 37 %), with another 21 experts (46 %) rating this feature very useful.
- 81 % of owners and 92 % of experts are very or extremely satisfied with the characteristics of iBRoad2EPC.
- 84 % of owners and 91 % of experts understood the graphical display of renovation measures very well or extremely well.
- 80 % of the building owners would recommend the tool to other building owners, though 32 % of these would only do so if improvements were made.
- 91 % of the experts would recommend the tool to their clients and 93 % to their colleagues; among them, 35 % in both cases would only recommend it if improvements were made.

Both experts and owners favoured the voluntary integration of iBRoad2EPC alongside the EPC, reflecting the tool's potential to enhance energy efficiency and cost-effectiveness in building renovations.

The primary motivations for renovation, as articulated by building owners, focused on energy cost savings and cost-effectiveness, with a secondary focus on quality improvement and contributions to climate change mitigation. Notably, while energy and cost considerations remained consistent across pilot countries, the importance attributed to climate protection varied, indicative of differing national priorities.

¹ For the full iBRoad2EPC training evaluation please see the report “Evaluation of iBRoad2EPC training”.

During iBRoad2EPC's development, cost-effectiveness was not focused on, given its potential misalignment with climate targets. This highlights the discrepancy between renovation costs, energy prices and incentives.

Building owners and property managers widely approved of the mandatory on-site visit component of iBRoad2EPC, although this means extra effort for the experts.

Overall, stakeholders agree on iBRoad2EPC's suitability for multi-family and public/administrative buildings, recognising its capacity to provide essential insights for long-term renovation planning and proactive mitigation of lock-in situations. Recommendations from experts and owners, alongside considerations for pricing structures, underscore the perceived value and potential of iBRoad2EPC in facilitating energy-efficient renovations and climate protection efforts.

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Introduction

The building sector accounts for approximately 40 % of total energy consumption and 36 % of CO₂ emissions in the use phase² in the European Union. Currently, almost 75 % of the European building stock is not energy efficient, while the building renovation rate is very low.³

Deep building renovation has the potential to lead to significant energy savings, lower CO₂ emissions and contribute to energy and climate objectives, at national and European level.

The iBRoad2EPC project is intended to contribute to raising this potential. To this end, it aims to widely spread the idea of integrating long-term renovation strategies for individual buildings (as introduced in Building Renovation Passports (BRPs)) into Energy Performance Certificates (EPCs), and to provide building owners with pragmatic assistance.

The iBRoad2EPC project, funded by the Horizon 2020 European programme, represents the next step in energy performance assessment schemes and certification practices, promoting and showcasing the integration of BRP elements into EPC schemes. It builds on the results of the iBRoad project (2017-2020), which developed, tested and delivered a model for the BRP supporting single-family homeowners with personalised advice to facilitate stepwise deep renovation. iBRoad2EPC aims to bridge the BRP and EPC; expand, improve and broaden their format and joint scope to consider additional features; and be applicable to multi-family and public buildings as well as individual homes. The aim is to improve reliability, usefulness and effectiveness, establishing the next generation of EPCs that will support Europe's decarbonisation ambitions while improving conditions for building occupants.

The project's activities are clustered around four main pillars:

- (1) Assess the needs, potential and practicability of merging the EPC with the BRP
- (2) Adapt the iBRoad concept to become part of EPCs
- (3) Test and evaluate the applicability of iBRoad2EPC in six pilot countries (Bulgaria, Greece, Poland, Portugal, Romania and Spain), including training for issuers and EPC issuers
- (4) Facilitate the adoption and use of the iBRoad2EPC model across Europe.

Implementing authorities in the six countries are directly involved in the process of conceptualisation, development and testing of iBRoad2EPC to become an integral part of existing schemes. Targeted communication, dissemination and demonstration activities at national and European level support further acceptance and uptake. The project leverages existing knowledge from other projects to expand EPC features and offers policy proposals as well as training and capacity building modules.

This report summarises the results of the iBRoad2EPC field test in the pilot countries. It provides information on how the first tests were organised, conducted and evaluated. It sets out conclusions, recommendations to improve future field tests in other countries, and lessons learnt from the pilot countries to support the further implementation of iBRoad2EPC.

² Built4People. 2020. *People-centric sustainable built environment*

³ EU annual average renovation rate is 1 %, with deep renovations accounting for only 0.2-0.3 % of the renovated floor area (European Commission, 2019).

Objectives of this report

The iBRoad2EPC project provides an approach for introducing BRP elements into existing EPC schemes in six partner countries (Bulgaria, Greece, Poland, Portugal, Romania and Spain) and preparing the relevant markets for its uptake.

The products, concepts and software solutions elaborated in the project need to be field tested to gain feedback from both energy experts who will issue the iBRoad2EPC and building owners who stand to benefit. Prior to the field test, the concept and design of iBRoad2EPC was finalised and the software was prepared for use. All elements of iBRoad2EPC were adapted to the requirements of each country (language, energy classes, climate zones, building type specifications, renovation recommendations, national minimum energy performance standards, milestones and others). The field test is an important way to gain thorough feedback and comprehensively evaluate all elements of iBRoad2EPC, including on-site visits, the iBRoad2EPC output document, supporting materials and the software (iBRoad2EPC Assistant). Final adaptations may be made following the results of the field testing.

This report briefly introduces the basic concept of iBRoad2EPC and describes how the field test was set up, prepared, and conducted. The field test results are shown as an overview, with detailed results for each pilot country included in the annex. Results from building owners are presented in parallel with the respective results from energy experts, allowing for easy comparison of the different perspectives. The partner organisations from the pilot countries also describe their experiences. The main outcomes of the field test are summarised in the concluding chapter.

Objectives of this report

- Overview of iBRoad2EPC
- Organisation of the field test
- Evaluation of energy experts' and building owners' feedback
- Feedback from pilot country partners
- Conclusion

1 OVERVIEW OF iBRoad2EPC

iBRoad2EPC is an energy consultation tool for building owners, issued by building professionals. It outlines an initial renovation strategy on how a building can become climate neutral in the long term. The strategy can include a full renovation in one step, but also a renovation in several steps. The long-term perspective means that the individual renovation steps build on each other, connections between components can be prepared in good time and future renovation obligations can be considered well in advance. iBRoad2EPC is designed to answer the core questions building owners have about the long-term renovation strategy for their buildings.

	Explanation	Example
what?	Description of measures	insulate the roof replace the heat generator install a ventilation system
when?	Likely time span to implement measures	before 2030 before 2040 before 2050
how?	technical specifications according to LTRS, NBRP, NECP	roof: 24 cm polystyrene heating: heat pump ventilation: 85% heat recovery
what to beware of?	foreseeable obligations	MEPS: your building has to fulfil at least efficiency class F in 2030
what to pay attention to?	notes to prevent lock-in situations	if you insulate the roof make sure that the overhang is sufficient for the wall insulation at a later stage

Figure 1: iBRoad2EPC answers the core questions building owners have about the long-term renovation strategy for their buildings.

iBRoad2EPC follows a modular approach so it can be adapted to the different requirements in implementing Member States; the basic module comprises the general renovation plan and related advice. Processing is automated to minimise costs. The basic module of iBRoad2EPC can therefore complement national EPC schemes or even be a mandatory part of EPCs.

Member States may choose to enlarge the basic module with several additional modules. These add information about energy demand, energy consumption, renovation costs, smart readiness, indoor environmental quality and measured energy performance into the iBRoad2EPC. Through the additional modules, iBRoad2EPC covers a whole range of the topics relevant for a BRP in the context of the Energy Performance of Buildings Directive (EPBD).

iBRoad2EPC provides the following added value for building owners:

- Better renovation recommendations in EPCs through the integration of BRP elements
- Outline of an individual long-term renovation strategy considering:
 - Step-by-step renovations that lead to deep renovation
 - Avoidance of mistakes, lock-in effects and wasted costs through early preparation of later renovation measures

- Alignment with overarching national building targets, future requirements and obligations (e.g. fossil fuel phaseout, minimum energy performance standards (MEPS)) to fulfil all legal requirements.

The following pages show the online output forms of the iBRoad2EPC basic module and the information they provide. The overview page presents the whole renovation strategy at a glance. Building components that have been renovated to a target-proof standard turn green. When the whole building is green in the target year it means the building will have achieved the national climate goals of the respective Member State. For every renovation step there is a subpage explaining in detail what, when and how to renovate, what to beware of and what to pay attention to.



Figure 2: Overview page of the iBRoad2EPC online output form.

The screenshot displays the iBRoad2EPC software interface. At the top, the header includes the logo, contact information for Max Mustermann, and the date 18. August 2022. The main content area is titled 'Basic Module > Step 1' and features a 'Step 1 Soon' dropdown menu. Three renovation measures are listed:

- Measure 1: External wall insulation**
 - Description of the measure:** The external wall is insulated with a "Exterior Insulation Finishing System (EIFS)". EIFS is a lightweight synthetic wall cladding that includes foam plastic insulation and thin synthetic coatings.
 - Specification of the measure:** 15 cm of insulation ($U = 0,2 \text{ W}/(\text{m}^2\text{K})$).
 - Icon:** A green house icon with a square window.
- Measure 2: Replacement of the windows**
 - Description of the measure:** Replacement of all windows that are older than 10 years.
 - Specification of the measure:** Triple glazing, highly efficient windows ($UW = 0,8 \text{ W}/(\text{m}^2\text{K})$).
 - Icon:** A green square icon with a cross pattern.
- MEPS/Regulations:** By 1 January 2024, every new installed heating system is to be based on 65 percent renewable energy.

Additional information is provided in the right-hand column:

- Note/Recommendation:** When the outer wall is being insulated, please prepare a low thermal bridge connection to a later pitched roof insulation. Existing panels at the eaves should be opened so that the insulation can be laid up to the upper edge of the rafters. At the verge, the insulation should be laid up to the upper edge of the gable wall. For this, the roof overhang must usually be extended. When the outer wall is being insulated the control settings of the existing heat generator should be adapted to the reduced heat load. Your installer should check whether the flow temperatures and the flow rate of the heating circuit pump can be reduced.
- When the outer walls are being insulated, please prepare for a later installation of a ventilation system by installing the outside wall openings for fresh and exhaust air shafts for the ventilation system in the wall insulation layer. Facade integrated ventilation units for single or multiple rooms are most easily installed in the same step as the wall insulation.
- If you plan to install a heat pump in the future, please carry out preparation measures to lower the flow temperature of the heating systems (ideally below 55°C or less). This will raise the efficiency of the heat pump significantly. The flow temperature can be lowered by carrying out a hydraulic balance, exchanging single radiators and insulating single building components. An energy auditor can identify the components and radiators that provide the maximum improvements.

Callouts from the image provide further context:

- Future requirements:** Information about content and timing.
- Preparation for later renovation steps:** reach deep renovation and avoid lock-in.
- Description of the measures:** What should be renovated?
- Specification of the measures:** Renovation depth according to NBRP.
- Icon:** same as in the overview for easy orientation.

Figure 3: Page 2 of the iBRoad2EPC output form presents detailed information for each renovation step.

The iBRoad2EPC is created with an online tool called the iBRoad2EPC Assistant. The main objectives of this tool are to:

- Create the iBRoad2EPC in a uniform design
- Output the iBRoad2EPC in an online version
- Provide clear and intuitive user guidance
- Facilitate issuers in assigning renovation measures at specific points in time
 - time steps
 - specifications of renovation measures that are aligned with national targets
 - recommendation texts to prepare for later renovation measures
- Enable issuers to easily overwrite all default texts
- Allow easy expansion with additional modules.

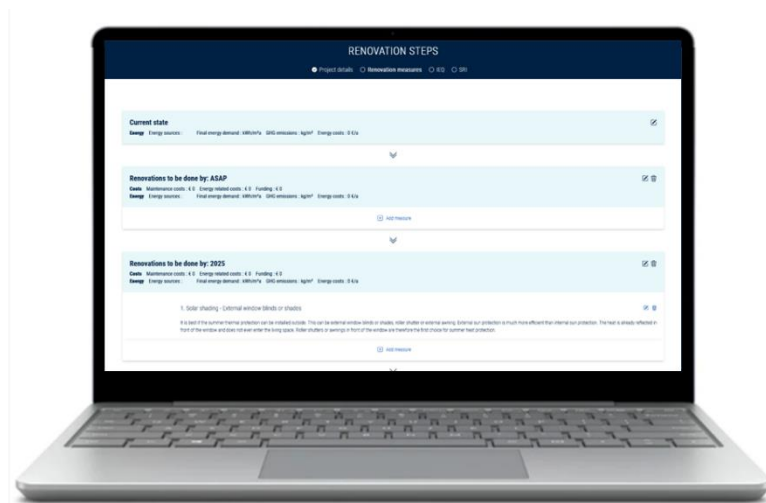


Figure 4: The iBRoad2EPC Assistant is an online tool to process and issue the iBRoad2EPC.

iBRoad2EPC adds an extra page to the EPC which contains a link to the individual online document.

The iBRoad2EPC concept, implementation and how it can be embedded in the framework conditions of the pilot countries are described in detail in the following reports:

- [“Conceptualising iBRoad2EPC: can EPCs be upgraded to include building renovation passport elements?”](#)
- [“iBRoad2EPC in depth”](#)
- [“National initial guidelines”](#).

2 ORGANISATION OF THE iBRoad2EPC FIELD TEST

2.1 Preparation of the field test

2.1.1 Training material

The iBRoad2EPC training toolkit was developed based on the concept and software developed in earlier tasks of the project. The objective of the training toolkit was to prepare a complete set of information to be used for the initial training of energy experts for iBRoad2EPC and to include the iBRoad2EPC training in the training institutions' curricula. The training toolkit can be seamlessly integrated into regular EPC training. The toolkit also contains supporting material that experts may use when issuing an iBRoad2EPC. The training toolkit includes the following elements:

- Handbook for energy experts
This provides guidance and advice on how to issue the iBRoad2EPC in general; what principles to respect; how to define the renovation steps in collaboration with the building users; and assessing indoor environmental quality, measured energy consumption and smart readiness. The handbook explains the basic processes and concrete steps. It contains the following chapters:
 - Overview of iBRoad2EPC
 - Target groups of iBRoad2EPC
 - Added value of iBRoad2EPC
 - Five steps to issue the iBRoad2EPC
 - Checklist for the on-site visit
 - The iBRoad2EPC Assistant
 - Additional functionalities of iBRoad2EPC
 - Tabs to facilitate navigating through the document
 - Handing over the iBRoad2EPC to the building owner
 - Further information on iBRoad2EPC
- Presentation for experts' training
The presentation is ready for use during training. It shows the use of the tools and the implementation procedures and explains them step-by-step.
 - What is iBRoad2EPC?
 - Five steps to issue the iBRoad2EPC
 - iBRoad2EPC Assistant
 - Additional functionalities of iBRoad2EPC
- Template for the on-site visit
A blank template to support the energy experts during the on-site visit. With the help of the template, experts can guide buildings owners and decision-makers to contribute to defining their individual solutions for a target-oriented renovation plan.
- Checklist for the on-site visit
A checklist to support the energy experts during the on-site visit. It contains important questions to clarify together with building owners.



Figure 5: The training material consists of a presentation, a handbook and a template for the on-site visit.

The preparation of the trainings included managing the recruitment processes of suitable energy experts, managing building owners attending the field test and translating the materials. All pilot countries received a supporting document summarising the conditions of the field test preparation regarding the selection of energy experts and buildings. (see Annex 1 - Selection of Energy Experts and Subcontracts)

The document covers general requirements for the field test and procedures to follow as well as prerequisites that must be met by the energy experts. It also contains a template letter to recruit energy experts, explaining the objectives of iBRoad2EPC and the field test as well as the expected tasks and time schedule. The document also addresses key points regarding building owners who attend the field test.

2.1.2 Train-the-trainer seminar

A train-the-trainer seminar was conducted for the country partners in order to clarify the process for the experts' training and the field test. The objective of the seminar was to enable the respective country partners to manage the whole process. The seminar comprised the objectives of the field test, logistic requirements, accompanying support during the field test, and support in managing the prepared evaluation questionnaires for experts and homeowners. The country partners were also guided through the latest versions of the iBRoad2EPC tool to prepare them for any questions that might arise.

2.1.3 Energy experts' trainings

The country partners recruited experts for the training. The recruitment process was carried out via national energy auditor networks, social media, country partners' internal networks and official technical chambers of engineers and/or architects. The country partners also organised the administrative side of the training sessions and translated some or all the training material. They conducted the training sessions with these materials and the Assistant tool and distributed the questionnaires to the experts. Five country partners held the training online, while one partner offered a hybrid session that allowed physical presence. All country partners conducted the trainings themselves. All have deep knowledge and experience on buildings and energy, while ADENE (the Portuguese country partner) regularly hosts EPC trainings.

The number of participants varied between 10 and 92 per training session. In total, 202 experts attended the trainings. The trainings lasted between two and six hours, on average four hours. All country partners included sessions where participants tested the iBRoad2EPC Assistant hands-on and assisted in case of questions. The training was linked to the iBRoad2EPC field test, which directly followed the training.

The expert trainings were evaluated retrospectively to use the results in future trainings. The results are presented in the report "Evaluation of iBRoad2EPC training". Some of the results are also relevant to the current report and are therefore included in the corresponding sections. The underlying questionnaire is always indicated in the related figure caption.

2.2 Boundary conditions for the field test

The actual test phase lasted from July 2023 to March 2024. During this time, 48 energy experts visited 57 buildings in six countries.

Alongside the national advisory committees and stakeholder roundtable discussions, the field test is the most important means of obtaining feedback on the concept, design and software solutions. The field test was intentionally conducted after the products and country adaptations had already been largely finalised. The input and output tools had been adapted to the pilot countries. For example, all specifications of the renovation measures had been adapted to the countries' regulations and both the software tool and the output document had been translated into the respective languages. However, interfaces to country software tools had not yet been implemented, so the iBRoad2EPC results output in the field test looked the same for all pilot countries. This ensured that the results were comparable across all pilot countries and were not influenced by country-specific versions. At this stage of the project, the field test results can be easily incorporated, and the products adapted to meet the needs of the individual countries.

2.2.1 Recruitment of experts

The energy experts that took part in the field test were selected by the pilot country partners. At the end of the iBRoad2EPC expert trainings, the attendees were introduced to the field test procedure. The experts were asked to show their interest directly after the training sessions or later. Interested experts needed to fulfil certain prerequisites: a recognised qualification for issuing EPCs, a minimum number (7) of EPCs issued, an official registration in a certification system and a credible record related to their EPC quality. These prerequisites set the minimum requirements; exceeding them made experts more eligible to attend the field test. The complete list of prerequisites is part of Annex 1 - Selection of Energy Experts and Subcontracts.

The experts were recruited two months before the field test, depending on the date of the training. The selection of experts was planned to be finalised in December 2023 but took longer than expected and was finalised in early 2024. The recruitment process differed between pilot countries. The country partners contacted experts affiliated with associations of energy experts or engineers or other networks, or who they knew personally or due to their outstanding experience. It was, however, difficult to find enough experts in some cases. In those cases, calls for experts were put out. In Greece, there were enough experts to issue iBRoad2EPC for buildings in the eastern and southern parts of the country, but a call was needed to find experts from the northern regions; several experts agreed to issue an iBRoad2EPC for more than one building. In Romania, experts were very hesitant to answer the call and a second call combined with personal contacts was needed. Due to the high workload - an EPC in Romania is comparable to a full energy audit - the start of the field test had to be delayed.

2.2.2 Selection of buildings

Before the selection process, the pilot countries checked letters of interest/support from several official and private entities to analyse their potential for collaborating on combined EPC and iBRoad2EPC issuing as well as potential buildings to test the combined methodology. The country partners did not report severe difficulties in recruiting buildings. The buildings were selected by the country partners in the first place, with some partners allowing the energy experts to suggest buildings themselves. The selection process was planned to be finalised in February 2023, but external factors hampered the process. Ongoing elections in Greece, for example, kept officials from signing contracts because in many cases it was unclear if the next mayor would agree to including public buildings in the field test.

The aim of the field test was to assess 22 residential and 36 public buildings to show the potential impact of iBRoad2EPC on these building types, and demonstrate how this would contribute to the decarbonisation of the European building stock. iBRoad2EPC builds on its predecessor, the iBRoad project, by expanding the focus from single-family homes to multi-family and public buildings. Another crucial feature of the buildings is the potential for energy improvements. Older buildings were preferred because they provide higher

potential energy savings and greenhouse gas emission reductions than newer buildings. The building owners' consent was, of course, a prerequisite for the building to take part in the field test.

In addition to the building-related characteristics that were the focus of the selection process, the search for test buildings was also linked to the work of the energy experts and their networks and clients. Ideally, buildings that participated in the iBRoad2EPC field test did not already have an EPC or needed to have one reissued due to regulatory requirements.⁴ This enabled energy experts to make best use of their workflow and issue the EPC and iBRoad2EPC jointly in one fluent step, and offer valuable feedback on the combination of EPC and iBRoad2EPC. This process is aligned with the recommendations in the EPBD⁵ that “*Member States should be able to allow the renovation passport and the energy performance certificate to be drawn up jointly by the same expert and issued together*”.

In the event, the field test covered 30 residential buildings and 27 public buildings, as shown in Table 1. These categories had to be applied to a range of building types which did not necessarily fit exactly into one or the other. A good example for this is university accommodation, which are often publicly owned but serve as residential buildings. In addition, in Portugal for example the majority of multi-family houses are publicly owned. For a complete overview and more information on the tested buildings, see Annex 2 - Tested Buildings.

Table 1: Tested buildings within the iBRoad2EPC field test.

		Bulgaria	Greece	Poland	Portugal	Spain	Romania	Total
Number of	Residential buildings	2	0	10	8	7	3	30
	Public buildings	11	9	0	2	3	2	27
Building type examples		Multi-family dwelling	City hall	Multi-family dwelling	Office	Multi-family dwelling	Research and education	
		Research and education	Cultural centre		Research and education	Office	Office	
		Sports				Administrative	Multi-family dwelling	
		Office administrative				Sports		

⁴ The iBRoad2EPC report “Extending the iBRoad Renovation Passport I” provides an elaborated analysis of trigger points for issuing an EPC

⁵ European Parliament legislative resolution of 12 March 2024 on the proposal for a directive of the European Parliament and of the Council on the energy performance of buildings (recast) (COM(2021)0802 - C9-0469/2021 - 2021/0426(COD))

3 Collecting evaluation data

3.1 Objectives of the survey

To ensure a comprehensive and objective evaluation of the iBRoad2EPC field test, feedback was collected from three target groups: building owners, pilot country partners and energy experts. Building owners and pilot country partners were surveyed once and energy experts twice: once after the iBRoad2EPC training (for the results of this survey see chapter 4 and Annex 3) and once after the field test.

The questionnaires included general questions on the person filling out the questionnaire and the assessed building, and technical questions on the concept, issuing process, clarity, feasibility and usefulness of iBRoad2EPC. To compare a range of perspective, the same questions were posed to different target groups.

The range and emphasis of questions depended on the audience. The questionnaire for energy experts was more focused on the technical feasibility of the iBRoad2EPC Assistant and the user experience. The questionnaires for the pilot country partners and building owners focused on the organisation, knowledge transfer and general implementation of the methodology.

3.2 Survey among energy experts

The energy experts who conducted the field test were asked to fill in two questionnaires: one after the iBRoad2EPC training session and one after they tested iBRoad2EPC in a real building. Most results of the training questionnaire are included in the report “Evaluation of iBRoad2EPC training”. However, questions that are closely related to the field test are presented here as they complement the results from the questionnaire that experts answered after the field test. The questionnaires for experts and building owners after the field test are aligned in large parts to show the target groups’ different perspectives on the same aspects.

The country partners translated the questionnaires into their national languages. The questionnaire consisted of 39 questions, divided into the following sections:

- Background data
- On-site visit
- iBRoad2EPC blank template for the on-site visit
- Planning and calculating renovation steps
- iBRoad2EPC Assistant
- iBRoad2EPC in general

The full questionnaire is included in Annex 4 to this report. The questions were predominantly asked as closed questions to enable a clear evaluation. Free comments were nevertheless possible in many cases, so that as many aspects and opinions as possible could be considered. This approach allows for both a quantitative and a qualitative evaluation. All energy experts attending the field test (n=48) answered the questionnaire.

3.3 Survey among building owners

The building owners who participated in the field test were asked to fill in a questionnaire. The questionnaires were translated by the country partners, and consisted of 34 questions, divided into the following sections:

- Background data
- Your building
- On-site visit
- The iBRoad2EPC for your building
- Further questions

The full questionnaire is included in the Annex to this report. The questions were predominantly asked as closed questions to enable a clear evaluation. Free comments were nevertheless possible in many cases, so that as many aspects and opinions as possible could be considered. This approach allows for both a quantitative and a qualitative evaluation. A total of 37 building owners answered the questionnaire.

3.4 Survey among country partners

The pilot country partners were asked to fill in a questionnaire. The questionnaires were not translated in their respective languages. The questionnaire consisted of 16 questions, divided into the following sections:

- Recruitment and selection process of energy experts
- Recruitment and selection process of the buildings and building owners
- Perspective on the field test from the country partners' point of view

The questions were asked as open questions with the possibility for free text answers. The evaluation of the pilot country partners' field test experience was solely qualitative. The full questionnaire is included in Annex 7. The results of the first part have been discussed in Chapter **Error! Reference source not found.** The results of the second part are illustrated in Annex 2 - Tested Buildings. The results of the third part are evaluated and summarised in Chapter 5.11.

4 Results from the iBRoad2EPC training evaluation

This report refers mainly to surveys related to the field test, but to put these results into perspective, relevant responses from the iBRoad2EPC training evaluation are presented below. A total of 95 participants took part in the survey following the iBRoad2EPC energy experts training. Some of the same questions were posed again to the experts in the field test evaluation.

Questions from the training evaluation

- ❖ Have you previously developed a long-term renovation plan for a building?
 - 70 of 95 experts answered
- ❖ Do you use the EPC renovation recommendations in the EPC?
 - 91 of 95 energy experts answered

Most of the training participants were familiar with the renovation recommendations in EPCs, whereas 80 % had no experience with developing a long-term renovation strategy (Figure 6). This indicates the knowledge gap which iBRoad2EPC intends to fill.

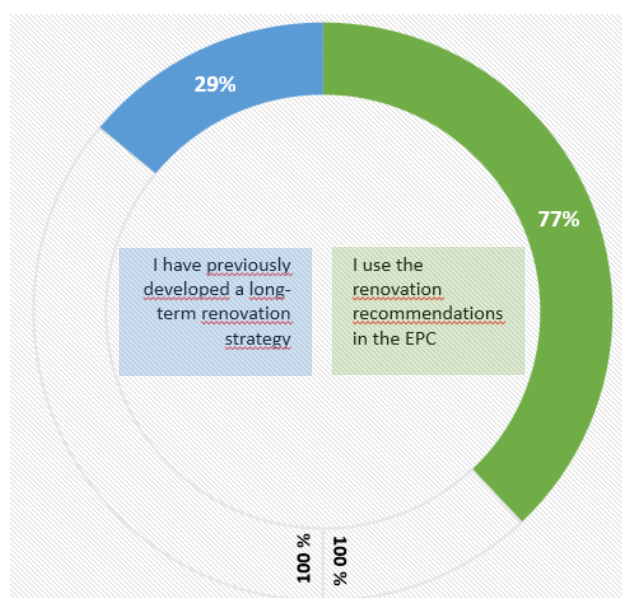


Figure 6: Experience of the iBRoad2EPC training participants regarding renovation recommendations and long-term renovation strategies.

76 % of the energy experts who attended the training use renovation recommendations in EPCs.
Only 29 % of them have previously developed long-term renovation strategies.

Question from the training evaluation

- ❖ For which buildings have you issued an EPC or conducted an energy audit already? Multiple answers allowed.
- 81 of 95 energy experts answered

Figure 7 illustrates that all experts that participated in the training had previously issued EPCs for single-family buildings and almost 80 % for multi-family houses, whereas less than 50 % had issued EPCs for public buildings. Compared to the number of issued EPCs, the number of energy audits carried out is significantly lower for all building types. Most energy audits were for multi-family buildings, office buildings and various public buildings, especially schools and cultural venues. The focus of iBRoad2EPC on multi-family homes and public buildings therefore provided a professional development opportunity for the energy experts participating in the field test.

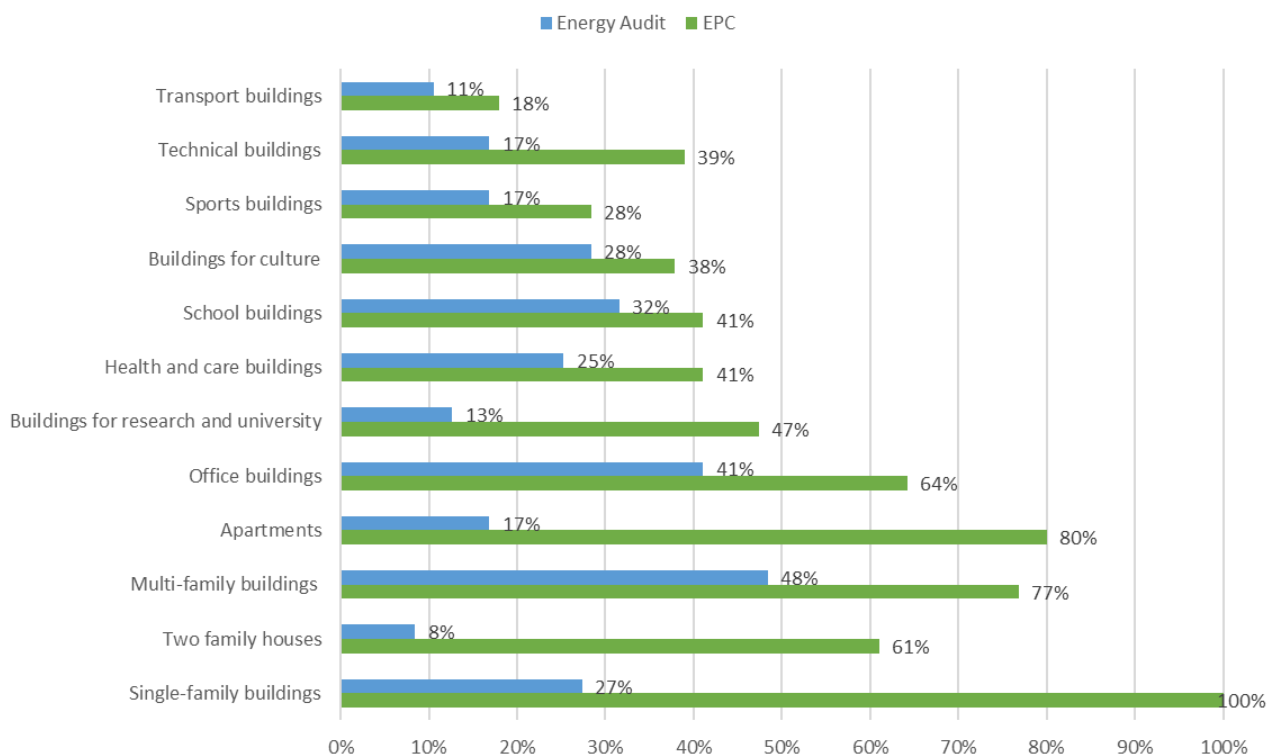


Figure 7: For which buildings have you issued an EPC or conducted an energy audit already?

The energy experts had issued significantly more EPCs than energy audits. Most EPCs were issued for single-family buildings, most audits for multi-family and office buildings.

Question from the training evaluation

- ❖ Do you see potential in the integration of iBRoad2EPC into the EPC?
 - 63 of 95 energy experts answered

The energy experts that attended the iBRoad2EPC training were also asked about their opinion on merging iBRoad2EPC with the EPC. Of those who responded, 86 % see potential in integrating iBRoad2EPC into EPCs, and another 5 % believe there “may be” potential (Figure 8).

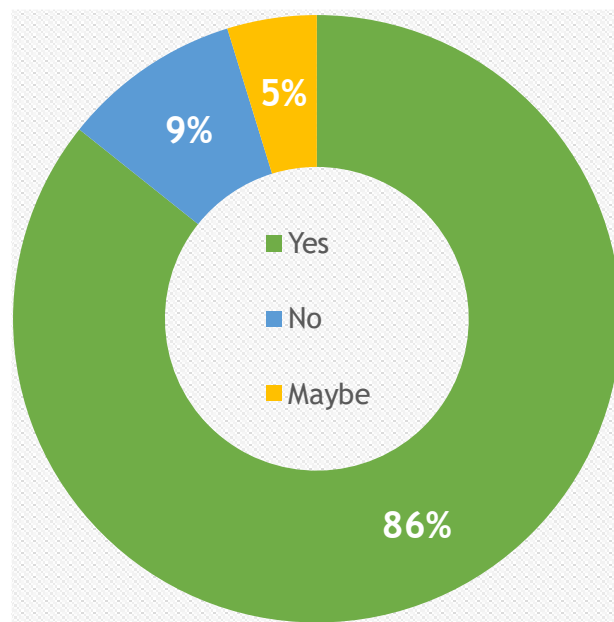


Figure 8: Do you see potential in the integration of iBRoad2EPC into the EPC?

86 % of the energy experts see potential in integrating iBRoad2EPC in EPCs.

Question from the training evaluation

❖ How do you think clients would receive the integration of iBRoad2EPC with the EPC?

- 93 of 95 energy experts answered

Nearly two-thirds (64 %) of the experts think their clients would receive the integration of iBRoad2EPC in the EPC positively or very positively, while 18 % think clients would be less positive and just 1 % think they would receive it negatively (Figure 9).

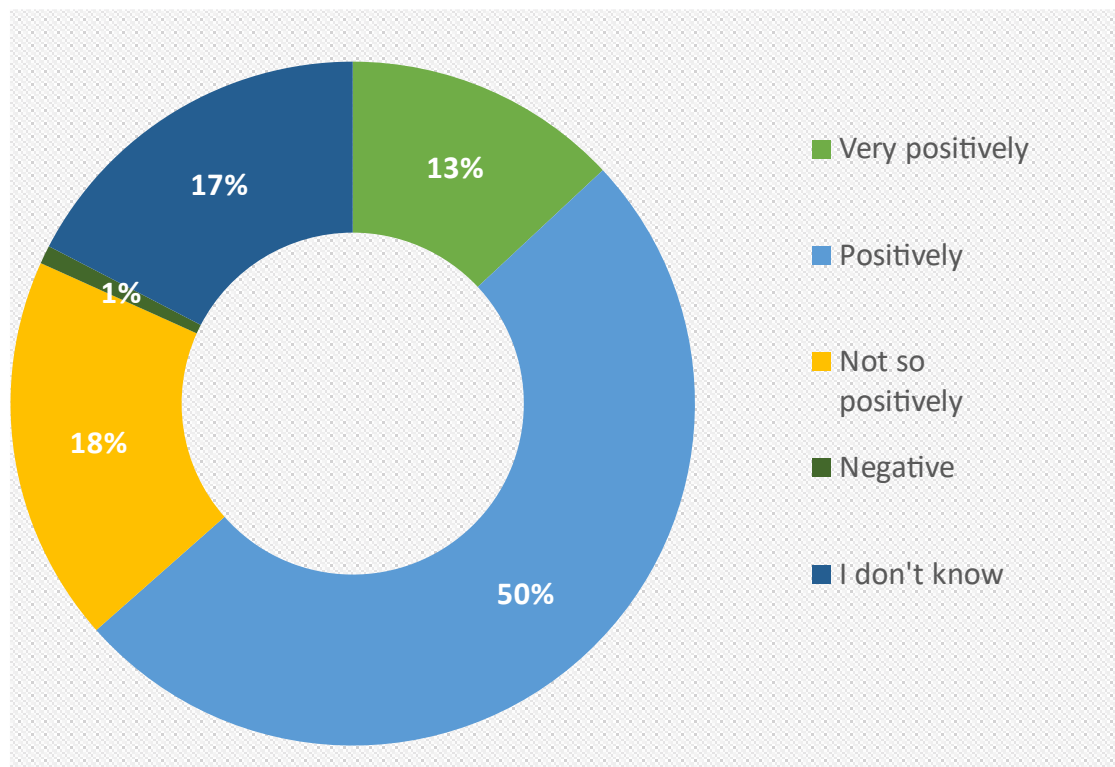


Figure 9: How do you think clients would receive the integration of iBRoad2EPC with the EPC?

63 % of the experts think their clients would receive the integration of iBRoad2EPC in the EPC positively or very positively.

Question from the training evaluation

❖ For which building types do you think iBRoad2EPC is most suitable?

Multiple answers allowed.

• 87 of 95 energy experts answered

On the residential side, experts thought the iBRoad2EPC would be most suitable for single-family (85 votes; 98 %) and multi-family (80 votes; 92 %) houses. Semi-detached houses ranked third with 65 votes (75 %) followed by single apartments (48 votes; 55 %).

On the non-residential side, office (70 votes; 80 %) and school (67 votes; 77 %) buildings ranked first and second. Healthcare (52 votes; 60 %) and technical (e.g. workshops) (49 votes; 56 %) buildings followed third and fourth. The fewest votes were for transport (22 votes; 25 %) and sports (28 votes; 32 %) buildings (Figure 10)

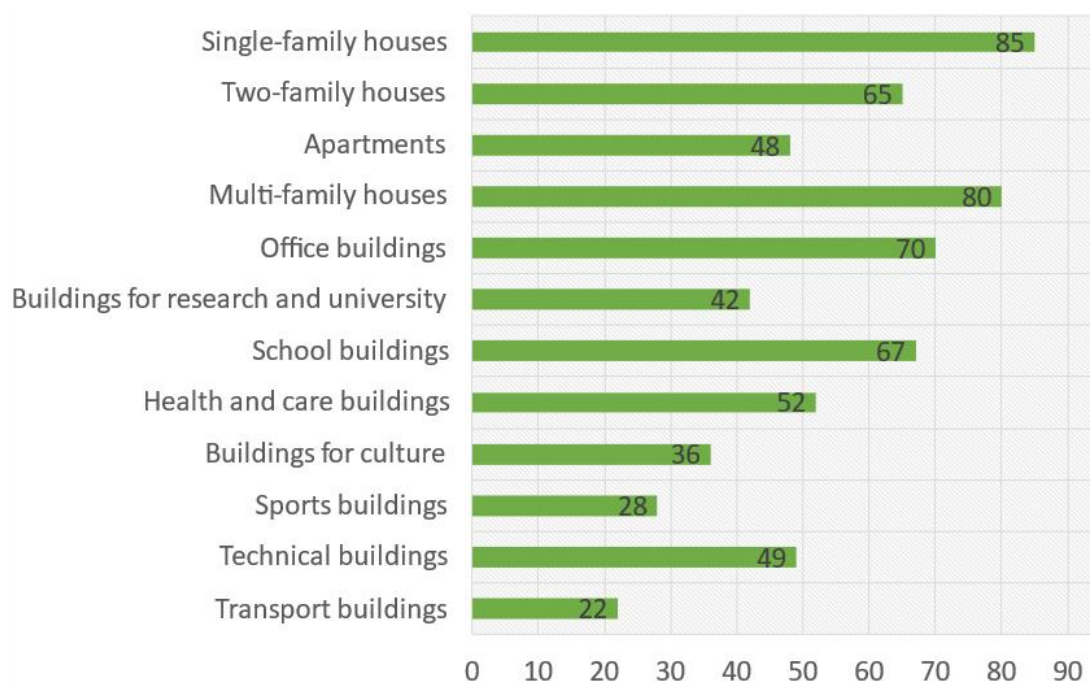


Figure 10: For which building types do you think iBRoad2EPC is most suitable?

Overall, the concept and design of iBRoad2EPC were rated mostly positively, as was the Assistant tool.

The following notes were received from energy experts for improving iBRoad2EPC:

- Experts asked for a comparison of various renovation strategies in the process of issuance, preferably at an early stage. The output document should not include a comparison but be the result of a decision process together with the building owner.
- There should be a better explanation of cost savings in the context of long-term renovation plans. Long-term objectives rather than short-term savings are the focus of iBRoad2EPC. The economic viability of renovation measures depends on the relation of investments and energy prices (including CO₂ prices). The latter will rise in the future as the demand for renewable energies rises and the availability of fossil fuels drops. These effects are already foreseeable, but cannot be calculated on today's price bases.

5 Results of the field test

5.1 Framework of the iBRoad2EPC field test

The iBRoad2EPC field test was conducted successfully in all six pilot countries. To achieve a relevant impact during the project the aim was to issue an iBRoad2EPC for 57 buildings, 30 public and 27 residential. The field test was evaluated by surveying 48 energy experts who issued the iBRoad2EPC, the 37 owners of the buildings, and the six project partners who supervised the field test in the pilot countries.

Question from the field test evaluation

- ❖ What is your technical background with respect to building renovation?
 - 37 of 37 building owners answered

The building owners were asked about their experience in building renovation. Two (5 %) said they had no experience, nine (24 %) said they had a basic understanding and ten (27 %) said they had a sound but not detailed understanding. The remaining 16 owners (43 %) rated their knowledge as good, saying they were well informed about building renovation and modernisation (Figure 11).

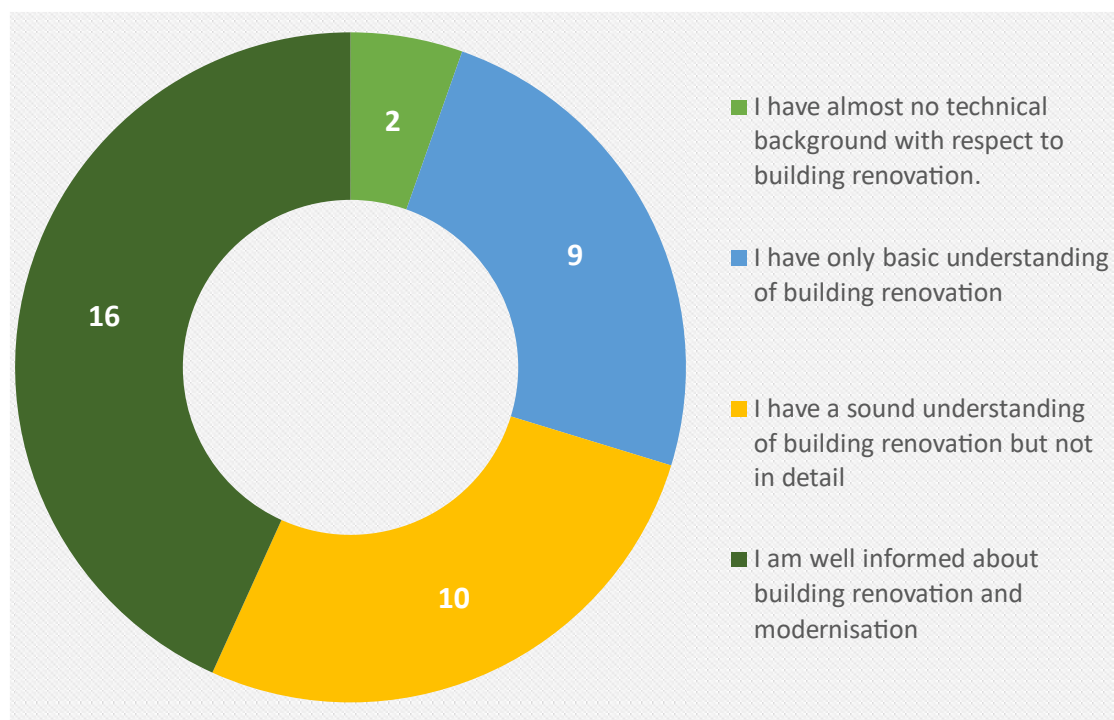


Figure 11 : What is your technical background with respect to building renovation?

Only 44 % of the owners state they were well informed about building renovation.

Question from the field test evaluation

❖ What is your perspective on professional audits within the realm of renovation?

- 37 of 37 building owners answered

Although roughly half of the owners felt confident about technical details of building renovation, most of them (32; 86 %) said they would always ask for professional advice when it comes to the renovation of their building. Two owners (5 %) said they would not ask for professional advice because they know energy experts personally. Only four owners (11 %) showed some scepticism regarding energy audits (Figure 12).

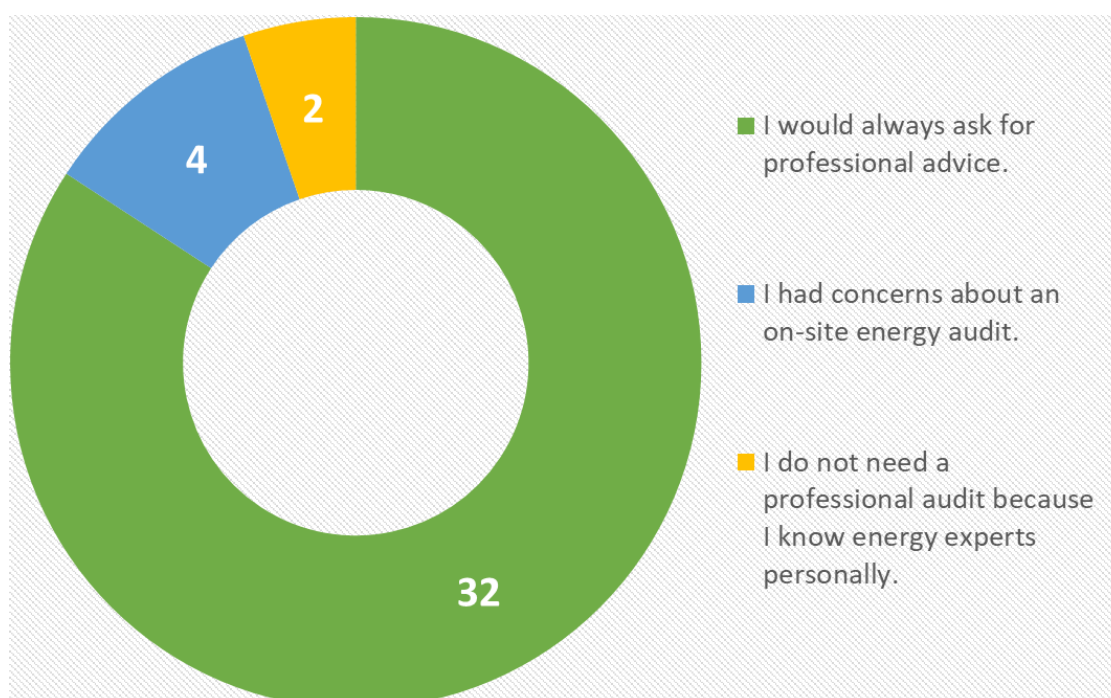


Figure 12: What is your perspective on professional audits within the realm of renovation?

86 % of the building owners said they would always ask for professional advice on renovation.

5.1.1 Tested buildings

During the field test, the iBRoad2EPC was issued for buildings that differed in use, ownership, volume, size and year of construction. The total floor area ranged from 52 m² for the smallest apartment up to almost 150,000 m². The oldest building was built in 1909 and the newest in 2014, with the largest share (33 %) built between 1956 and 1982. The large diversity of tested buildings is an advantage because it allows for the evaluation of iBRoad2EPC's suitability for a variety of building types.

The field test sample consisted of single-, semi-detached and multi-family buildings on the residential side and sports, administrative, research and education, and office buildings on the public side. It included buildings with and without an EPC issued before the field test. To gather valuable data on the interlinkage between the issuing of an EPC and an iBRoad2EPC, the aim was to issue both simultaneously, which happened in the majority of cases (Figure 13).

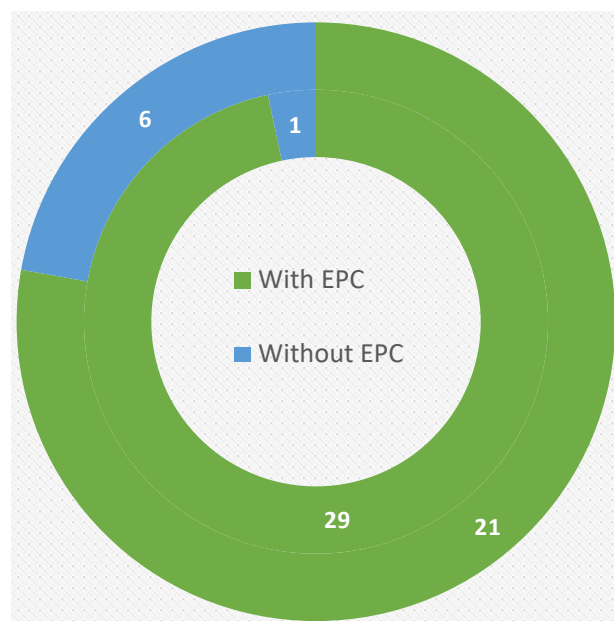


Figure 13: Share of residential buildings (inner ring, n=30) and public buildings (outer ring, n=27) for which the iBRoad2EPC was issued jointly with or without an EPC during field test.

During the field test, the iBRoad2EPC was issued jointly with an EPC in 29 out of 30 residential buildings and in 21 out of 27 public buildings.

5.2 Connection of iBRoad2EPC and EPC

Question from the field test evaluation

- ❖ How should the iBRoad2EPC be connected to the regular EPC?
 - 36 of 37 building owners answered
 - 47 of 48 energy experts answered

Of the 36 building owners that answered, 17 (47 %) said the iBRoad2EPC should be a voluntary addition to the EPC. Six building owners (17 %) could imagine a mandatory EPC for certain building types. Another six could imagine it being mandatory with every EPC, while seven (19 %) would see it as independent from the EPC (Figure 14).

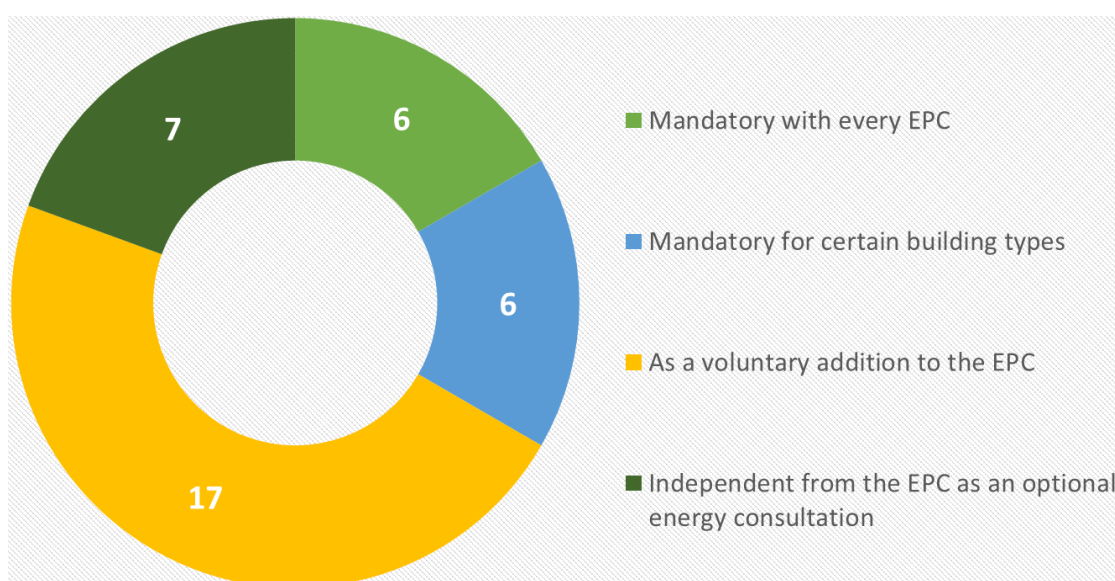


Figure 14: How should the iBRoad2EPC be connected to the regular EPC?

Even though combined issuing has several advantages for energy experts, they have various preferences for how the iBRoad2EPC should be connected to the EPC. Around half the energy experts (23 of 47; 49 %) favoured the iBRoad2EPC as a voluntary addition to the EPC, while almost as many (22; 47 %) thought it should be mandatory for at least some buildings - a higher proportion than among building owners, where 33 % (12 out of 36) thought it should be mandatory with every EPC or for certain building types. Five experts (11 %) believed it should be an obligatory annex to every EPC while 17 (36 %) would make it mandatory, but only for certain building types. Two experts (4 %) would not couple iBRoad2EPC to the EPC but offer it as a voluntary energy consultation (Figure 15).

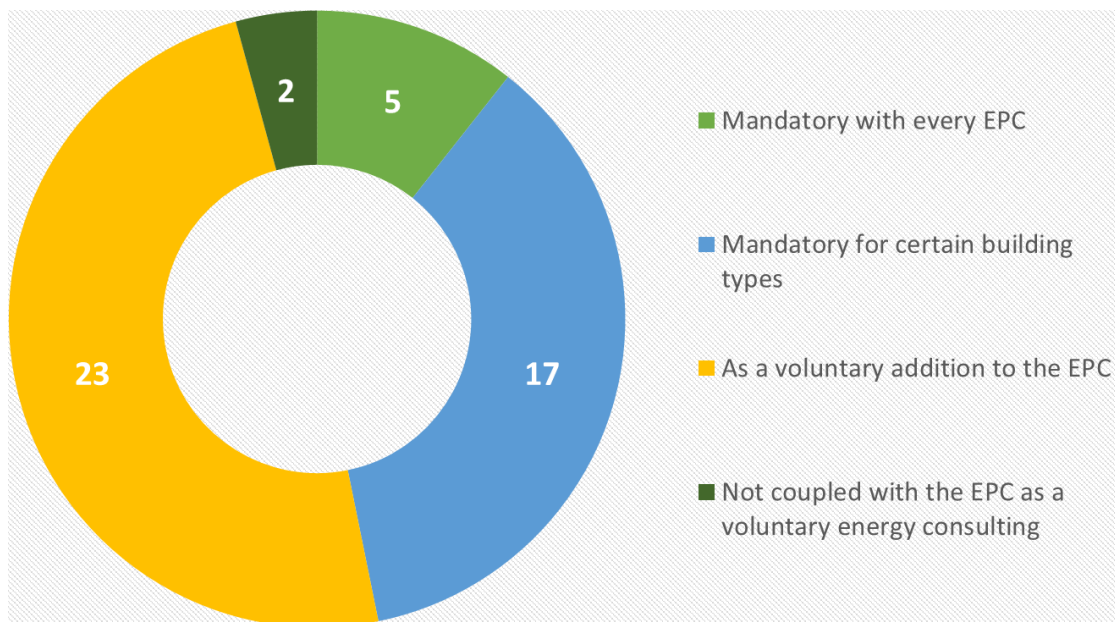


Figure 15: How should the iBRoad2EPC be connected to the regular EPC?

Both building owners and experts favoured making iBRoad2EPC a voluntary addition to the EPC.

5.3 Trigger points for building renovation

Ideally, an iBRoad2EPC is issued in combination with the EPC⁶. Combining the certificates will save time and cost for energy experts and building owners while amplifying the credibility of the EPC and imposing the least burden on the building owner. This can trigger deep renovation and make the work of the energy expert as well as possible future investments of the building owner as efficient as possible.

Question from the field test evaluation

❖ What is the most important reason for a renovation for you?
Multiple answers allowed.

• 37 of 37 building owners answered

There is a broad range of trigger points both for issuing an EPC⁶ and for the renovation of a building. The economic aspect is the biggest push factor for building owners, with 34 owners (92 %) rating saving energy costs as an extremely appropriate or very appropriate reason for a renovation and 37 owners (100 %) rating good cost-effectiveness as a very appropriate reason. A high building quality (31 votes; 84 %), improvement of the indoor climate (27 votes; 73 %), contribution to climate protection (27 votes; 73 %), fulfilment of legal requirements (27 votes; 73 %) and the exterior appearance of the building (27 votes; 73 %) are other very important reasons for a renovation to the building owners. Extending the living space (6 votes; 16 %) or preparing for retirement (6 votes; 16 %) received the fewest votes. The full range of answers is displayed below in Figure 16.

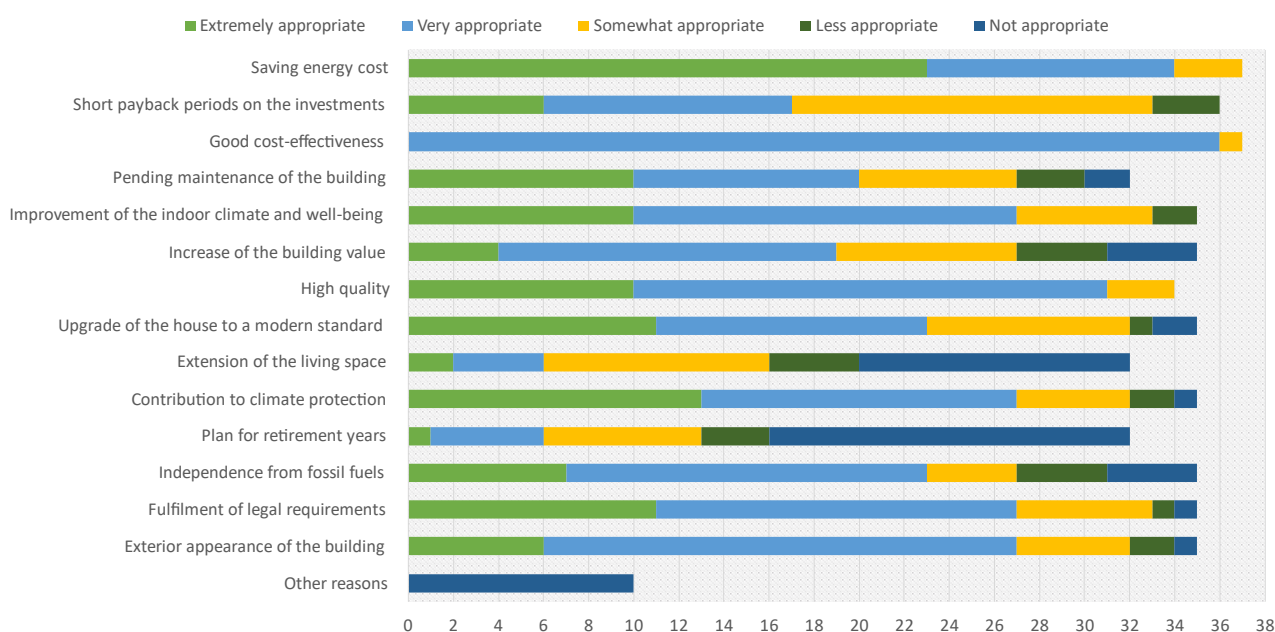


Figure 16: What is most important reason for a renovation for you?

92 % of the building owners rated “saving energy costs” as an extremely appropriate or very appropriate reason for a renovation.

⁶ The issuing of an EPC can be triggered in various ways. A detailed analysis is given in the [Report on the adaptation to multi-family and public buildings](#).

5.4 On-site visit

5.4.1 Owners' perspective

During the issuing process of an iBRoad2EPC, the energy expert needs to conduct an on-site visit. The site visit is an integral part of the iBRoad2EPC issuance process. This enables experts to make high quality recommendations and allows the client to clarify any questions directly with the expert.

Question from the field test evaluation

- ❖ For what reason and to what extent do you consider the visit of the energy expert useful for you?
- 37 of 37 building owners answered

Building owners in the field test said the most added value came from the discussion with the energy expert about the potential benefits of a renovation (35 votes; 95 %) saying it would be extremely useful, very useful or somewhat useful) and the current state of the building (35 votes; 95 %). Many also see added value in gaining information about the benefits of a long-term scheduled renovation (33 votes; 89 %) and sketching this out together with the energy expert (32 votes; 86 %) during the on-site visit. The full range of responses is shown in Figure 17.

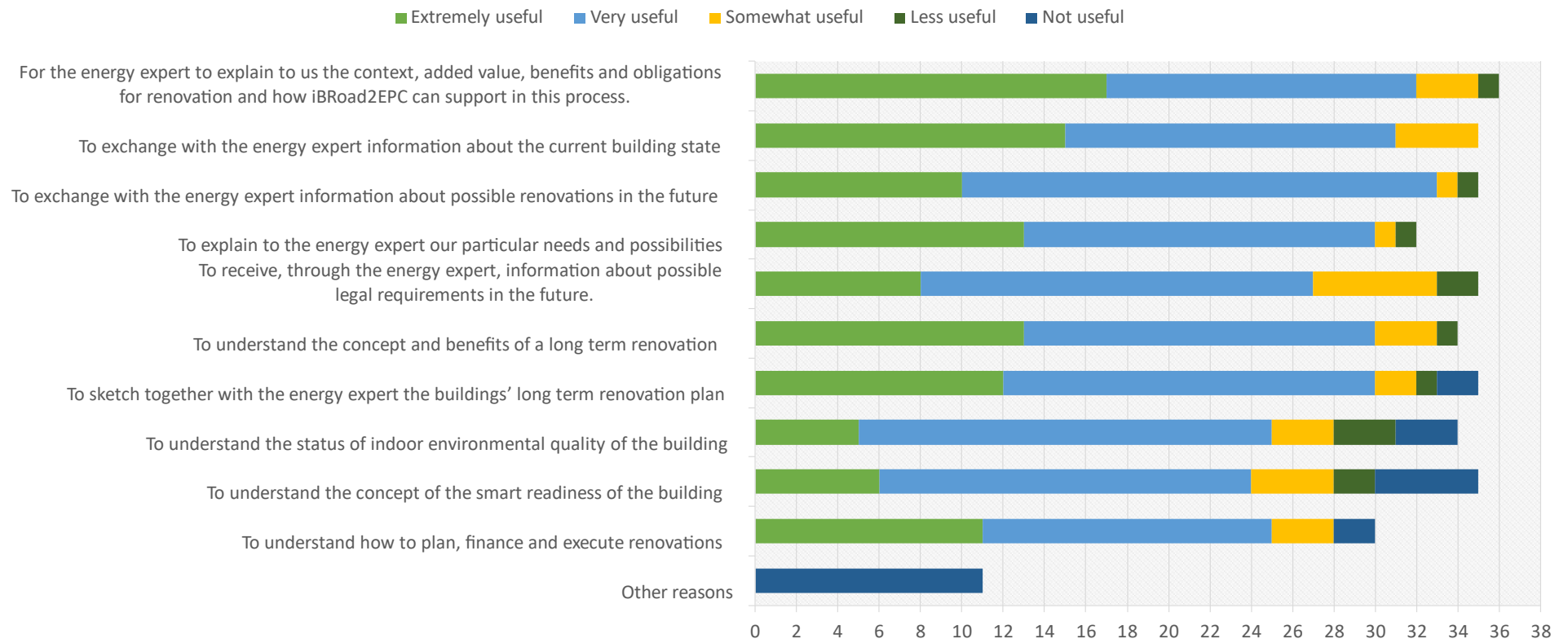


Figure 17: For what reason and to what extent do you consider the visit of the energy expert useful for you?

5.4.2 Experts' perspective

One of the time-saving elements of the iBRoad2EPC is the blank template for the on-site visit. This template was introduced to the experts during the iBRoad2EPC training.⁷ The energy experts were asked about their understanding of the iBRoad2EPC blank template twice, firstly after the initial training and secondly after actually using the template during the on-site visit. The groups are not directly comparable because only some of the experts that were trained to use the iBRoad2EPC participated in the field test, though all the field test participants attended the training.

Question from the training evaluation

- ❖ Did you understand the blank template for the iBRoad2EPC on-site visit?
- 89 of 95 energy experts answered

After the training 62 experts (70 %) said that they understood the blank template well or very well (Figure 18). Fourteen experts (16 %) stated that they did not fully understand, three (3 %) understood it poorly and ten (11 %) were unsure.

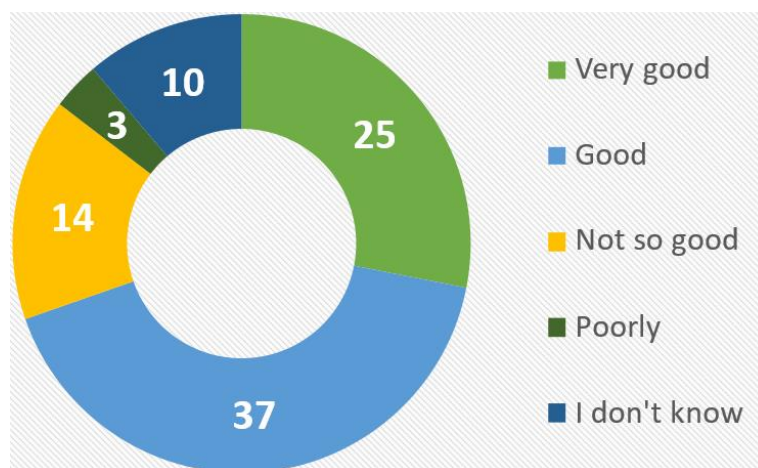


Figure 18: Did you understand the blank template for the iBRoad2EPC on-site visit?

71 % of the experts said they had a good or very good understanding of the blank template.

⁷ The full evaluation of the training and the introduction of the training material, including the blank template, are the subject of the upcoming report on the Evaluation of iBRoad2EPC training.

Question from the field test evaluation

- ❖ Did you find the blank template useful for the on-site visit?
 - 40 of 48 energy experts answered

During the field test, the energy experts had the chance to use the iBRoad2EPC on-site visit template for their inspection of the building. Of these, 35 out of 40 (88 %) said that they found the blank template extremely, very or somewhat useful for the on-site visit (Figure 19).

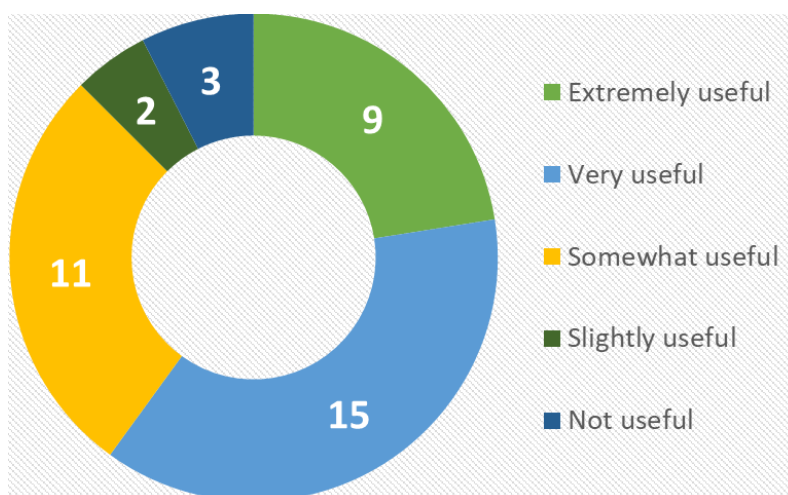


Figure 19: Did you find the blank template useful for the on-site visit?

88 % of the experts said they found the blank template useful for the on-site visit.

Question from the field test evaluation

❖ For what reason and to what extent do you consider your visit useful? Multiple answers allowed.

• 41 of 48 energy experts answered

The energy experts were also asked to assess the usefulness of the on-site visit. It was considered very or extremely useful to explain the benefits of a long-term renovation to the owner by three quarters (31 experts, 76 %). All (41 experts; 100 %) said the visit was very or extremely useful to collect information about possible future renovations of the building. In addition, 36 experts (88 %) said the visit was very or extremely useful to understand the owners' needs and 39 (95 %) found it very or extremely useful for assessing the current building state (Figure 20).

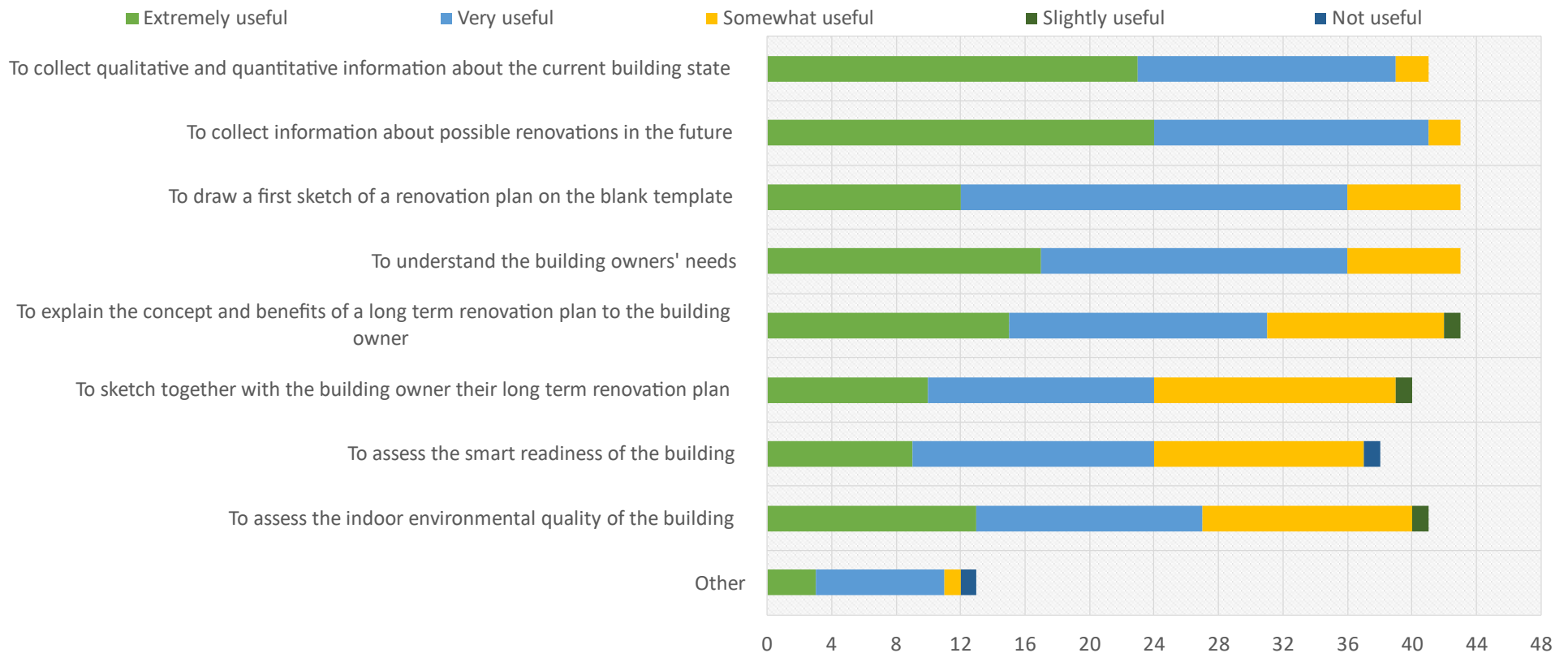


Figure 20: For what reason and to what extent do you consider your visit useful?

5.5 Issuing process

Question from the field test evaluation

❖ How much time did you need for the steps of the combined issuing of the EPC and the iBRoad2EPC?

- 43 of 48 energy experts answered

5.5.1 Duration of the on-site visit

The on-site visit is the first actual step in the process of issuing an iBRoad2EPC. There is preparatory work before the visit for the experts, but this is more organisational. Ideally, experts prepare for the visit by looking at all data that is available for the building, familiarising themselves with the floor plans, checking space available for installations etc. The on-site visit itself is short if the expert has some experience. During their on-site visit the iBRoad2EPC field test experts needed approximately three hours (median) to check for all data regarding the EPC (light green bar). To acquire all additional data needed for the iBRoad2EPC they needed four hours (median) on top of that (light blue bar) (Figure 21). Several experts added that it was possible to shorten this effort when they got used to the template and the crucial aspects to look for during the on-site visit.

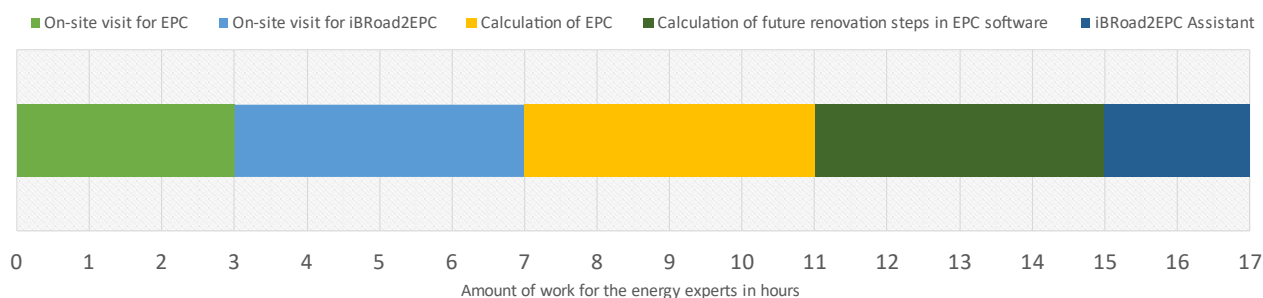


Figure 21: Effort that energy experts put into the combined issuing of EPC and iBRoad2EPC. Coloured bar sections illustrate the hours spent on each step of the process (median values).

5.5.2 Duration of processing the iBRoad2EPC

Having collected all necessary data during the on-site visit, experts need to do the actual calculation of the EPC and the iBRoad2EPC with the corresponding software. For the EPC calculation (yellow bar) the experts needed four hours (median) which, added to the on-site visit, comes to a total seven hours (median) of work for the EPC. Transferring the building information into the iBRoad2EPC Assistant (dark blue bar) took them two hours (median). Having sketched the first draft of a renovation plan within the Assistant, experts followed up the calculation of future renovation steps in their respective EPC software to quantify the savings for the customer. This was done several times to compare different renovation strategies for the building. These calculations (dark green bar) took the experts around four hours (median) on top of the EPC calculation. Issuing the iBRoad2EPC overall thus took the experts approximately nine hours (median) of work on top of the four and a half hours for the EPC (Figure 21).

A skilled expert needs up to 16 working hours for a BRP. For the iBRoad2EPC the experts needed about 10 working hours (median) on top of the EPC. The upcoming report on the definition of the proposed concept, content and methodology of iBRoad2EPC⁸ concludes that the iBRoad2EPC is best placed somewhere between

⁸ This report is currently under revision, and will be published on the [official project website](#).

the EPC and the BRP. The finding that the iBRoad2EPC can be issued in half the time of a BRP supporting this conclusion.

On average, the experts needed 7 hours to issue the EPC and another 10 hours to issue the iBRoad2EPC.

5.5.3 Consideration of variants of the renovation plan

The central task of the experts when issuing the iBRoad2EPC is to draw up the long-term renovation plan. It is possible that several reasonable renovation plans could be proposed for a single building, but the iBRoad2EPC must focus on one final strategy. The iBRoad2EPC process does not prescribe a set course of action for comparing options.

Question from the field test evaluation

- ❖ Have you considered multiple variants of the renovation plan?
- 47 of 48 energy experts answered

This question was used to find out the experts' solutions. Of the 47 experts, 33 (70 %) did compare different renovation plans. In 11 cases (23 %), this was at the request of the building owner, while 22 experts (47 %) proactively chose to discuss the variants with their customers.

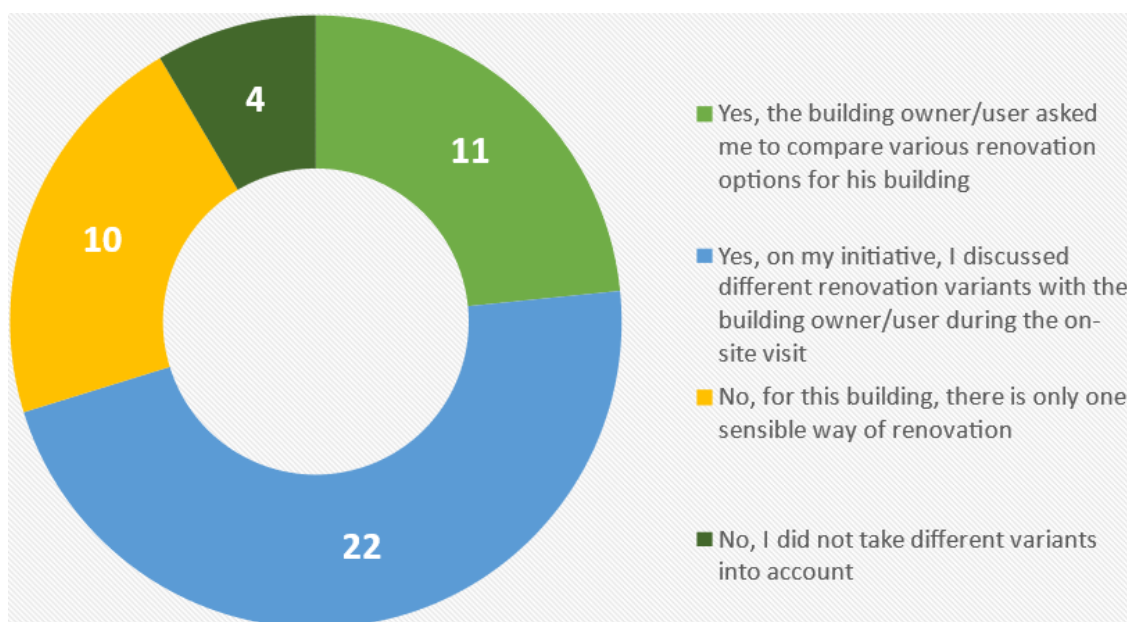


Figure 22: Have you considered multiple variants of the renovation plan?

70 % of the experts compared various renovation plans before deciding on a final version.

5.5.4 User experience with the iBRoad2EPC Assistant

The iBRoad2EPC Assistant is the main tool for the energy experts to issue the iBRoad2EPC output document. It should allow for an efficient workflow to support the experts' work.

Question from the field test evaluation

❖ What was your experience with using the iBRoad2EPC Assistant?
Multiple answers allowed.

- 47 of 48 energy experts answered

There was a high general satisfaction with the Assistant tool. Twenty experts (43 %) found it very easy to use. Another 29 (62 %) said that they had no major problems using it after a short period of getting used to it. Another seven (15 %) needed a lot of time to be able to work with the Assistant but could use it. Three experts (6 %) needed support from their local country partner, three said they did not understand it and two (4 %) said it did not work (Figure 23).

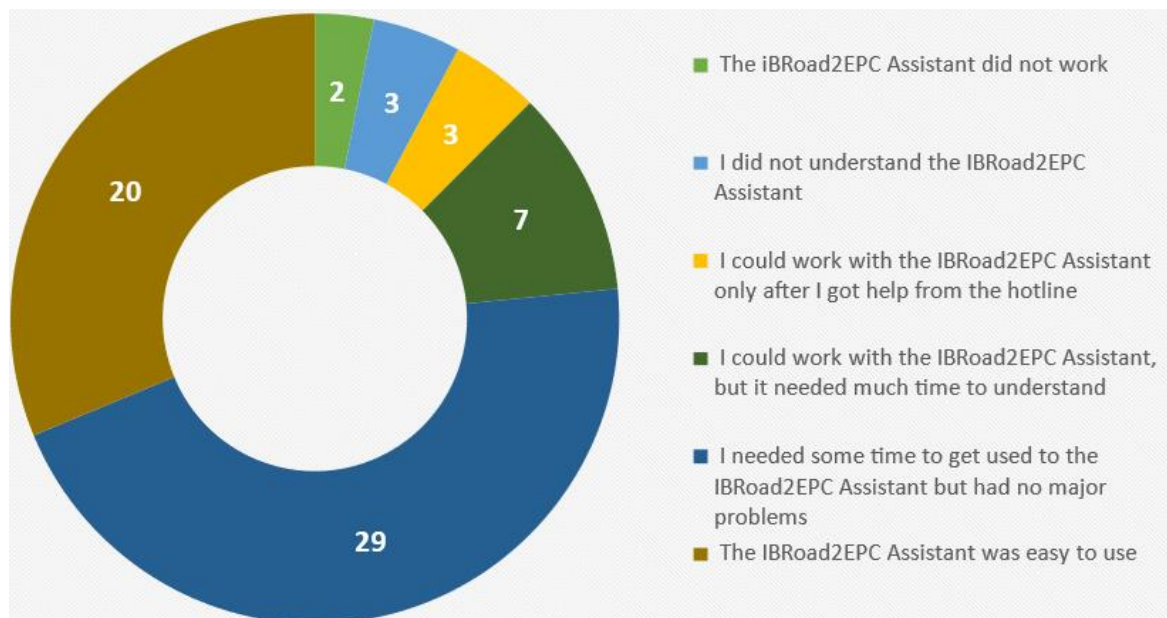


Figure 23: What was your experience with using the iBRoad2EPC Assistant?

77 % of experts said there were no major problems with the iBRoad2EPC Assistant or it was easy to use.

Question from the field test evaluation

❖ How do you rate the usability of the following features within the iBRoad2EPC Assistant?

- 45 of 48 energy experts answered

After providing their general impression of the Assistant, the experts were asked for their opinion on its different features. The answers were overall positive. The functionalities of editing the building and its current state were rated very good. Nineteen (42 %) said the building was extremely easy to edit and 22 (49 %) said it was very easy. Fourteen experts (31 %) said that editing the current building state is extremely easy and another 26 (58 %) said it was very easy.

Creating renovation steps was extremely easy for 16 experts (36 %) and very easy for 20 experts (44 %), creating a new measure within a renovation was rated extremely easy by 12 experts (27 %) and very easy by 23 (51 %). Eleven experts (24 %) found creating a step or measure less easy. Most experts (73 %) thought the navigation through the Assistant in general was extremely or very easy, with nine (20 %) rating it somewhat easy and four (9 %) slightly easy. No one rated the usability of the Assistants' features "not easy" (Figure 24).

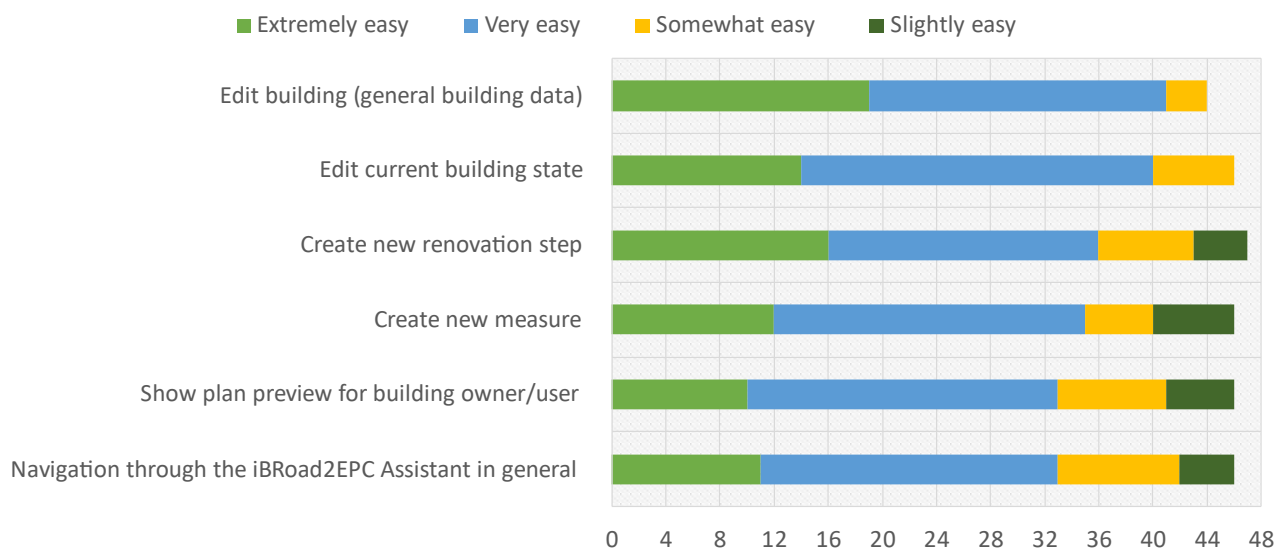


Figure 24: How do you rate the usability of the following features within the iBRoad2EPC Assistant?

Experts rated the usability of the iBRoad2EPC Assistant features overall very or extremely easy.

5.5.5 Comprehension of external tools

5.5.5.1 Building owners

iBRoad2EPC also incorporates external tools to measure smart readiness (Smart Readiness Indicator - SRI), indoor environmental quality (IEQ) and measured energy performance (Measured Energy Performance Indicator - MEPI). These tools are embedded in the iBRoad2EPC Assistant. The respective results are automatically transferred to the iBRoad2EPC output document. The MEPI was added to the Assistant at a later stage of the project after the questionnaires were already sent out, so questions on this were not included.

Question from the field test evaluation

❖ How do you rate the Indoor Environmental Quality (IEQ) Assessment?

• 30 of 37 building owners answered

The IEQ module was evaluated for its usefulness in understanding, identifying and locating potential issues. Most building owners were able to use the IEQ spreadsheet without major problems: 15 of 30 owners (50 %) rated it “very easy to understand”, another “extremely easy” and 10 (33 %) “somewhat easy”. However, four (13 %) did face some issues, with one (3 %) even stating that it was “not easy to understand” (Figure 25).

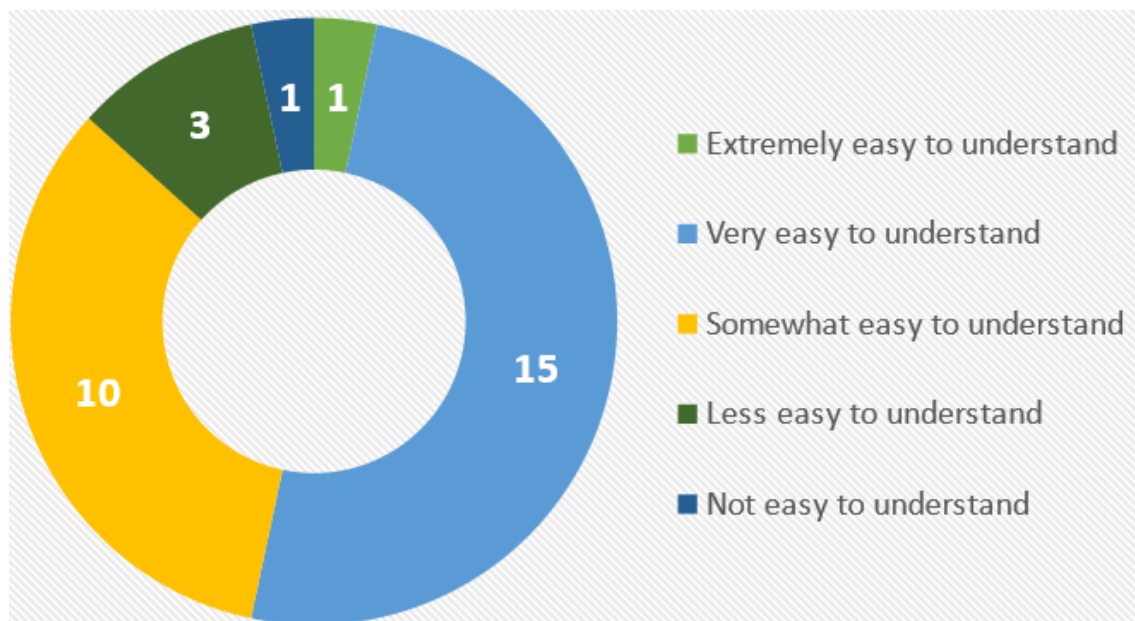


Figure 25: How do you rate the indoor environmental quality (IEQ) assessment?

83 % of building owners rated the IEQ assessment easy to use.

Question from the field test evaluation

- ❖ How do you rate the Smart Readiness Indicator(SRI) Assessment?
 - 29 of 37 building owners answered

The usability of the SRI module was also evaluated and was also well understood. Fifteen building owners (52 %) said the SRI was very easy to understand. Eight (28 %) found it somewhat easy and four (14 %) less easy to understand. No owner (0 votes for “not easy to understand”) said it was not easy to understand.

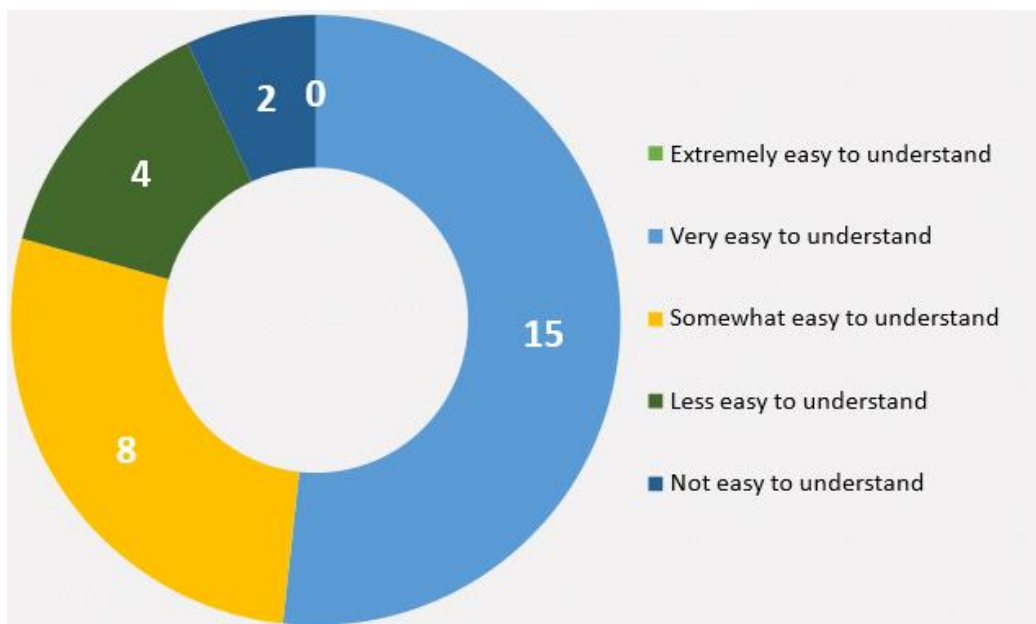


Figure 26: How do you rate the Smart Readiness Indicator (SRI) assessment?

80 % of the building owners rated the SRI assessment easy to understand.

5.5.5.2 Energy experts

The energy experts were provided with external spreadsheets that have been integrated into the iBRoad2EPC Assistant. They can download the latest spreadsheet from the original source, fill it in and then reupload it to the Assistant. The Assistant then automatically reads the relevant data from the spreadsheets and transfers it into the output document. While working with the spreadsheets and calculating the IEQ and SRI requires some technical knowledge, the steps to visualise the results in the Assistant itself require only basic knowledge of web applications.

Question from the field test evaluation

- ❖ How do you rate the usability of the Indoor environmental quality tool within the iBRoad2EPC Assistant?
- 44 of 48 energy experts answered

Downloading and uploading the spreadsheet was very or extremely easy for almost all experts. Working with the template was rated less easy, with 19 experts (43 %) rating it “somewhat easy” and 10 votes (23 %) finding it only “slightly easy” or “not easy”. The display of the IEQ results was well understood good, with 26 (59 %) finding it “extremely” or “very easy” and 13 (30 %) “somewhat easy” to understand (Figure 27).

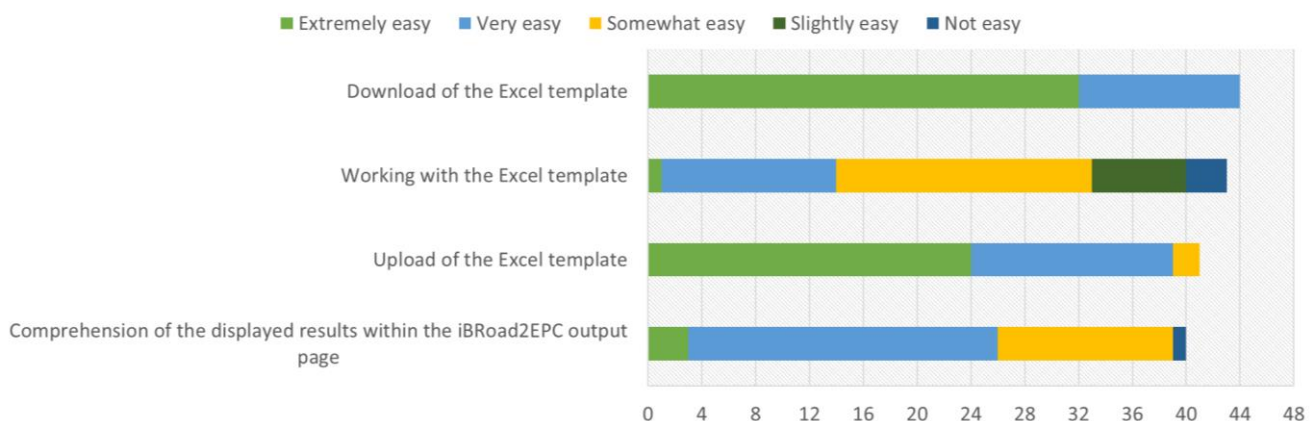


Figure 27: How do you rate the usability of the indoor environmental quality tool within the iBRoad2EPC Assistant?

Overall, the experts found the IEQ tool easy to use.

Question from the field test evaluation

❖ How do you rate the usability of the Smart Readiness Indicator tool within the iBRoad2EPC Assistant?

- 43 of 48 energy experts answered

Working with the SRI template was “somewhat easy” for 21 experts (49 %). The display of the SRI results was understood extremely easily by six experts (14 %), very easily by 18 (42 %) and somewhat easily by 13 (30 %). Uploading the SRI spreadsheet was “extremely easy” for 27 experts (63 %) and “very easy” for another 11 experts (26 %). The results were easy to understand for most experts (6 experts (14 %) extremely easy; 18 experts (42 %) very easy; 13 experts (30 %) somewhat easy), though two (5 %) found this only slightly easy and one (2 %) said it was not easy.

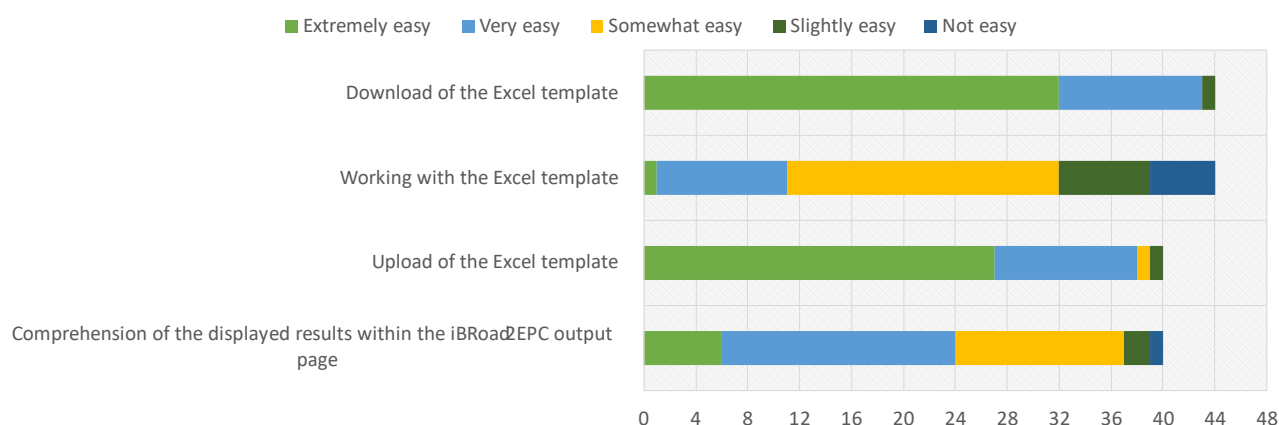


Figure 28: How do you rate the usability of the Smart Readiness Indicator tool within the iBRoad2EPC Assistant?

The implementation of the external tools in the iBRoad2EPC Assistant was generally very highly rated. The external tools themselves were well understood in general but the experts needed some support occasionally.

Overall, the experts rated the SRI tool easy to use.

5.5.6 Usefulness of the iBRoad2EPC Assistant

Question from the field test evaluation

❖ How useful are the following features of the iBRoad2EPC Assistant to you as an issuer?

• 46 of 48 energy experts answered

The experts rated the ability to add and edit renovation measures as particularly useful, with 42 (91 %) rating this feature as very or extremely useful. The energy requirements module received the same rating. Technical details and notes were considered very or extremely useful by 40 experts (87 %), while 37 (80 %) found it very or extremely useful that the automatically generated text blocks can be overwritten. On average, the features of the iBRoad2EPC Assistant were rated as very or extremely useful by 80 % of the experts.

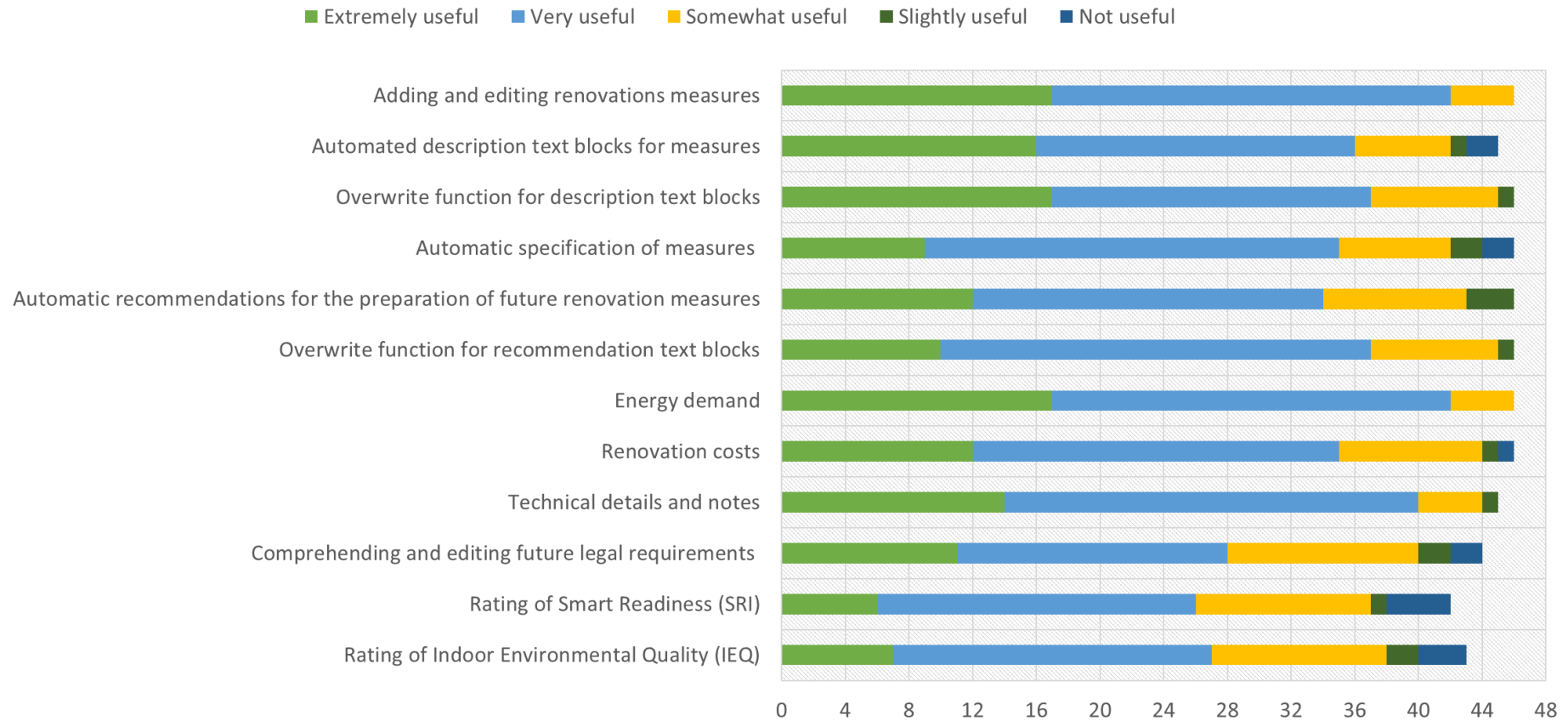


Figure 29: How useful are the following features of the iBRoad2EPC Assistant to you as an issuer?

Question from the field test evaluation

❖ What did you like about the iBRoad2EPC Assistant? Please write free text.

- 36 of 48 energy experts answered

In addition to the closed questions, experts were asked to provide their opinions and suggestions as free text. Several experts gave positive feedback. Some of recurring examples are shown in Figure 30.

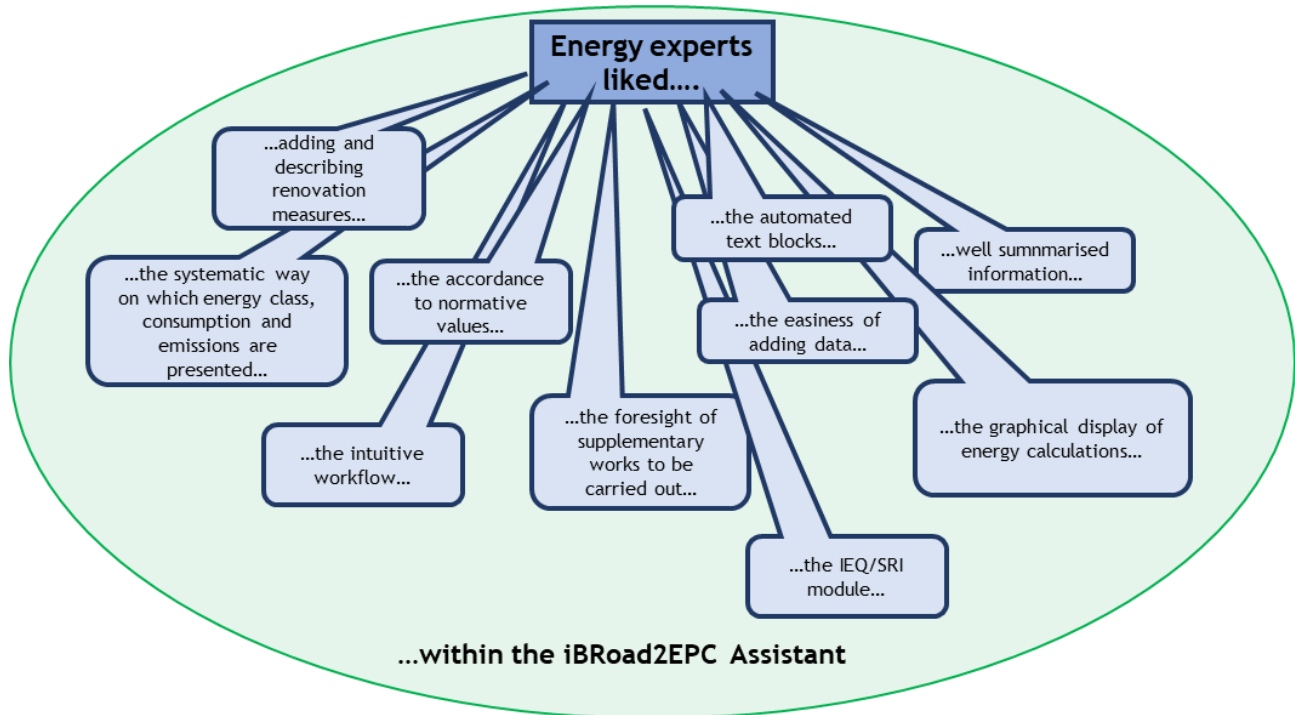


Figure 30: Free text suggestions from energy experts on what they liked about the iBRoad2EPC Assistant.

Question from the field test evaluation

- ❖ Do you have any wishes or suggestions for improving the iBRoad2EPC Assistant? please write free text
 - 20 of 48 energy experts answered

To support the possible future development of the Assistant, experts were also asked to suggest improvements. These answers were given as free text, and are summarised in Figure 31. Suggested improvements related to the SRI and IEQ spreadsheets are outside the scope of this project as these tools were developed externally, but comments on the automated transfer of the data from the spreadsheets to the iBRoad2EPC Assistant can be addressed as part of the project.

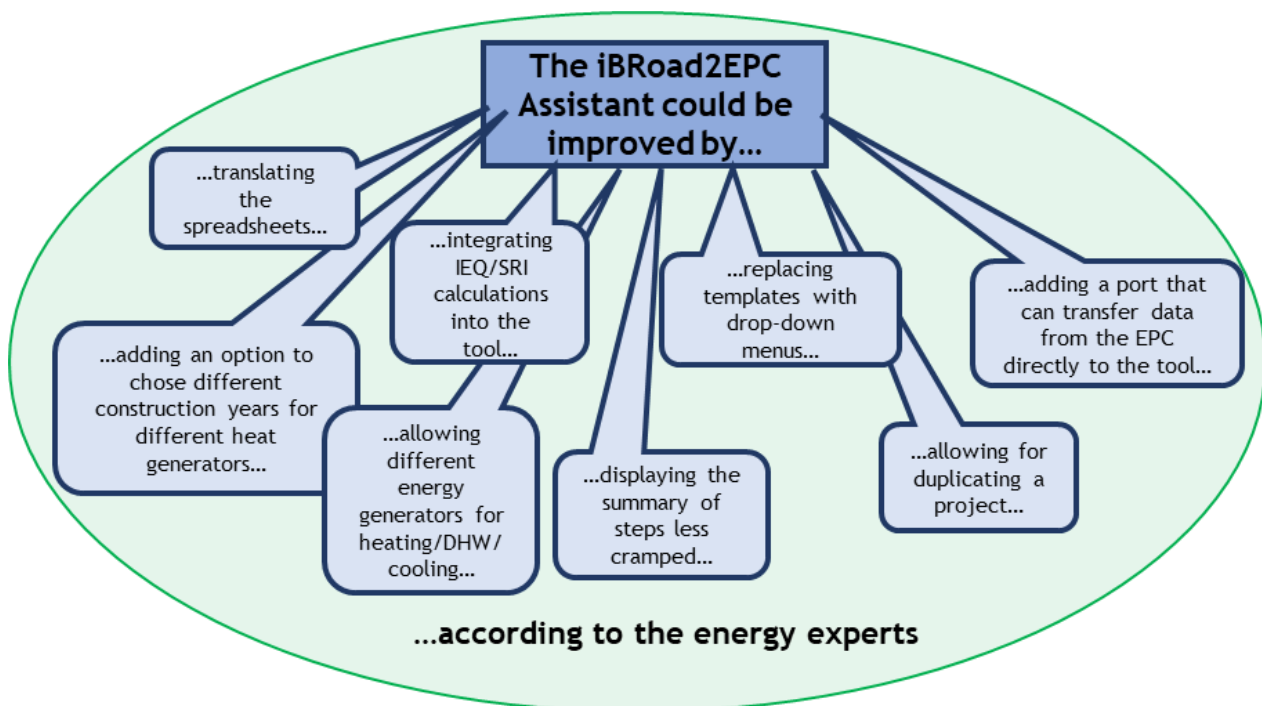


Figure 31: Free text suggestions to improve the iBRoad2EPCAssistant.

5.6 Output document

Question from the field test evaluation

- ❖ To what extent do you agree with the following statements ?
 - 36 of 37 building owners answered
 - 46 of 48 energy experts answered

Both energy experts (87 %) and building owners (78 %) agreed most strongly with the statement that **iBRoad2EPC provides building owners with an outline of a long-term renovation plan for their building**. One building owner disagreed with this statement. The lowest rating came from four experts (9 %) who said they "somewhat agreed".

The statement **"the iBRoad2EPC is useful and informative for the building owner/user"** was also rated highly by both groups (experts 85 %, owners 70 %).

Both groups also agree that **"the iBRoad2EPC enables and motivates the building owner/user to realise concrete renovation measures"**, although this statement received more cautious backing, with 63 % of experts and 53 % of owners expressing extreme/strong agreement. This supports the positioning of iBRoad2EPC as an initial entry point into long-term renovation planning.

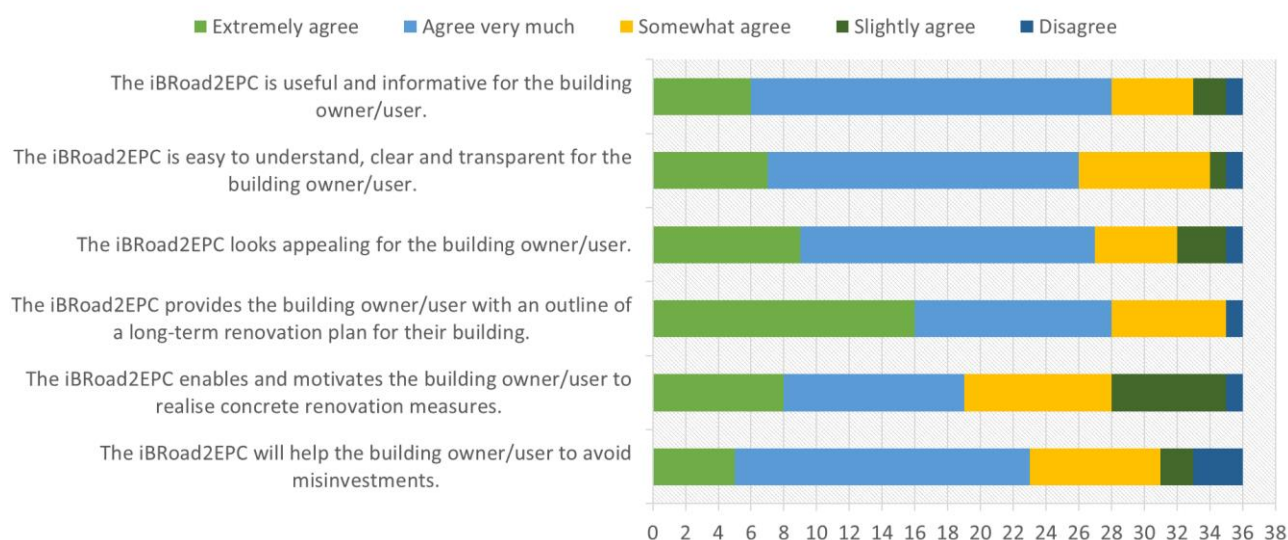


Figure 32: To what extent do you as a **building owner** agree with the following statements?

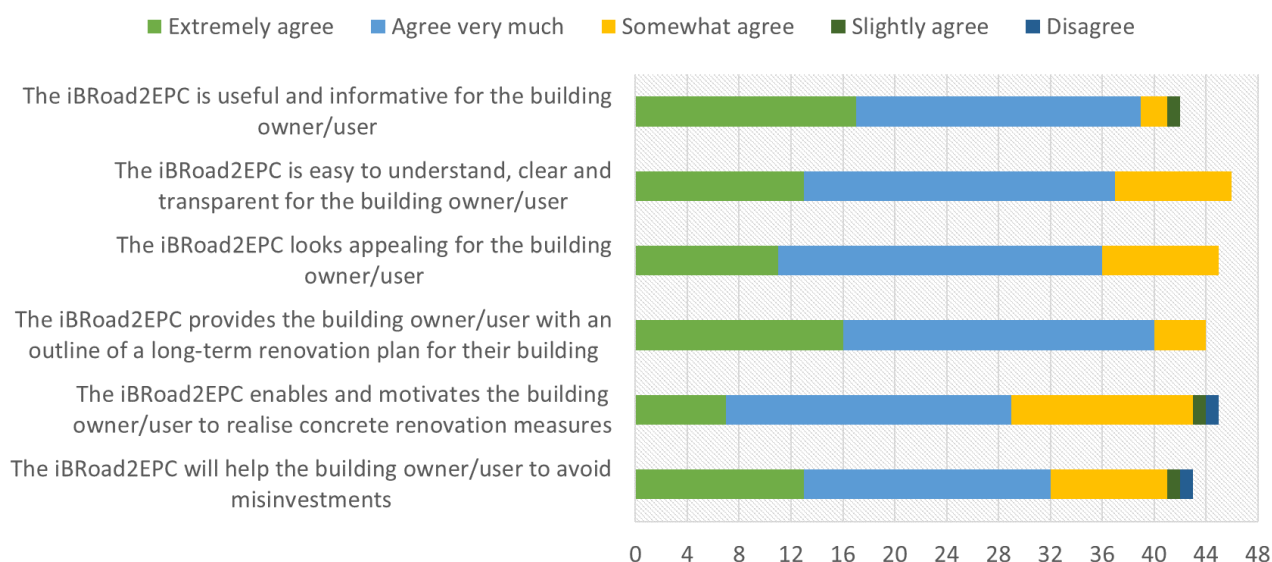


Figure 33: To what extent do you as an **energy expert** agree with the following statements?

Both energy experts (87 %) and building owners (70 %) agreed most strongly with the statement that iBRoad2EPC provides building owners with an outline of a long-term renovation plan for their building.

5.6.1 Content

5.6.1.1 Owners' perspective

Question from the field test evaluation

❖ How useful do you consider the following content of the iBRoad2EPC?

- 36 of 37 building owners answered

Owners were asked how useful they consider particular content of iBRoad2EPC. They rated the content in the following order:

Technical details and notes were rated best, with 31 owners (86 %) rating this very or extremely useful. As this is one of the core features of iBRoad2EPC, it is encouraging that owners recognise the benefits.

The **detailed description of single renovation steps** was rated very or extremely useful by 30 owners (83 %). Although this information is generated automatically by iBRoad2EPC, it appears to contain sufficiently individualised specifications.

Similarly, 29 owners (81 %) rated the **overview page** and information on the **renovation costs** as very or extremely useful, with 28 (78 %) saying the same for the **description of preparation measures**.

Only 16 owners (44 %) rated the **information on possible future requirements** very or extremely useful, with another 11 owners (31 %) calling this somewhat useful. This is the most reserved rating of the iBRoad2EPC features; only the external features SRI and IEQ were rated lower. This may indicate either that owners are already well informed about the future requirements for their buildings, or that they are not yet aware that they will be affected by such requirements.

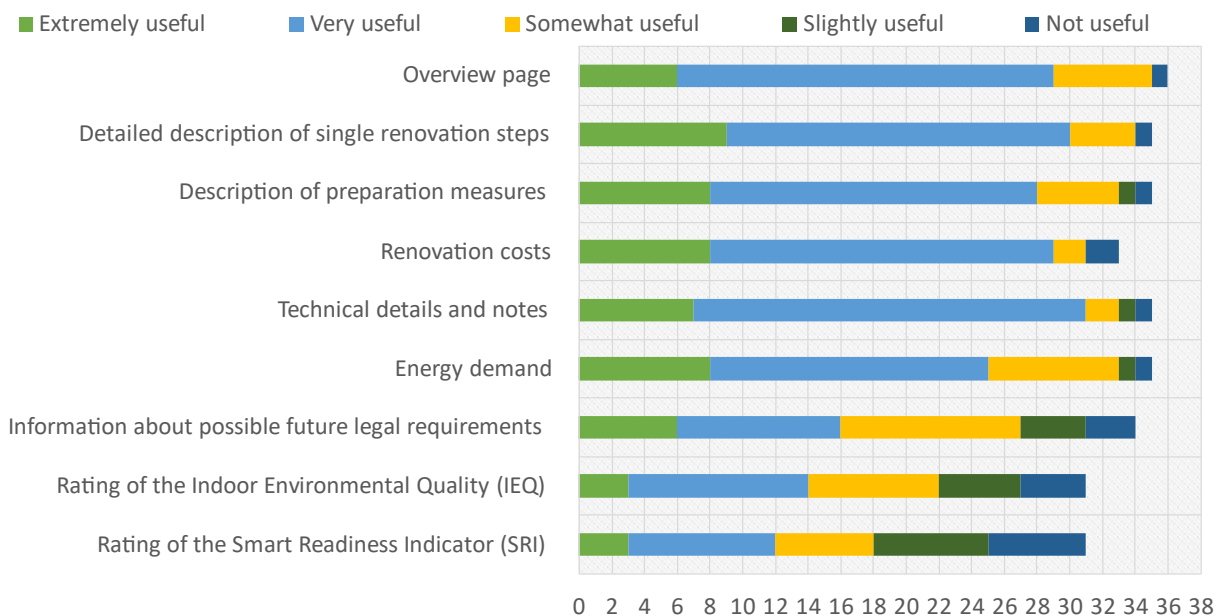


Figure 34: How useful do you consider the following content of the iBRoad2EPC?

Energy experts and building owners rated the overview page and the detailed description of single steps as most useful content of the iBRoad2EPC.

5.6.1.2 Experts' perspective

Question from the field test evaluation

❖ How useful do you consider the following content of the iBRoad2EPC?

• 46 of 48 energy experts answered

Compared to the building owners, the energy experts rated the content of iBRoad2EPC even more positively on average. Almost all the experts (45; 98 %) found the **detailed description of single renovation steps** very or extremely useful, confirming the positive assessments of the building owners, who rated this the second most useful aspect. The high level of agreement on this point is particularly interesting as it relates to the core expertise of energy experts.

The **description of preparatory measures** achieved the highest number of “extremely useful” votes, with 17 (37 %) rating this feature extremely useful and 21 (46 %) rating it very useful. This assessment is encouraging, as long-term, staged renovation planning is a new perspective for many experts. Preparing for later stages of renovation and optimising buildings over time are clearly seen as useful by the experts.

Like building owners, experts rated the **overview page** highly, with 41 experts (89 %) finding this very or extremely useful.

Both groups also assessed information on **renovation costs** as useful to a large degree, even though there is a high level of uncertainty in the forecast costs. It is understandable that building owners want to know what they can expect to spend on renovation, and experts clearly want to support their clients with accurate cost estimates.

The **information about possible future legal requirements** also received the lowest rating from the experts among the iBRoad2EPC features, although two-thirds (32 experts; 70 %) rated it as very or extremely useful. This is significantly higher than for the building owners, but still an unexpected assessment.

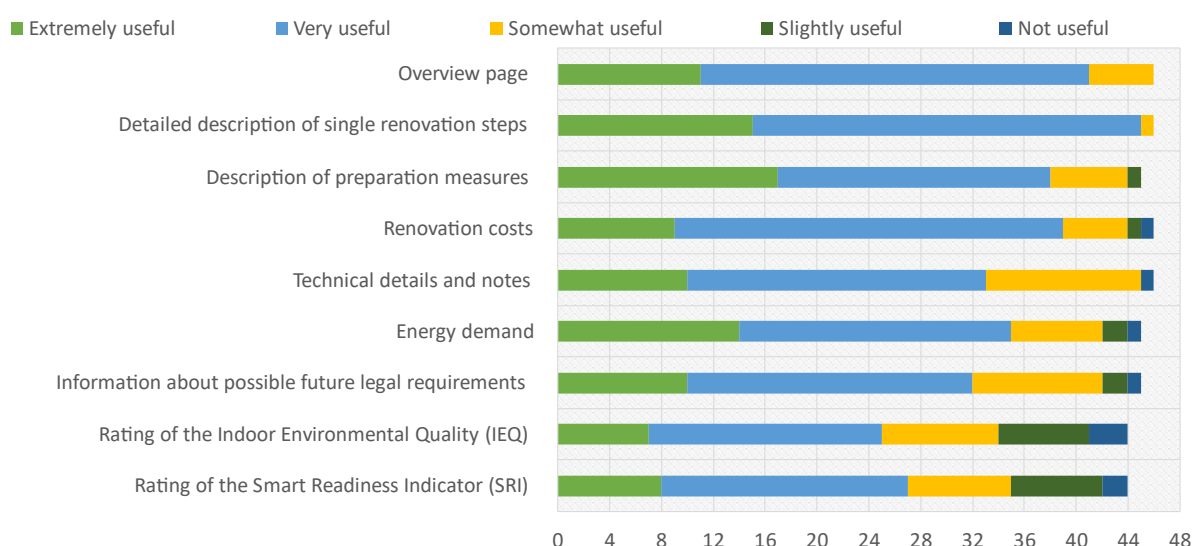


Figure 35: How useful do you consider the following content of the iBRoad2EPC?

Question from the field test evaluation

❖ Do you have any suggestions for improving the content of iBRoad2EPC?

- 13 of 48 energy experts answered

The energy experts were asked to provide their opinion on additional content that could improve iBRoad2EPC. A selection of the free text answers is shown in Figure 36. Experts see potential in a more detailed explanation of the external tools (IEQ, SRI) and the energy class that is reached. Experts from Romania want a clearer explanation and distinction between maintenance costs and energy-related costs, based on feedback from their customers.

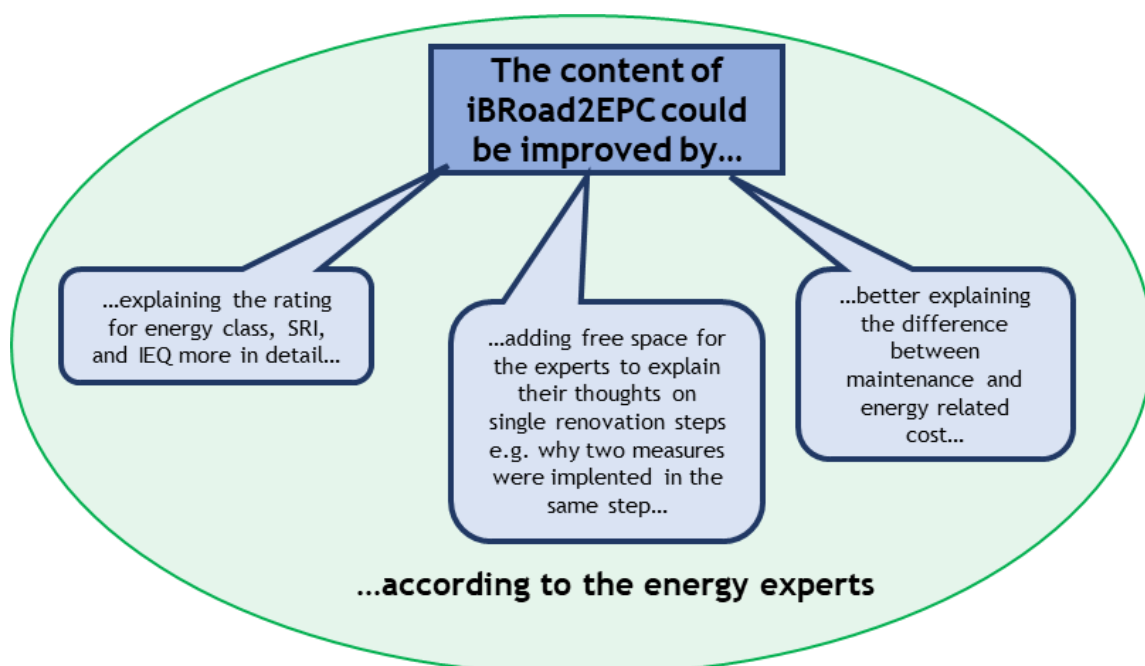


Figure 36: Do you have any suggestions for improving the content of iBRoad2EPC?

5.6.2 Comprehension

5.6.2.1 Owners' perspective

Question from the field test evaluation

❖ How satisfied are you with the following characteristics of the iBRoad2EPC?

- 34 of 37 building owners answered

Building owners are highly satisfied with the characteristics of iBRoad2EPC. Although the differences between the categories are small and should not be overinterpreted given the small sample size, the comprehensibility of the renovation plan received the highest approval ratings. On average across the categories, 80 % of owners are very or extremely satisfied with the characteristics of iBRoad2EPC. A further 17 % of owners are somewhat satisfied. There was one owner in each category who was only “slightly satisfied” - it is not known if this was always the same person. No building owner said they were “not satisfied” about any characteristic (Figure 37).

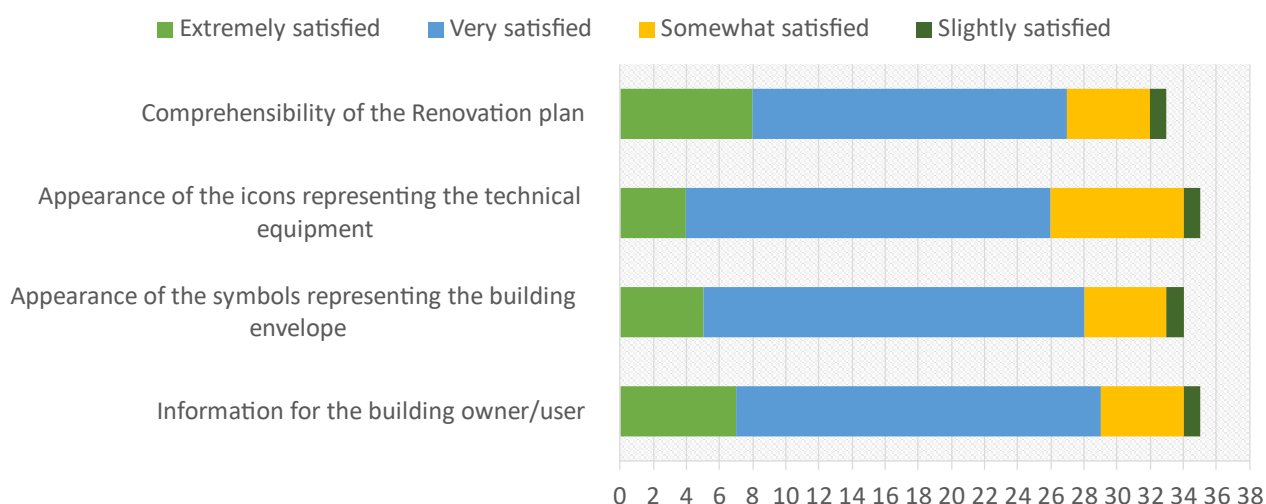


Figure 37: How satisfied are you with the following characteristics of the iBRoad2EPC?

Overall, building owners are very or extremely satisfied with the characteristics of iBRoad2EPC.

Question from the field test evaluation

- ❖ Did you understand the graphical display of...?
 • 33 of 37 building owners answered

Most owners understood the graphical display of measures very or extremely well. The display of “...measures implemented in the current renovation step” received the highest rating with 87 %. On average 85 % of the owners understood the graphical display of renovation measures very well or extremely well.

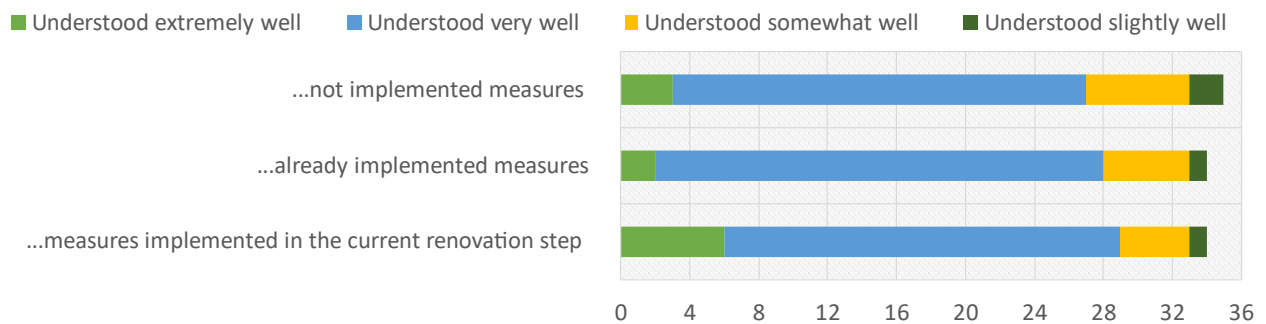


Figure 38: Did you understand the graphical display of...?

Overall, building owners understood the graphical displays in iBRoad2EPC very or extremely well.

5.6.2.2 Experts' perspective

Question from the field test evaluation

❖ How satisfied are you with the following characteristics of the iBRoad2EPC?

• 43 of 48 energy experts answered

The energy experts were highly satisfied with the characteristics of iBRoad2EPC. On average across the categories, 92 % of experts were very or extremely satisfied and a further 13 % were “somewhat” satisfied. One expert was only “slightly satisfied” with the appearance of the icons representing the technical equipment and one was “not satisfied” with the appearance of the icons representing the building envelope.

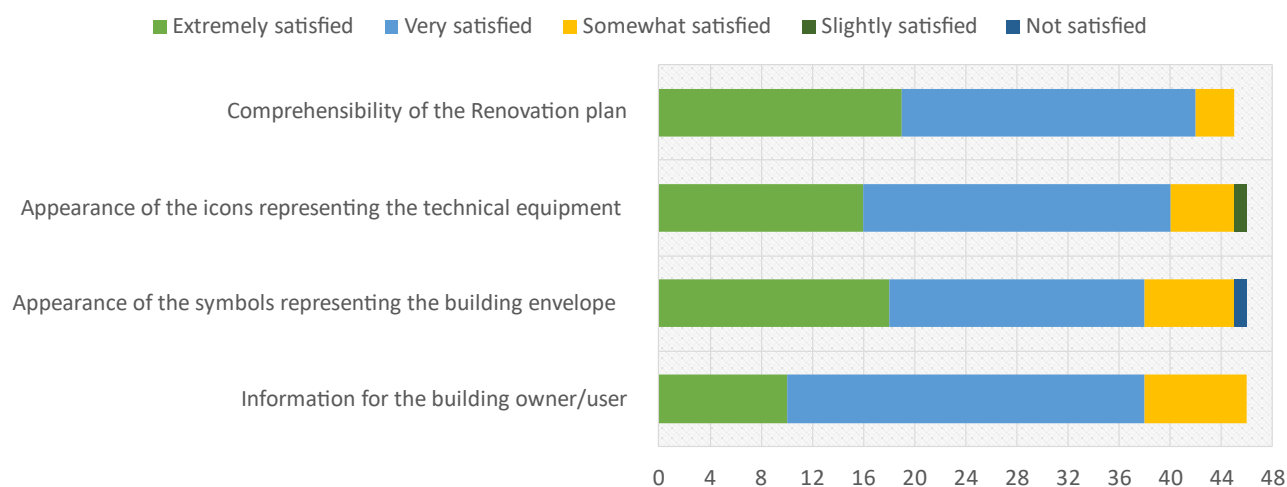


Figure 39: How satisfied are you with the following characteristics of the iBRoad2EPC?

Overall, experts are very or extremely satisfied with the characteristics of iBRoad2EPC.

Question from the field test evaluation

- ❖ Did you understand the graphical display of...?
• 46 of 48 energy experts answered

Most experts understood the graphical display of measures very or extremely well. 98 %. On average 91 % of the experts understood the graphical display of renovation measures very well or extremely well.

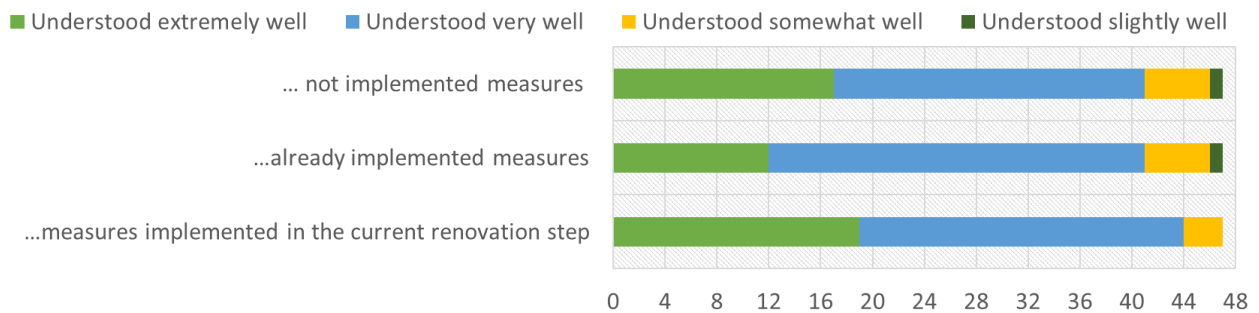


Figure 40: Did you understand the graphical display of...?

Overall, experts understood the graphical displays in iBRoad2EPC very or extremely well.

5.7 Suitable building types

The following paragraphs evaluate questions that focus on the concrete implementation of iBRoad2EPC. The groups were asked about the applicability of the tool to different building types. Energy experts had already answered this after the training and were asked again after the field test. Although the sample of energy experts is not the same, there is an overlap between the samples because all experts in the field test attended the training. Building owners did not attend the training and were only asked after the field test.

5.7.1 Owners' perspective

Question from the field test evaluation

- ❖ For which building types do you think iBRoad2EPC is most suitable?
- Multiple answers allowed
- 33 of 37 building owners answered

Regarding the residential sector, 27 owners (82 %) think that iBRoad2EPC is most suitable for multi-family houses, followed by single-family houses (23 owners; 70 %). For non-residential buildings, offices (23 owners; 70 %) and public buildings in general (21 owners; 64 %) were rated most suitable to be renovated with an iBRoad2EPC.

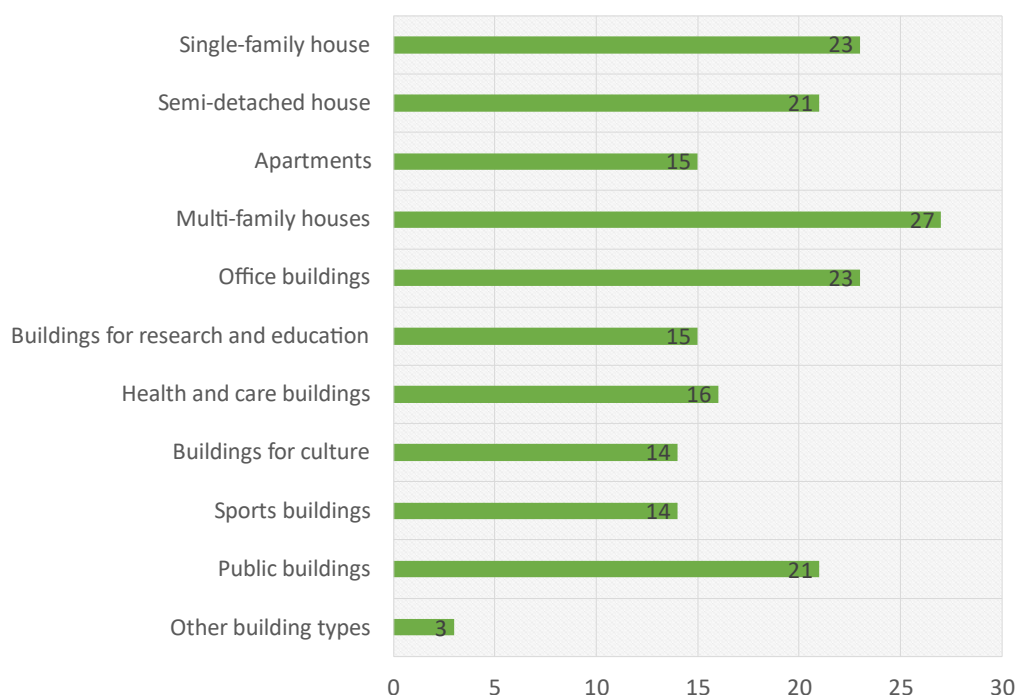


Figure 41: For which building types do you think iBRoad2EPC is most suitable?

Building owners think iBRoad2EPC is most suitable for all kinds of residential buildings as well as for office and public buildings.

5.7.2 Experts' perspective

Question from the training evaluation

- ❖ For which building types do you think iBRoad2EPC is most suitable?
Multiple answers allowed
• 92 of 95 energy experts answered

Regarding the residential sector, after the training 85 experts (92 %) thought that iBRoad2EPC is most suitable for single-family houses, followed by multi-family houses (80 experts; 87 %). Among non-residential buildings, offices and schools were rated as most suitable to be renovated with an iBRoad2EPC.

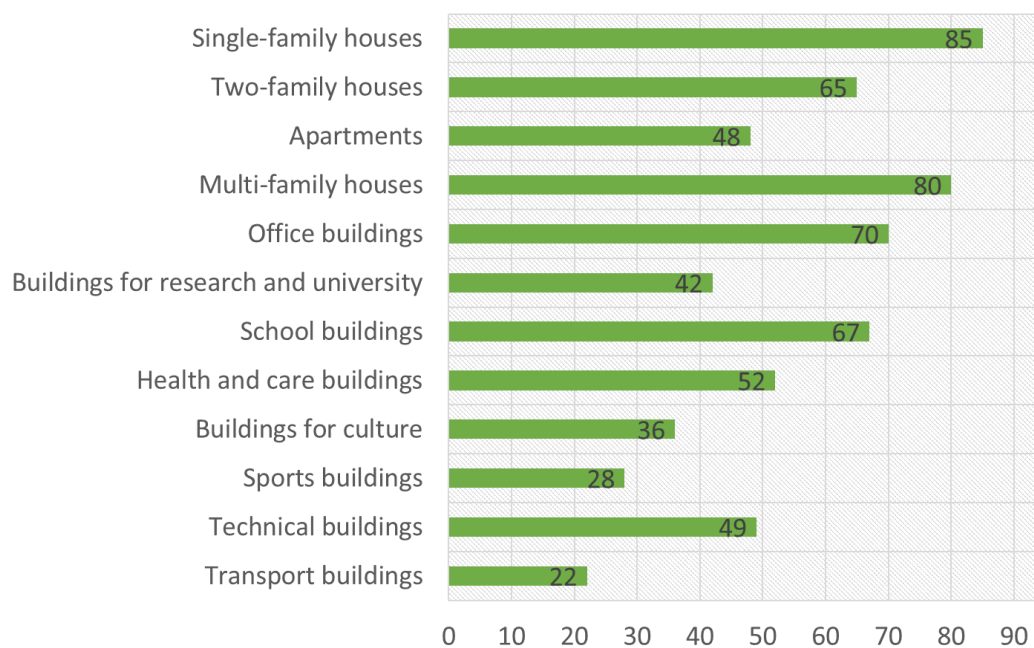


Figure 42: For which building types do you think iBRoad2EPC is most suitable?

After the training, energy experts thought iBRoad2EPC is most suitable for most residential buildings as well as for office and school buildings.

Question from the field test evaluation

❖ For which building types do you think iBRoad2EPC is most suitable?

Multiple answers allowed

• 43 of 48 energy experts answered

Regarding the residential sector, after the field test all experts thought that iBRoad2EPC is most suitable for multi-family houses, followed by single-family houses (37 experts; 86 %). For non-residential buildings, public buildings (35 experts; 81 %) and offices (34 experts; 79 %) were rated most suitable to be renovated with an iBRoad2EPC.

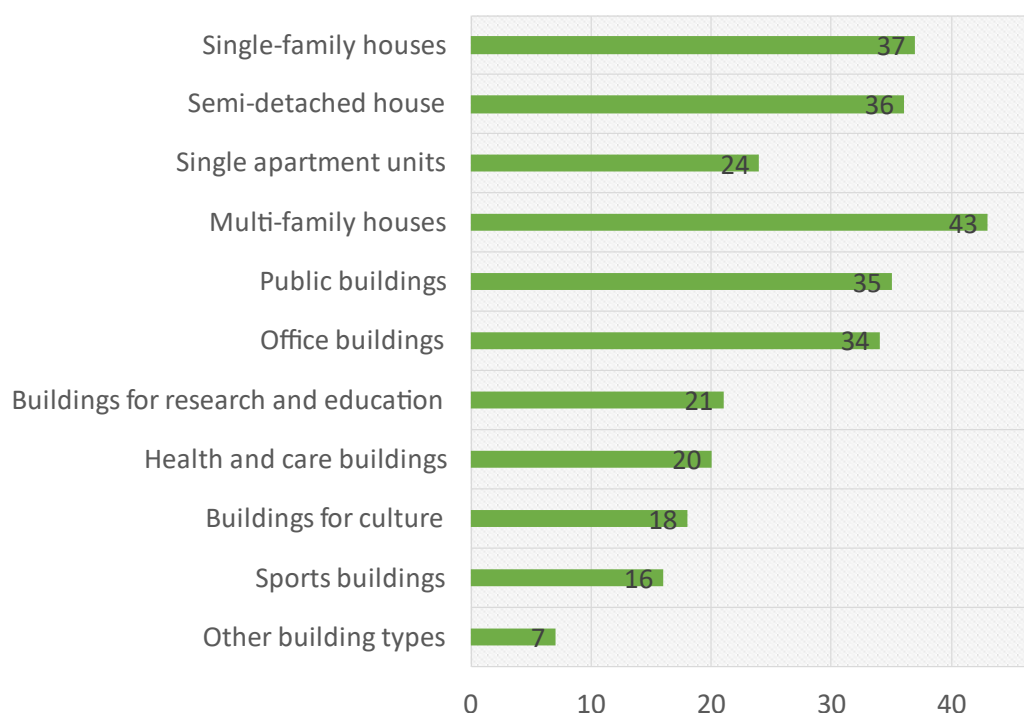


Figure 43: For which building types do you think iBRoad2EPC is most suitable?

After the field test, energy experts thought iBRoad2EPC is most suitable for most residential buildings as well as for office and public buildings.

It can be assumed that experts drew confidence from the field test. For example, after the training seven experts (8 %) said the iBRoad2EPC was suitable for educational buildings, but this rose to 25 (60 %) after the field test. Experts rated administrative buildings as the most suitable sub-category of non-residential building for an iBRoad2EPC after the field test, followed by educational and healthcare buildings (Figure 43). Before the field test, educational buildings (ranked first, followed by sports buildings. In the residential sector, owners and experts agreed that iBRoad2EPC is most suitable for multi-family houses, followed by single-family houses. Figure 44 summarizes the answers of experts and owners and provides for a direct comparison of the experts' answers after the training and the field test.

Overall, the participants thought that iBRoad2EPC is most suitable for multi-family and administrative/public buildings. This reinforces the aim of iBRoad2EPC to widen the scope of the iBRoad tools to cover multi-family and public buildings.

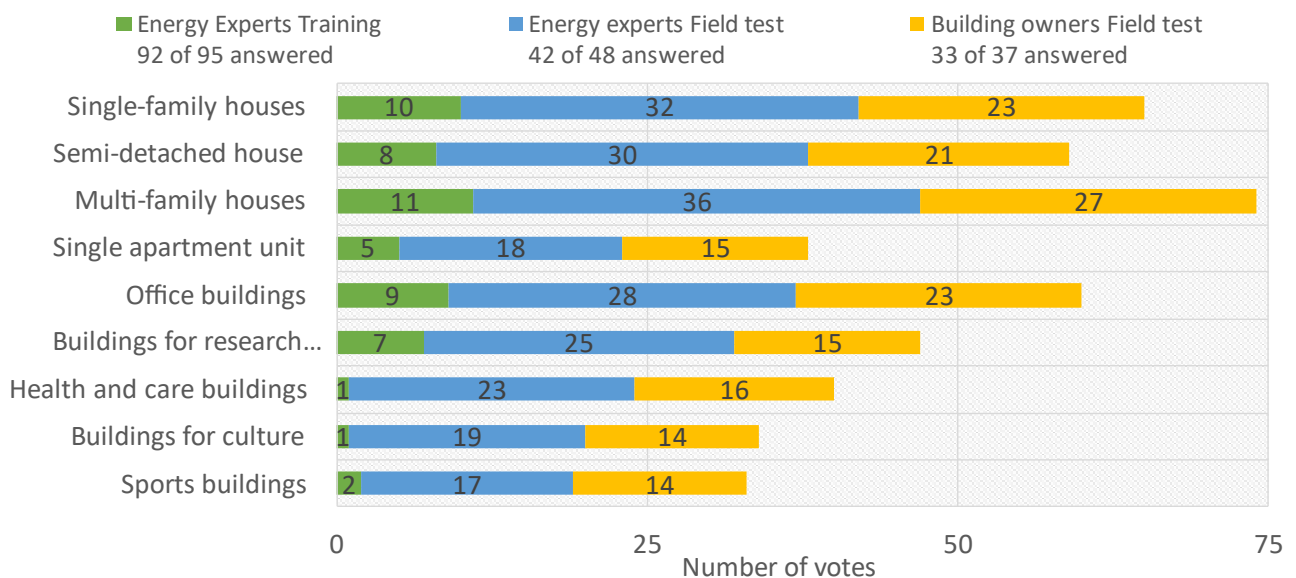


Figure 44: For which building do you think iBRoad2EPC is most suitable?

5.8 Added value

5.8.1 Owners' perspective

Question from the field test evaluation

- ❖ What would you consider the most important added value of iBRoad2EPC for you? Multiple answers allowed.
- 35 of 37 building owners answered

The added value iBRoad2EPC provides compared to the existing EPC is crucial for its further deployment. For 23 building owners (66 %), the most important added value was the basic information about future renovation steps. This is a key target of iBRoad2EPC. For 15 owners (43 %), early preparation for future renovation measures was most important. Only four building owners (11 %) rated the information about future legal requirements as the most important added value (Figure 45), in line with the relatively low rating this received in section 5.6.1.

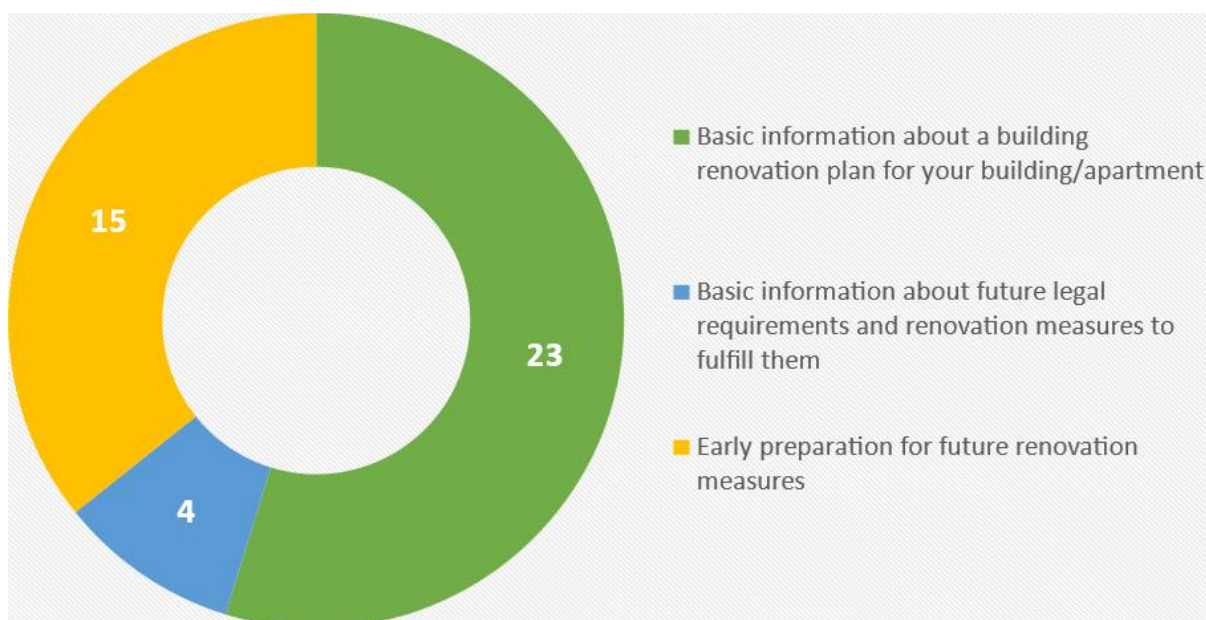


Figure 45: What would you consider the most important added value of iBRoad2EPC for you?

66 % of the building owners considered basic information about a building renovation plan for their building the most important added value of iBRoad2EPC.

5.8.2 Experts' perspective

Question from the field test evaluation

❖ What would you consider the most important added value of iBRoad2EPC for your clients? Multiple answers allowed.

• 44 of 48 energy experts answered

Like building owners, experts rated basic information about a building renovation plan in the iBRoad2EPC, with 31 (70 %), compared to 66 % of building owners) noting the important added value for their clients. Experts and building owners had a similar perception of the value of preparation for future renovation measures: 23 experts (52 %) thought this is most valuable for owners. Energy experts rated the information about future legal requirements twice as highly as building owners, with 15 experts (34 %) saying this was most valuable for their clients (Figure 46).

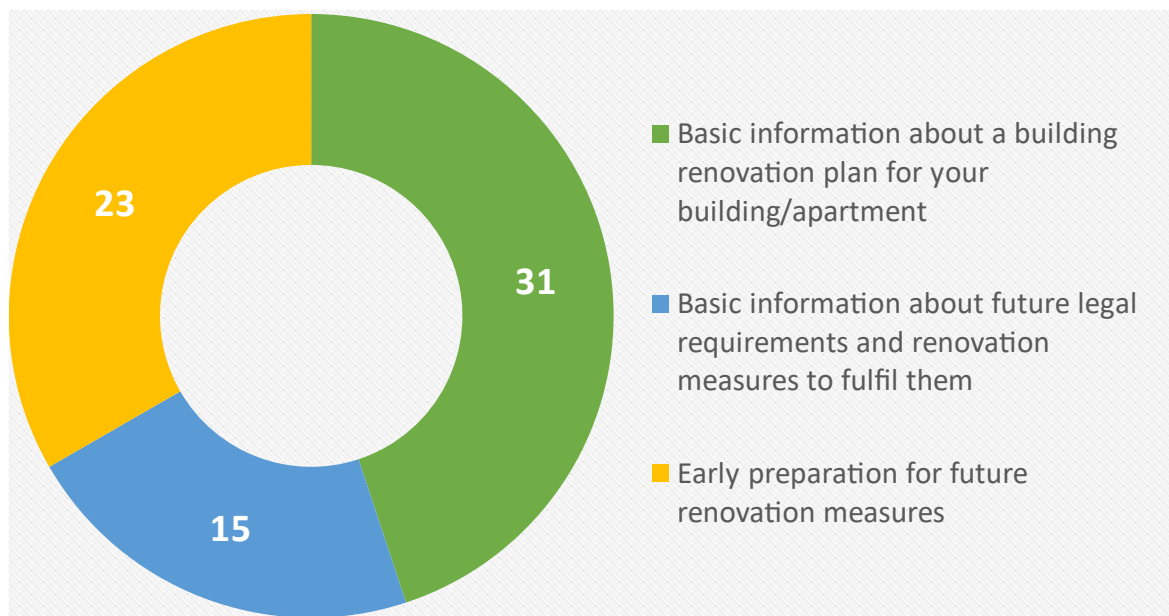


Figure 46: What would you consider the most important added value of iBRoad2EPC for your clients?

70 % of the energy experts consider the basic information about a building renovation plan the most important added value of iBRoad2EPC.

5.9 Recommendation

iBRoad2EPC aims to trigger deep renovation in the pilot countries. Dissemination beyond the implementing countries will be considered.⁹ Building owners and energy experts were asked if they would recommend iBRoad2EPC to third parties.

Their answers match with the overall opinion on iBRoad2EPC that can be derived from the questionnaires. Experts and owners seem to be generally satisfied with the tool, with experts being particularly convinced. The EPC is valued very differently amongst the pilot countries. This has an impact on the perceived value of iBRoad2EPC. Comparing the summarised answers of the building owners with the country-specific ones (see Annex 3) confirms this assumption.

⁹ Dissemination is discussed in detail in the upcoming report “Revamping the iBRoad2EPC concept: lessons learnt from the national experiences.”

5.9.1 Owners' perspective

Question from the field test evaluation

- ❖ Would you recommend the iBRoad2EPC to other building owners/colleagues?
 - 35 of 37 building owners answered

Of the building owners, 28 (80 %) would recommend the tool to other building owners, of which 9 (26 %) would only do so if improvements to the tool were realised. Three owners (9 %) said they would not recommend it and four (11 %) were unsure (Figure 47). These answers only reflect a first impression as details about pricing and funding of iBRoad2EPC were not clear at the time of the field test.

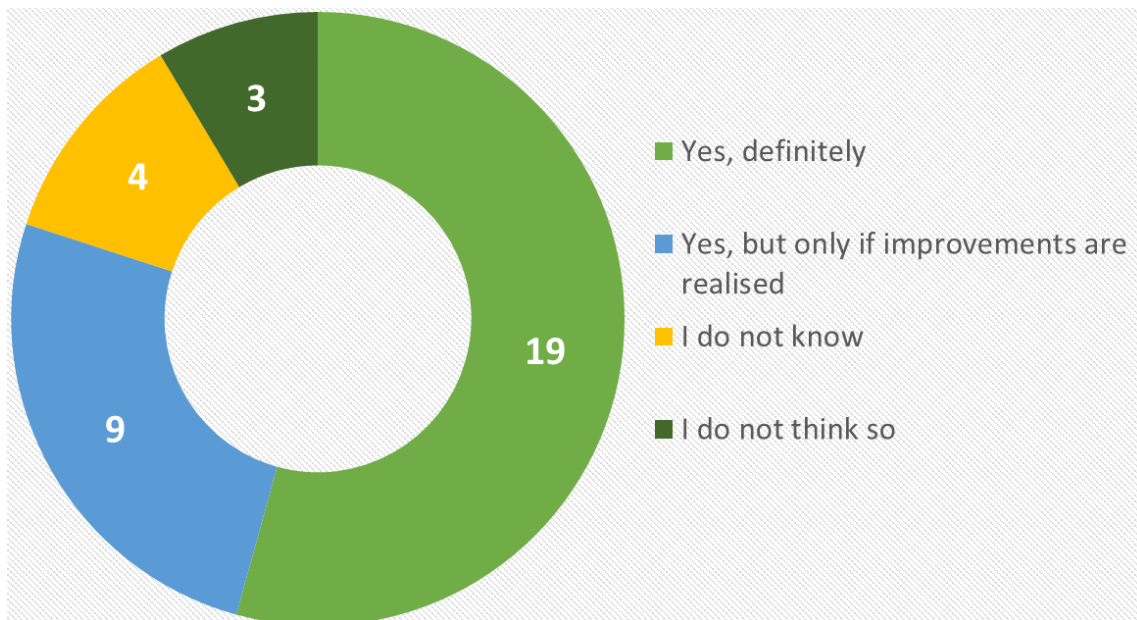


Figure 47: Would you recommend the iBRoad2EPC to other building owners/colleagues?

74 % of the building owners would recommend iBRoad2EPC to others.

5.9.2 Experts' perspective

Question from the training evaluation

- ❖ Would you offer iBRoad2EPC to your clients?
 - 89 of 95 energy experts answered

After the training, 94 % of experts said they would offer an iBRoad2EPC to their clients, while 2 % were unsure and 4 % would not do so. At this point, none of the experts had used iBRoad2EPC on a real building (Figure 48).

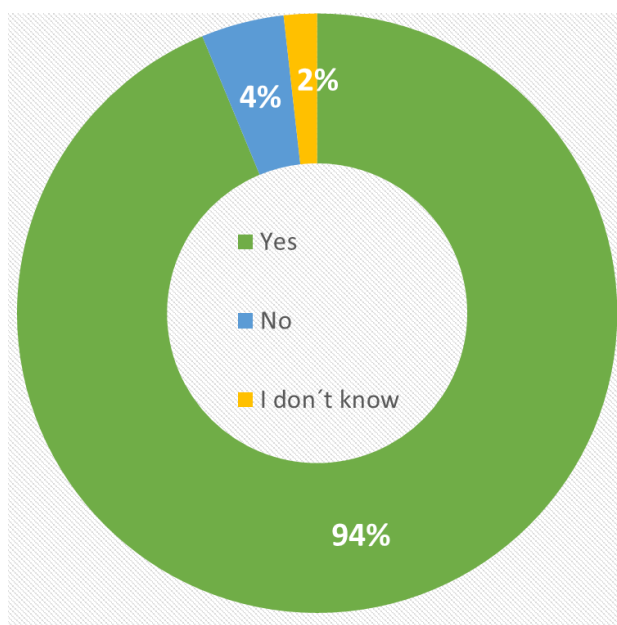


Figure 48: Would you offer iBRoad2EPC to your clients?

94 % of the energy experts who attended the training would offer iBRoad2EPC to their clients.

Question from the field test evaluation

- ❖ Would you recommend the iBRoad2EPC to your clients?
 - 46 of 48 energy experts answered

Compared to the building owners, the energy experts were even more likely to recommend iBRoad2EPC, with 42 (91 %) saying they would recommend it to their clients. Among them are 15 (33 %) who would only recommend it if improvements were made. This high level of agreement is seen as an endorsement of the basic concept and its implementation; at the time, the experts were not aware of the costs of iBRoad2EPC for clients or colleagues, so their recommendation is based only on the content and tools. One expert (2 %) was not sure if he or she would recommend iBRoad2EPC to his clients and three experts (7 %) would not recommend (Figure 49).

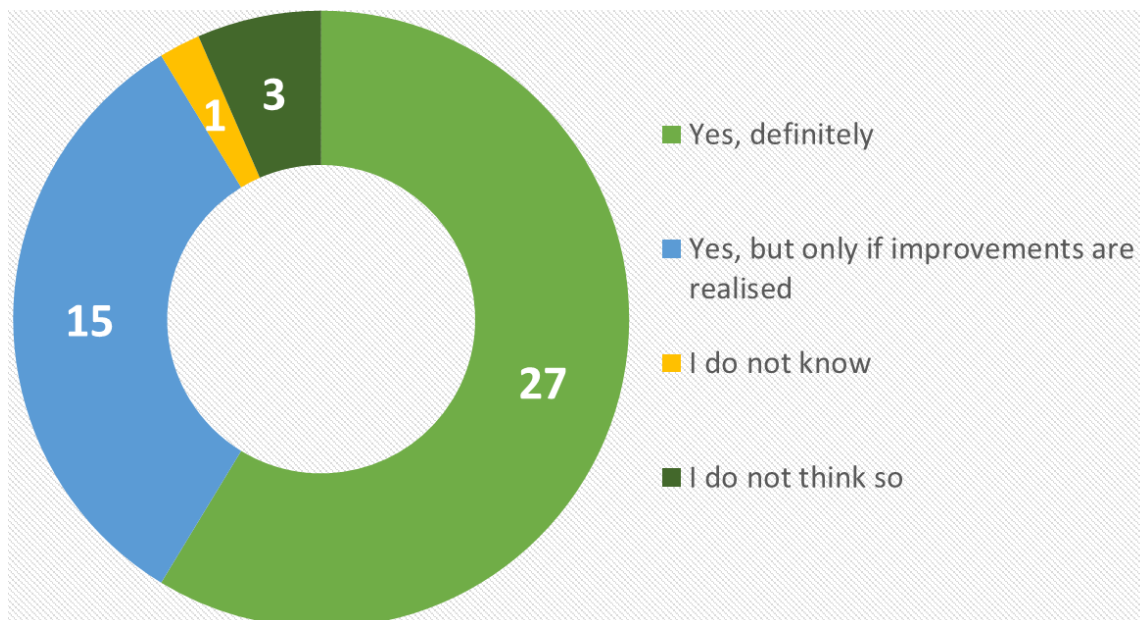


Figure 49: Would you recommend the iBRoad2EPC to your clients?

91 % of the energy experts would recommend iBRoad2EPC to their clients.

Question from the field test evaluation

- ❖ Would you recommend the iBRoad2EPC to your colleagues?
 - 46 of 48 energy experts answered

The energy experts were equally likely to recommend iBRoad2EPC to their colleagues: 43 (93 %) said they would do so, though this again included 15 (33 %) who would recommend it if improvements were made. One expert (2 %) was not sure if he would recommend iBRoad2EPC to his colleagues; it is not known if this is the same expert as before. Two experts (4 %) would not recommend the iBRoad2EPC to their colleagues (Figure 50).

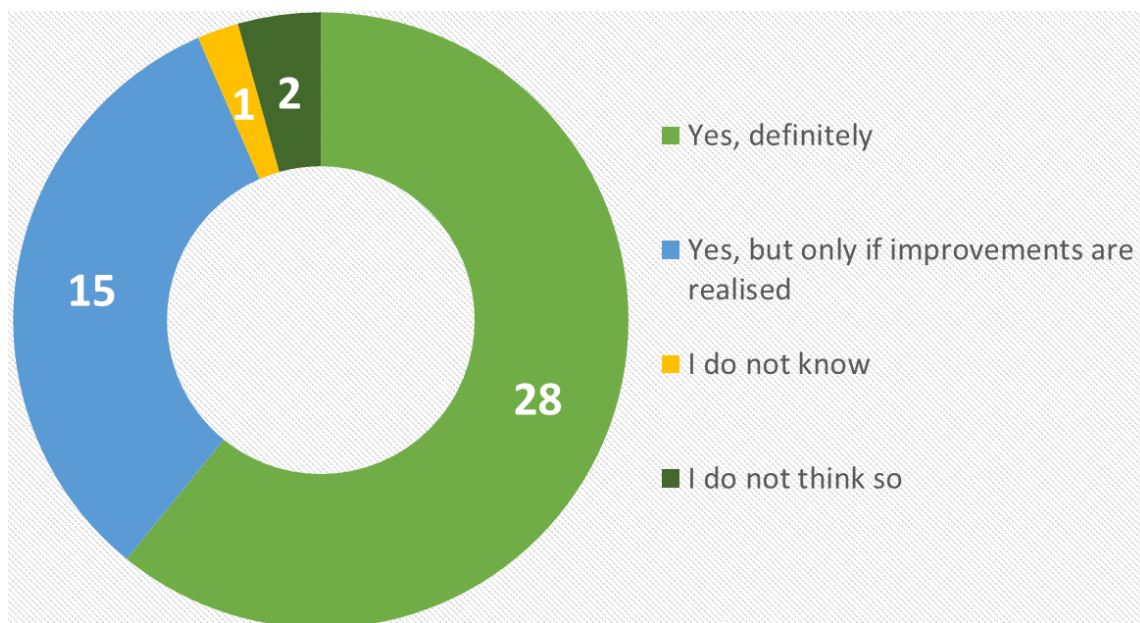


Figure 50: Would you recommend the iBRoad2EPC to your colleagues?

93 % of the energy experts would recommend iBRoad2EPC to their colleagues.

5.10 Pricing

Both groups were asked what they thought would be a reasonable surcharge for an iBRoad2EPC on top of the EPC.

5.10.1 Owners' perspective

Question from the field test evaluation

❖ What would you consider a reasonable additional cost for the iBRoad2EPC if combined with the EPC?

• 35 of 37 building owners answered

Three owners (9 %) estimated the value of the iBRoad2EPC very highly, saying it would be worth a 200 % surcharge or more on top of the price of the EPC. Another eight owners (23 %) would pay up to a 100 % surcharge.

Six owners (17 %) would pay up to 60 % more for an iBRoad2EPC and 10 owners (29 %) thought that a 25 % surcharge on the EPC price is reasonable. Seven building owners (20 %) said it should be free of charge.

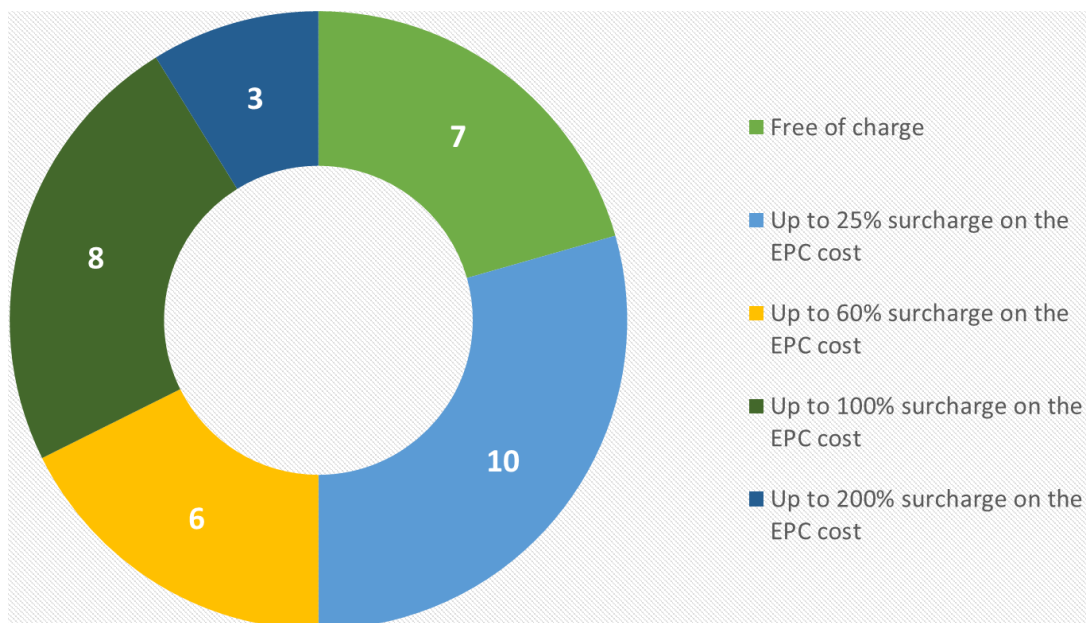


Figure 51: What would you consider a reasonable additional cost for the iBRoad2EPC if combined with the EPC?

A surcharge for the iBRoad2EPC would be acceptable for 80 % of the building owners.

5.10.2 Experts' perspective

Question from the training evaluation

❖ What would you consider a reasonable additional cost for the iBRoad2EPC if merged with the EPC?

• 62 of 64 energy experts answered

After the training, before having issued an iBRoad2EPC, 12 experts (19 %) thought the iBRoad2EPC should be free with the EPC, while 48 experts (77 %) thought the additional cost should be under €200. Of these, four (6 %) thought the additional price should be up to €50, 16 (26 %) said €50-100 and 15 (24 %) said €100-200. Nine experts (15 %) thought the additional cost should be €200-400 and six (10 %) said over €400. Most of the experts opting for a higher cost came from Portugal and Bulgaria.

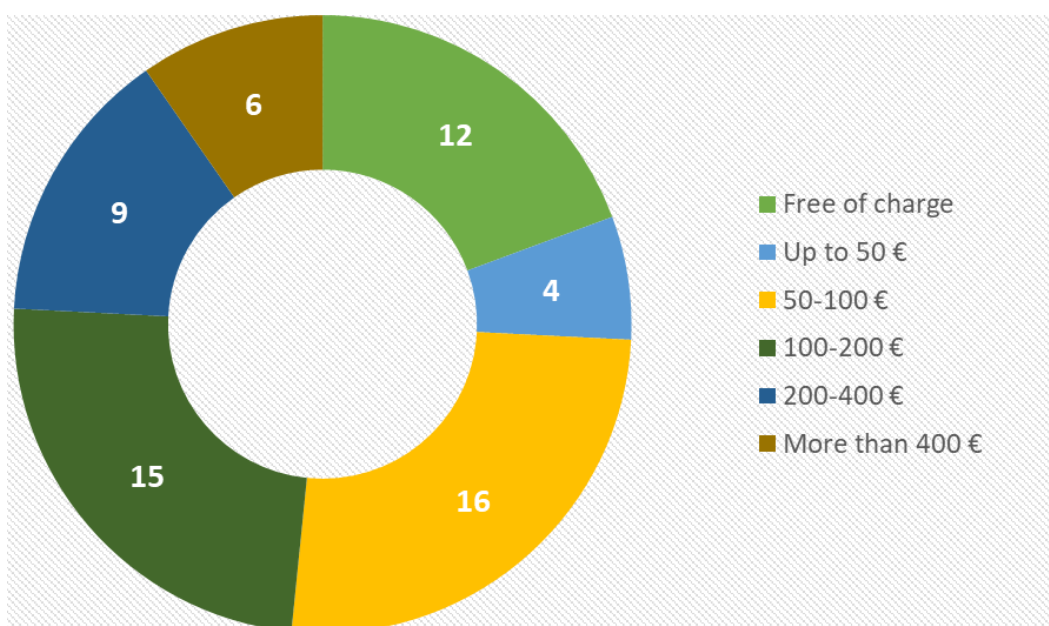


Figure 52: What would you consider a reasonable additional cost for the iBRoad2EPC if merged with the EPC?

After the training, around half the experts thought the iBRoad2EPC should cost between €50 and €200 on top of the price of an EPC.

Question from the field test evaluation

❖ What would you consider a reasonable additional cost for the iBRoad2EPC if combined with the EPC?

• 46 of 48 energy experts answered

After the field test, three experts (7 %) had the opinion that an iBRoad2EPC would be worth a 200 % surcharge or more on top of the price for the EPC, while 13 (28 %) thought it would be reasonable to charge up to 100 % more. Another 11 (24 %) suggested a surcharge of up to 60 % surcharge and 16 (35 %) up to 25 %.

At this point, the experts had experience of issuing an iBRoad2EPC (Chapter 5.5.1; Figure 21). On average, the process (including the on-site visit, the calculation and the EPC issuance) took them twice as long as issuing an EPC- which would imply that a 200 % surcharge would be reasonable. Given that most experts suggested a lower surcharge, it can be assumed that they either see potential to shorten the time an iBRoad2EPC takes to issue or they rate the value of an iBRoad2EPC lower than the EPC. They might also assume that owners would not be prepared to pay much more on top of the EPC.

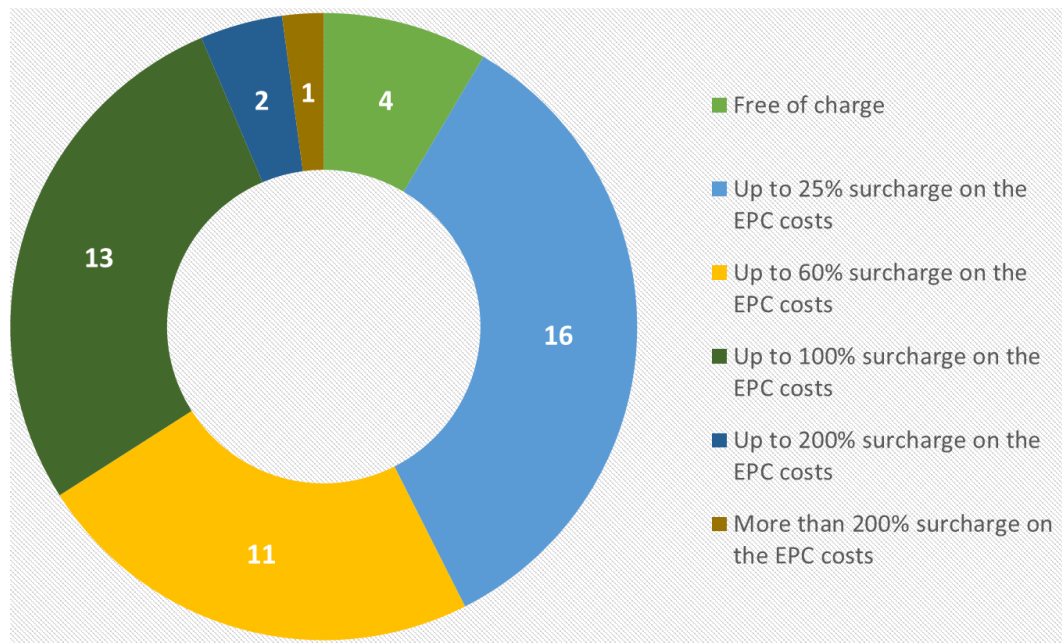


Figure 53: What would you consider a reasonable additional cost for the iBRoad2EPC if combined with the EPC?

After the field test, most experts thought the iBRoad2EPC should cost between 25 % and 100 % more than the EPC.

5.11 Feedback from the pilot country partners

As described in chapter **Error! Reference source not found.**, country partners reported no major issues in recruiting energy experts and buildings for the field test.

The field test itself revealed some interesting findings. The country partners said that the results from the field test will strongly influence discussions in the national advisory committees on the implementation of iBRoad2EPC.

In some countries, the national advisory committees want the field test to be a proof of concept for e.g. the replication potential of the tool. The results will be used to identify barriers, assess the usefulness for different building types, and draw conclusions for further implementation.

Several country partners thought it was helpful for experts to experience the full range of features of iBRoad2EPC in a real example building. According to one country partner, the prefabricated text blocks were particularly useful as the EPC already requires renovation recommendations and these text blocks made the work of the energy experts more efficient. In some countries the field test was used to update the existing databases, which was considered especially useful.

Country partners frequently noted that they want the tool to be able to exchange data with existing EPC software to avoid duplicating data entry work. The iBRoad2EPC will be able to adapt to existing software via an API interface. Due to ongoing discussions, it will also be able to integrate an XML or Excel interface.

Some country partners had doubts about the logistical aspects of the iBRoad2EPC. Several building owners were hesitant to participate because the energy experts would have to conduct the on-site visit; they would need to make an appointment and let experts into their private dwelling. Country partners suggest a budget for communication could be helpful. The capacity of iBRoad2EPC may be extended on district level. This could help avoid privacy concerns.

On the technical side of the tool, most questions concerned the SRI and IEQ spreadsheets (that were transferred from external projects). Experts reached out to the country partners because they had issues filling out the spreadsheets, though the country partners and experts said that the iBRoad2EPC handbook was very helpful in solving these problems. Most of the help provided to the energy experts was by email or telephone. However, some experts needed help during the on-site visit which was provided by the country partner.

The country partners mentioned a few times that a shorter time span between training and field test would help to avoid most of the problems when using the iBRoad2EPC Assistant.

Overall, the field test was very labour intensive for the country partners. In the Portuguese case, the database of the external IEQ tool needed to be adapted to reflect the correct climatic zones. Nevertheless, the field test ran smoothly from the perspective of most of the country partners and they all stated that the results and learnings from the field test will help to push the iBRoad2EPC implementation forward.

6 Conclusion

In a comprehensive field test conducted in Bulgaria, Greece, Portugal, Romania and Spain, 48 energy experts undertook the assessment of a total of 57 buildings, consisting of 31 residential and 26 public buildings. The energy experts, as well as 37 building owners and property managers, also participated in the study by completing detailed questionnaires.

A substantial number of energy experts (39 out of 46) and owners (28 out of 36) believe that iBRoad2EPC is very useful for the building owner. More than half of the building owners felt motivated to conduct concrete renovation measures through the iBRoad2EPC, while 63 % of the experts believe the tool will motivate owners to renovate. A lot (70 %) of the owners and even more (85 %) of the experts said that iBRoad2EPC provides the building user/owner with very or even extremely useful information. Moreover, 97 % of owners and 96 % of the experts said that iBRoad2EPC provides a useful outline for a renovation plan. Overall, all but one expert were satisfied with the graphical display of the different aspects of iBRoad2EPC.

Owners and experts agree that iBRoad2EPC is most suitable for multi-family houses and public/administrative buildings, validating the starting hypothesis of the project. They also agree that the most important added value through iBRoad2EPC is the basic information about the long-term-oriented renovation plan for a building, followed by the early preparation for future renovation measures to avoid lock-in situations. In total, 28 owners (74 %) would recommend the tool to other owners and 43 experts (91 %) would recommend the tool to their colleagues/clients.

Most experts and building owners thought iBRoad2EPC should be a voluntary addition to the EPC, with slight variation in opinion across the pilot countries. This feedback is in line with the EPBD's recommendations on benefiting from synergies between the renovation passport and the EPC in the assessment of the current performance of the building and the recommendations for its improvement; combining the two instruments would also reduce costs for building owners. From the perspective of building owners, the primary motivation for renovation is energy cost savings and cost-effectiveness, followed by improved quality and contribution to climate protection. This focus on energy costs and cost-effectiveness was consistently high across all pilot countries. However, the importance of climate protection varied, reflecting the status of this topic in the respective countries and samples. This finding is crucial as it reflects the motivations of potential iBRoad2EPC customers.

During the development of iBRoad2EPC, cost-effectiveness was not the focus, as cost-effective renovations do not necessarily align with climate targets. This presents a clear discrepancy between renovation costs and incentives on one hand, and energy prices and CO₂ pricing on the other. Cost-efficiency plays a minor role in iBRoad2EPC due to the unpredictable long-term development of renovation costs and energy prices. However, to meet the market demand for information on cost savings through renovation, a more detailed cost calculation for the initial renovation step can be implemented in iBRoad2EPC. The short time span until the first step allows for more reliable predictions.

The mandatory on-site visit of the iBRoad2EPC was generally considered very useful by building owners and property managers. Some building owners requested multiple variants of the renovation plan beforehand. Experts should consider multiple variants before issuing the iBRoad2EPC and discuss them with the owners via phone. On average, experts took four and a half hours to issue an EPC, including the on-site visit, and an additional nine hours for the complete issuing process of the iBRoad2EPC. With more practice, together with the future connection of the tool to the official EPC software to avoid double work, there is potential to reduce the time spent on the on-site visit and the processing within the iBRoad2EPC Assistant. The experts were largely able to work with the iBRoad2EPC Assistant easily, and those who faced issues received help via the hotline. The building owners' impressions of iBRoad2EPC were positive, with the content rated as very or even extremely useful by 78 % of the owners. However, more than half of the owners need to be convinced of the added value provided by the IEQ and SRI tools for their building.

In terms of pricing, almost a third (31 %) of the owners and 35 % of the experts consider a surcharge of more than 100 % on top of price of the EPC to be reasonable. This demonstrates the perceived value and potential of iBRoad2EPC in contributing to energy-efficient renovations and climate protection.

Overall, the concept and design of iBRoad2EPC were rated mostly positively, as was the Assistant tool.

Annex 1 - Selection of Energy Experts and Subcontracts

Key Points for the Selection of Energy Experts

Prerequisites that must be met by the energy experts:	Prerequisites: • Recognised qualification (background, experience, exam) for issuing EPCs as defined by the national context and for the specific building typologies to be tested • Registered in a respective certification system (if present) • Completed attendance of relevant (national) training on issuing EPCs (even if voluntary) • At least 7 EPCs completed • No notification or sanction related to EPC quality on their records Considered an advantage: • Additional work experience as energy experts or in related fields • Knowledge of English • Good network
Tasks by the energy experts:	• Willingness to take part in the experimental project iBRoad2EPC which envisages to enhance current EPC schemes • Attend the relevant training in the period from March to April 2023 • Attend the field test from April to November 2023, i.e., complete a combined EPC/iBRoad2EPC site visit to examine at least one building and issue both EPC and iBRoad2EPC for this building • Take part in the relevant evaluation process (questionnaires) concerning the iBRoad2EPC concept, methodology and tools, the training and the field test • Agree with the publication of field-test-results and evaluation results (anonymised)
KEY POINTS FOR THE SUBCONTRACT WITH THE ENERGY EXPERTS	
Contracting parties:	The respective country partner and the respective energy experts
Data Protection:	Compliance with the GDPR and national data protection law
Confidentiality obligation:	Energy experts shall keep field-test-results, to the extent accessible to them, confidential and shall not make this information available to third parties

Cover letter

Dear Country partner,

You can use this letter and the attached information to inform energy experts about the iBRoad2EPC project and the training and field test, or as part of your relevant tendering procedure. Feel free to use this document and information as a template, adjust, translate or insert it into your own layout.

Dear candidates,

[company name] is involved in the European Horizon 2020 project iBRoad2EPC and we are looking for energy experts to take part in an experimental training and field test, thereby contributing to the development of the next generation of Energy Performance Certificates.

iBRoad2EPC is combining the Energy Performance Certificate with elements from Building Renovation Roadmaps. This allows issuing target-related renovation recommendations quickly and cost-effectively. The results of the training and field test can contribute to improving the quality of EPCs in [country name] and throughout Europe. The project builds on the previous project iBRoad [hyperlink], which developed a building renovation roadmap and a digital building logbook.

We hope this brief introduction has aroused your interest.

For more details, please contact us before [date] via [phone number] or email [email address].

Kind regards,

[Signature]

Objectives of iBRoad2EPC	The Horizon 2020 iBRoad2EPC project represents the next step in energy performance assessment schemes and certification practices, promoting and showcasing the integration of Building Renovation Passport elements into EPC schemes. It thereby aims to stimulate the use of next generation EPCs as a central tool to promote deep and, where necessary, stepwise renovation of the EU building stock and achieve a highly efficient and decarbonised building stock by 2050. iBRoad2EPC build up on the results of the iBRoad project (2017-2020) which developed, tested and delivered a model for the Building Renovation Passport supporting single-family home-owners with personalised advice to facilitate stepwise deep renovation. iBRoad2EPC aims to bridge the Building Renovation Passport with the EPC, and expand, improve and broaden their format and joint scope to consider additional features and become applicable also to multi-family and public buildings. This will be achieved by upgrading EPC schemes with the integration of customised recommendations for deep (stepwise) renovation, and by offering a ready-to-use framework (including software, training, and surrounding policy instruments) for its adoption across Europe
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	The aim of iBRoad2EPC is to bring existing EPCs closer to an individual building decarbonisation roadmap and introduce a focus on the long-term objective of decarbonisation by: • Including improvement measures in a specific sequence to avoid lock-in effects • Ensuring that every measure implemented is part of a comprehensive renovation strategy • Complying with future regulatory and financial requirements, e.g., mandatory Minimum Energy Performance Standards (MEPS), mortgage portfolio standards or the EU taxonomy regulation • Presenting the recommendations in a way that can easily be understood by the end-user and consider the user's needs. In addition, the project will enhance the information provided in the EPC by introducing the onsite visit as a mandatory element and incorporating features covering complementary dimensions, such as comfort and indoor environmental quality, the smart dimension of buildings, and others. The aim is to improve reliability, usefulness and effectiveness, thereby establishing the next generation of EPCs that will support Europe's decarbonisation ambitions while improving conditions for building occupants.
Objectives of the iBRoad2EPC training	The iBRoad2EPC training is designed to become an integral part of the official EPC training provided or envisaged in the country. It aims to enhance existing or upcoming training schemes by: • preparing the energy experts for the obligatory onsite visit, • making energy experts familiar with the long term and step wise renovation and target oriented approach, • guiding energy experts in the use and issue of improved, reliable, tailor-made and future proof recommendations that are consistent with long term targets and MEPS of the respective country • introducing energy experts in the methodology for combining EPCs with the evaluation of other indicators, such as the Smart Readiness Indicator and the Indoor Environmental Quality of the buildings. At the end of the training, participants should be able to issue a combined EPC and iBRoad2EPC according to the level of qualification already acquired through the national training scheme. After the training, all participants are expected to evaluate the training material and procedure based on an evaluation questionnaire.
Objectives of the iBRoad2EPC field test	iBRoad2EPC is designed to become an integral part of the EPC. The iBRoad2EPC field test is designed to test the iBRoad2EPC methodology and tool in practical use. Therefore, the iBRoad2EPC issuing procedure is intended as an extension/enhancement of the current EPC issuing methodology. Each one of the selected and iBRoad2EPC trained energy auditors/experts is assigned to test the iBRoad2EPC methodology through a mandatory onsite visit and to issue the iBRoad2EPC for real buildings (multi-family or public) parallel to issuing the relevant EPC. Energy experts will thereby also provide suitable long term and target oriented recommendations and additional information (e.g., SRI, IEQ)

	to building owners. After completion of the field test, participants' (energy experts and building owners) experience is collected via an evaluation questionnaire in order to implement or propose optimisations. The field test opens the doors to an official launch of the iBRoad2EPC or relevant tools at specific country contexts. Each energy expert is expected to test iBRoad2EPC at approx. X buildings selected by or in consultation with the iBRoad2EPC pilot country leader.
Prerequisites that must be met by the energy experts:	Prerequisites: • Recognised qualification (background, experience, exam) for issuing EPCs as defined by the national context and for the specific building typologies to be tested (registered in a respective certification system (if present)) • Completed attendance of relevant (national) training on issuing EPCs (even if voluntary) • At least 7 EPCs completed • No notification or sanction related to EPC quality on their records Considered an advantage: • Additional work experience as energy experts or in related fields • Knowledge of English • Good network
Tasks by the energy experts:	• Willingness to take part in the experimental project iBRoad2EPC which envisages to enhance current EPC schemes • Attend the relevant training in the period from March to April 2023 • Attend the field test from April to November 2023, i.e., complete a combined EPC/iBRoad2EPC site visit to examine X number of Y type of buildings and issue both EPC and iBRoad2EPC for each of these buildings • Take part in the relevant evaluation process (questionnaires) concerning the iBRoad2EPC concept, methodology and tools, the training and the field test • Agree with the publication of field-test-results and evaluation results (anonymised)
Selection procedure	To be filled in by each pilot country partner
Benefits for the energy experts:	The energy experts participate in an experimental European research project, thereby contributing to enhancing relevant national and EU policy and schemes. They will be in the privileged position to gain a forerunner understanding of and experience with the national and EU policy developments, as well as the principles of long term and step wise renovation, long term targets and MEPS and therefore will come to be one step ahead of their peers. Experts who take part at the field test receive a standard compensation fee.
Specification for the building type:	As a total in six iBRoad2EPC pilot countries, approx. 58 case buildings (36 public, 22 residential) will be tested. In [country] we have to test [number and type of buildings]. The test includes a mandatory on-site visit for assessment and issuing both an EPC and the iBRoad2EPC. The buildings will be selected by [please explain procedure according to your proposed approach]. Building owners must: • Require an EPC

	• Allow the EPC certifier/energy auditor to examine the present state of their building during and around the onsite visit and supply them with required information about their building • Allow the EPC certifier/energy auditor to test and explain the iBRoad2EPC parallel to issuing the EPC • Consent and take part in the evaluation: Report the experiences with the iBRoad2EPC in a questionnaire • Sign a GDPR consent agreement • Agree with the publication of field-test-results (anonymised): Building owners agree that the iBRoad2EPC issued for their building, basic information and photographs of their building are published anonymously within the context of the iBRoad2EPC reports and dissemination process
Time schedule	The training for the field test will take place from March to April 2023. The testing will take place during April to November 2023. After the test, an evaluation takes place. You and the building owners will be asked about your experiences, suggestions for improvement, etc.

Key Points Regarding the Building owners Attending the Field test (Declaration of Consent)

Charge	Building owners who attend the field test are provided the iBRoad2EPC free of charge but will be charged by the energy expert the normal market price for the issue of their EPC following national procedures.
Issues required from building owners	Building owners must: - Require an EPC - Allow the EPC certifier/energy auditor to examine the present state of their building during and around the onsite visit and supply them with required information about their building - Allow the EPC certifier/energy auditor to test and explain the iBRoad2EPC parallel to issuing the EPC - Consent and take part in the evaluation: Report the experiences with the iBRoad2EPC in a questionnaire - Sign a GDPR consent agreement - Agree with the publication of field-test-results (anonymised): Building owners agree that the iBRoad2EPC issued for their building, basic information and photographs of their building are published anonymously within the context of the iBRoad2EPC reports and dissemination process
Data Protection:	Compliance with the GDPR and national data protection law will be observed
Confidentiality obligation:	Building owners shall keep field-test-results, to the extent accessible to them, confidential and shall not make this information available to third parties

Annex 2 – Tested Buildings

This annex provides an overview of the buildings that an iBRoad2EPC was issued for during the field test. The additional information was provided by the energy experts that issued the iBRoad2EPC. In some cases the experts wanted the building to remain unknown. The following fact sheets therefore introduce the majority of the attending buildings, but not all of them can be displayed.

Bulgaria

	Floor area	Building year	Last renovation	Characteristic
	1.971 m ²	1982	Unknown	Thermal insulation of basement ceiling planned for 2040
	Multi-family building in Sofia			
	Floor area	Building year	Last renovation	Characteristic
	4.933 m ²	1975	Unknown	
	Multi-family building in Gabrovo			
	Floor area	Building year	Last renovation	Characteristic
	1.560 m ²	1987	Not renovated	Energy class C; no insulation; aims to reach Class A in the first renovation step (asap)
	Municipality building of Etropole			

No photo available	Floor area	Building year	Last renovation	Characteristic
	2.545m ²	1992	unknown	
	Kindergarten			
No photo available	Floor area	Building year	Last renovation	Characteristic
	1.197 m ²	1982	Unknown	
	Sports hall			
No photo available	Floor area	Building year	Last renovation	Characteristic
	2.007 m ²	1925	unknown	
	Multi-family house			
No photo available	Floor area	Building year	Last renovation	Characteristic
	2.840 m ²	1973	2009	
	School building			
No photo available	Floor area	Building year	Last renovation	Characteristic
	1.149m ²	1978	2011	
	Kindergarten			
No photo available	Floor area	Building year	Last renovation	Characteristic
	8.320 m ²	1971	2004	
	School building			

No photo available	Floor area	Building year	Last renovation	Characteristic
	2.959 m ²	1912	2007	Open to public
	Municipal building			
No photo available	Floor area	Building year	Last renovation	Characteristic
	12.938 m ²	2002	Unknown	Open to public
	Office building			
No photo available	Floor area	Building year	Last renovation	Characteristic
	2.700 m ²	1982	2015	Open to public
	Dormitory			

Greece

	Floor area	Building year	Last renovation	Characteristic
	3.886 m ²	1996		
	City hall of Egaleo			
	Floor area	Building year	Last renovation	Characteristic
	1.015 m ²	1994		
	Cultural center of Egaleo			
	Floor area	Building year	Last renovation	Characteristic
	712 m ²	1986		
	City hall of Zefyri			
	Floor area	Building year	Last renovation	Characteristic
	697 m ²	1982	2016	
	City hall of Chasia			

	Floor area	Building year	Last renovation	Characteristic
	1.522 m ²	1993	2005	
	Cultural center of Farsala			
	Floor area	Building year	Last renovation	Characteristic
	1.446 m ²	1986	2023	
	City hall of Farsala			

Poland

	Floor area	Building year	Last renovation	Characteristic
	1.844 m ²	1956	2000	
	Multi-family house in Warsaw			
	Floor area	Building year	Last renovation	Characteristic
	3.889 m ²	1967	2005	
	Multi-family house in Warsaw			
	Floor area	Building year	Last renovation	Characteristic
	846 m ²	1935	2010	
	Multi-family house in Warsaw			
	Floor area	Building year	Last renovation	Characteristic
	692 m ²	1939	2014	
	Multi-family house in Warsaw			
	Floor area	Building year	Last renovation	Characteristic
	1.049 m ²	1975	2005	
	Multi-family house in Warsaw			

	Floor area	Building year	Last renovation	Characteristic
	2.874 m ²	1956	unknown	
	Multi-family house in Warsaw			
	Floor area	Building year	Last renovation	Characteristic
	1.914 m ²	1992	2010	
	Multi-family house in Warsaw			
	Floor area	Building year	Last renovation	Characteristic
	3.435 m ²	1965	2009	
	Multi-family house in Warsaw			
	Floor area	Building year	Last renovation	Characteristic
	1.699 m ²	1960	2003	
	Multi-family house in Warsaw			
	Floor area	Building year	Last renovation	Characteristic
	2.207 m ²	1957	2009	
	Multi-family house in Warsaw			

	Floor area	Building year	Last renovation	Characteristic
	31.578 m ²	1976	2000	
	Headquarter of Construção Publica E.P.E. Public Enterprise			
	Floor area	Building year	Last renovation	Characteristic
		1976	2000	
	Secondary school in Pombal (central Portugal)			
	Floor area	Building year	Last renovation	Characteristic
	480 m ²	1930	None, only maintenance	
	Multi-family house			
	Floor area	Building year	Last renovation	Characteristic
	2.160 m ²	1939	None, only maintenance	Solar powered DHW
	Multi-family house			
	Floor area	Building year	Last renovation	Characteristic
	Unknown	2001	None, only maintenance	
	Multi-family house			
	Floor area	Building year	Last renovation	Characteristic

	292 m ²	1932	None, only maintenance	No heating or cooling systems installed by now
	Single-family house (rented unit)			
	Floor area	Building year	Last renovation	Characteristic
	17 m ²	1960	None, only maintenance	
Single apartment in a social housing building				
	Floor area	Building year	Last renovation	Characteristic
	52 m ²	1960	None, only maintenance	
Single apartment in a social housing building				
	Floor area	Building year	Last renovation	Characteristic
	67 m ²	1986	None, only maintenance	
Semi-detached house				
	Floor area	Building year	Last renovation	Characteristic
	29 m ²	Unknown	None, only maintenance	
Single apartment in social housing building				

Spain

	Building envelope	Building year	Last renovation	Characteristic
	500 to 2.000 m ²	1960-1980	Not renovated	Cavity walls made of brick with an inner air chamber.
	Seven buildings from Vitoria-Gasteiz, District of Zaramanga. The pictures represent typical buildings of the district.			
	Building envelope	Building year	Last renovation	Characteristic
	28.280 m ²	2012	Not renovated	Owned by public authority, used private as office
SEPIDES office building in Madrid.				
	Building envelope	Building year	Last renovation	Characteristic
	116.223 m ²	1942	unknown	
Nuevos Ministerios government complex in Madrid. The complex hosts the governmental departments of Development, Labour, Social Security and Ecological Transition.				
	Building envelope	Building year	Last renovation	Characteristic
	4.333 m ²	2010	unknown	
Maresme Sports Center in Barcelona				

Annex 3 – Additional Country specific evaluation results from the iBRoad2EPC experts training

The questionnaire for energy experts that have attended the iBRoad2EPC training is part of the report on the evaluation of the iBRoad2EPC training.

Bulgaria

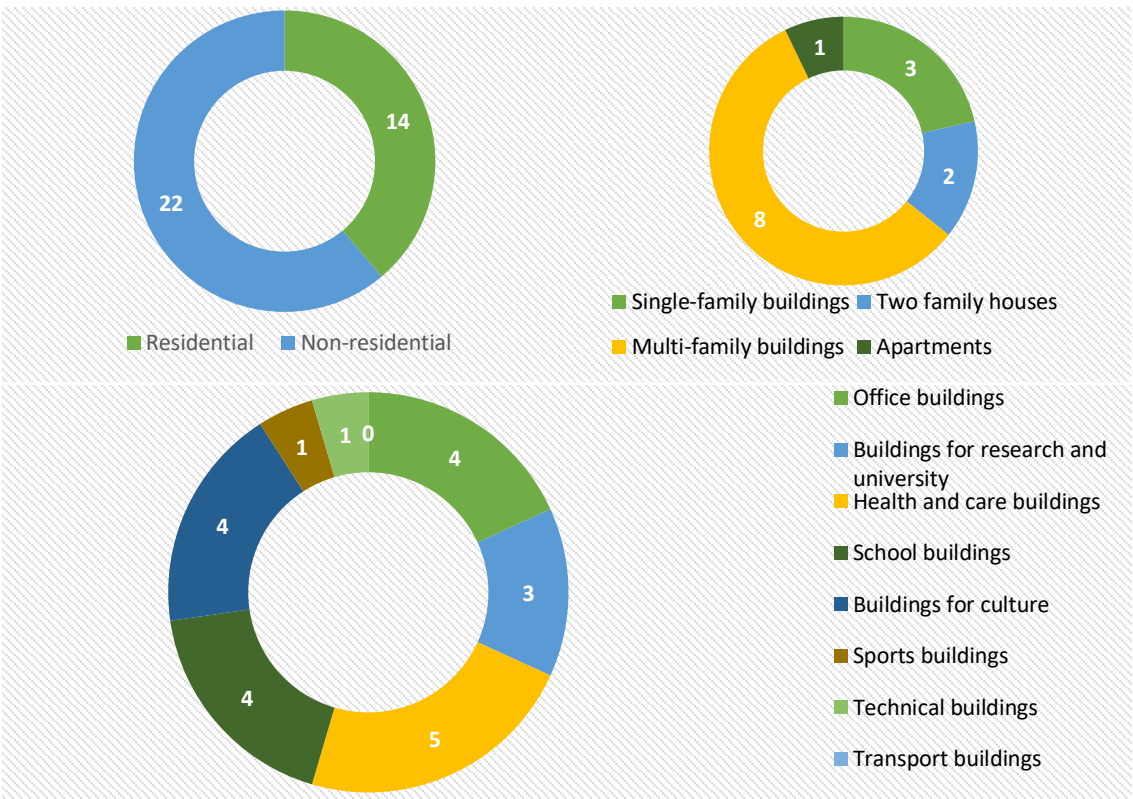


Figure 54: From iBRoad2EPC training evaluation: For which building types have you already issued EPCs in the past?
n=11

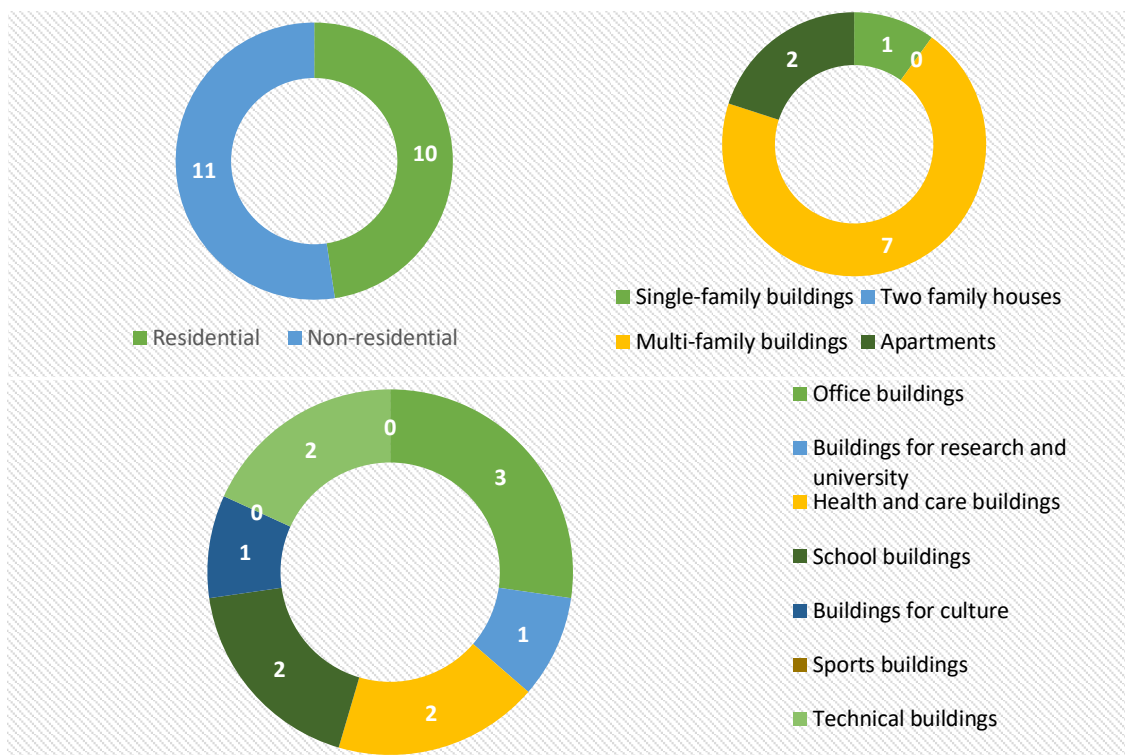


Figure 55: From iBRoad2EPC training evaluation: Have you carried out energy audits (other than EPC audits) for the following building types? n=11

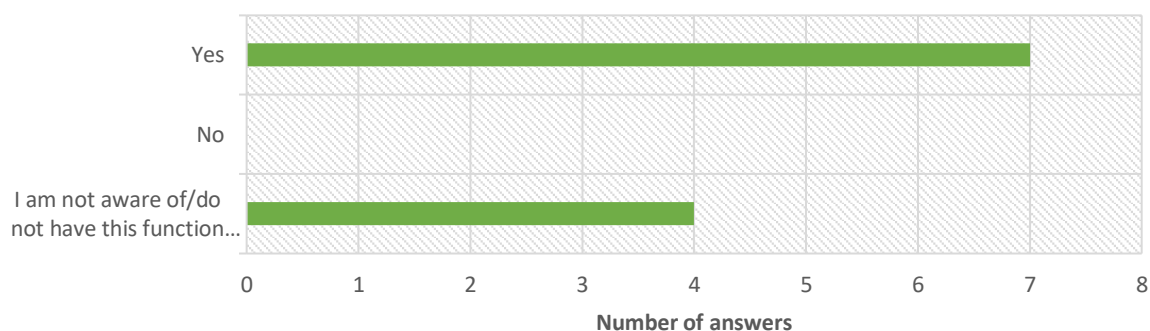


Figure 56: From iBRoad2EPC training evaluation: Do you use the EPC renovation recommendations in the EPC? n=11

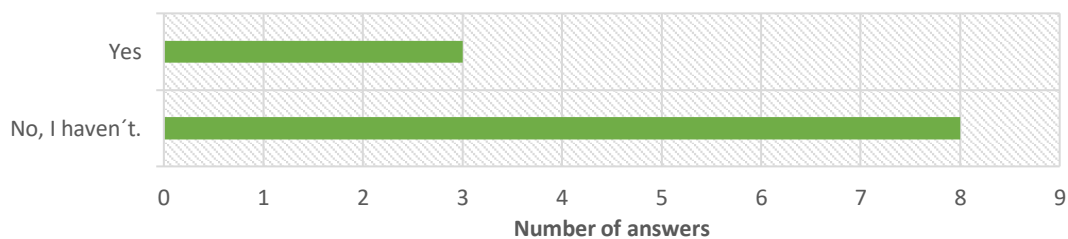


Figure 57: From iBRoad2EPC training evaluation: Have you previously developed a long-term renovation plan for a building? n=11

■ Extremely appropriate ■ Very appropriate ■ Somewhat appropriate ■ Less appropriate ■ Not appropriate

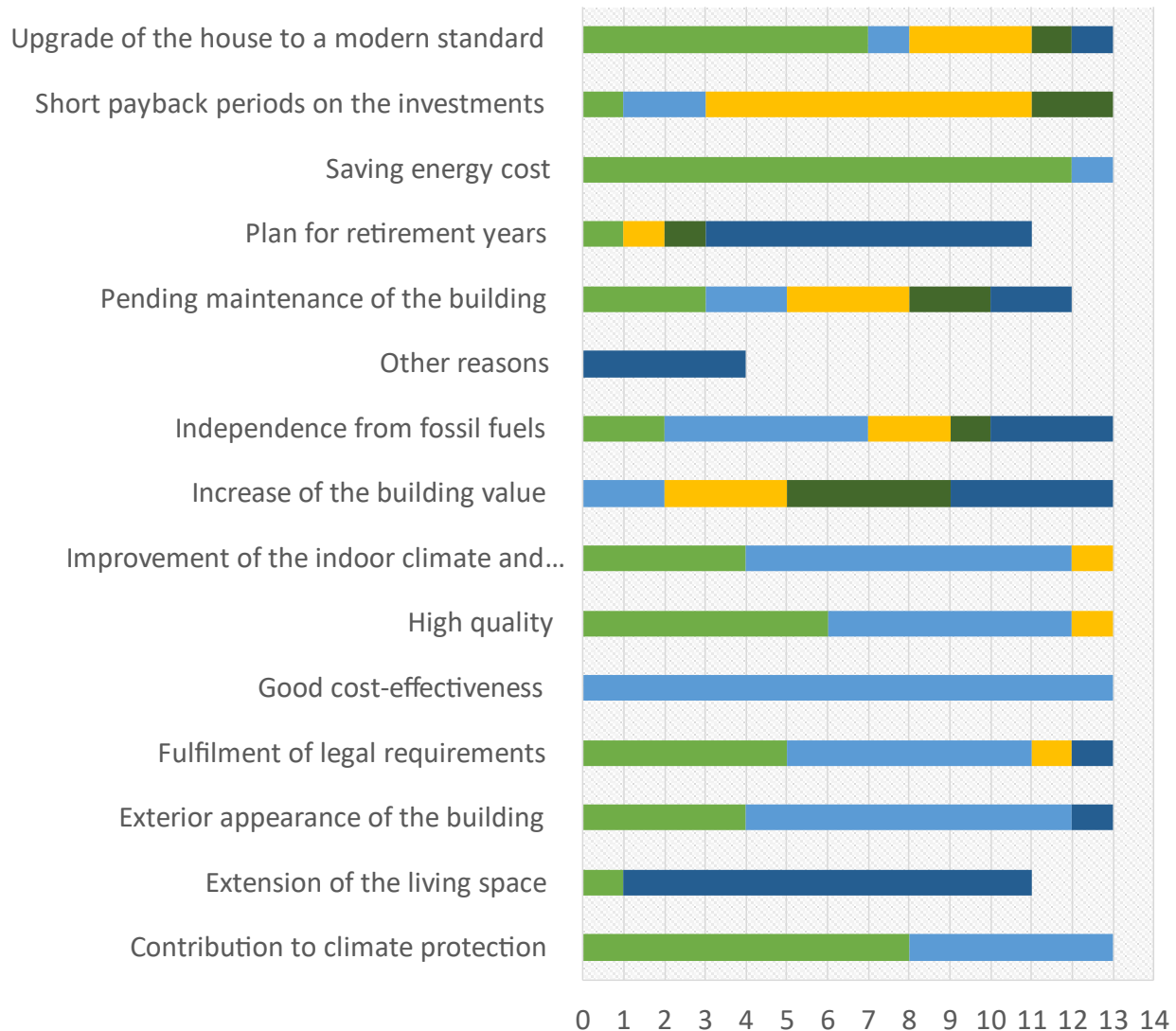


Figure 58: From iBRoad2EPC field test evaluation, questionnaire for building owners: What is the most important reason for a renovation for you? n=13

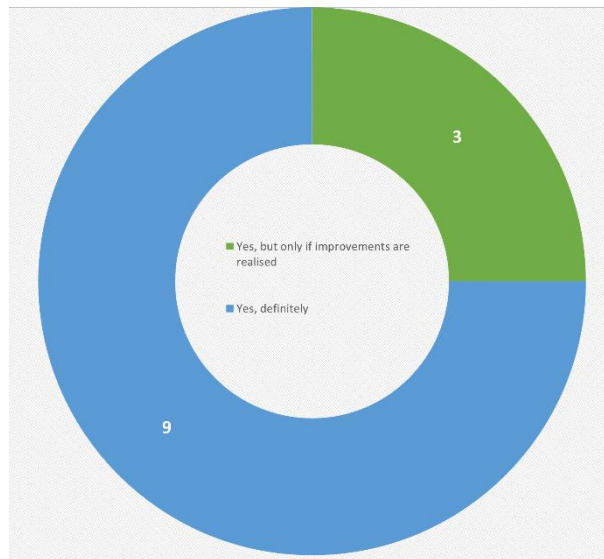


Figure 59: From iBRoad2EPC field test evaluation, questionnaire for building owners: Would you recommend the iBRoad2EPC to other building owners/colleagues? n=13

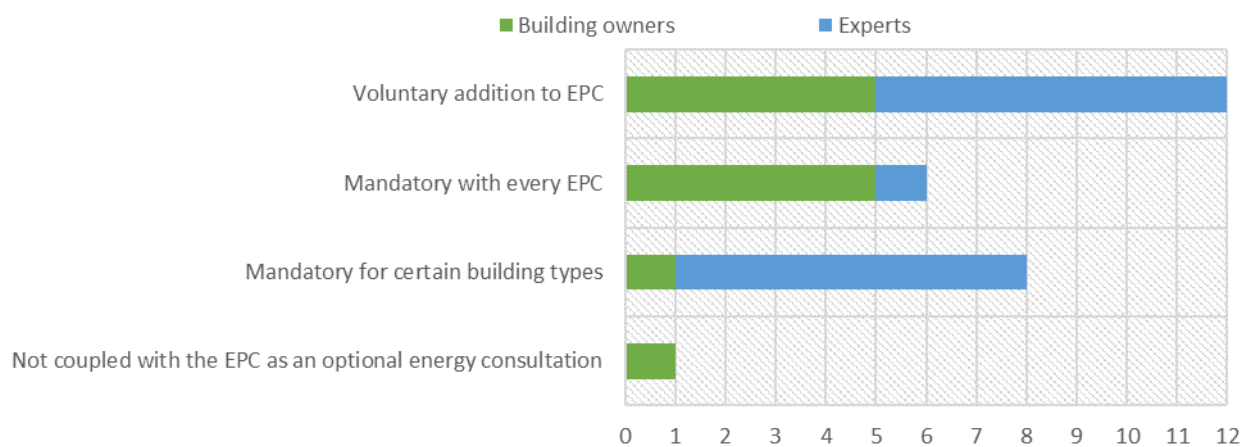


Figure 60: From iBRoad2EPC field test evaluation, questionnaire for building owners (n=13) and energy experts (n=15): How should the iBRoad2EPC be connected to the EPC?



Figure 61: From iBRoad2EPC field test evaluation, questionnaire for building owners (n=13) and energy experts (n=15): What would you consider a reasonable additional cost for the iBRoad2EPC if combined with the EPC?

Greece

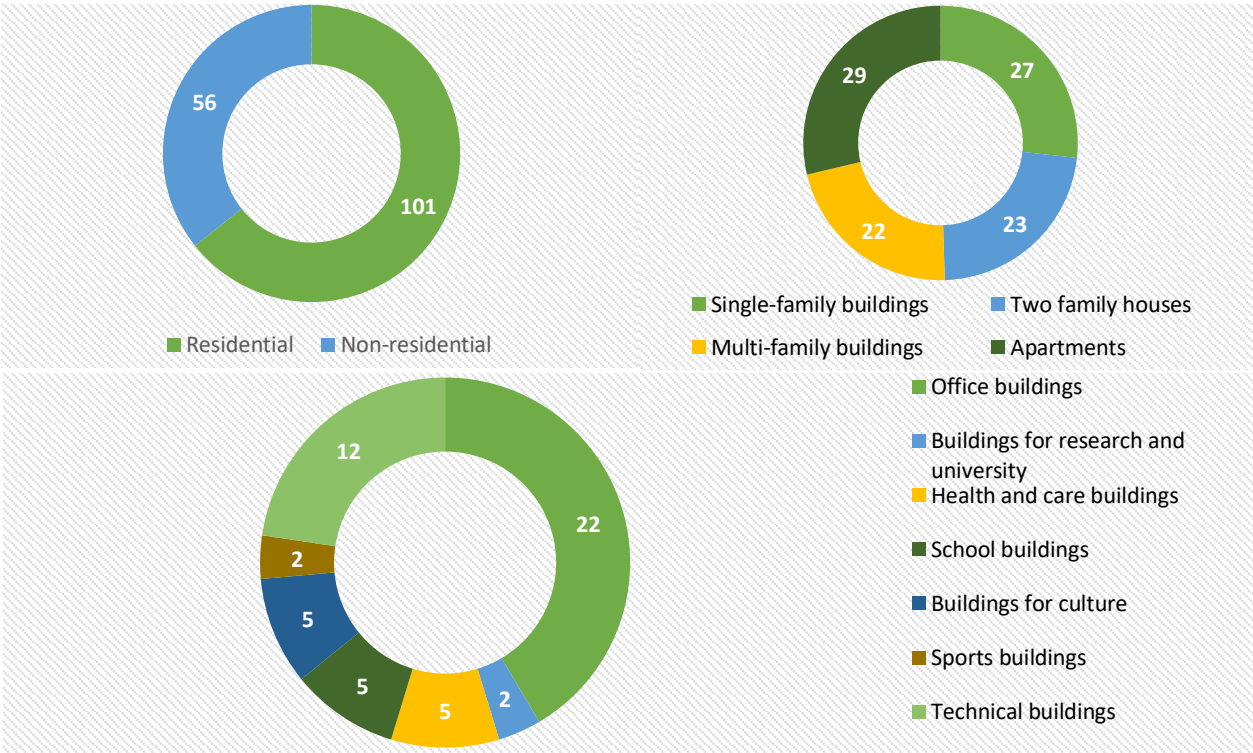


Figure 62: From iBRoad2EPC training evaluation: For which building types have you already issued EPCs in the past? n=31

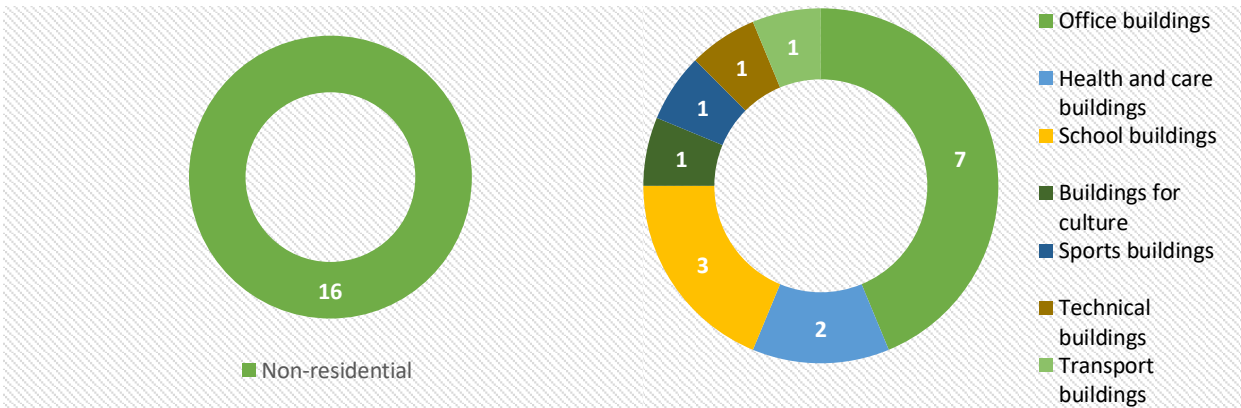


Figure 63: From iBRoad2EPC training evaluation: Have you carried out energy audits (other than EPC audits) for the following building types? n=31

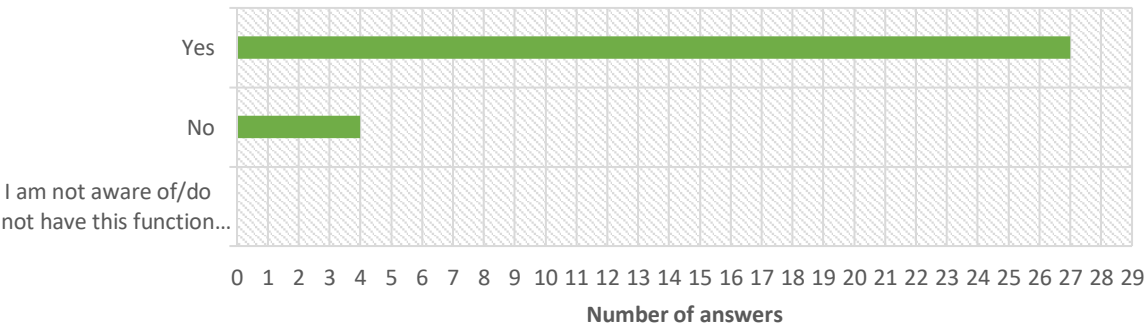


Figure 64: From iBRoad2EPC training evaluation: Do you use the EPC renovation recommendations in the EPC? n=31

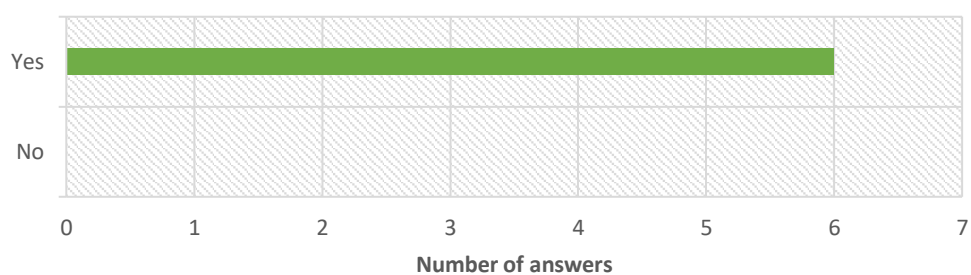


Figure 65: From iBRoad2EPC training evaluation: Have you previously developed a long-term renovation plan for a building? n=31

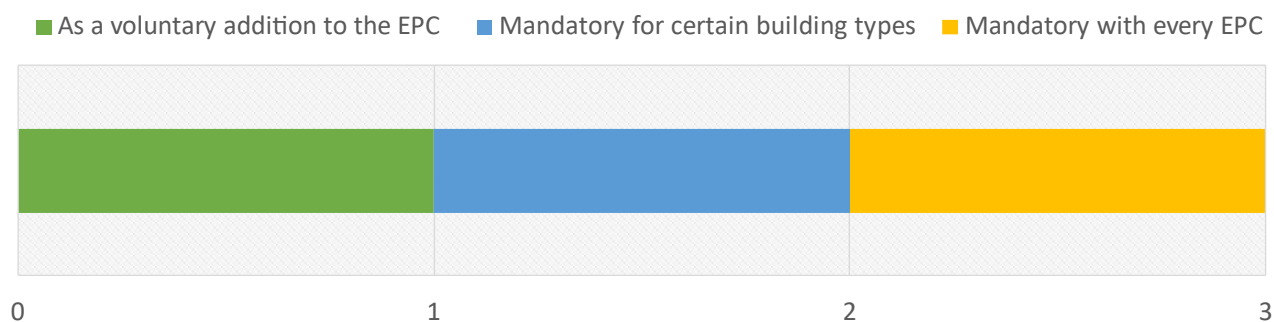


Figure 66: From iBRoad2EPC field test evaluation, questionnaire for energy experts (n=3): How should the iBRoad2EPC be connected to the EPC?

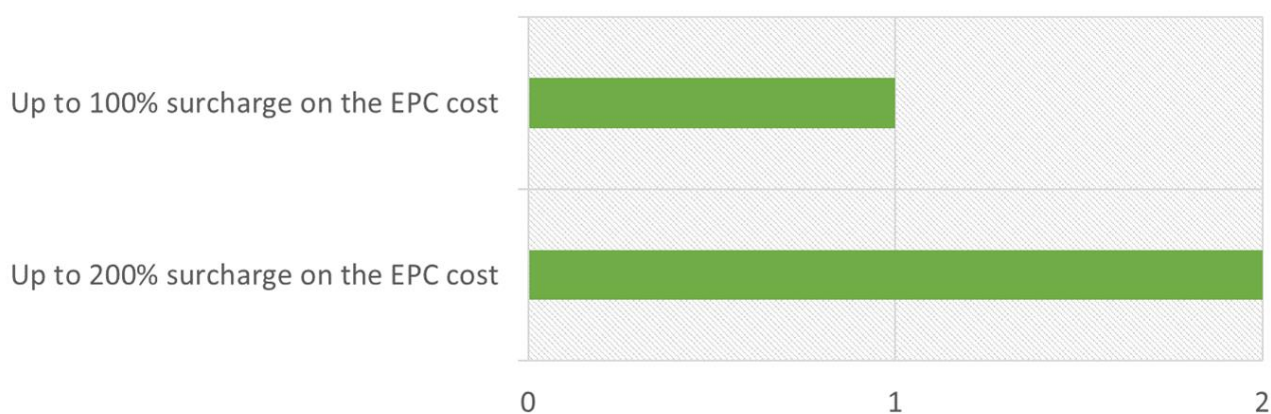


Figure 67: From iBRoad2EPC field test evaluation, questionnaire for energy experts (n=3): What would you consider a reasonable additional cost for the iBRoad2EPC if combined with the EPC?

Portugal

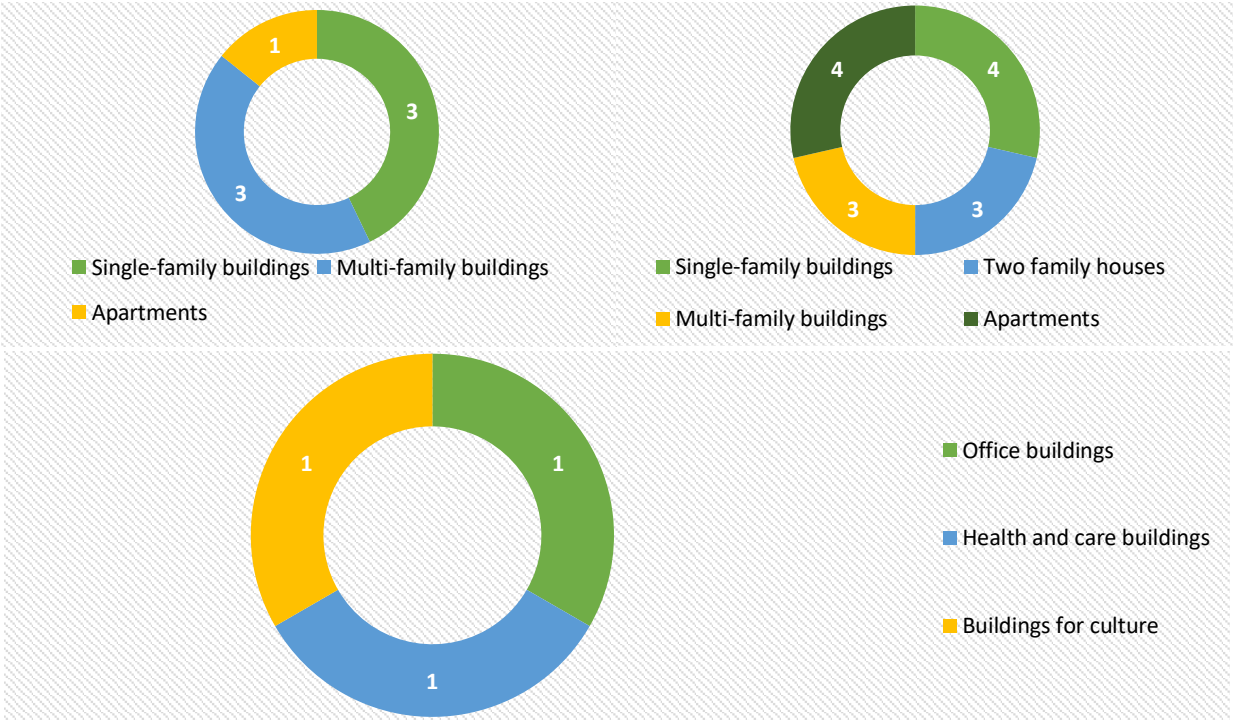


Figure 68: From iBRoad2EPC training evaluation: For which building types have you already issued EPCs in the past? n=6

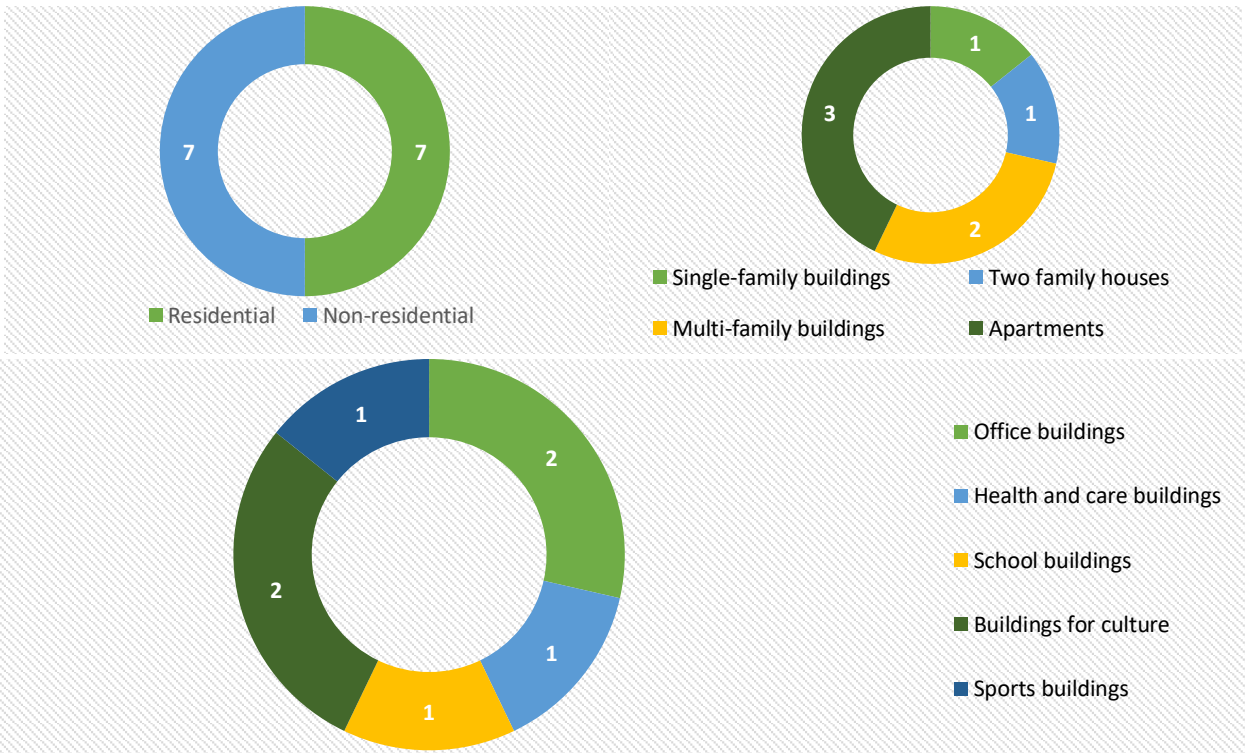


Figure 69: From iBRoad2EPC training evaluation: Have you carried out energy audits (other than EPC audits) for the following building types? n=6

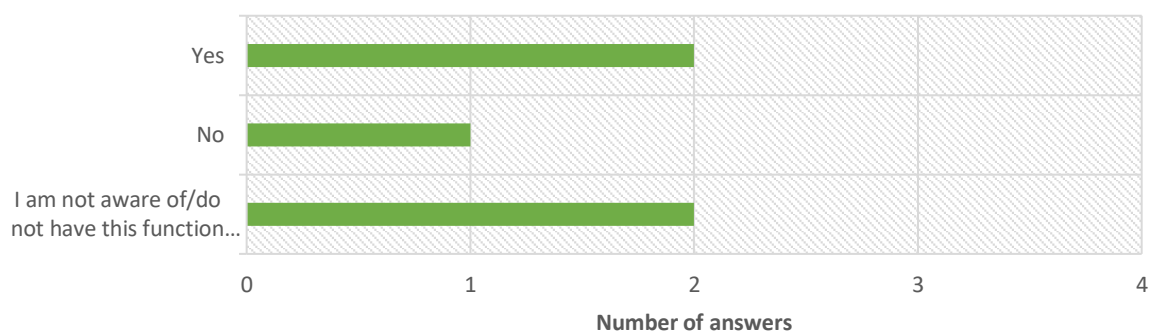


Figure 70: From iBRoad2EPC training evaluation: Do you use the EPC renovation recommendations in the EPC? n=6

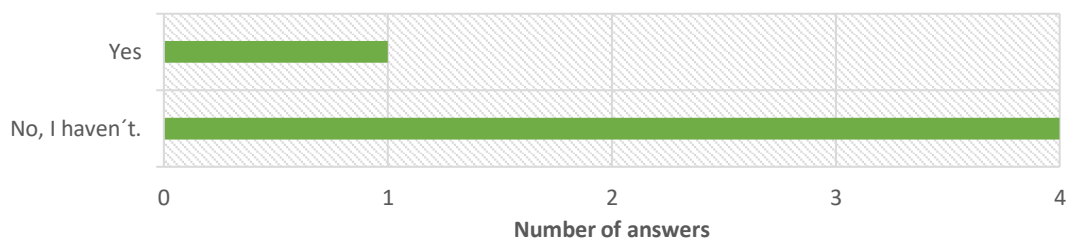


Figure 71: From iBRoad2EPC training evaluation: Have you previously developed a long-term renovation plan for a building? n=6

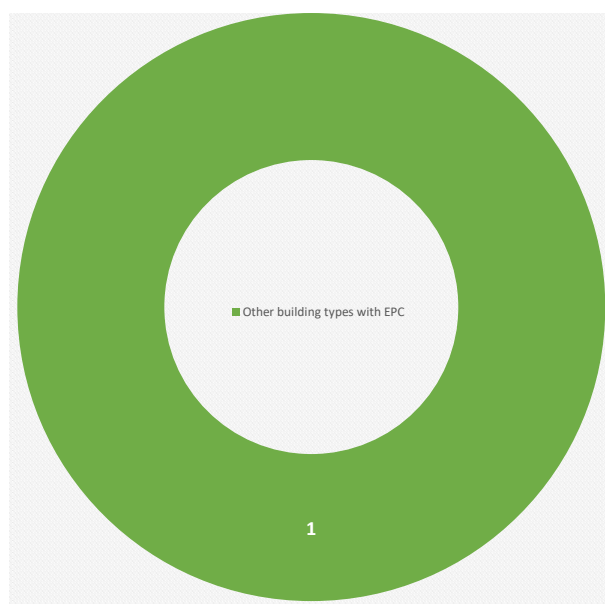


Figure 72: From iBRoad2EPC field test evaluation, questionnaire for building owners: Was the field test combined with the issue of an EPC? If yes, for which buildings? n=2

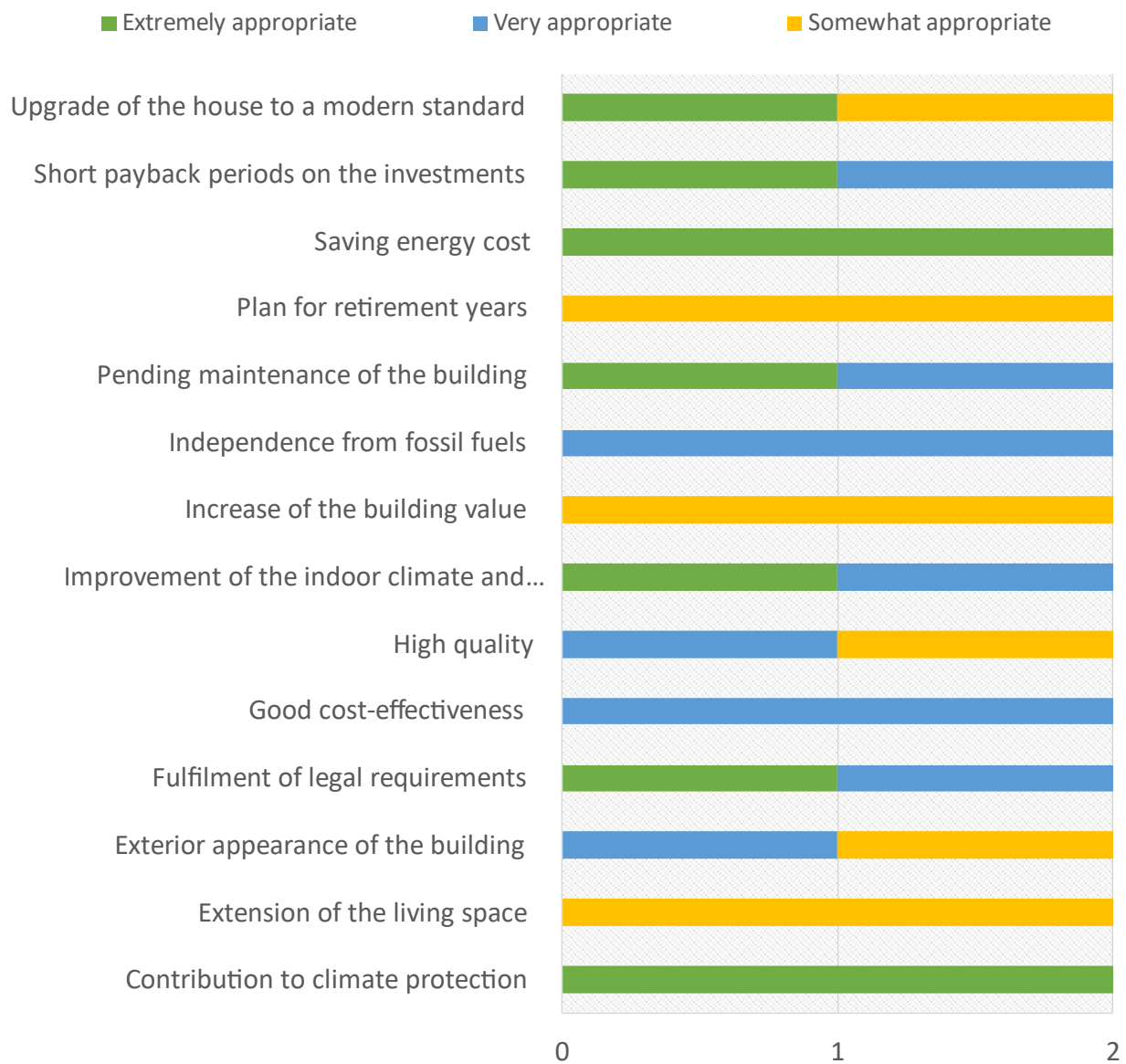


Figure 73: From iBRoad2EPC field test evaluation, questionnaire for building owners: What is the most important reason for a renovation for you? n=2

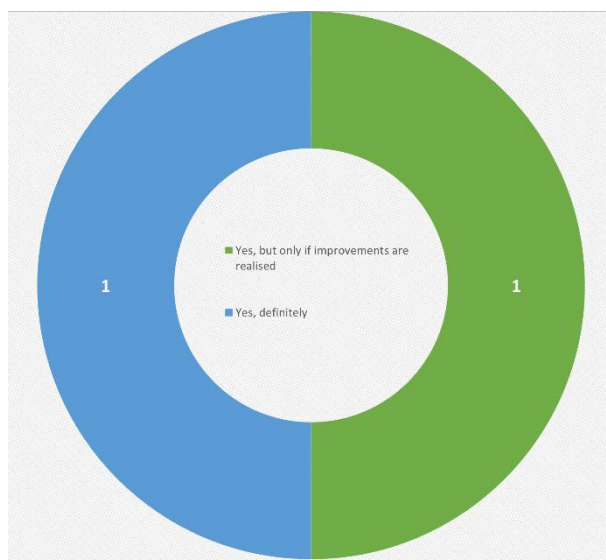


Figure 74: From iBRoad2EPC field test evaluation, questionnaire for building owners: Would you recommend the iBRoad2EPC to other building owners/colleagues? n=2

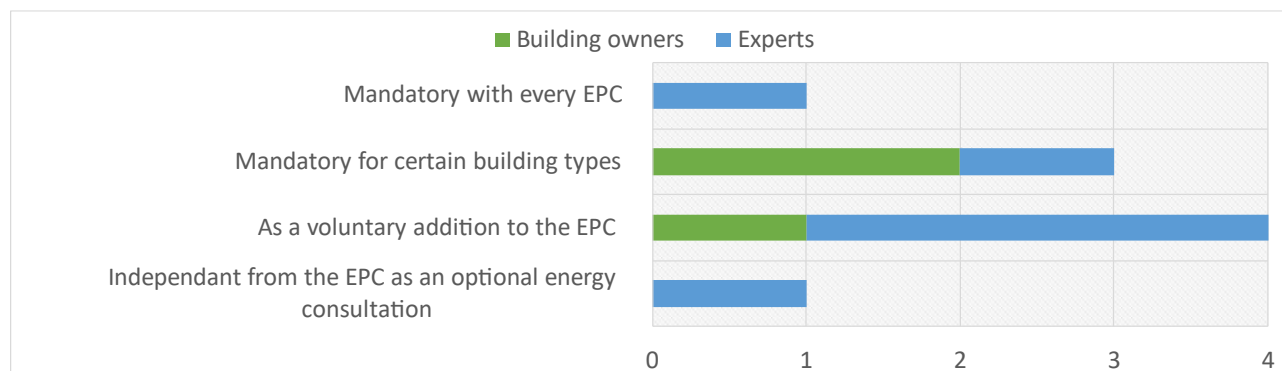


Figure 75: From iBRoad2EPC field test evaluation, questionnaire for building owners (n=2) and energy experts (n=9): How should the iBRoad2EPC be connected to the EPC?

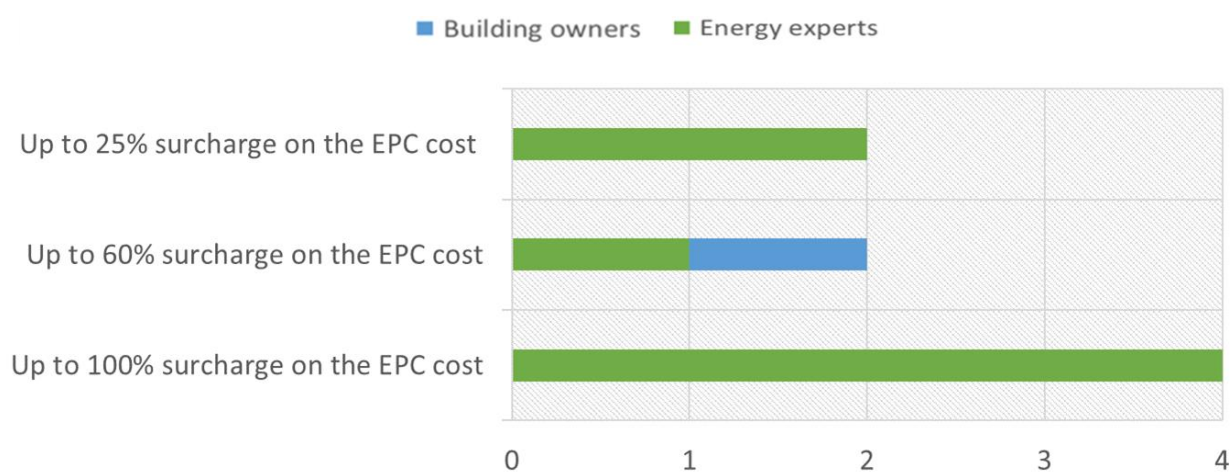


Figure 76: From iBRoad2EPC field test evaluation, questionnaire for building owners (n=2) and energy experts (n=9): What would you consider a reasonable additional cost for the iBRoad2EPC if combined with the EPC?

Poland

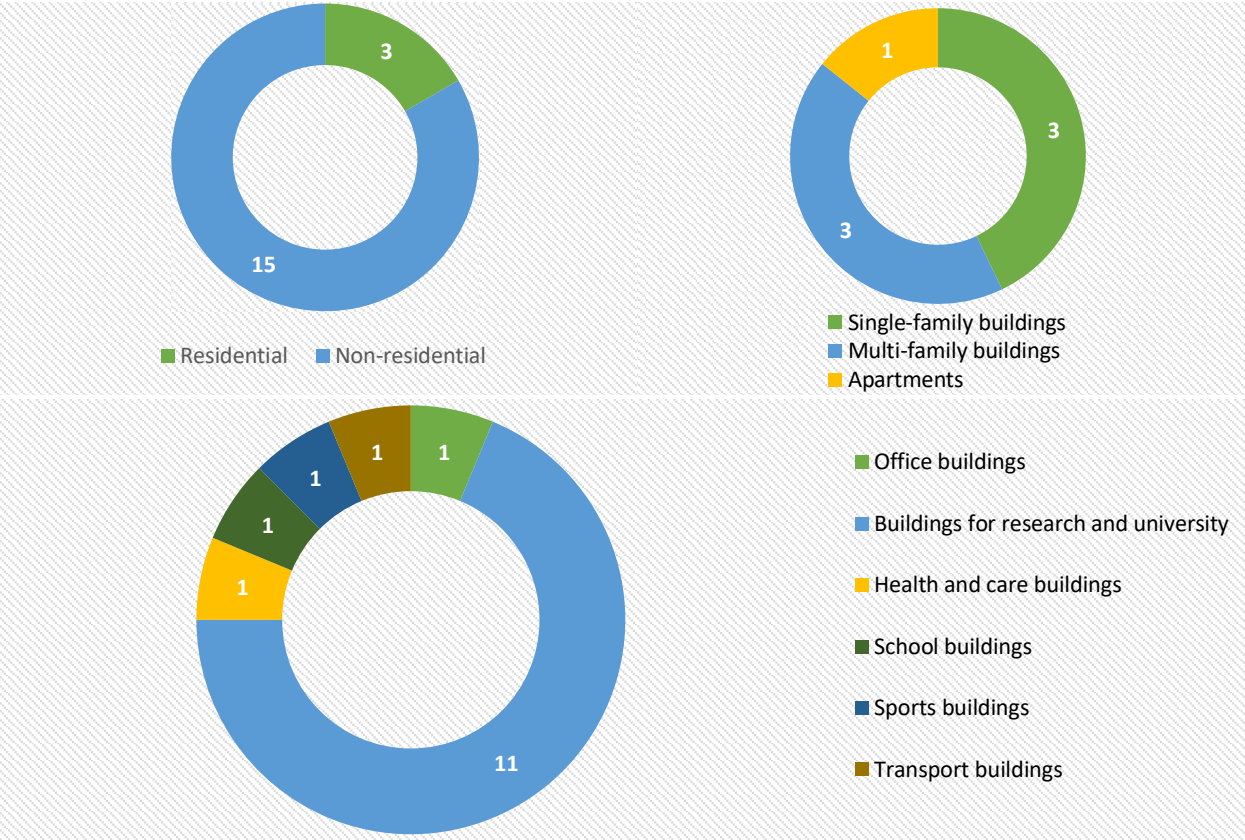


Figure 77: From iBRoad2EPC training evaluation: For which building types have you already issued EPCs in the past?
n=5

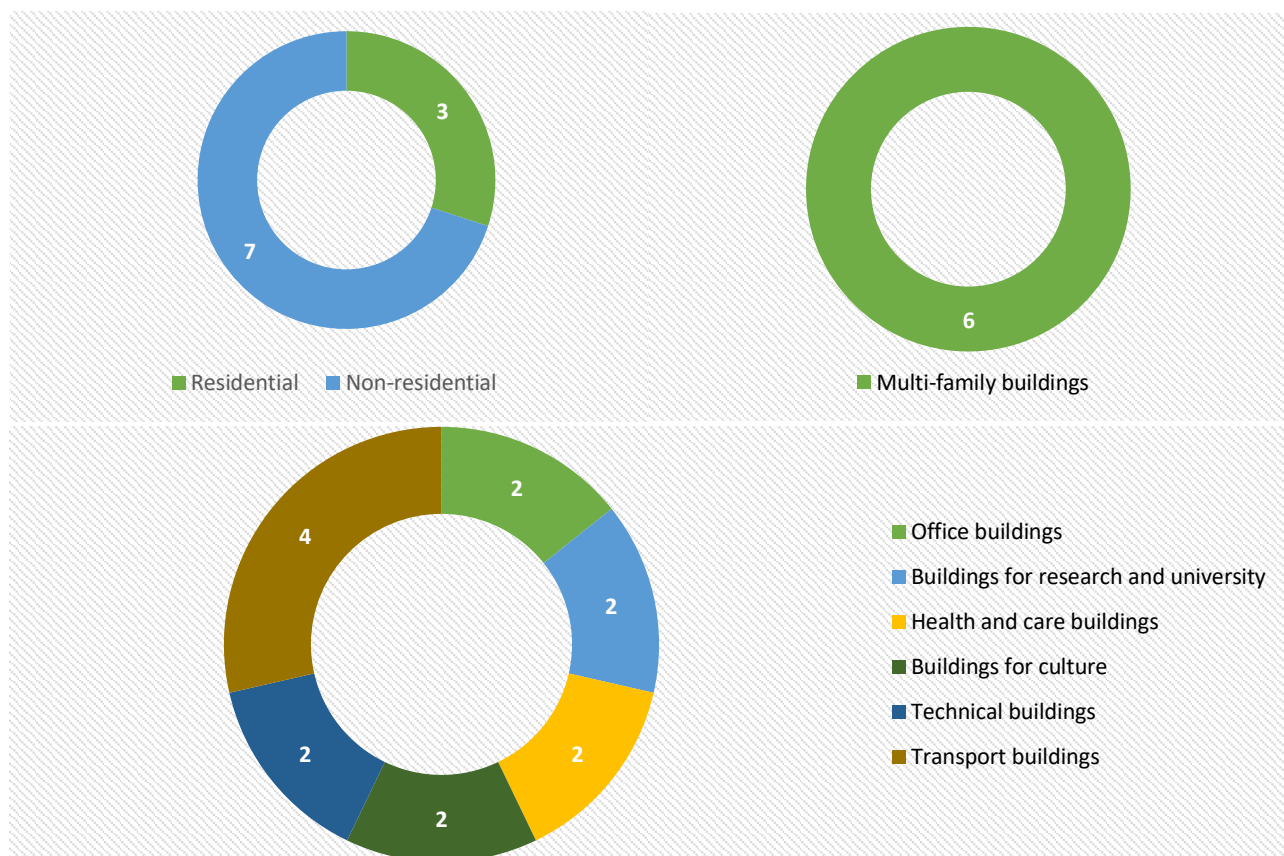


Figure 78: From iBRoad2EPC training evaluation: Have you carried out energy audits (other than EPC audits) for the following building types? n=5

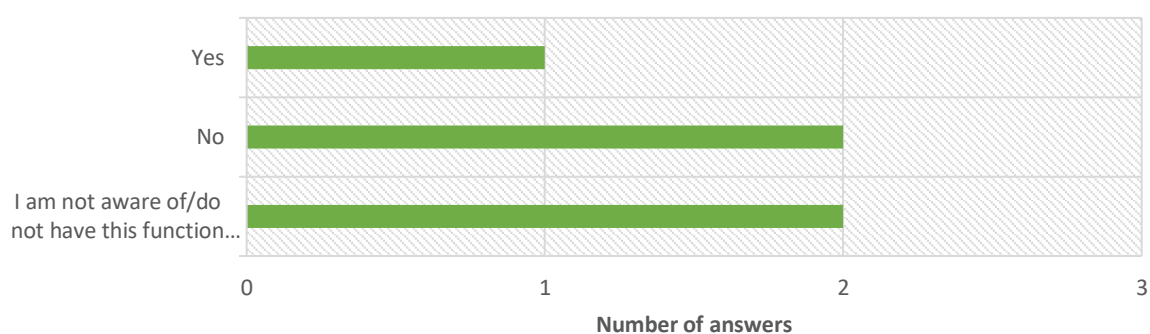


Figure 79: From iBRoad2EPC training evaluation: Do you use the EPC renovation recommendations in the EPC? n=5

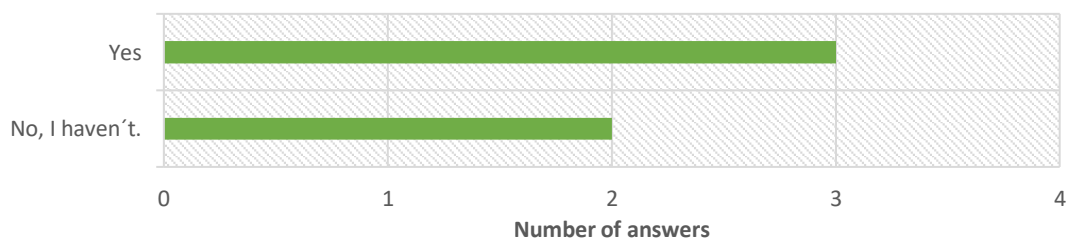


Figure 80: From iBRoad2EPC training evaluation: Have you previously developed a long-term renovation plan for a building? Please write free text. n=5

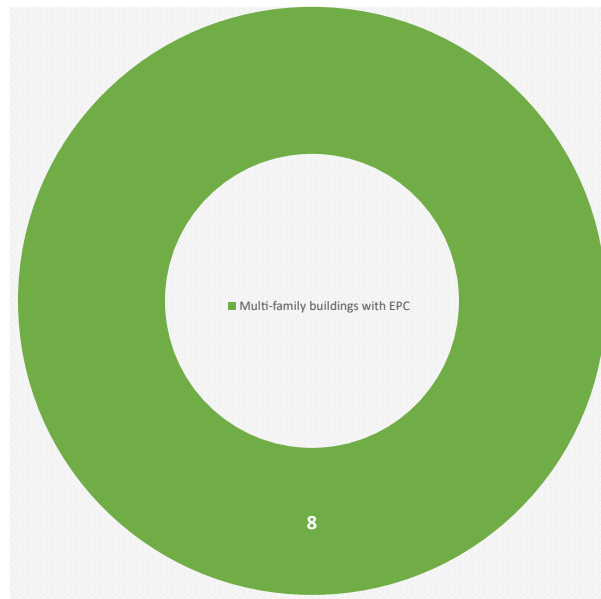


Figure 81: From iBRoad2EPC field test evaluation, questionnaire for building owners: Was the field test combined with the issue of an EPC? If yes, for which buildings? n=8

“Yes in Poland while we prepare the audits we have the option of suggesting as many renovations as we want so usually it take some time to apply all of them. On the other hand we have no control over what the investor will do with those information and the investor can apply all the renovations at once.”

■ Extremely appropriate ■ Very appropriate ■ Somewhat appropriate ■ Less appropriate ■ Not appropriate

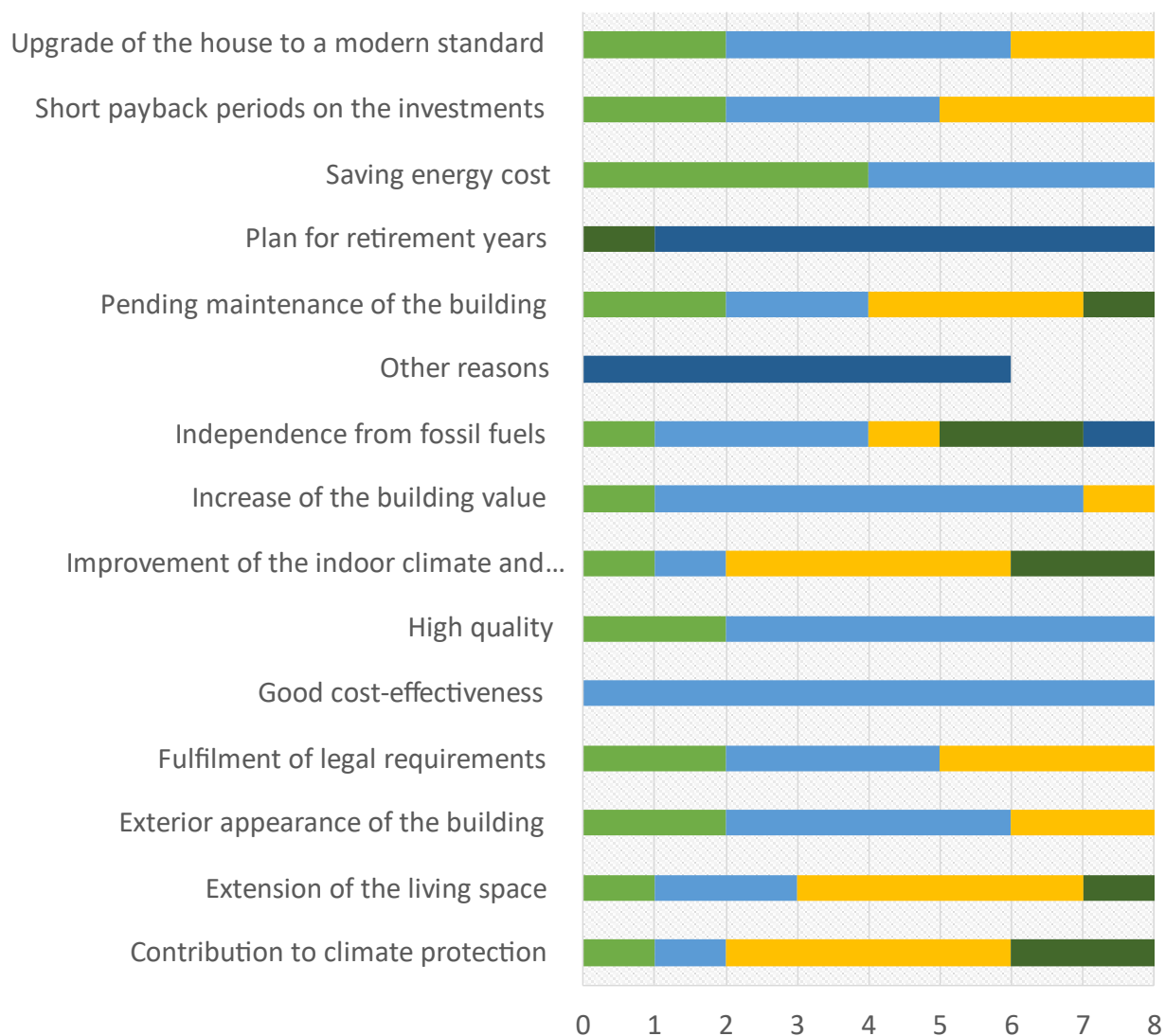


Figure 82: From iBRoad2EPC field test evaluation, questionnaire for building owners: What is the most important reason for a renovation for you? n=9

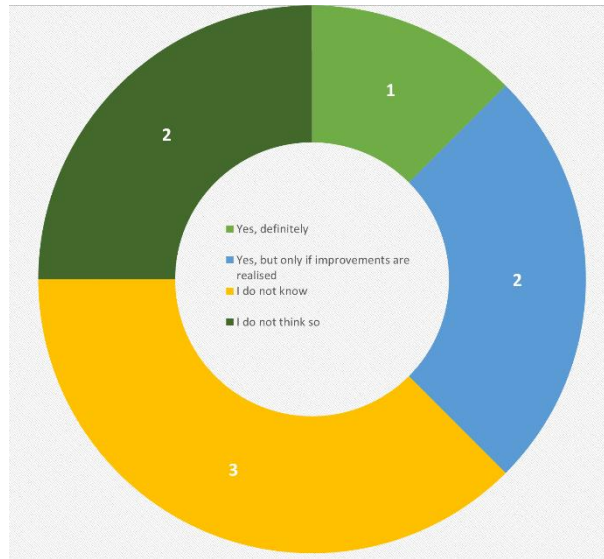


Figure 83: From iBRoad2EPC field test evaluation, questionnaire for building owners: Would you recommend the iBRoad2EPC to other building owners/colleagues? n=8

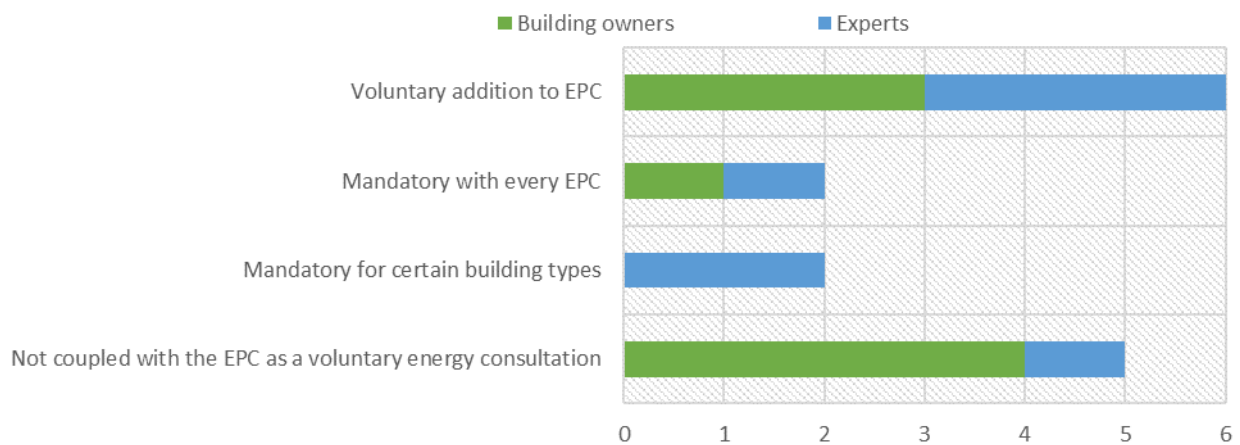


Figure 84: From iBRoad2EPC field test evaluation, questionnaire for building owners (n=8) and energy experts (n=10): How should the iBRoad2EPC be connected to the EPC?

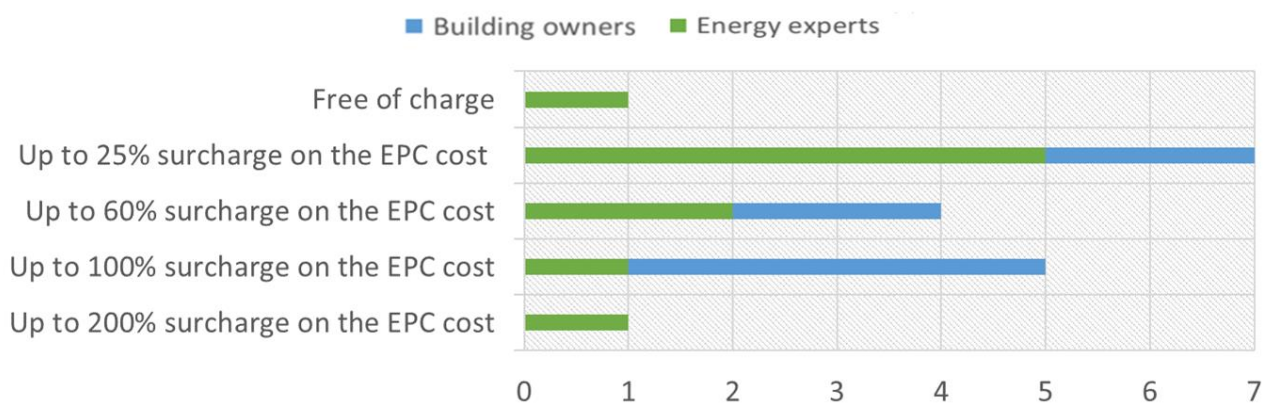


Figure 85: From iBRoad2EPC field test evaluation, questionnaire for building owners (n=8) and energy experts (n=10): What would you consider a reasonable additional cost for the iBRoad2EPC if combined with the EPC?

Romania

From iBRoad2EPC training evaluation: For which building types have you already issued EPCs in the past?
n=28

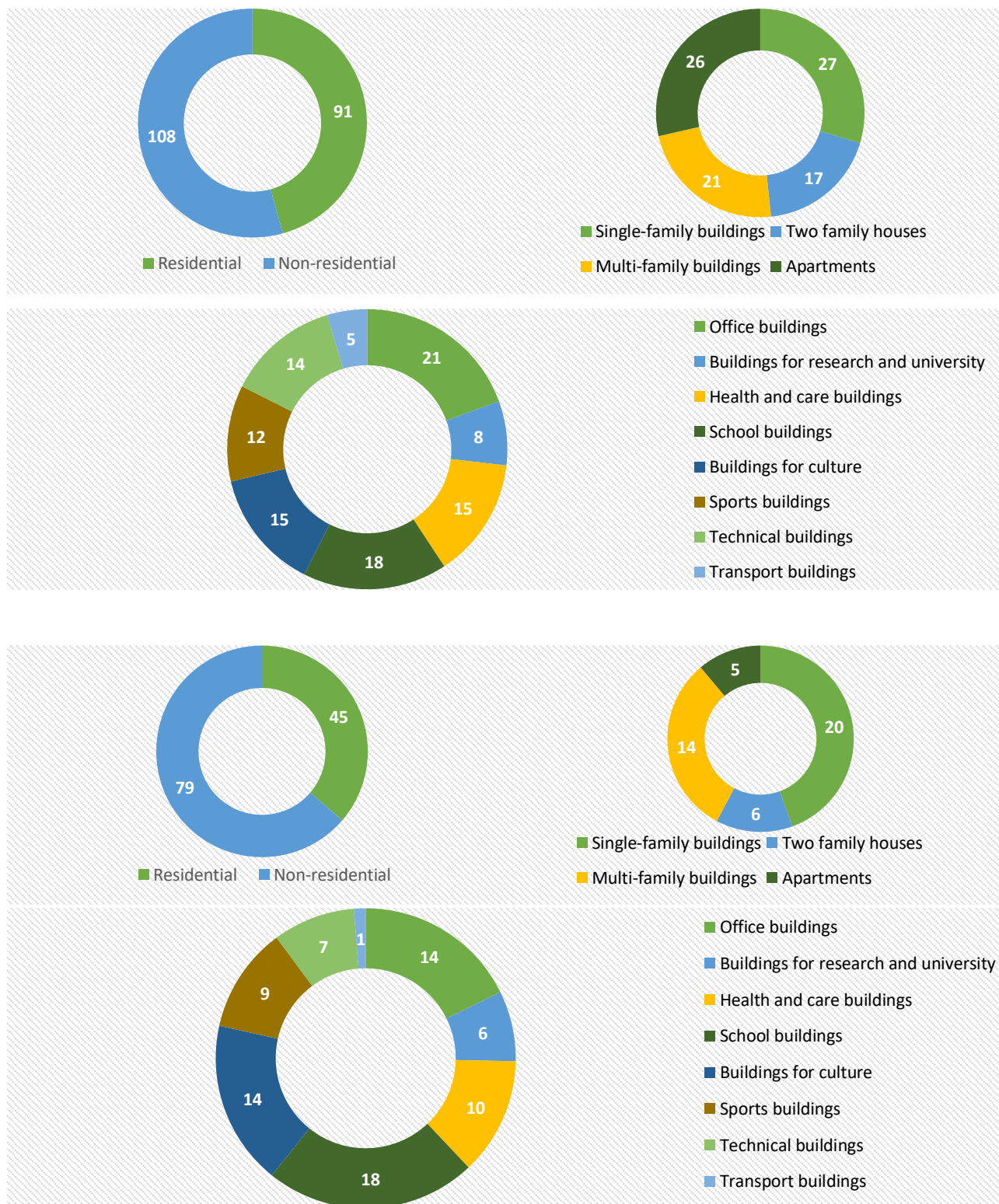


Figure 86: From iBRoad2EPC training evaluation: Have you carried out energy audits (other than EPC audits) for the following building types? n=28

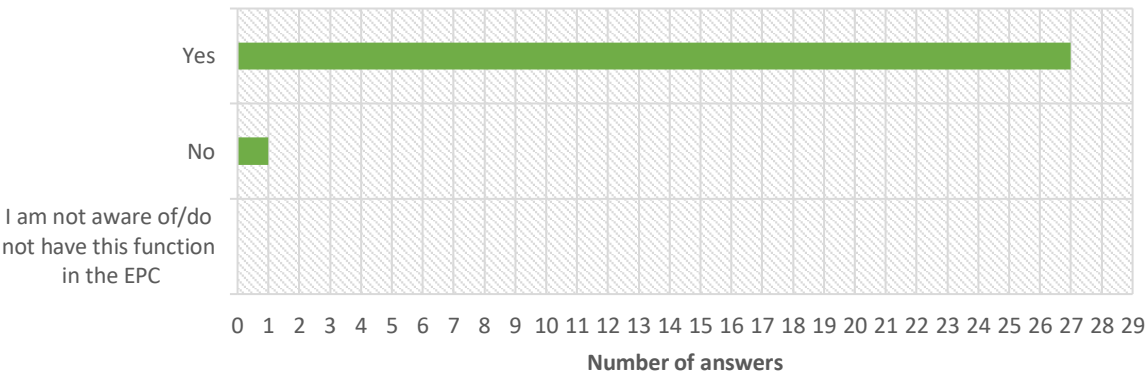


Figure 87: From iBRoad2EPC training evaluation: Do you use the EPC renovation recommendations in the EPC? n=28

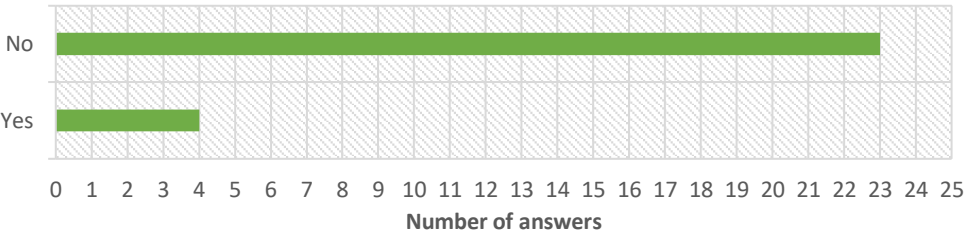


Figure 88: From iBRoad2EPC training evaluation: Have you previously developed a long-term renovation plan for a building? n=28

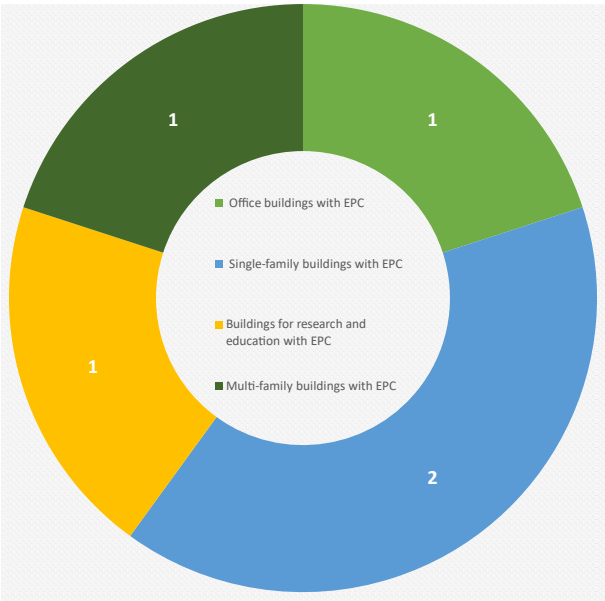


Figure 89: From iBRoad2EPC field test evaluation, questionnaire for building owners: Was the field test combined with the issue of an EPC? If yes, for which buildings? n=5

■ Extremely appropriate ■ Very appropriate ■ Somewhat appropriate ■ Less appropriate ■ Not appropriate

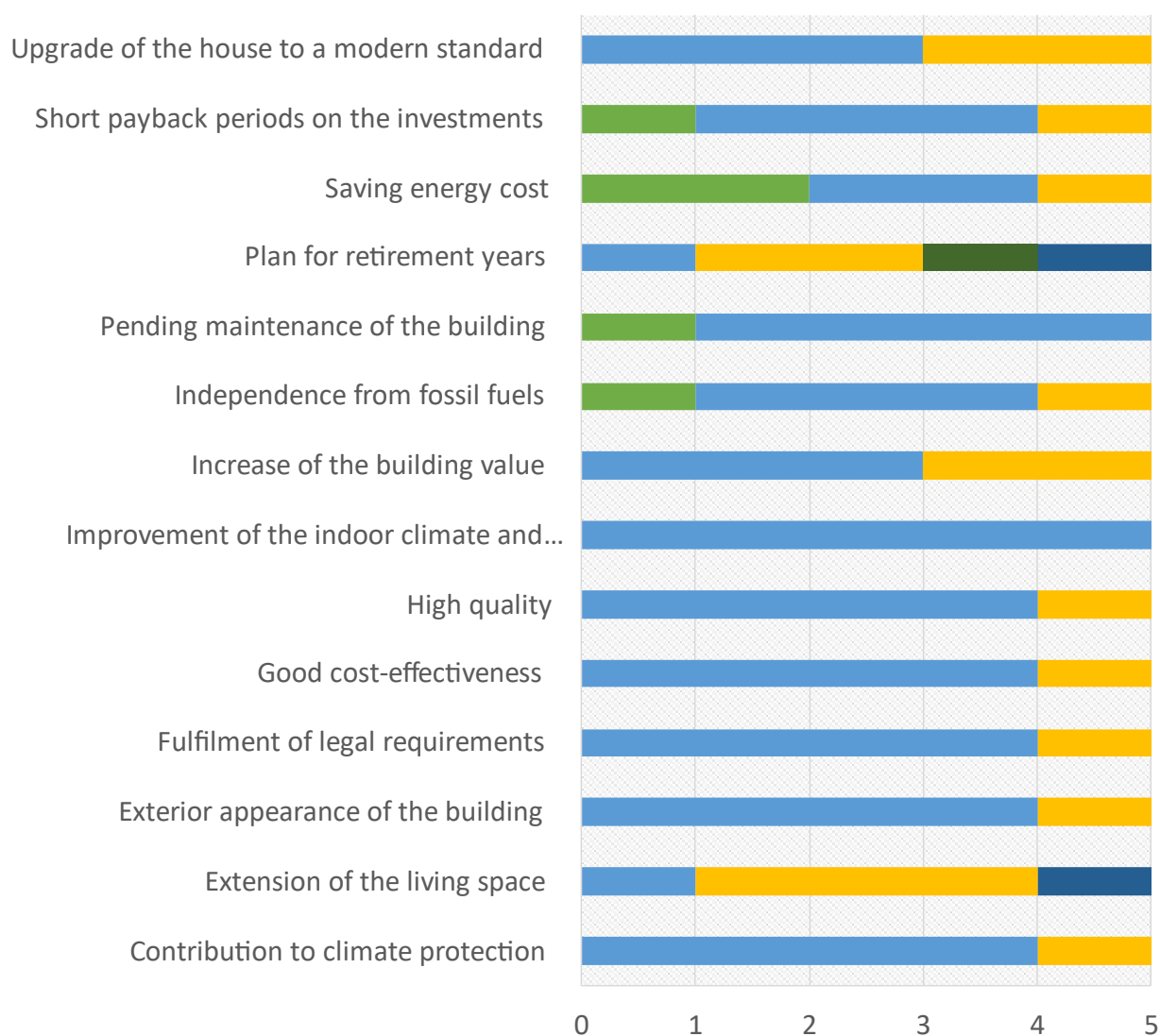


Figure 90: From iBRoad2EPC field test evaluation, questionnaire for building owners: What is the most important reason for a renovation for you? n=5

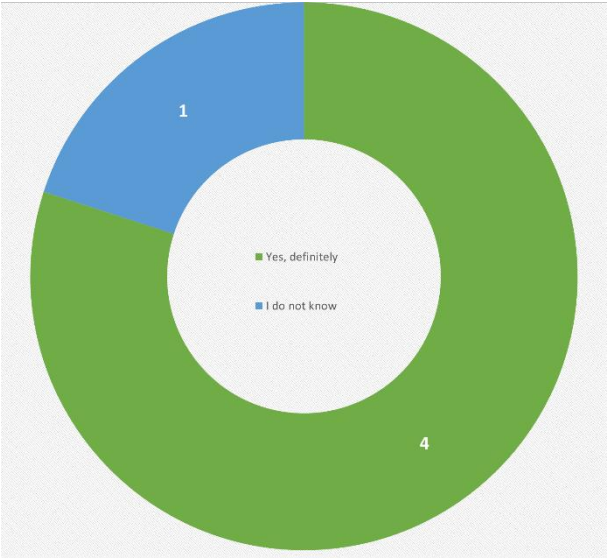


Figure 91: From iBRoad2EPC field test evaluation, questionnaire for building owners: Would you recommend the iBRoad2EPC to other building owners/colleagues? n=5

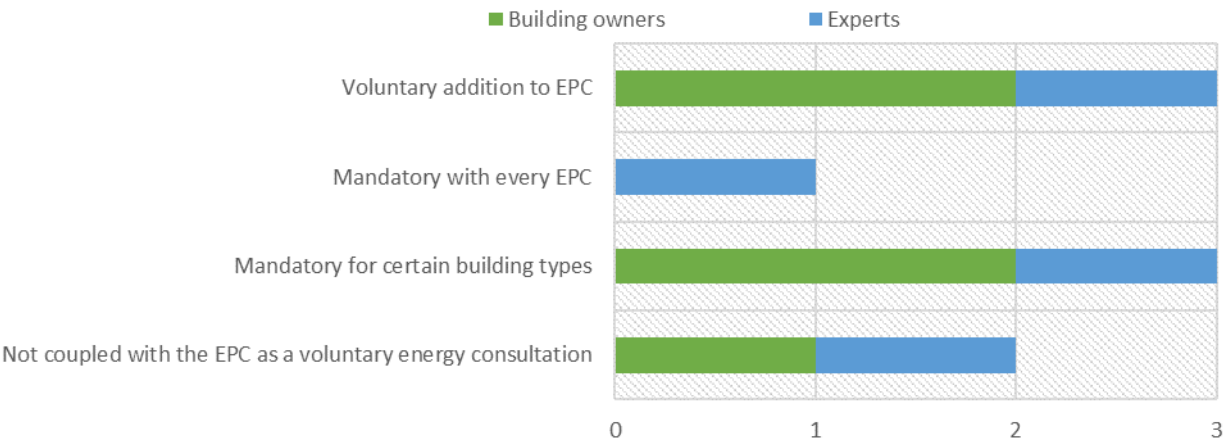


Figure 92: From iBRoad2EPC field test evaluation, questionnaire for building owners (n=4) and energy experts (n=2): How should the iBRoad2EPC be connected to the EPC?

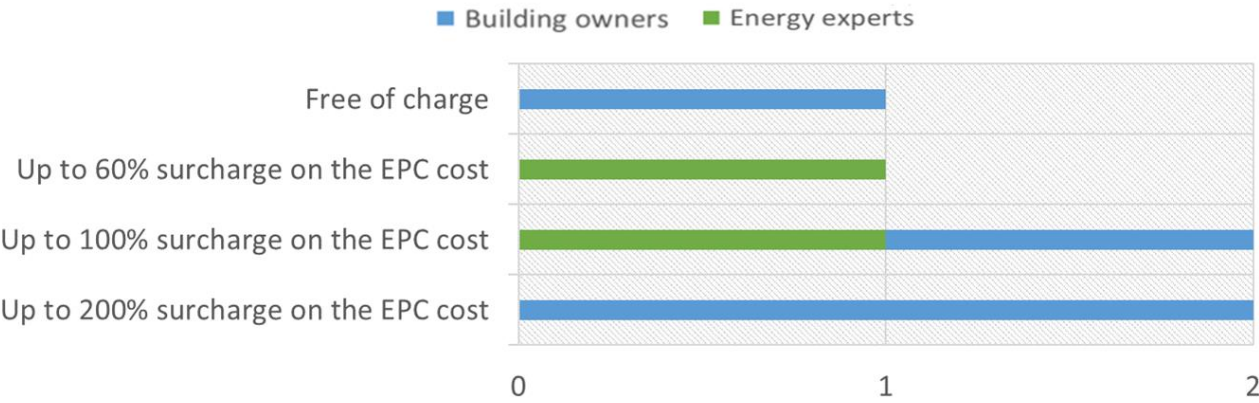


Figure 93: From iBRoad2EPC field test evaluation, questionnaire for building owners (n=4) and energy experts (n=2): What would you consider a reasonable additional cost for the iBRoad2EPC if combined with the EPC?

Spain

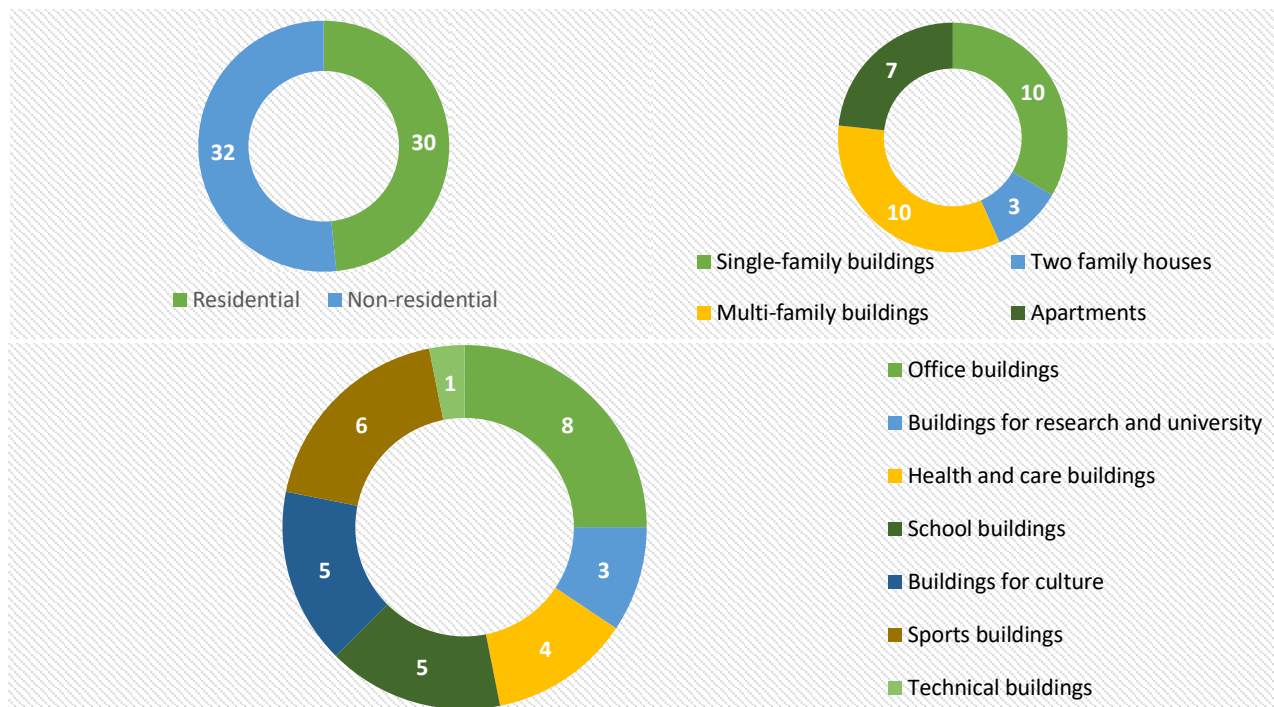


Figure 94: From iBRoad2EPC training evaluation: For which building types have you already issued EPCs in the past? n=14

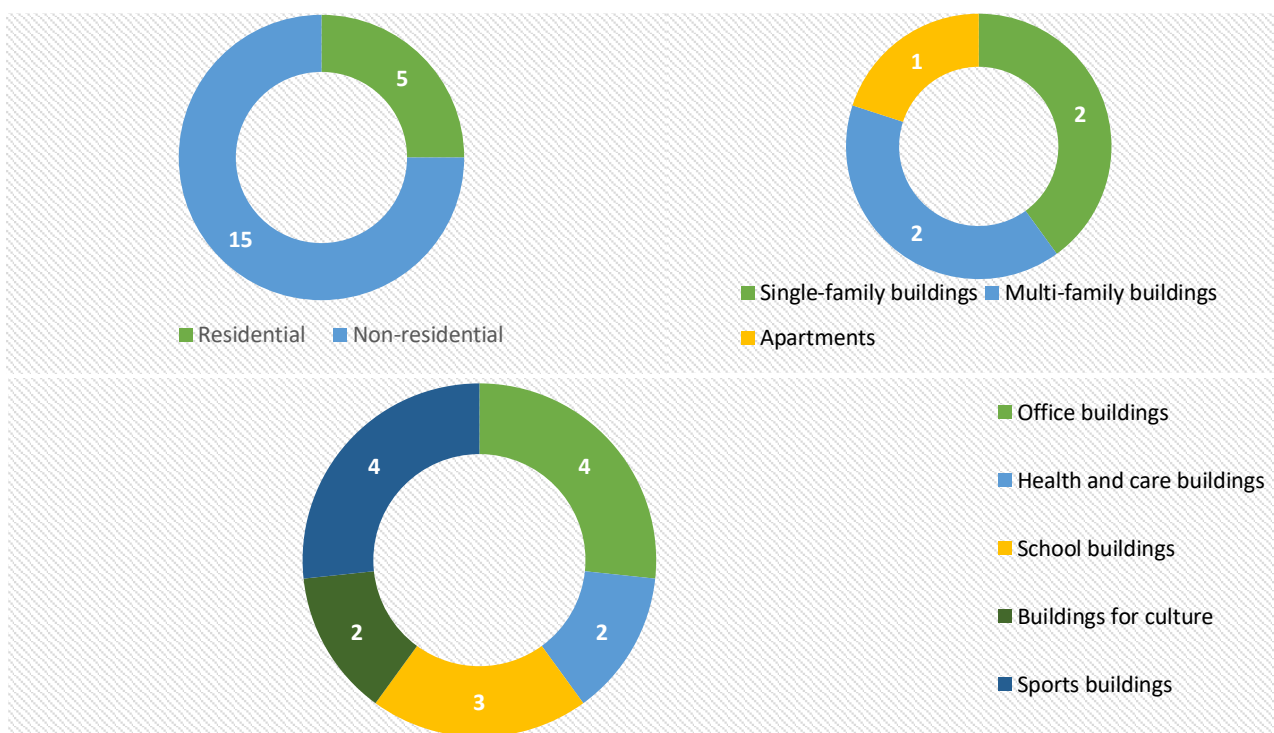


Figure 95: From iBRoad2EPC training evaluation: Have you carried out energy audits (other than EPC audits) for the following building types? n=14.

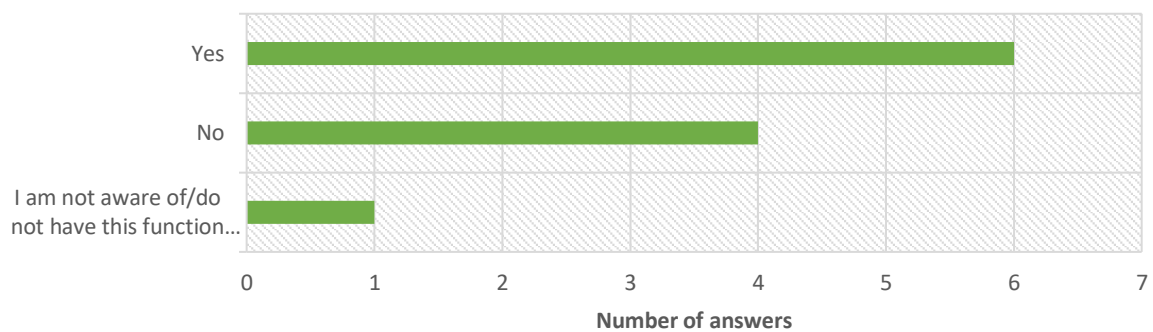


Figure 96: From iBRoad2EPC training evaluation: Do you use the EPC renovation recommendations in the EPC? n=14

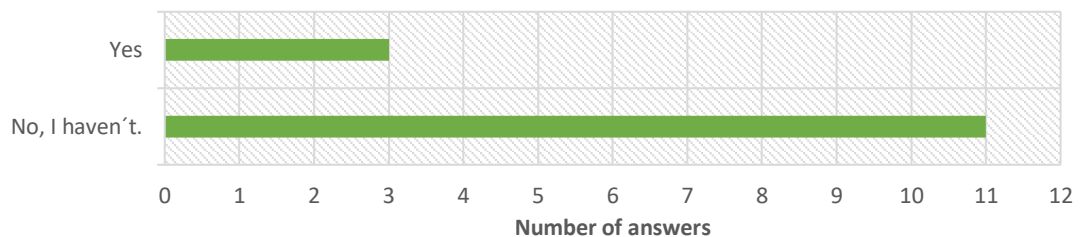


Figure 97: From iBRoad2EPC training evaluation: Have you previously developed a long-term renovation plan for a building? n=14

“Yes, with the Fitbuildings Project we have studied more than 20 sports buildings with the aim of providing a roadmap for energy efficient and sustainable refurbishment. In my professional career I have carried out rehabilitation projects and rehabilitation master plans for the Generalitat de Catalunya, the Diputació and town councils.”

“Yes, including the processing of grants under the Next Generation programme. Various sports, cultural and office buildings.”

“Yes. Building renovation in stages according to PassivHaus "steep by steep" methodology.”

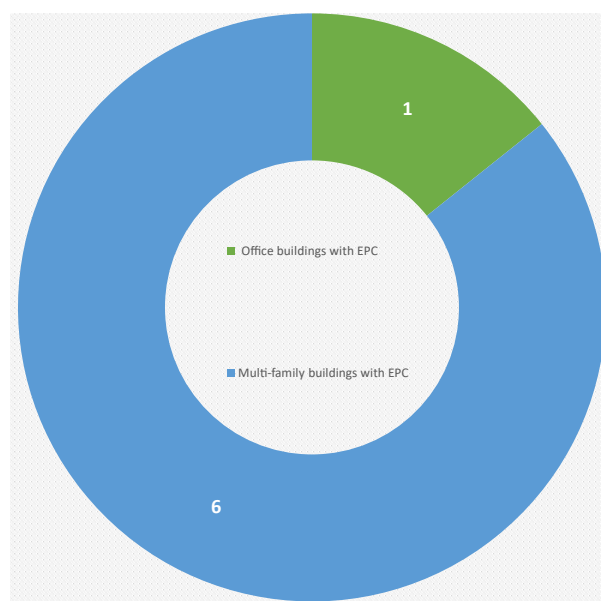


Figure 98: From iBRoad2EPC field test evaluation, questionnaire for building owners: Was the field test combined with the issue of an EPC? If yes, for which buildings? n=10

■ Extremely appropriate ■ Very appropriate ■ Somewhat appropriate ■ Less appropriate ■ Not appropriate

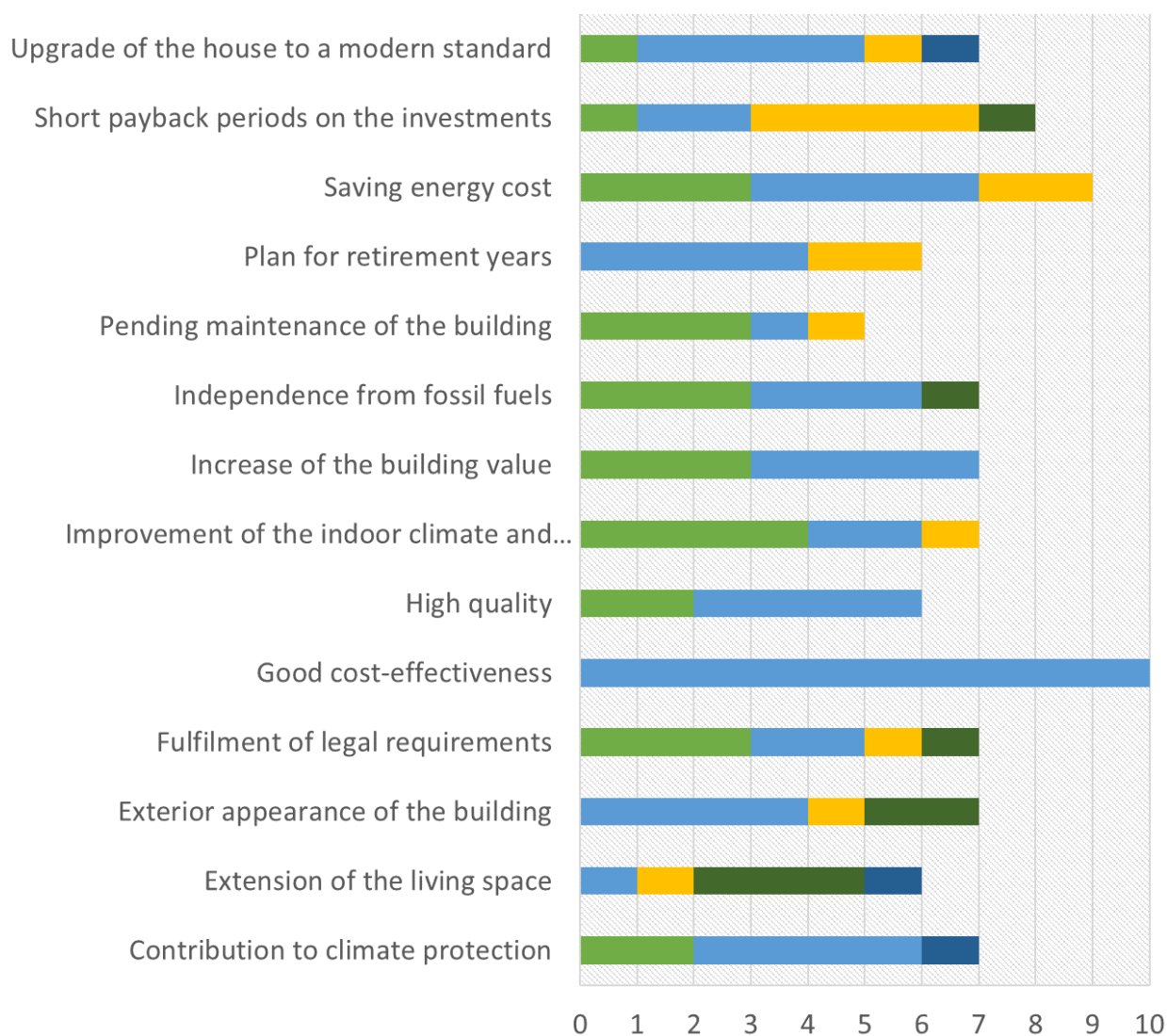


Figure 99: From iBRoad2EPC field test evaluation, questionnaire for building owners: What is the most important reason for a renovation for you? n=10

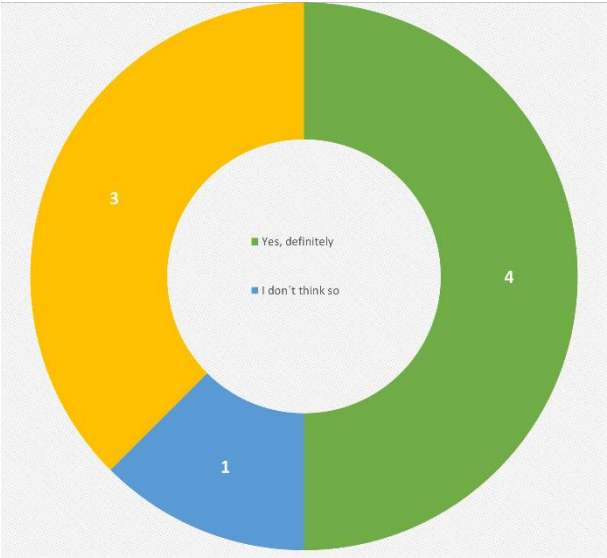


Figure 100: From iBRoad2EPC field test evaluation, questionnaire for building owners: Would you recommend the iBRoad2EPC to other building owners/ colleagues? n=10

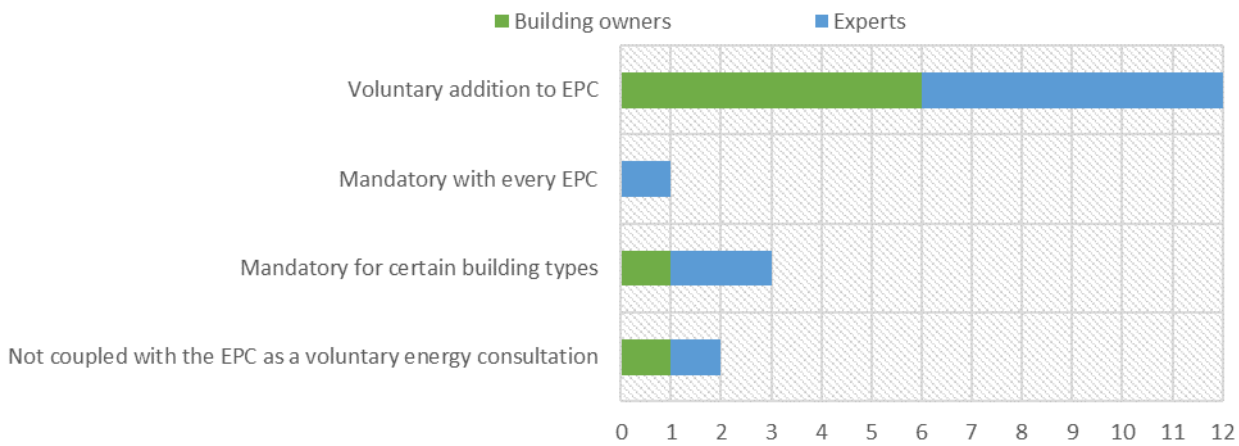


Figure 101: From iBRoad2EPC field test evaluation, questionnaire for building owners (n=10) and energy experts (n=10): How should the iBRoad2EPC be connected to the EPC?

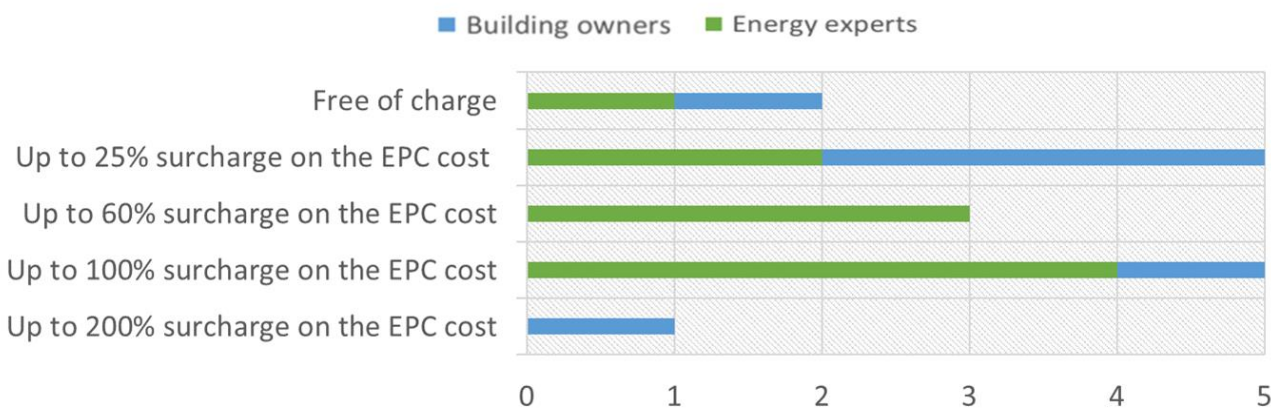


Figure 102: From iBRoad2EPC field test evaluation, questionnaire for building owners (n=10) and energy experts (n=10): What would you consider a reasonable additional cost for the iBRoad2EPC if combined with the EPC?

Annex 4 - Questionnaire for energy experts attending the field test

Background data

1 To which of the following age categories do you belong?	
18 - 20	☐
21 - 29	☐
30 - 39	☐
40 - 49	☐
50 - 59	☐
60 or older	☐

2 Please enter your gender.	
Male	☐
Female	☐
Non-binary	☐
Prefer not to say	☐

3 What is your level of education?	
Lower school degree	☐
High school graduation or equivalent	☐
Studies without a degree	☐
Bachelor's degree	☐
Master's degree	☐
PhD degree	☐

8 For how many years are you an EPC issuer?

_____ years

9 Do you have past experience with any energy auditing tools? If yes which?

Please write free text.

10 What type and number of buildings did you field test iBRoad2EPC on? Did you combine the issue of an EPC with the iBRoad2EPC field test? If yes for which/how many buildings? Multiple answers possible.

Building type	Number	Combined with the issue of an EPC (y/n)
Single-family buildings		
Two family buildings		
Multi-family buildings		
Single apartment units		
Office buildings		
Buildings for research and education		
Health and care buildings		
Buildings for culture		
Sports buildings		
other building types		

On-site visit

A main prerequisite of the iBRoad2EPC approach is to perform an on-site visit to the building. Please describe your experience answering the following questions.

11 Did you visit the buildings that you assessed within the iBRoad2EPC field test?	
yes	☐

If you did not visit the buildings that you assessed you can skip the following questions and move forward to question No. 18.

12 How long did the onsite-visit in the buildings last?
_____ hours in total If iBRoad2EPC was combined with an EPC issuance how much additional time did it take above the time for the EPC _____ hours

13 Did the building owner/user already have a long-term perspective for the renovation of the building before the on-site visit?	
Yes	☐
No	☐

14. For what reasons and to what extent was the on-site visit useful to you as energy expert?	Extremely useful	Very useful	Some-what useful	Slightly useful	Not useful
To collect qualitative and quantitative information about the current building state	☐	☐	☐	☐	☐
To collect information about possible renovations in the future	☐	☐	☐	☐	☐
To draw a first sketch of a renovation plan on the blank template	☐	☐	☐	☐	☐
To understand the building owners' needs	☐	☐	☐	☐	☐
To explain the concept and benefits of a long term renovation plan to the building owner	☐	☐	☐	☐	☐
To sketch together with the building owner their long term renovation plan	☐	☐	☐	☐	☐
To assess the indoor environmental quality of the building	☐	☐	☐	☐	☐
To assess the smart readiness of the building	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☒

iBRoad2EPC blank template

	Year of construction	Energy improvements/ renovations in the past	Step 1 2024 No legal requirements	Step 2 2030 At least class E	Step 3 2040 At least class D ban on new fossil fuel boilers	Step 4 2050 Climate neutral building
Inhabitants / Users 						
Inhabitants / Users 						
Roof 						
Outer walls 						
Windows / doors 						
Floor / cellar 						
Heating 						
Domestic hot water 						
Ventilation 						
Cooling 						
Smart Home 						
Lighting 						

Figure 103: Blank template for the on-site visit

15. Did you find the blank template useful for the on-site visit?				
Extremely useful	Very useful	Somewhat useful	Slightly useful	Not useful
☐	☐	☐	☐	☐
Please explain				

16. Do you have any suggestions for improving the blank template for the iBRoad2EPC on-site visit? <i>Please write free text.</i>

Planning and calculating renovation steps

After the on-site visit, you composed the future renovation steps and created a Renovation plan.

17. How long did it take to calculate the energy performance certificate with your calculation software?
_____ hours

18. How long did it take to create future renovation steps and calculate them with the calculation software?
_____ hours

19. Have you considered multiple variants of the Renovation plan? <i>Multiple answers possible</i>	
Yes, the building owner/user asked me to compare various renovation options for his building.	☐
Yes, on my initiative, I discussed different renovation variants with the building owner/user during the on-site visit.	☐
No; for this building, there is only one sensible way of renovation.	☐
No, I did not take different variants into account	☐

iBRoad2EPC Assistant

The iBRoad2EPC Assistant is the online tool in which the energy expert enters all values to create the iBRoad2EPC as an addition to the EPC. Find here below, as an example, a screenshot of the iBRoad2EPC Assistant page where a renovation step can be edited.

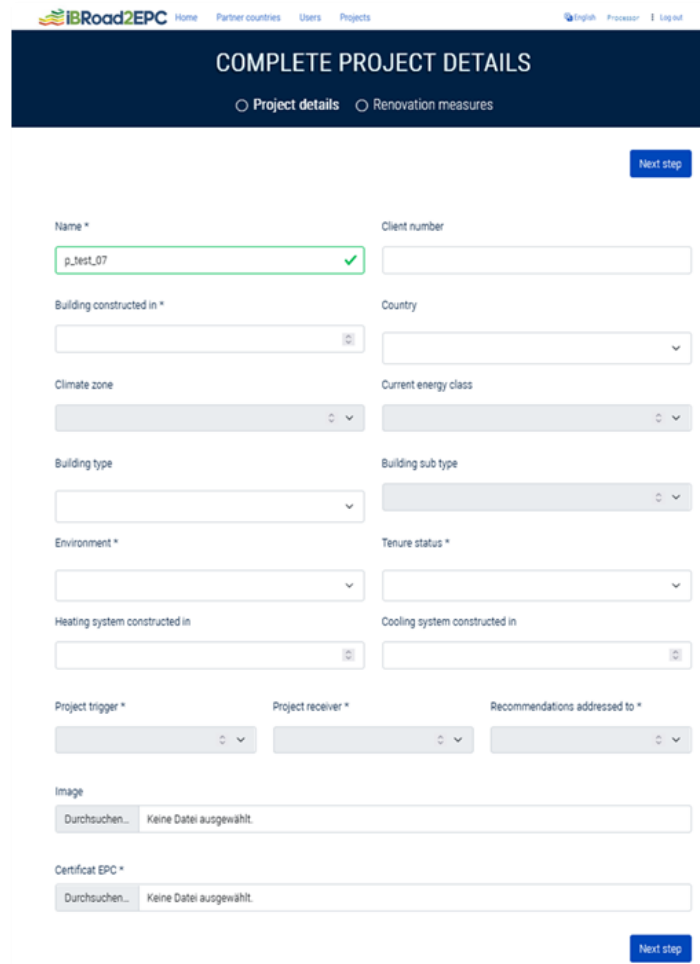


Figure 104: Blank project details page in the iBRoad2EPC Assistant

20. How long did the processing in the iBRoad2EPC Assistant take?

_____ hours

21. What was your experience with using the iBRoad2EPC Assistant? <i>Multiple answers possible</i>	
The iBRoad2EPC Assistant did not work.	☐
I did not understand the iBRoad2EPC Assistant.	☐
I could work with the iBRoad2EPC Assistant only after I got help from the hotline.	☐
I could work with the iBRoad2EPC Assistant, but it needed much time to understand.	☐
I needed some time to get used to the iBRoad2EPC Assistant but had no major problems.	☐
The iBRoad2EPC Assistant was easy to use.	☐
Space for explanatory notes	

22. How do you rate the usability of the following features within the iBRoad2EPC Assistant?	Extremely easy	Very easy	Some-what easy	Slightly easy	Not easy
Edit building (general building data)	☐	☐	☐	☐	☐
Edit current building state	☐	☐	☐	☐	☐
Create new renovation step	☐	☐	☐	☐	☐
Create new measure	☐	☐	☐	☐	☐
Show plan preview for building owner/user	☐	☐	☐	☐	☐
Navigation through the iBRoad2EPC Assistant in general	☐	☐	☐	☐	☐

23. How do you rate the usability of the indoor environmental quality tool within the iBRoad2EPC Assistant?	Extremely easy	Very easy	Somewhat easy	Slightly easy	Not easy
Download of the Excel template	☐	☐	☐	☐	
Working with the Excel template	☐	☐	☐	☐	
Upload of the Excel template	☐	☐	☐	☐	
Comprehension of the displayed results within the iBRoad2EPC output page	☐	☐	☐	☐	

24. How do you rate the usability of the Smart Readiness Indicator tool within the iBRoad2EPC Assistant?	Extremely easy	Very easy	Somewhat easy	Slightly easy	Not easy
Download of the Excel template	☐	☐	☐	☐	
Working with the Excel template	☐	☐	☐	☐	
Upload of the Excel template	☐	☐	☐	☐	
Comprehension of the displayed results within the iBRoad2EPC output page	☐	☐	☐	☐	

26. How useful are the following features of the iBRoad2EPC Assistant for you as an issuer?	Extremely useful	Very useful	Some-what useful	Slightly useful	Not useful
Adding and editing renovations measures	☐	☐	☐	☐	☐
Automated description text blocks for measures	☐	☐	☐	☐	☐
Overwrite function for description text blocks	☐	☒	☐	☐	☐
Automatic specification of measures i.e. U-Value or insulation thickness	☐	☐	☐	☐	☐
Automatic recommendations for the preparation of future renovation measures	☐	☐	☐	☐	☐
Overwrite function for recommendation text blocks	☐	☐	☐	☐	☐
Details of renovation steps - energy demand	☐	☐	☐	☐	☐
Details of renovation steps - renovation cost	☐	☐	☐	☐	☐
Details of renovation steps - technical details and notes	☐	☐	☐	☐	☐
Future regulations - comprehending and editing future legal requirements	☐	☐	☐	☐	☐
Rating of Indoor Environmental Quality (IEQ)	☐	☐	☐	☐	☐
Rating of Smart Readiness (SRI)	☐	☐	☐	☐	☐

27. What did you like about the iBRoad2EPC Assistant? <i>please write free text</i>

28. What did you not like about the iBRoad2EPC Assistant? <i>please write free text</i>

29. Do you think iBRoad2EPC is an improvement of the EPC?

please explain improvements or benefits compared to the EPC

[illegible]

30. Do you have any wishes or suggestions for improving the iBRoad2EPC Assistant? *please write free text*

[illegible]

iBRoad2EPC

The iBRoad2EPC is the output document from the iBRoad2EPC Assistant.

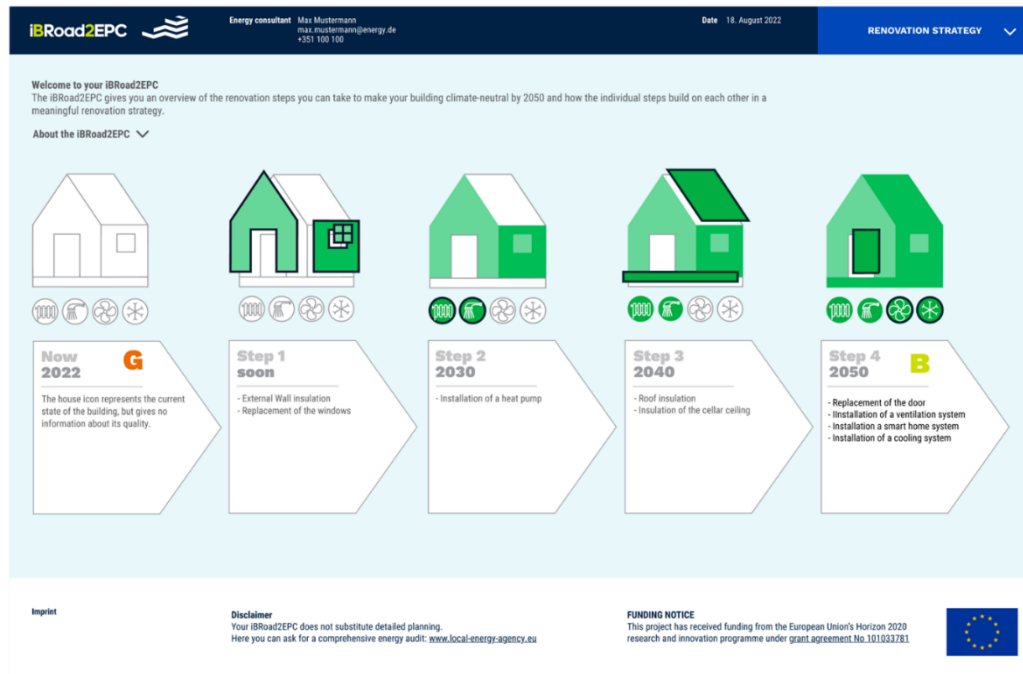


Figure 105: Renovation steps overview page in the iBRoad2EPC (example)

31. How satisfied are you with the following characteristics of the iBRoad2EPC?	Extremely satisfied	Very satisfied	Some-what satisfied	Slightly satisfied	Not satisfied
Comprehensibility of the Renovation plan	☐	☐	☐	☐	☐
Appearance of the icons representing the technical equipment	☐	☐	☐	☐	☐
Appearance of the symbols representing the building envelope	☐	☐	☐	☐	☐
Information for the building owner/user	☐	☐	☐	☐	☐

32. Did you understand the graphical display of....	Understood extremely well	Understood very well	Understood somewhat well	Understood slightly well	Not understood
... not implemented measures	☐	☐	☐	☐	☐
...already implemented measures	☐	☐	☐	☐	☐
...measures implemented in the current renovation step	☐	☐	☐	☐	☐

33. How useful do you consider the following content of the iRoad2EPC for the building owner/user?	Extremely useful	Very useful	Some-what useful	Slightly useful	Not useful
Overview page	☐	☐	☐	☐	☐
Detailed description of single renovation steps	☐	☐	☐	☐	☐
Details of renovation steps - description of preparation measures	☐	☐	☐	☐	☐
Details of renovation steps - renovation costs	☐	☐	☐	☐	☐
Details of renovation steps - technical details and notes	☐	☐	☐	☐	☐
Details of renovation steps - energy demand	☐	☐	☐	☐	☐
Future regulations - information about possible future legal requirements	☐	☐	☐	☐	☐
Rating of Indoor Environmental Quality (IEQ)	☐	☐	☐	☐	☐
Rating of Smart Readiness (SRI)	☐	☐	☐	☐	☐

34. Which other features would you consider useful to include? *please write free text*

35. To what extent do you agree with the following statements?	Extremely agree	Agree very much	Somewhat agree	Slightly agree	Disagree
The iBRoad2EPC is useful and informative for the building owner/user.	☐	☐	☐	☐	☐
The iBRoad2EPC is easy to understand, clear and transparent for the building owner/user.	☐	☐	☐	☐	☐
The iBRoad2EPC looks appealing for the building owner/user.	☐	☐	☐	☐	☐
The iBRoad2EPC provides the building owner/user with an outline of a long-term renovation plan for their building.	☐	☐	☐	☐	☐
The iBRoad2EPC enables and motivates the building owner/user to realise concrete renovation measures.	☐	☐	☐	☐	☐
The iBRoad2EPC will help the building owner/user to avoid misinvestments.	☐	☐	☐	☐	☐

36. Do you think that the iBRoad2EPC already contains all necessary indicators and inputs to provide an added value to owners/users or would you like to add more indicators / inputs to iBRoad2EPC?

The inputs in iBRoad2EPC are sufficient.

☐

I propose to add inputs or indicators to the iBRoad2EPC:

☐

37. Do you have any suggestions for improving the content of iBRoad2EPC?

Please write free text.

38. Do you have any suggestions for improving the presentation of iBRoad2EPC?

Please write free text.

39. How should the iBRoad2EPC be connected to the EPC?	
Mandatory with every EPC	☐
Mandatory for certain building types	☐
As a voluntary addition to the EPC	☐
Not coupled with the EPC as a voluntary energy consulting	☐

Annex 5 – Answers from energy experts attending the field test

Question	How satisfied are you with the following characteristics of the iBRoad2EP					
Count of Answer_2	Column Labels					
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain
Extremely satisfied	22	10	4	2	3	22
Appearance of the icons representing the technical equipment	8	3				4
Appearance of the symbols representing the building envelope	6	2		1		8
Comprehensibility of the Renovation plan	4	3		2	1	7
Information for the building owner/user	4	2		1		3
Not satisfied						1
Appearance of the symbols representing the building envelope						1
Slightly satisfied				1		
Appearance of the icons representing the technical equipment				1		
Somewhat satisfied	3	2	13	4	1	
Appearance of the icons representing the technical equipment	1			3	1	
Appearance of the symbols representing the building envelope		1		5	1	
Comprehensibility of the Renovation plan				1	1	1
Information for the building owner/user	2	1		4	1	
Very satisfied	30		22	22	4	17
Appearance of the icons representing the technical equipment	5			6	6	6
Appearance of the symbols representing the building envelope	8			4	6	1
Comprehensibility of the Renovation plan	9			7	4	3
Information for the building owner/user	8			5	6	7
Grand Total	55	12	40	28	8	40

Question		Did you understand the graphical display of..?				
Count of Answer_2		Column Labels				
Row Labels		Bulgaria	Greece	Poland	Portugal	Romania Spain
0						3
... not implemented measures						1
...already implemented measures						1
...measures implemented in the current renovation step						1
Understood extremely well		11	4	9		3 16
... not implemented measures		4	1	3		1 6
...already implemented measures		3	1	3		1 3
...measures implemented in the current renovation step		4	2	3		1 7
Understood slightly well			2			
... not implemented measures			1			
...already implemented measures			1			
Understood somewhat well		4	3	5		
... not implemented measures		1	1	2		
...already implemented measures		2	1	2		
...measures implemented in the current renovation step		1	1	1		
Understood very well		27		16	21	3 14
... not implemented measures		9		5	7	1 4
...already implemented measures		9		5	7	1 7
...measures implemented in the current renovation step		9		6	7	1 3
(blank)						
... not implemented measures						
...already implemented measures						
...measures implemented in the current renovation step						
Grand Total		42	9	30	24	6 30

	For what reasons and to what extent was the on-site visit useful to you as energy expert?					
Question						
Count of Answer_2	Column Labels					
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain
Other	5	2		1		1
Extremely useful			1			
Not useful		1				
Somewhat useful				1		
Very useful	5					1
To assess the indoor environmental quality of the building	14	3		8	6	
Extremely useful	5	1		1	3	
Slightly useful						
Somewhat useful	4	1		5		
Very useful	5	1		2	3	
To assess the smart readiness of the building	14	3		8	6	
Extremely useful	2	1			3	
Not useful				1		
Somewhat useful	3	2		6		
Very useful	9			1	3	
To collect information about possible renovations in the future	14	3		8	6	
Extremely useful	10	2		4	6	
Somewhat useful				1		
Very useful	4	1		3		
To collect qualitative and quantitative information about the current building state	12	3		8	6	
Extremely useful	6	3		2	6	
Somewhat useful				2		
Very useful	6			4		
To draw a first sketch of a renovation plan on the blank template	14	3		8	6	
Extremely useful		1		3	2	
Somewhat useful	2	1		2		
Very useful	12	1		3	4	
To explain the concept and benefits of a long term renovation plan to the building owner	14	3		8	6	
Extremely useful	5	1			2	
Slightly useful						
Somewhat useful	5	1		3	2	
Very useful	4	1		5	2	
To sketch together with the building owner their long term renovation plan	13	3		8	6	
Extremely useful	2	1			2	
Slightly useful						
Somewhat useful	4	1		5	2	
Very useful	7	1		3	2	
To understand the building owners' needs	14	3		8	6	
Extremely useful	10	1			2	
Somewhat useful				4	2	
Very useful	4	2		4	2	
Grand Total	114	26		65	48	1

Question	How useful are the following features of the iBRoad2EPC Assistant for you as an issuer							
Count of Answer_2	Column Labels							
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain	(blank)	
Adding and editing renovations measures	14	3	10	6	2	10	1	
Extremely useful	5	2		2	1	7		
Somewhat useful			4					
Very useful	9	1	6	4	1	3	1	
Automated description text blocks for measures	14	3	10	6	2	9	1	
Extremely useful	4	1	4		1	6		
Not useful				2				
Slightly useful		1						
Somewhat useful			4	2				
Very useful	10	1	2	2	1	3	1	
Automatic recommendations for the preparation of future renovation measures	14	3	10	6	2	10	1	
Extremely useful	5	1			2	4		
Slightly useful			1	2				
Somewhat useful			6	1		2		
Very useful	9	2	3	3		4	1	
Automatic specification of measures	14	3	10	6	2	10	1	
Extremely useful	2	1	1		2	3		
Not useful				2				
Slightly useful			2					
Somewhat useful		2	3	1		1		
Very useful	12		4	3		6	1	
Comprehending and editing future legal requirements	14	3	10	7	2	8		
Extremely useful	4	3	1	1	1	1		
Not useful						2		
Slightly useful				2				
Somewhat useful	2		5	2		3		
Very useful	8		4	2	1	2		
Energy demand	14	3	10	7	2	10		
Extremely useful	2	2	2	2	2	7		
Somewhat useful			2	2				
Very useful	12	1	6	3		3		
Overwrite function for description text blocks	14	3	10	6	2	10	1	
Extremely useful	5	2	1		1	8		
Slightly useful			1					
Somewhat useful	2		4	1			1	
Very useful	7	1	4	5	1	2		
Overwrite function for recommendation text blocks	14	3	10	6	2	10	1	
Extremely useful	2	1			1	6		
Slightly useful			1					
Somewhat useful	2		4	1				1
Very useful	10	2	5	5	1	4		
Rating of Indoor Environmental Quality (IEQ)	14	3	10	7	2	7		
Extremely useful	5	1			1			
Not useful						3		
Slightly useful			1			1		
Somewhat useful			6	3		2		
Very useful	9	2	3	4	1	1		
Rating of Smart Readiness (SRI)	14	3	10	6	2	7		
Extremely useful	4	1			1			
Not useful						4		
Slightly useful						1		
Somewhat useful			7	3		1		
Very useful	10	2	3	3	1	1		
Renovation costs	14	3	10	7	2	10		
Extremely useful	2	2	2	2	1	3		
Not useful						1		
Slightly useful						1		
Somewhat useful			4	2		3		
Very useful	12	1	4	3	1	2		
Technical details and notes	14	3	10	7	2	9		
Extremely useful	4	3	1	2	1	3		
Slightly useful			1					
Somewhat useful			2	2				
Very useful	10		6	3	1	6		
Grand Total	168	36	120	77	24	110	6	

Question	How useful do you consider the following content of the iBRoad2EPC for the building owner/user						
Count of Answer_2	Column Labels						
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain	
Description of preparation measures	13	3		10	7		10
Extremely useful	5	2		1	2		5
Slightly useful				1			
Somewhat useful				4			2
Very useful	8	1		4	5		3
Detailed description of single renovation steps	14	3		10	7	2	10
Extremely useful	6	1		1		1	5
Somewhat useful				1			
Very useful	8	2		8	7	1	5
Details of renovation steps – description of preparation						2	
Extremely useful						1	
Very useful						1	
Details of renovation steps – energy demand						2	
Extremely useful						1	
Very useful						1	
Details of renovation steps – renovation costs						2	
Very useful						2	
Details of renovation steps – technical details and notes						2	
Extremely useful						1	
Very useful						1	
Energy demand	14	3		10	7		9
Extremely useful	5	1		3			4
Not useful							1
Slightly useful		1		1			
Somewhat useful				3	4		
Very useful	9	1		3	3		4
Future regulations – information about possible future legal						2	
Extremely useful						1	
Very useful						1	
Information about possible future legal requirements	14	3		10	6		9
Extremely useful	4	1		2			2
Not useful							1
Slightly useful				1			1
Somewhat useful	2	1		2	2		2
Very useful	8	1		5	4		3
Overview page	14	3		10	7	2	10
Extremely useful	5	1		2			3
Somewhat useful				2	1		1
Very useful	9	2		6	6	2	6
Rating of Indoor Environmental Quality (IEQ)						2	
Extremely useful						1	
Very useful						1	
Rating of Smart Readiness (SRI)						2	
Extremely useful						1	
Very useful						1	
Rating of the Indoor Environmental Quality (IEQ)	14	3		10	6		8
Extremely useful	4	1		1			
Not useful				2			1
Slightly useful		1		2	2		2
Somewhat useful	3			2	1		3
Very useful	7	1		3	3		2
Rating of the Smart Readiness Indicator (SRI)	14	3		10	6		8
Extremely useful	4	1					1
Not useful				1			1
Slightly useful		1		1	2		3
Somewhat useful	1			4	1		1
Very useful	9	1		4	3		2
Renovation costs	14	3		10	7		10
Extremely useful	4	1		1			3
Not useful							1
Slightly useful							1
Somewhat useful				2			3
Very useful	10	2		7	7		2
Technical details and notes	14	3		10	7		10
Extremely useful	6	1					2
Not useful							1
Somewhat useful	5			4	3		
Very useful	3	2		6	4		7
Grand Total	125	27		90	60	18	

Question	To what extent do you agree with the following statements						
Count of Answer_2		Column Labels					
Row Labels		Bulgaria	Greece	Poland	Portugal	Romania	Spain
The iBRoad2EPC enables and motivates the building owner/user to realise concrete renovation measures							
		14	3	9	6	2	10
	Agree very much	9	1	5	2		5
	Extremely agree	4	1	1			1
	Slightly agree			1			
	Somewhat agree	1	1	2	4	2	4
The iBRoad2EPC is easy to understand, clear and transparent for the building owner/user							
		14	3	10	6	2	10
	Agree very much	5		7	6	2	5
	Extremely agree	6	2	2			3
	Somewhat agree	3	1	1			2
The iBRoad2EPC is useful and informative for the building owner/user							
		14	3	6	6	2	10
	Agree very much	10		1	6	1	4
	Extremely agree	4	3	2		1	6
	Slightly agree			1			
	Somewhat agree			2			
The iBRoad2EPC looks appealing for the building owner/user							
		14	3	10	6	2	9
	Agree very much	8	1	5	6	1	5
	Extremely agree	2	1	3		1	4
	Somewhat agree	4	1	2			
The iBRoad2EPC provides the building owner/user with an outline of a long-term renovation plan for their building							
		14	3	10	4	2	9
	Agree very much	9	1	5	3	1	3
	Extremely agree	5	2	2	1	1	5
	Somewhat agree			3			1
The iBRoad2EPC will help the building owner/user to avoid misinvestments							
		14	3	9	7	2	8
	Agree very much	7	2	5	2		3
	Extremely agree	6	1	1	2	2	1
	Slightly agree			1			
	Somewhat agree	1		2	3		4
Grand Total		84	18	54	35	12	56

Question	Did the building owner/user already have a long-term perspective for the renovation of the building before the on-site visit?						
Count of Answer_2	Column Labels						
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain	
no		3	1	6	2	2	4
yes		11	2	3	3		6
Grand Total		14	3	9	5	2	10

Question	Did you visit the buildings that you assessed within the iBRoad2EPC field test?						
Count of Answer_2	Column Labels						
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain	
yes		14	3	9	6	2	10
Grand Total		14	3	9	6	2	10

Question	How long did the onsite-visit in the buildings last?						
Count of Answer_2	Column Labels						
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain	
1 hour				1			3
1,5 hours					1		
12 hours		1					
16 hours					1		
2 hours			1	5			2
3 hours		2		3			1
3,5 hours							2
4 hours		2	1			1	
5 hours		1					
6 hours		4			2		1
8 hours		1	1		2		
8-10 h (combined with blowerdoor test in some projects).						1	
9 hours		1					
Grand Total		12	3	9	6	2	9

Question	Did you find the blank template useful for the on-site visit?						
Count of Answer_2		Column Labels					
Row Labels		Bulgaria	Greece	Poland	Portugal	Romania	Spain
Extremely useful		6	2				1
Not useful					1		1
Not useful. It's preferable to complete the tempalte after the visit. The owner's don't like long visits. The definition of measures isn't imediate and this greatly increases the time of the visits.						1	
Slightly useful						1	1
Somewhat useful		2	1	5	2		2
Very useful		6			2		3
Very useful. The template already presents a list of focal points, which makes it much easier when visiting to ensure you don't forget any items!						1	
Grand Total		14	3	8	5	2	8

Question	Do you have any suggestions for improving the content of iBRoad2EPC?		
	Portugal	Romania	Spain
Count of Answer_2 Row Labels			
_There could be a space where the technician briefly explains the reason why he has put two measurements together in the same phase and why he has ordered the phases in that way. For example, explain that for aerothermal energy to work, they must first insulate the entire envelope of the building or that, when intervening on the false ceilings of the home to install fan coils, it is used to install the mechanical ventilation system of the home, with the aim of not reopening the roofs on another occasion for its execution. _Cost module: -It is not completely understood what "maintenance costs" and "energy-related costs" mean. Perhaps it would be better understood if it could be briefly explained along with the maintenance costs what they refer to. For example, when replacing heat generators with aerothermal heat pumps, indicate that by that date certain existing heat generators will have already ended their useful life and must be replaced. Or for example, the façade cladding is currently defective and they are going to have to undertake repair work (even if it is minor) no matter what. In this way, it would be better to understand what we mean by maintenance costs, since otherwise the property understands that they are maintenance costs that they will have to face after the work. -Financing: it is impossible to know now what subsidies there will be in the future. This should be explained in an explanatory note and indicate the subsidies with which the data that is inserted has been calculated. _Energy module: -Instead of indicating the energy costs based on euros per year per m2, it would be good to enter this data per home (indicate the m2 of the homes located in the building and have it calculated automatically). In this way, the owners see more clearly the annual investment in energy that heating, DHW and cooling entail for each of the phases. Also indicate that these costs do not include lighting or appliances as they may be misleading. -Together with this data, estimate the years of amortization of the interventions and the revaluation of the homes in the building.			
			1
An apartment can have na energy class A+ and a lower IEQ. This information can confuse the owner. Perhaps it would be preferebale to elimiate the indication IEQ I also have some doubts about the importance of indicating SRI in iBRoad2EPC			
In the first phase, I would not include the SRI and IEQ indicators	1		
Maybe after a longer use I could come up with proposals, for now I don't have any.		1	
See previous comments			1
That rehabilitations that do not imply energy efficiency but that are also necessary be taken into account.			1
WHEN IMPLEMENTING THE INSTALLATIONS I MISSED A HEAT PUMP FOR HOT WATER AND HEATING (I ONLY FOUND IT SEPARATELY).			1
Grand Total	1	1	4

Question	Do you have any suggestions for improving the presentation of iBRoad2EPC?					
Count of Answer_2	Column Labels					
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain
_That there is the possibility of making a printed copy of the assistant to be able to give it to those elderly owners who do not have the necessary skills with a mobile phone or computer. In this way, for example, for a community of neighbors, the printed copy can be delivered with the page with the link and the QR code at the beginning for those owners who do not have any problem opening the assistant on their devices. _That on the page where the QR code and the link are shown, the identification of the building and the technical writer appear and that it is explained very briefly what the iBRoad2EPC is and what will be found in the link _That on the iBRoad2EPC assistant page that the owners access, the building is identified with its address xeg. MULTI-FAMILY BUILDING ON XXX STREET OF XXX MUNICIPALITY, so that it is clear that this rehabilitation strategy has been specifically studied for your building. _Explain where the acronyms of the CAI and SRI modules come from in their description. _The following errors have been detected in the presentation of the iBRoad2EPC: - In the mobile view, both in the cost module and in the energy module, the information is cut out at the bottom. Photographs are attached: -The information about the different milestones that the building will have to reach by regulations is not visible. The manual indicates that these milestones will be shown on the rehabilitation strategy definition page. -On the base step of the building with the text indicated, it seems that the building is empty and I have not marked anything like that in the wizard. Image attached:						1
It's not possible to read the full texts of the "Costs" and "Energy" fields				2		
Maybe after a longer use I could come up with proposals, for now I don't have any.					1	
Maybe it should force certifier to write something about certified building.				1		
Maybe it should look more like bms dashboard, with moving icons.				1		
no	10				1	
No suggestions.	1					
No.					2	
none				1		
None for the time being		1				
Not answered						5
To be able to print to pdf to give it to clients, some don't know how to use a QR code.					1	
We consider that on a visual level it is very good.						2
WHEN DISPLAYING THE RESULTS, THE LAST LINES ARE NOT COMPLETE DUE TO THE ARROWHEAD SHAPE.						1
Grand Total	11	1	3	5	2	9

Question
Do you have any wishes or suggestions for improving the iBRoad2EPC Assistant? please write free text
Count of Answer_2
Row Labels
Maybe assistant should force certifier to write something about the building. 1) In the renovation measures, where the available budget is requested, I should be able to indicate for future scenarios the owners' plan to proceed only with a funding program (and put the percentage of the grant amount and/or the name of the program) 2) In the Mepi module, the platform should not ask to upload the excel file for the scenarios also, as it is not feasible to have recorded consumptions for future operating conditions. 3) In the IEQ module it states that the calculation is done for use per room, but I had to input data of the whole building, without knowing in the end if the file could evaluate the data 1. Why can't the receiver of the project be the same agent to whom the recommendations are addressed? 2. Although I personally found it useful for this project, why is the final energy data requested instead of the primary energy data (as it is in the EPC)? 3. Only one year can be entered for the age of the heating and cooling equipment, what happens when you have equipment of many different years (as it happened to me in this project)? 4. The tool gives problems when putting in investments higher than 20 million € and does not allow to put in energy costs higher than maintenance costs. 5. Perhaps it would be more appropriate to change the term "financing" to "subsidies" in the economic data part.6. If you change the language, it does not change the automated descriptions of the measures. 7. There is no description for slabs in contact with the exterior (only floors and basements).8. There is no possibility of including measures on interior partitions or in vertical in contact with non-habitable spaces.9. There is no possibility of creating measures not listed in any of the existing categories (customised). Some actions of this project that were not included in the predefined ones were:- Application of anti-radiation sheets under the large windows where the fan coils or radiators are usually located.- Specific actions on thermal bridges.- Renovation of the exterior spaces with vegetation.- Distribution changes to improve energy performance.1310. It would be nice to be able to copy a whole step or measure and then work/edit on it.11. Once the project is closed, if I go back to edit the details it always creates a new step in 2024 (my first one is planned for 2025)12. In this project the equipment is mixed (heating, cooling and acs), depending on how I enter the strategies, some of the symbols may not be activated in the final summary. In this case it happens to me with DHW. Wouldn't it be better to define the strategy and then determine which systems are affected?13. In the results document only the symbols for active systems are activated and none for passive systems. There is no symbology for renewables.14. In Step O (Current status) some texts appear that I do not know where they come from and cannot be edited. It would be advisable to be able to enter a summary of the initial conditions of the building.15. The user's influence is in English and it seems that the text is incomplete.16. The date I don't know where it can be edited if it can be edited at all, it seems to be the date of the project's creation on the website.17. In the project details there is a text "image attached" but no image can be attached. A different menu from which you can choose measures, a list as easy to navigate, a search functionable as well as details to note before the measure as well as what already exists and what follows it. Automatically read data from the EPC software or EPC itself It is importante to add a field of notes and observations for the expert. Increase the list of types of improvement measure ("Measure type") Preventthat when we change the title of the improvement measure ("Measure type") the text ("Description") is deleted. To allow to duplicate the project My suggestions regarding the wizard are the following: _The "Measurement type" tab should be able to be filled out by the technician if there is no measurement that matches the ones seen in the drop-down menu. It could be inserted by the technician and he is the one who connects this measurement with one of the symbols that later appear in the diagram of the house for the owners. Likewise, it should be possible to associate a measurement for more than one symbol (e.g. Aerothermal for DHW, heating and cooling). _Automatically load the data from the energy module (current state data and data from different phases) using the xml file exported from the computer program in which the EECs are made. _Cost module: -Create a tool (Excel type or another tab within the wizard) that you can rely on to calculate the costs of the interventions, with updated unit prices of the different systems (SATE, roof insulation, etc.). In this way the costs will be uniform regardless of which technician performs the study. Otherwise, each technician has unit prices from the construction companies they are used to working with and they can vary greatly. At the same time, this tool could give you an idea of what criteria to follow regarding the percentage to apply to maintenance costs with respect to the general intervention, depending on its nature. -Create a tool (Excel type or another tab within the wizard) where when inserting the CEE data, the energy cost per year is automatically calculated, having updated energy cost data at that time. _CAI Module: -Translate Excel into Spanish -Explain the drop-down menus in more detail -Explain how to do each calculation. In several boxes it seems that the module only refers to a room within the home. _SRI Module -Translate Excel into Spanish -Explain in greater detail what each section to be analyzed refers to (providing some examples). The operation of Excel is easy but the content of the parameters to be analyzed is complex and is not explained in a simple way. Perhaps, the part in which the program itself establishes automatic measures to be taken into account in previous phases, when you add a new phase or measure, could create a warning every time one of those automatic texts is generated, so as not to forget its review. RENEWAL MEASURES: COMMENT 1. When editing the measures, they ask for three economic data: maintenance costs, energy-related costs and financing. Should these data to be entered be before the improvement or after? Does the financing refer to the costs of the intervention or to the current aid? COMMENT 2 We find it interesting to be able to offer residents different alternatives within the roadmap that is sent to them, however, the program only allows one variable to be introduced per year. For example: In our building we have proposed a renovation of facilities using a heat pump for the year 2040 and, alternatively, the replacement of the current natural gas boiler with a biomass one. By not being able to offer both options so that the community can choose, we have had to put an intervention in 2040 and another in 2039. COMMENT 3. For DHW there is no biomass boiler option, nor is there the option of DHW + Heating together. For this reason, we propose to introduce one more concept in the drop-down menu with "OTHERS" to be able to add different specificities. This would also serve in the event that the building needs other improvements such as accessibility or improvement of other facilities not related to improving energy efficiency since these are necessary interventions for a complete and real roadmap. IAC (INDOOR AIR QUALITY): COMMENT 1. The Excel is prepared for individual homes since each home has a different orientation and is located on a different floor, so having a sheet of the entire building is imprecise. COMMENT 2. When choosing certain data, it would help to have more precise comments. For example, in the case of the thermostat it is not specified whether its programming is with respect to time or temperature. So when there is a community boiler with time programming, we do not know if it is a programmable thermostat or if it simply does not have a thermostat. COMMENT 3. The prepared Excel does not execute the final grade well. FINAL DOCUMENT: Once the PDF has been downloaded, both the link and the QR have been tested and neither of them work. Renovation costs are hard to estimate in a long-term perspective. Even if they are estimations, building owners use to consider it as "real". This approach may not be the appropriate one. The EQC and SRI calculation tools could already be integrated into iBRoad Assistant so we wouldn't have to download excel files. The menu for selecting measures needs to be improved to make navigation and selection easier. Perhaps sub-menus would be helpful. Some add-on help for final energy demand prices and energy costs in the renovation measures would be useful. Perhaps an info-icon in the context of the field. The default years (2030-2040-2050) should be deleted when entering different years (2025-2032-2035). The summary of steps for all of the categories should be redesigned or made with better visuality in mind. Right now the data is all crammed into small shapes, making it look unattractive. The pop-up tips should be implemented into the assistant - hovering over some text or shape should evoke some tip or explanation. The tool does not allow you to select measures such as heat pump for DHW, only for heating. The options should be expanded and the possibility of proposing measures not included should be left. It was difficult for me to understand the data to enter in "Maintenance costs" (I think it would be better understood as replacement/replacement costs), energy-related costs (I think it would be better to translate it as costs of improvements in energy efficiency) and financing (I think would be better understood as a subsidy). Yes, it could be very useful if the assistant could automatically read data from EPC software or EPC which is already done. You can replace the templates with drop-down menus in real time mode (online only). You can replace the templates with drop-down menus in real time mode(online only). You can replace the templates with drop-down menus.

Question	Do you think iBRoad2EPC is an improvement of the EPC?						
Count of Answer_2	Column Labels						
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain	
For sure iBRoad2EPC is an improvement of the EPC. The idea of showing renovation steps in a simple way along with all of the benefits and costs coming with modernization is a great thing and it certainly would have an impact on building owners on the likelihood of renovation of a building.				1			
In some cases yes.						1	
It gives comprehensible information about stages of renovation and approximate future costs				1			
It's na improvement, but I don't know if the associated costs are justified					2		
Not at the moment				1			
Yes	9	3		1	1	1	10
Yes, and in my opinion it'd be better if it'd be additional option to calculation programs as Audytor OZC, not separate calculation sheets. It would take less time to prepare calculation sheet as all the input data is already in the software. As a user it would be much more convenient if this Calculation tool would be created in cooperation with producers of most popular programs for EPC and it would be an addition to it's functions.				1			
Yes, because it gives the possibility to combine easily different measures and see the effect of them and also to plan the stages of the renovation process.	1						
Yes, especially for the customer where he can see all the renovation plan and the energy performance gains				1			
Yes, recommendations are tailored				1			
Yes. It adds renovation steps, future energy demand and potential costs.				1			
Yes. It gives a long-term perspective.					2		
Yes. The benefits are that the owner could prepare a long term plan for building renovation without having to incur unnecessary expenses	1						
Grand Total	11	3	7	6	2	2	10

Question	Do you think that the iBRoad2EPC already contains all necessary indicators and inputs to provide an added value to owners/users or would you like to add more indicators / inputs to iBRoad2EPC?					
Count of Answer_2	Column Labels					
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain
Agree very much				2		
Enough inputs						2
Extremely agree				1		
I propose adding entries or indicators to the iBRoad2EPC						1
I propose adding entries or indicators to the iBRoad2EPC: introduce economic indicators (payback in years)						1
I propose adding entries or indicators to the iBRoad2EPC: Other indicators that have nothing to do with energy efficiency could appear in a separate tab, such as an accessibility and fire protection indicator with possible interventions to improve them and why sometimes combine the works Accessibility with the intervention of facades is the best solution, either to obtain greater subsidies or for example if the expansion of the communications core is necessary, to avoid carrying out the SATE of the facade prior to the extension.						1
I propose to add entries or indicators to the iBRoad2EPC:						2
I propose to add entries or indicators to the iBRoad2EPC:- SOME REFERENCE TO IMPROVED COMFORT / HEALTH- SOME REFERENCE TO IMPROVED ACOUSTIC- SOME REFERENCE TO HOUSING REPRECIATION- SOME REFERENCE TO AMORTIZATION OF INVESTMENT						1
I propose to add inputs or indicators to the iBRoad2EPC			1			
It contains all necessary indicators						2
Somewhat agree				1		
The inputs in iBRoad2EPC are sufficient					6	2
The inputs in iBRoad2EPC are sufficient.	14		2			
Yes				6		
Grand Total	14	3	3	10	6	10

Question	For which building types do you think iBRoad2EPC is most suitable						
Count of Answer_2		Column Labels					
Row Labels		Bulgaria	Greece	Poland	Portugal	Romania	Spain
no						17	8
Buildings for culture							1
Multi-family houses						4	1
Office buildings						3	
Other building types							2
Public buildings						1	
Semi-detached house						4	1
Single apartment units						2	1
Single-family houses						3	1
Sports buildings							1
Yes		93	20	34	13	14	68
Buildings for culture		7	2	1			1
Buildings for research and education		10	2	2			2
Health and care buildings		10	2	1			2
Multi-family houses		14	2	7		1	1
Office buildings		10	3	3		1	2
Other building types		3	1				
Public buildings		13	3	2		2	2
Semi-detached house		7	1	8		3	1
Single apartment units		2	1	4		2	1
Single-family houses		10	2	5		4	1
Sports buildings		7	1	1			1
Grand Total		93	20	34	30	22	68

Question	How should the iBRoad2EPC be connected						
Count of Answer_2		Column Labels					
Row Labels		Bulgaria	Greece	Poland	Portugal	Romania	Spain
As a voluntary addition to the EPC		7	1	3	4		7
Mandatory for certain building types		7	1	2	2		2
Mandatory with every EPC		1	1	1		1	1
Not coupled with the EPC as a voluntary energy consulting					1		
Grand Total		15	3	7	7	6	10

Question	Was the Handbook helpful for you when you created the iBRoad2EPC ?					
Count of Answer_2		Column Labels				
Row Labels		Bulgaria	Greece	Poland	Portugal	Romania Spain
Helpful		5	2	5		8
I did not use the handbook				1	5	1
Less helpful				1		
Very helpful		9	1			2 1
Grand Total		14	3	7	5	2 10

Count of Answer_2	
Row Labels	
easy to use	
_It is a simple, intuitive and fast program. _Helps the technicians who carry out the energy improvement study of buildings to synthesize and organize the information collected and the rehabilitation strategy studied. _Helps the technicians who will carry out the rehabilitation works of the building in the future to analyze the improvements that are proposed in each step and the why and technical characteristics of the same. _Modules can be added easily as the need arises to provide more information about the building. _Provides information in a very visual way. Technicians can rely on this program to make building owners understand in a simple way the most appropriate rehabilitation strategy for their building. _It is a good way to inform both technicians and building owners of the different milestones that buildings will have to meet in the coming years for total decarbonization by the year 2050.	
1.The graphical preview of the different renovation steps.	
2.Very simple way to add and describe each renovation measure.	
3.The systematic way on which energy class, energy consumption and emissions are presented.	
Easy edit data for energy measures, edit current building state and renovation steps	
Easy edit data for energy measures, edit current building state and renovation steps.	
easy to use interface, readability	
I find the graphical interface very interesting with the description of the proposed step-by-step measures.	
I like the iBRoad2EPC Assistant, it is useful tools	
I think that the global idea is good and the layout are well done. It just need some more detailed information sometimes	
I think the iBRoad2EPC Assistant must be enhanced, adapted, and modernised to accommodate the future needs of building users.	
Intuitive, easy to use, well summarised information, pre-set recommendations and their automation, reduced editing time	
It is an easy to use tool and at the same time enables to have a first overview of the current state and the measures planned. Very interesting the modules of IEQ and SRI, although we could not use them for this first project.	
It is easy to download and use the Excel template. It is also nice that all of the data implemented and calculated within Excel are (after uploading) displayed on the page. It makes all of the process less time-consuming. Also, automated description text blocks for measures are a pleasant thing to see. Most of the time they are well written and could be directly applied to the renovation step without a need to edit.	
It is easy to edit the fields, the automated responses cover a wide field of possibilities.	
It is easy to fill out and its organization allows us to remember to fill in all the fields required.	
IT IS INTUITIVE AND ROBUST FOR YOUR ONLINE WORK	
It is user friendly.	
It was easy to operate and nicely looking.	
It's easy to work with.	
Overall quite easy to use, the end result easy to read and understand. After a first use it seems to be heading in a good direction.	
Simple and comprehensible interface, easiness of entering data	
Simplicity and ease of presenting the results to a stakeholder who is not an expert in the field of energy efficiency and emission reduction in buildings.	
The data entry part in the online tool is simple and intuitive. It is a very correct and useful tool to produce an intuitive and easy-to-understand report for owners, which helps or assists the explanation that we can give to the community as technicians. It would be nice to be able to download the results also as a PDF report, organized in an easy-to-understand manner (at least the main aspects of the proposed improvement measures), to be able to offer it to sectors of the population that find online review complicated.	
The easiness to use.	
The graphical presentation of energy calculations that the owner often does not understand	
The iBRoad2EPC is easy to use, works well and don't block	
The possibility to describe easily the renovation measures and use predefined texts	
The user interface and the ease of completing the steps. The comprehensive description of the intervention proposals	
Easy-to-use and friendly environment. The grouping of steps and smooth transition at each step of the process.	
The foresight of supplementary works to be carried out before, alongside or after an energy upgrading measure	
That it helps me to compile the energy recommendations with ready-made texts and normative values	
Grand Total	

Question
What did you not like about the iBRoad2EPC Assistant? please write free text
Count of Answer_2
Row Labels
The NAME of the program is not simple, especially so that the owners of the buildings can remember it. It could have a name related to the building rehabilitation strategy that is what the wizard consists of. The following errors have been detected in the program: -The section in which to insert the photograph of the building has not been found. -In the tab for filling in the project details where the year of the thermal generators is indicated, in the case of multi-family buildings with individual installations it is not possible to fill in this information because each home has a generator from a different year. -The section has not been found in which to modify the recommendations that are given to the owners in the last tab. -It does not allow a facility measure to be related to more than one element. For example, in the installation of aerothermal heat pumps it is wanted to specify that they are for heating, DHW and cooling and this has not been possible. In the document that is extracted, only the heating symbol is marked in green. We have not found a way to mark the 3 elements with the same improvement. -When you finish entering the maintenance costs and those related to energy and exit the improvement measure, the maintenance cost data appears in the 2 cells. When generating the iBRoad2EPC it is corrected and in the document that the owners see it is correctly placed. Image is attached: -The measurement search engine (where it says search when searching in the drop-down menu) does not work -CAI Module: The "ventilation" tab does not load correctly on the meter. Automated responses normally do not have the option to be edited, so if we did not find the option we were looking for, the title ends up being incorrect. A selection such as "other" is needed to allow specifying another type of improvement measure, for example. For the SRI-EIQ-MEPI standards : make it clear whether in the SRI-EIQ-MEPI calculations, the usable or the total surface area of the building is used. In the SRI-EIQ-MEPI calculations, there should be a manual for the electrical/electronic systems, for the non- mechanical engineers. The EIQ is limited to 90 m2 per room - perhaps a generalisation option for the building would be helpful. Also, the location of the tc_summer_comfort should be corrected in the template, and it should also match with the winter. In general, a translation of the terminology would help to make it clear what the measures refer to. There should be some automatic options (e.g. changing of windows --> acoustic upgrading). Furthermore, dates up to the current year for the registration of consumption should be added - there are only up to 2021, and if the period is 2022-2023-2024 the result returns div/0!. Data source in tables & assumptions are missing. I like the iBRoad2EPC Assistant, it is useful tools INITIALLY, WHEN I GOT THE RESULTING DOCUMENT, I FOUND THE RESULT EXTREMELY SIMPLE AS IT ONLY SHOWED THE HOUSES AND A SUMMARY OF THE MEASUREMENT... UNTIL I CLICKED ON THEM AND ACCESSED THE DETAILED RESULTS. MAYBE IT'S JUST ME BUT MAYBE IT WOULD BE USEFUL TO SHOW IN SOME WAY THAT YOU NEED TO CLICK ON THE HOUSES TO GET THE DETAIL. OVERALL, I LIKED IT. It could be useful to be able to dump some data directly from calculation programs such as CE3X, instead of transcribing it, although we understand that each technician and country uses different tools and this would be complicated. The Excel templates of the added tools (CAI and SRI), in addition to not yet being in Spanish, which makes them difficult to understand when it comes to more technical aspects and vocabulary, is difficult to use without a guide that explains step by step the tabs and boxes that need to be filled out and how to interpret the data. From our point of view, the most attractive thing about the iBRoad2EPC Assistant is the ease of online data entry, with drop-down menus and clarity as to what data to enter. The added tools should follow this same concept, instead of an editable Excel template with so much information. It does not allow proposing measures that are not provided in the drop-down menu. Limited list of improvement measures to select from ("Measure type") When we change the title of the improvement measure ("Measure type") the text ("Description") is deleted. It's not possible to duplicate the project Maybe the necessity to download templates. Maybe the need to download templates and fill them separately. On-site visit template, the summary of steps (altogether too cramped, lack of visibility of details of renovation steps), lack of helping tips/non-intuitive interface. Some irregularities that occurred (possible bugs) such as in a project the IEQ tool was not displayed and I could not to fill it in. Some small problems like search not working, weird loading of SRI at some point (possibly my fault, I didn't realize) Text suggested by assistant should be selected for specific building situation. It is too common. That the owner does not perceive the work behind it The iBRoad2EPC Assistant is useful tools, I like it. The iBRoad2EPC Assistant is very well organised. However, regarding the investments, the part "repairs and maintenance" didn't visualize correctly. The lack of more detailed information This tool seems to be developed for simpler intervention projects where actions are planned in complete steps. In more complex cases it might be a bit short, but I fully understand that the usefulness of this tool is not intended for more technical audits but for assessments of a standard energy certificate and the improvement measures proposed therein.
Grand Total

Question	What would you consider a reasonable additional cost for the iBRoad2EPC if combined with the EPC?						
Count of Answer_2	Column Labels						
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain	
Free of charge	2			1			1
More than 200% surcharge on the EPC costs			1				
Up to 100% surcharge on the EPC costs	3		1	1	2	1	4
Up to 200% surcharge on the EPC costs			1	1			
Up to 25% surcharge on the EPC costs	7			5	1		3
Up to 60% surcharge on the EPC costs	2			2	1	1	3
Grand Total	14	3	3	10	4	2	11

Question	What would you consider the most important added value of iBRoad2EPC for your clients?						
Count of Answer_2	Column Labels						
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain	
Basic information about a building renovation plan for your building/apartment	9			7	5		9
Basic information about future legal requirements and renovation measures to fulfil them	7		2	1	2	2	1
Early preparation for future renovation measures	9		1	4	2		6
Grand Total	25	3	3	12	9	2	16

Question	Which improvements would you suggest for the handbook?
Count of Answer_2	
Row Labels	
I didn't see the manual. Exist?	
More information with details about how to fill in the data in excel correctly, less screenshots from the website.	
The cost and energy module is explained at the end when in reality you have to do it while defining the rehabilitation strategy. They could be in the same order as the program or warn that they are explained at the end of it	
The information where not presented in a very transparent way in my opinion	
The programme was really easy to use so I didn't really need to use it, although I did ask a few loose questions about some of the issues raised in point 21 but found no answer.	
To be translated in Greek	
Very helpful	
Grand Total	

Question
Which other features would you consider useful to include? please write free text
Count of Answer_2
Row Labels
_Energy module: -Add the letter regarding the consumption of non-renewable primary energy next to the emissions letter so that the owners are aware of the improvement in this regard. Add a small explanation of the difference between the two indicators. -Next to the total energy consumption indicator, include the NON-RENEWABLE primary energy consumption indicator so that the owners are aware of the improvement in this regard. _Be able to indicate in some way the actions that have already been carried out so that if there is a new owner in the building, they are aware of the type of rehabilitation that has been done so far and the interventions that remain to be carried out for the decarbonization of the building. building. This update should be carried out by the technician who undertakes each of the rehabilitation interventions at the time the end-of-work documentation is delivered. A free text option to perhaps enter some assumptions made with the price of energy etc., should be available A section could be added for work deadlines and interventions for each of the phases. or measurements, as well as the considerations to be taken into account by the property in view of the incidence of certain measures on housing. Example: -SATE installation in building: 8 months. To take into account: Scaffolding on the façade work phases. -Complete intervention of air conditioning and ventilation installations: 1 year. To keep in mind account: Clearings and other modifications will be made to the home for correct integration of the facilities and their elements, which will impact a necessary interior reform in homes: floors, walls and ceilings. Adding for CO2 emissions online calculation tool, based on national regulatory note for each country in EU- in Tons per year. CO2 emissions online based calculation on national regulatory note for each country in EU- in Tons per year. I don't remember anything else. I THINK IT WOULD BE INTERESTING TO TALK ABOUT THE IMPROVEMENT OF COMFORT AS THE DIFFERENT STAGES OF REHABILITATION ARE IMPLEMENTED. IMPROVING COMFORT IS GOOD FOR HEALTH. IMPROVING WINDOWS AND INSULATION IN ADDITION TO THE THERMAL IMPROVEMENT MEANS AN ACOUSTIC IMPROVEMENT... I WOULD ALSO SEE SOME REFERENCE TO THE AMORTISATION OF THE INVESTMENT AS INTERESTING. It might be interesting to be able to view the section on Costs and Energy together. It would be helpful if the excel worksheets were translated Maybe after a long use I could come up with proposals, for the moment I have not. On my opinion the information included is sufficient.
Grand Total

	Would you recommend the iBRoad2EPC to colleagues?					
Question						
Count of Answer_2	Column Labels					
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain
I do not know				2		
I do not think so				7	2	2
Yes, but only if improvements are realised	3					
Yes, definitely	11	3		1	4	2
Grand Total	14	3	10	6	2	10

	Would you recommend the iBRoad2EPC to your clients?					
Question						
Count of Answer_2	Column Labels					
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain
I do not know				3		
I do not think so				4	2	1
Yes, but only if improvements are realised	6	1				
Yes, definitely	8	2		3	4	1
(blank)						10
Grand Total	14	3	10	6	2	10

Question

Do you have any suggestions for improving the blank template for the iBRoad2EPC on-site visit? Please write free text

Count of Answer_2

Row Labels



A "comments" column for general notes/references would be helpful. Space for autopsy date is needed. Perhaps tick boxes for the interventions would be helpful.

Incorporate energy generation and blank spaces for possible measures.

It would be beneficial to remake the template for the on-site visit, e.g. to make renovation steps the main thing to focus on. Perhaps it should be in the form of the list with renovation steps as titles with all of the information needed to fill for iBRoad2EPC as a reminder at the end of the document.

Its usefulness is not in question as feedback:

-a printer friendly version

-sometimes I found insufficient space to note some details (although it's nice to have everything on one A4 page)

-assuming that most of the time a CPE is also prepared together with the use of the iBRoad2EPC wizard, it would probably be useful to have a more detailed and common data entry sheet for the existing building for the wizard and CPE preparation (probably every auditor has one prepared by him, but something uniform would not be bad).

no

Some explanation could be added about the evaluation criteria for each row or element. Example: in what sense is the question asked about the occupants and how this point can affect the analysis of the building's possibilities.

THE DATA IN THE TEMPLATE ARE DIFFICULT TO FILL IN ON THE SPOT: SOME ARE SEARCHED FOR IN ADVANCE AND OTHERS ARE THE RESULT OF LATER REFLECTION. IN MY VIEW, A SPECIFIC TEMPLATE WOULD NOT BE NECESSARY: IF ANYTHING, THERE SHOULD BE AN ADDITIONAL COLUMN IN THE ONE REQUIRED FOR ENERGY CERTIFICATION, WHERE SOME CONSIDERATION OF THE PHASED RENOVATION OF THE BUILDING CAN BE NOTED.

This template could be combined with a slightly more extensive one that can be used to collect the data necessary to prepare the energy certificate of the building from which the different rehabilitation phases will be carried out. This template can have the following elements: _Type of building by floors _Number of homes and their typologies (to know how many homes in the building it is necessary to measure to calculate the useful habitable surface of the building) _Characteristics of the envelope -Orientation, composition and thickness of facades -Definition of upper enclosure (slab in contact with storage rooms, roof, etc.) -Definition of lower enclosure (slab, first floor slab in contact with NH premises, slab in contact with sanitary chamber, etc.) -Windows (materials of the frame and glass for each home and neighbors especially interested in changing the windows) _Characteristics of the facilities -Type of DHW and heating generator per home (year, performance, power and neighbors especially interested in changing the generator) On the other hand, also It is important to collect information on possible pathologies in the building for a correct rehabilitation strategy. Therefore, in the definition of the envelope and the facilities, a box could appear where you can mark if they have any pathology (dampness on façades and roofs, peeling on façade coverings, poor condition of roof tiles, etc.). In this way, in the first phase of rehabilitation, priority will be given to the rehabilitation of the elements of the building that present pathologies. For this there could also be a box where you can mark whether the building has ITE and, if so, what pathologies are described in the report. Finally, in addition to these templates, it would be appropriate to bring a sheet to the visit in which the community is simply informed of what the assistant consists of, what it is for the residents of the building and how they can access the same when the improved CEE is delivered to them.

To include every dwelling or type of dwelling in the template

To include internal partitions among spaces with different uses; existence of smart systems to register and monitor water/energy consumption.

We could add some blank spaces for building address and other specific info, not only building envelope and systems.

Grand Total

	have past experience with any energy auditing tools? If yes which?					
Question						
Count of Answer_2	Column Labels					
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain
Audytor ozc				3		
CE3X						3
CE3X, CEE3, Cypetherm, Ecotect and Design Builder						1
CE3X, PHPP						2
EAB – Energy Analysis of Buildings software	1					
EAB Software	1					
EAB Software HC. 1.0 developed by TU-Sofia , and adapted to Bulgarian ordinances for Energy efficiency.						
EECalc Software version 1.0.0 1269 developed by SEDA, Bulgaria.	1					
EAB Software HC. 1.0 developed by TU-Sofia , and adapted to Bulgarian ordinances for Energy efficiency. EECalc Software version 1.0.0 1269 developed by SEDA, Bulgaria.	2					
EAB Software HC. 1.0 developed by TU-Sofia, and adapted to Bulgarian ordinances for Energy efficiency. EECalc Software version 1.0.0 1269 developed by SEDA, Bulgaria.	1					
ENSI Keynumber software by ENSI Norway;						
EAB Software HC. 1.0 developed by TU-Sofia , and adapted to Bulgarian ordinances for Energy efficiency.						
HAP 4.70 with ASHRAE methodology;						
EECalc Software version 1.0.0 1269 developed by SEDA, Bulgaria.	1					
ENSI, EAB Software	1					
Hourly Analysis Program - Software					1	
Mostly excel calculations				1		
National EPC software – EECalc SEDA; ENSI software	1					
National EPC tool – EECalc SEDA; ENSI software, certified by Sustainable Energy Development Agency within the Ministry of Energy	1					
national software				1		
no				1	1	
No, only the Bulgarian national software during the training for auditors	1					
No.						
No. I've just used the Bulgarian national software during the education process for energy auditor.	1					
Not answered						3
Specific training by ADENE as “Energy Auditors for Residential Buildings”						
“TOOLS” per se: drone and photogrammetry, Flir camera, 360 camera, Bosch 120C laser with Bluetooth connection to display in-picture measurements						
Software:						
EnergyPlus family (E+, OpenStudio, ...)						
Ecotect						
BIM to BEM: Revit + GBxml or IFC						
Algorithm Aided Design: Rhino + Grasshopper + (Climate Studio, Ladybug, ...)					1	
To perform calculations of energy audits of buildings I used Excel, but for modelling, I used the software Audytor OZC. In this software, one can create a model of a building and issue an EPC for a whole building or for a certain space within it.				1		
With first Ibroad tool and national energy audit software				1		
Yes, associated to norm UNE EN 16247						1
Yes, Polish computer programs called Audytor OZC and Arcadia						
TermoCAD				1		
Yes. I use the Itecons tool					2	
Yes. In buildings and Industry					2	
Yes: All Energy Clădiri, All Energy Apartamente, Energ +						1
Yes: DOSET-PEC						1
No			3			
Grand Total	12	3	9	7	2	10

For how many years are you an EPC issuer?					
Question					
Count of Answer_2	Column				
Row Labels	Bulgaria	Poland	Portugal	Romania	Spain
10 years	2				4
12 years	4				1
14 years	1			1	
15 years	1			1	1
2 years	1	2			1
3 years	2	1			
8 years	1				
I'm just certified as an issuer.	1				
I've just passed a certification course	1				
More than 10 years				2	
(blank)					
Grand Total	14	3	4	1	6

Question	For what kind of building types have you issued EPCs?					
Count of Answer_2	Column Labels					
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain
Administrative buildings						
Multi-family buildings						
Buildings for education	1					
All of those in the range of PQ1:						
_SFH						
_MFH						
_Small shops and commerce						
_Under 1000 sqm buildings					1	
Apartments, houses, multi-family residential buildings and small shops					1	
Detached houses						
Apartment buildings						
Office buildings				1		
Detached houses						
Office buildings				1		
Large non-residential buildings						
Mainly residential						1
Mosly all kind of buildings						
-Multifamily buildings						
-Hotels						
-Schools						
-Office	1					
Mostly all kind of buildings						
-Multifamily buildings						
-Hotels						
-Trade buildings						
-Schools						
-Dormitories						
-Office	1					
Multi-family buildings, Office buildings, Health buildings, Care buildings, School buildings, Public buildings	1					
Multi-family buildings, Schools, Kindergartens, Office buildings, Sports buildings, Residential buildings and Health and care buildings	1					
Residential, tertiary						1
residential				1		4
Residential Buildings, Apartment Buildings, Commercial Buildings, Offices, Medical offices, Hospitals, University Buildings, School Buildings, Museums, Cinemas, Sports Buildings			1			
Residential buildings, educational buildings, kindergartens, hospitals, sanitarium	1					
Residential Buildings, Hotels, Commercial Buildings			1			
Residential, industrial, offices, shopping malls and other				1		
Residential, public, comercial						3
Residential, tertiary						1
Schools and offices					2	

Question	For what kind of building types have you issued EPCs?					
Count of Answer_2	Column Labels					
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain
Schools, Kindergartens, Office buildings, Sports buildings, Residential buildings and Health and care buildings.	1					
Schools, Kindergartens, Office buildings, Sports buildings, Residential buildings and Health and care buildings	1					
Single Family Buildings, Apartments, Apartment Buildings (with 20 apartments maximum), School Buildings (Kindergartens), Commercial Buildings, Offices, Small hotels		1				
Single family buildings, multi-family buildings, Apartments, Office buildings, Educational buildings (universities, schools), health and care buildings (hospital), sports building (sports hall)				1		
Single family houses						
Multi-family houses						
Office buildings				2		
Single-family buildings and apartments					2	
Single-family buildings, apartments in multi-family buildings (new and existing), multi-family buildings, office buildings, educational buildings, health care buildings						1
Single-family buildings, apartments in multi-family buildings (new and existing), new multi-family buildings						1
Single-family buildings, Multi-family buildings, Office buildings, Health and care buildings, School buildings, Buildings for culture	1					
Single-family buildings, Multi-family buildings, Office buildings, Health and care buildings, School buildings, Kindergartens, Sports buildings	2					
Singlefamily houses						
Multifamily houses				1		
Singlefamily houses						
Multifamily houses						
Offices				1		
Single-family houses						
Multi-family houses						
Warehouses				1		
Two-family buildings, Multi-family buildings, Office buildings, Administrative building	1					
Grand Total	12	3	10	6	2	10

Question	Have you considered multiple variants of the Renovation plan						
Count of Answer_2		Column Labels					
Row Labels		Bulgaria	Greece	Poland	Portugal	Romania	Spain
No, for this building, there is only one sensible way of renovation		7		1	2		
No, I did not take different variants into account		2			2		
Yes, on my initiative, I discussed different renovation variants with the building owner/user during the on-site visit		3		2	5	6	2
Yes, the building owner/user asked me to compare various renovation options for his building		2			1	1	
Grand Total		14		3	10	7	2

Question	rate the usability of the following features within the iBRoad2EPC Assistant						
Count of Answer_2		Column Labels					
Row Labels		Bulgaria	Greece	Poland	Portugal	Romania	Spain
Create new measure		14	3	10	6	2	10
Extremely easy		4	1		2		5
Slightly easy		3			2		1
Somewhat easy		2	1	1			
Very easy		5	1	7	4	2	4
(blank)							
Create new renovation step		14	3	10	5	2	10
Extremely easy		5	2	1	1		6
Slightly easy		3		1			
Somewhat easy		4	1	2			
Very easy		2		6	4	2	4
(blank)							
Edit building (general building data)		14	3	10	3	2	10
Extremely easy		4	2	2		1	8
Somewhat easy		1		1			
Very easy		9	1	7	3	1	2
(blank)							
Edit current building state		14	3	10	5	2	10
Extremely easy		3	2	1	1		6
Somewhat easy		1	1	3			
Very easy		10		6	4	2	4
(blank)							
Navigation through the iBRoad2EPC Assistant in general		14	3	10	6	2	10
Extremely easy		4	1		2		4
Slightly easy					1		2
Somewhat easy		5		3			
Somewhat easy							
Very easy		5	2	6	3	2	4
(blank)							
Show plan preview for building owner/user		14	3	10	6	2	10
Extremely easy		5	2				3
Slightly easy				4			1
Somewhat easy		3		2			
Somewhat easy							
Very easy		6	1	4	5	2	6
(blank)							
Grand Total		84	18	60	31	12	60

	How do you rate the usability of the indoor environmental quality tool within the iBRoad2EPC					
Question						
Count of Answer_2	Column Labels					
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain
Comprehension of the displayed results within the						
iBRoad2EPC output page	14	3	10	6	2	4
Extremely easy		1			1	1
Somewhat easy	5		4	3	1	
Very easy	9	2	6	3		3
(blank)						
Download of the Excel template						
	14	3	10	6	2	8
Extremely easy	12	3	5	4	2	6
Very easy	2		5	2		2
(blank)						
Upload of the Excel template						
	14	3	10	7	2	5
Extremely easy	8	3	5	4	2	2
Somewhat easy	2					
Very easy	4		5	3		3
(blank)						
Working with the Excel template						
	14	3	10	6	2	7
Extremely easy	1					
Not easy	1					2
Somewhat easy	8	2	6	3		5
Very easy	4	1	4	3	2	
(blank)						
Grand Total	56	12	40	25	8	24

Question	How do you rate the usability of the Smart Readiness Indicator tool within the iBRoad2EPC Assistant						
Count of Answer_2		Column Labels					
Row Labels		Bulgaria	Greece	Poland	Portugal	Romania	Spain
Comprehension of the displayed results within the							
[-] iBRoad2EPC output page		14	3	10	6	2	4
Extremely easy		4	1			1	
Not easy							1
Slightly easy				1			1
Somewhat easy		3		4	3	1	1
Very easy		7	2	5	3		1
[-] Download of the Excel template		14	3	10	6	2	8
Extremely easy		12	3	6	4	2	5
Slightly easy				1			
Very easy		2		3	2		3
[-] Upload of the Excel template		14	3	10	6	2	4
Extremely easy		12	3	4	4	2	2
Slightly easy				1			
Somewhat easy				1			
Very easy		2		4	2		2
[-] Working with the Excel template		14	3	10	6	2	8
Extremely easy		1					
Not easy							5
Slightly easy		2		4			1
Somewhat easy		7	2	3	5	1	2
Very easy		4	1	3	1	1	
Grand Total		56	12	40	24	8	24

Question		How long did it take to calculate the energy performance certificate with your calculation software?					
Count of Answer_2		Column Labels					
Row Labels		Bulgaria	Greece	Poland	Portugal	Romania	Spain
1 hour					2		
10 hours			1		1		1
12 hours			1				
1-3 hours / project							1
16 hours					1		
2 hours				1	3		1
2 hours/per apartment							
2,5 hours							2
20 hours			1				
24 hours			1				
3 hours			4		2		1
4 hours			3				
4 hours (THE BUILDING HAD 90 DIFFERENT WINDOWS)							1
5 hours			1				
6 hours						1	1
8 hours					1		1
Data was obtained during visits from various months							1
It have been already calculated by a colleague.			1				
It was already calculated by a colleague (blank)			1				
Grand Total			14	1	10	1	2
							9

Question	How long did it take to create future renovation steps and calculate them with the calculation software?					
Count of Answer_2	Column Labels					
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain
3 hours						
1 hour		2		1		
1,5 hours						2
10 hours		1				
16 hours						1
2 hours		1	1	3		2
20 hours			1		2	
24 hours aprox						1
3 hours		1		3	1	
4 hours		1				2
48 hours						1
5 hours		3		2		
6 hours		1				
8 hours		2	1	1	1	1
Already done by a colleague		1				
less than 1 hour / project						1
The steps have been already done by a colleague.		1				
(blank)						
Grand Total		14	3	10	4	2
						10

Question	How long did the processing in the iBRoad2EPC Assistant take?					
Count of Answer_2	Column Labels					
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain
1 hour		4		5	2	3
1,5 hours				1		1
1,5 hours/Apartment						
12 hours				1		
1-2 hours / project (excluding IEQ and SRI), probably times will be much less with experience using the tool.						1
2 hours		3	1	1		1
3 hours				1		
4 hours			1	1		2
5 hours		2				
6 hours		1				
8 hours		1			1	
(blank)		3	1			3
Grand Total		14	3	10	2	2
						10

Question	How many EPCs have you issued as a certified issuer in total?					
Count of Answer_2	Column					
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain
0					2	
1						1
5		1				
7		1		2		
10		1		2		
15		1				
18					2	
30		1				1
40				1		
50				1	2	3
60						1
90		1				
100				2		2
120		3				
147		1				
150				1		1
160		1				
180					1	
200				1		
2390					1	
7900						1
24		1				
1200			1			
242			1			
500			1			
10000						1
80						1
Grand Total		12	3	10	8	2

Question	What is your field of education?					
Count of Answer_2	Column					
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain
0					1	
Architecture		1			2	10
Electrical engineering		2				
Engineering (construction)			1	8	2	
Mechanical engineering		11	1		3	1
Other			1	1		
physics				1		
Technical building equipment						1
Grand Total		14	3	10	8	2

What is your level of EPC certification?						
Question						
Count of Answer_2	Column					
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain
0					1	
-						1
a certified EPC issuer		3				
I took part in the iBRoad2EPC training prior to field testing iBRoad2EPC			1			
1,2 (positive)						1
1,2 (positive)						1
2,3 (positive)						1
3 answers positive						6
a certified EPC issuer		4				
a certified EPC issuer, take part in the iBRoad2EPC training				10		
a certified EPC issuer; take part in the iBRoad2EPC training prior to field testing iBRoad2EPC		1				
a certified EPC issuer; take part in the iBRoad2EPC training prior to field testing iBRoad2EPC		1				
a certified EPC issuer; train to become an EPC issuer; take part in the iBRoad2EPC training prior to field testing iBRoad2EPC		5				
Certified EPC issuer.						
Took part in the iBRoad2EPC training prior to field testing iBRoad2EPC						2
certified EPC issuer; train to become an EPC issuer; take part in the iBRoad2EPC training prior to field testing iBRoad2EPC					7	
I am a certified EPC issuer; I took part in the iBRoad2EPC training prior to field testing iBRoad2EPC			1			
I am a certified EPC issuer; I took part in the iBRoad2EPC training prior to field testing iBRoad2EPC			1			
Grand Total	14	3	3	10	8	2
						10

Question	What was your experience with using the iBRoad2EPC Assistant					
Count of Answer_2	Column Label					
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain
I could work with the IBRoad2EPC Assistant only after I got help from the hotline					2	1
1					2	
Yes						1
I could work with the IBRoad2EPC Assistant, but it needed much time to understand				3		2
1				3		
Yes						2
I did not understand the IBRoad2EPC Assistant				1		
1				1		
I needed some time to get used to the IBRoad2EPC Assistant but had no major problems	13	3		5	1	6
1	13			3	1	
x IBRoad2EPC assistant at first was pretty difficult to use due to no hints, but after some time one can get used to it.				1		
x The options are not always clear. There should be a information tab that pops up when you place the mouse cursor on the specific text. And an option to view a more detailed information after pressing F1						
While choosing the renovations it is not always easy to find the wanted item				1		
Yes		3				6
The IBRoad2EPC Assistant was easy to use	2	1		2	1	4
1	1			2		
Yes		1			1	4
x	1					
Grand Total	15	4		11	1	3
						13

Question	For what reasons and to what extent was the on-site visit useful to you as energy expert?					
Count of Answer_2	Column					
Row Labels	Bulgaria	Greece	Poland	Portugal	Romania	Spain
Other	5	2	1		1	4
Extremely useful		1				2
Not useful		1				
Somewhat useful				1		
Very useful	5				1	2
To assess the indoor environmental quality of the building	14	3	8	6		8
Extremely useful	5	1	1	3		3
Slightly useful						1
Somewhat useful	4	1	5			2
Very useful	5	1	2	3		2
To assess the smart readiness of the building	14	3	8	6		5
Extremely useful	2	1		3		3
Not useful			1			
Somewhat useful	3	2	6			2
Very useful	9		1	3		
To collect information about possible renovations in the future	14	3	8	6		10
Extremely useful	10	2	4	6		1
Somewhat useful			1			1
Very useful	4	1	3			8
To collect qualitative and quantitative information about the current building state	12	3	8	6		10
Extremely useful	6	3	2	6		5
Somewhat useful			2			
Very useful	6		4			5
To draw a first sketch of a renovation plan on the blank template	14	3	8	6		10
Extremely useful		1	3	2		4
Somewhat useful	2	1	2			2
Very useful	12	1	3	4		4
To explain the concept and benefits of a long term renovation plan to the building owner	14	3	8	6		10
Extremely useful	5	1		2		6
Slightly useful						1
Somewhat useful	5	1	3	2		
Very useful	4	1	5	2		3
To sketch together with the building owner their long term renovation plan	13	3	8	6		8
Extremely useful	2	1		2		4
Slightly useful						1
Somewhat useful	4	1	5	2		3
Very useful	7	1	3	2		
To understand the building owners' needs	14	3	8	6		10
Extremely useful	10	1		2		3
Somewhat useful			4	2		
Very useful	4	2	4	2		7
Grand Total	114	26	65	48	1	75

Question		If iBRoad2EPC was combined with an EPC issuance how much additional time did it take above the time for the EPC			
Count of Answer_2		Column Label			
Row Labels		Bulgaria	Poland	Romania	Spain
0,5 hour					2
1 hour			2	3	
2 hours			1	2	2
3 hours				2	
4 hours			3		
5 hour			1		
5 hours			1		
6 hours			1	2	1
7 hours			1		
8 hours					2
Same time for data collection					1
Grand Total			10	9	2
					8

Question

please explain improvements or benefits compared to the EPC

Count of Answer_2

Row Labels

In some cases yes, especially public buildings lack a renovation direction that can be found here. A series of measures that come together, that lead to a certain objective and from which measures can be taken in a phased and informed way even if they come from different funding funds with different guidelines. It details and complements somewhat the recommendations contained in the energy certificate and I think it can be a useful and attractive tool for beneficiaries of energy advice.

It is an amazing tool, as it gives the owner a clear picture of the steps and benefits of the renovation. It prepares subsequent stages and prevents construction failures. It is a useful step-by-step renovation guide. It is dynamic and incorporates modifications and changes. It will constitute a radical application in the construction industry.

It is an improvement of EPC to a large extent, because it is more explanatory on how to implement the energy upgrading of buildings.

It provides steps and organises a future renovation by presenting the corresponding results in steps.

You can replace the templates with drop-down menus (online only).

You can replace the templates with drop-down menus in real time mode (online only).

You can replace the templates with drop-down menus in real time mode(online only).

Grand Total

Question		What type and number of buildings did you field test iBRoad2EPC on? Did you combine the issue of an EPC with the iBRoad2EPC field test?					
Count of Answer_2		Column Labels					
Row Labels		Bulgaria	Greece	Poland	Portugal	Romania	Spain
Buildings for culture with EPC			2				
1			2				
(blank)							
Buildings for culture without EPC							
(blank)							
Buildings for research and education with EPC		3	3			1	
1		3	3			1	
(blank)							
Buildings for research and education without EPC		1			7		
1		1			7		
(blank)							
Health and care buildings with EPC							
(blank)							
Health and care buildings without EPC							
(blank)							
Multi-family buildings with EPC		1			6	1	4
1		1			6	1	4
(blank)							
Multi-family buildings without EPC		1					
1		1					
(blank)							
Office buildings with EPC		3				1	
1		3				1	
(blank)							
Office buildings without EPC							
(blank)							
other building types with EPC		2	4				
1		2	4				
(blank)							
other building types without EPC		1					
1		1					
(blank)							
Single apartment units with EPC					4		
1					4		
(blank)							
Single apartment units without EPC							1
1							1
(blank)							
Single-family buildings with EPC						2	
1						2	
(blank)							
Single-family buildings without EPC							1
1							1
(blank)							
Sports buildings with EPC		1					1
1		1					1
(blank)							
Sports buildings without EPC							
(blank)							
Two family buildings with EPC							3
1							3
(blank)							
Two family buildings without EPC							
(blank)							
Grand Total		13	9	10	7	5	10

Annex 5 - Questionnaire for building owners attending the field test

Background Data

1 To which of the following age categories do you belong?	
18 - 20	☐
21 - 29	☐
30 - 39	☐
40 - 49	☐
50 - 59	☐
60 or older	☐

2 Please enter your gender.	
Male	☐
Female	☐
Non-binary	☐
Prefer not to say	☐

3 What is your level of education?	
Lower school degree	☐
High school graduation or equivalent	☐
Studies without a degree	☐
Bachelor's degree	☐
Master's degree	☐
PhD degree	☐

4 Which of the following terms describes your status best?	
Property Manager	☐
Building owner	☐
Apartment owner	☐
Tenant	☐
Other <i>Please write free text</i>	☐

Your building

The following questions refer to the building which the iBRoad2EPC was issued for. If you contributed with more than one building to the field test, please fill in one survey per building.

5 What type and number of buildings were field tested? Was the field test combined with the issue of an EPC? If yes for which/how many buildings? Multiple answers possible.		
Building type	Number	Combined with the issue of an EPC (y/n)
Single-family buildings		
Two family buildings		
Multi-family buildings		
Single apartment units		
Office buildings		
Buildings for research and education		
Health and care buildings		
Buildings for culture		
Sports buildings		
other building types		

6 If the answer to question 5 was “single-family house” or “multi-family house”: Are you a resident of the building?	
Yes	☐
No	☐

7 If the answer to question 5 was “public building”, was the building open to the public or run by a public authority?	
Open to public	☐
Run by public authorities	☐

8 How much floor area does your building/apartment have in total?
_____ m ²

9 What is the building's year of construction?

10 Since when have you owned/managed the building/apartment?

11 Were there any renovations conducted in previous years with the intention of decreasing energy consumption? If applicable, please note the year of the renovation on the right.

Multiple answers possible.

None	☐
Insulation of outer walls	_____
Insulation of the roof	_____
Insulation of the uppermost ceiling	_____
Insulation of cellar ceiling, floor or walls	_____
Installation of more efficient windows	_____
Installation of a more efficient heating system	_____
Installation of a more efficient hot water system	_____
Installation of a more efficient ventilation system	_____
Installation of a more efficient cooling system	_____
Installation of a photovoltaic system	_____
Installation of a solar thermal system	_____
Other <i>please write free text</i>	_____
_____	_____

12. What is the most important reason for a renovation for you?					
	Extremely appropriate	Very appropriate	Somewhat appropriate	Less appropriate	Not appropriate
Saving energy cost	☐	☐	☐	☐	☐
Short payback periods on the investments	☐	☐	☐	☐	☐
Good cost-effectiveness	☐	☐	☐	☐	☐
Pending maintenance of the building	☐	☐	☐	☐	☐
Improvement of the indoor climate and well-being	☐	☐	☐	☐	☐
Increase of the building value	☐	☐	☐	☐	☐
High quality	☐	☐	☐	☐	☐
Upgrade of the house to a modern standard	☐	☐	☐	☐	☐
Extension of the living space	☐	☐	☐	☐	☐
Contribution to climate protection	☐	☐	☐	☐	☐
Plan for retirement years	☐	☐	☐	☐	☐
Independence from fossil fuels	☐	☐	☐	☐	☐
Fulfilment of legal requirements	☐	☐	☐	☐	☐

Exterior appearance of the building	☐	☒	☐	☐	☐
Other:	☐	☐	☐	☐	☐

13. What is your technical background with respect to building renovation?	
I am well informed about building renovation and modernisation.	☐
I have a sound understanding of building renovation but not in detail.	☐
I have only basic understanding of building renovation.	☐
I have almost no technical background with respect to building renovation.	☐

14. What is your perspective on professional audits within the realm of renovation? <i>Multiple answers possible.</i>	
I would always ask for professional advice.	☐
I had concerns about an on-site energy audit.	☐
I do not need a professional audit because I have comprehensive information on the subject of renovation.	☐
I do not need a professional audit because I know energy experts personally.	☐
I do not trust professional consultants.	☐

The following questions refer to the on-site visit.

One of the primary prerequisites of the iBRoad2EPC approach is the execution of an on-site visit. Consequently, an energy expert conducted the initial on-site visit to your building/apartment.

15. How long did the first visit of the energy expert in your building last?
_____ hours

16. For what reasons and to what extent do you consider the visit of the energy expert useful for you?	Extremely useful	Very useful	Somewhat useful	Less useful	Not useful
For the energy expert to explain to us the context, added value, benefits and obligations for renovation and how iBRoad2EPC can support in this process.	☐	☐	☐	☐	☐
To exchange with the energy expert information about the current building state	☐	☐	☐	☐	☐
To exchange with the energy expert information about possible renovations in the future	☐	☐	☐	☐	☐
To explain to the energy expert our particular needs and possibilities					
To receive, through the energy expert, information about possible legal requirements in the future.	☐	☐	☐	☐	☐
To understand the concept and benefits of a long term renovation	☐	☐	☐	☐	☐
To sketch together with the energy expert the buildings' long term renovation plan	☐	☐	☐	☐	☐
To understand the status of indoor environmental quality of the building	☐	☐	☐	☐	☐

To understand the concept of the smart readiness of the building	☐	☐	☐	☐	☐
To understand how to plan, finance and execute renovations	☐	☐	☐	☐	☐
Other:	☐	☐	☐	☐	☐

The following questions refer to the iBRoad2EPC for your building(s).

Following the on-site visit, the energy expert issued your iBRoad2EPC. You have received the iBRoad2EPC for your building from your energy expert.

17. How satisfied are you with the following characteristics of the iBRoad2EPC?	Extremely satisfied	Very satisfied	Somewhat satisfied	Slightly satisfied	Not satisfied
Comprehensibility of the Renovation plan	☐	☐	☐	☒	☐
Appearance of the icons representing the technical equipment	☐	☐	☐	☐	☐
Appearance of the symbols representing the building envelope	☐	☐	☐	☐	☐
Information for the building owner/user	☐	☐	☐	☐	☐

18. Did you understand the graphical display of....	Understood extremely well	Understood very well	Understood somewhat well	Understood slightly well	Not understood
... not implemented measures	☐	☐	☐	☐	☐
...already implemented measures	☐	☐	☐	☐	☐
...measures implemented in the current renovation step	☐	☐	☐	☐	☐

19. How useful do you consider the following content of the iBRoad2EPC?	Extremely useful	Very useful	Some-what useful	Slightly useful	Not useful
Overview page	☐	☐	☐	☐	☐
Detailed description of single renovation steps	☐	☐	☐	☐	☐
Details of renovation steps - description of preparation measures	☐	☐	☐	☐	☐
Details of renovation steps - renovation costs	☐	☐	☐	☐	☐
Details of renovation steps - technical details and notes	☐	☐	☐	☐	☐
Details of renovation steps - energy demand	☐	☐	☐	☐	☐
Future regulations - information about possible future legal requirements	☐	☐	☐	☐	☐
Rating of Indoor Environmental Quality (IEQ)	☐	☐	☐	☐	☐
Rating of Smart Readiness (SRI)	☐	☐	☐	☐	☐

20. How do you rate the indoor environmental quality assessment?	
Extremely easy to understand	☐
Very easy to understand	☐
Somewhat easy to understand	☐
Less easy to understand	☐
Not easy to understand	☐

21. How do you rate the Smart Readiness Indicator assessment?

Extremely easy to understand	☐
Very easy to understand	☐
Somewhat easy to understand	☐
Less easy to understand	☐
Not easy to understand	☐

22. Which other features would you consider useful to include? *please write free text*

[illegible]

23. To what extent do you agree with the following statements?	Extremely agree	Agree very much	Some-what agree	Slightly agree	Disagree
The iBRoad2EPC is useful and informative for the building owner/user.	☐	☐	☐	☐	☐
The iBRoad2EPC is easy to understand, clear and transparent for the building owner/user.	☐	☐	☐	☐	☐
The iBRoad2EPC looks appealing for the building owner/user.	☐	☐	☐	☐	☐
The iBRoad2EPC provides the building owner/user with an outline of a long-term renovation plan for their building.	☐	☐	☐	☐	☐
The iBRoad2EPC enables and motivates the building owner/user to realise concrete renovation measures.	☐	☐	☐	☐	☐
The iBRoad2EPC will help the building owner/user to avoid misinvestments.	☐	☐	☐	☐	☐

24. Do you think that the iBRoad2EPC already contains all necessary indicators and inputs to provide an added value to owners/users or would you like to add more indicators / inputs to iBRoad2EPC?

The inputs in iBRoad2EPC are sufficient.	☐
I propose to add inputs or indicators to the iBRoad2EPC:	☐

25. Do you have any suggestions for improving the content of iBRoad2EPC?

Please write free text.

26. Do you have any suggestions for improving the presentation of iBRoad2EPC?

Please write free text.

27. How should the iBRoad2EPC be connected to the regular EPC?

Mandatory with every EPC	☐
Mandatory for certain building types	☐
As a voluntary addition to the EPC	☐
Independent from the EPC as an optional energy consultation	☐

28. What is your opinion regarding the inclusion of the iBRoad2EPC through a QR code at the end of the EPC?

Easy to use	☐
-------------	--------------------------

Further questions

31. For which building types do you think iBRoad2EPC is most suitable? <i>Multiple answers possible.</i>	
Single-family building	☐
Two family building	☐
Multi-family buildings	☐
Single apartment unit	☐
Public buildings	☐
Office buildings	☐
Buildings for research and education	☐
Health and care buildings	☐
Buildings for culture	☐
Sports buildings	☐
Other building types	☐

32. What would you consider the most important added value of iBRoad2EPC for you?	
Basic information about a building renovation plan for your building/apartment	☐
Basic information about future legal requirements and renovation measures to fulfil them	☐
Early preparation for future renovation measures	☐
Further added value <i>Please write free text</i>	

33. What would you consider a reasonable additional cost for the iBRoad2EPC if combined with the EPC?	
Free of charge	☐
Up to 25 % surcharge on the EPC cost	☐

Up to 60 % surcharge on the EPC cost	☐
Up to 100 % surcharge on the EPC cost	☐
Up to 200 % surcharge on the EPC cost	☐
More than 200 % surcharge on the EPC cost	☐

34. Would you recommend the iBRoad2EPC to other building owners/colleagues?	
Yes, definitely	☐
Yes, but only if improvements are realised	☐
I do not think so	☐
No, definitely not	☐
I do not know	☐

Annex 6 – Answers from building owners attending the field test

Question	What type and number of buildings were field tested? Was the field test combined with the issue of an EPC? If yes for which/how many buildings? Multiple answers possible.				
Count of Answer_2	Column Labels				
Row Labels	Bulgaria	Poland	Portugal	Romania	Spain
Office buildings with EPC	3			1	1
1	3			1	1
Single-family buildings with EPC				2	
1				2	
Sports buildings without EPC					1
1					1
Buildings for research and education with EPC	4			1	
1	4			1	
Multi-family buildings with EPC	1	8		1	6
1	1	8		1	6
Multi-family buildings without EPC	1				
1	1				
Office buildings without EPC					1
1					1
Other building types with EPC	3		1		
1	3		1		
Other building types without EPC	1				
1	1				
Sports buildings with EPC	1				
1	1				

Question	If the answer to question 5 was "single-family house" or "multi-family house": Are you a resident of the				
Count of Answer_2	Column Labels				
Row Labels	Bulgaria	Poland	Portugal	Romania	Spain
(blank)	13	8	2	5	10
Did not answer	11	1	1	2	5
No		3	1	1	1
Yes	2	4		2	4

Question	If the answer to question 5 was "public building", was the building open to the public of run by a public authority?				
Count of Answer_2	Column Labels				
Row Labels	Bulgaria	Poland	Portugal	Romania	Spain
(blank)	13	8	2	5	10
0	2	8	1	3	9
Open to public	7				
Open to public; Run by public authorities			1		
Run by a public authority					1
Run by public authorities	4			2	

Question	What is the building's year of construction?					
Count of Answer_2	Column Labels					
Row Labels		Bulgaria	Poland	Portugal	Romania	Spain
(blank)		13	8	2	5	9
1909		1				
1912		1				
1925		1				
1930				1		
1935			1			
1942						1
1956			2			
1957		1	1			
1960						1
1961						1
1965			1		2	
1967		1	1			1
1969						1
1970					1	
1971		1				1
1973		1				1
1978		1				
1982		3				
1992			1			
1993		1				
2000						1
2002		1				
2004					1	
2008					1	
2014						1
1960/1970				1		
before 1939			1			

Question		Were there any renovations conducted in previous years with the intention of decreasing energy consumption? If applicable, please note the year of the renovation on the right.				
Count of Answer_2	Column Labels	Bulgaria	Poland	Portugal	Romania	Spain
Installation of a more efficient cooling system		13	8	2	5	10
0		13	8		5	9
2012						1
No				2		
Installation of a more efficient heating system		13	8	2	5	10
0		10	5		4	10
1970			1			
1990			1			
2006			1		1	
2009		1				
2010		1				
2011		1				
No				2		
Installation of a more efficient hot water system		13	8	2	5	10
0		13	3		3	10
1970			1			
1990			1			
2006			1		1	
2009			1			
2010			1			
2013					1	
No				2		
Installation of a more efficient ventilation system		13	8	2	5	10
0		13	8		5	9
2012						1
No				2		
Installation of a photovoltaic system		13	8	2	5	10
0		13	8		5	10
No				2		
Installation of a solar thermal system		13	8	2	5	10
0		13	8		5	10
No				2		
Installation of more efficient windows		13	8	2	5	10
0		5	6		3	8
1		1				
2000		1	1			
2004		1				
2005			1			
2006					1	
2007		1				
2009		1				
2011		1				
2015		1				
2015 (partially)					1	
I canNot point to a specific year. Since most owners have independently carried out replacement of windows in apartments in different years		1				
In some dwellings						2
No				2		
Insulation of cellar ceiling, floor or walls		13	8	2	5	10
0		13	7		5	10
2001			1			
No				2		
Insulation of outer walls		13	8	2	5	10
0		10	4	1	4	10
2002			1			
2008			1			
2009		1				
2010			1			
2011		1				
2014			1			
2008 (partially)					1	
I canNot point to a specific year. Since most owners have insulated the outer walls of their apartment themselves in different years.		1				
No				1		
Insulation of the roof		13	8	2	5	10
0		12	4		4	10
2004			1			
2006			1			
2009			1			
2010					1	
2011		1				
2014			1			
No				2		
Insulation of the uppermost ceiling		13	8	2	5	10
0		13	6		4	10
2005			1			
2006			1			
2010						1
No					2	
No renovations in previous years with the intention of decreasing energy consumption		13	8	2	5	10
0		13	7		3	5
1				1	2	
No					1	
Yes					1	
Other renovation measures		13	8	2	5	10
0		13	8		5	10
No					2	

	What is the most important reason for a renovation for you?					
Question						
Count of Answer_2	Column Labels					
Row Labels		Bulgaria	Poland	Portugal	Romania	Spain
[-] Contribution to climate protection		13	8	2	5	7
Extremely appropriate		8	1	2		2
Less appropriate			2			
Not appropriate						1
Somewhat appropriate			4		1	
Very appropriate		5	1		4	4
[-] Extension of the living space		11	8	2	5	6
Extremely appropriate		1	1			
Less appropriate			1			3
Not appropriate		10			1	1
Somewhat appropriate			4	2	3	1
Very appropriate			2		1	1
[-] Exterior appearance of the building		13	8	2	5	7
Extremely appropriate		4	2			
Less appropriate						2
Not appropriate		1				
Somewhat appropriate			2	1	1	1
Very appropriate		8	4	1	4	4
[-] Fulfilment of legal requirements		13	8	2	5	7
Extremely appropriate		5	2	1		3
Less appropriate						1
Not appropriate		1				
Somewhat appropriate		1	3		1	1
Very appropriate		6	3	1	4	2
[-] Good cost-effectiveness		13	8	2	5	10
Somewhat appropriate					1	
Very appropriate		13	8	2	4	10
[-] High quality		13	8	2	5	6
Extremely appropriate		6	2			2
Somewhat appropriate		1		1	1	
Very appropriate		6	6	1	4	4
[-] Improvement of the indoor climate and well-being		13	8	2	5	7
Extremely appropriate		4	1	1		4
Less appropriate			2			
Somewhat appropriate		1	4			1
Very appropriate		8	1	1	5	2
[-] Increase of the building value		13	8	2	5	7
Extremely appropriate			1			3
Less appropriate		4				
Not appropriate		4				
Somewhat appropriate		3	1	2	2	
Very appropriate		2	6		3	4
[-] Independence from fossil fuels		13	8	2	5	7
Extremely appropriate		2	1		1	3
Less appropriate		1	2			1
Not appropriate		3	1			
Somewhat appropriate		2	1		1	
Very appropriate		5	3	2	3	3
[-] Other reasons		4	6			
Not appropriate		4	6			
[-] Pending maintenance of the building		12	8	2	5	5
Extremely appropriate		3	2	1	1	3
Less appropriate		2	1			
Not appropriate		2				
Somewhat appropriate		3	3			1
Very appropriate		2	2	1	4	1
[-] Plan for retirement years		11	8	2	5	6
Extremely appropriate		1				
Less appropriate		1	1		1	
Not appropriate		8	7		1	
Somewhat appropriate		1		2	2	2
Very appropriate					1	4
[-] Saving energy cost		13	8	2	5	9
Extremely appropriate		12	4	2	2	3
Somewhat appropriate					1	2
Very appropriate		1	4		2	4
[-] Short payback periods on the investments		13	8	2	5	8
Extremely appropriate		1	2	1	1	1
Less appropriate		2				1
Somewhat appropriate		8	3		1	4
Very appropriate		2	3	1	3	2
[-] Upgrade of the house to a modern standard		13	8	2	5	7
Extremely appropriate		7	2	1		1
Less appropriate		1				
Not appropriate		1				1
Somewhat appropriate		3	2	1	2	1
Very appropriate		1	4		3	4

	What is your technical background with respect to building renovation?					
Question						
Count of Answer_2	Column Labels					
Row Labels		Bulgaria	Poland	Portugal	Romania	Spain
(blank)		13	8	2	5	9
I am well informed about building renovation and moderni		6		1	3	6
I have a sound understanding of building renovation but nc		4	3	1	2	
I have almost no technical background with respect to building renovation.			2			
I have only basic understanding of building renovation		3	3			3

	What is your perspective on professional audits within the realm of renovation? Multiple answers possible					
Question						
Count of Answer_2	Column Labels					
Row Labels		Bulgaria	Poland	Portugal	Romania	Spain
I do not need a professional audit because I know energy experts personally.			1			1
1			1			1
I had concerns about an on-site energy audit.			2	1		1
1			2	1		1
I would always ask for professional advice.	13	5	2		5	7
1	13	5	2		5	

	How long did the first visit of the energy expert in your building last?					
Question						
Count of Answer_2	Column Labels					
Row Labels		Bulgaria	Poland	Portugal	Romania	Spain
(blank)		13	8	2	5	10
0		1		2		1
1			1			2
2			6			2
3			1			
3,5						2
4						1
6						1
1 hour					1	
2 hours		1			2	
3 hours		1				
3-4 hours					1	
4 hours		4			1	
5 hours		1				
6 hours		1				
8 hours		4				
Some visits were done during the audit						1

	For what reasons and to what extent do you consider the visit of the energy expert useful for you?					
Question						
Count of Answer_2	Column Labels					
Row Labels		Bulgaria	Poland	Portugal	Romania	Spain
For the energy expert to explain to us the context, added value, benefits and obligations						
☒ for renovation and how iBRoad2EPC can support in this process.		13	8	1	5	9
Extremely useful		6	2		2	7
Less useful						1
Somewhat useful			2		1	
Very useful		7	4	1	2	1
☒ Other reasons		4	7			
Not useful		4	7			
To exchange with the energy expert information about possible renovations in the future						
☒ renovations in the future		13	8	1	5	8
Extremely useful		1	3		3	3
Less useful						1
Somewhat useful		1				
Very useful		11	5	1	2	4
To exchange with the energy expert information about the current building state						
☒ current building state		13	8	1	5	8
Extremely useful		7	1		3	4
Somewhat useful			3			1
Very useful		6	4	1	2	3
☒ To explain to the energy expert our particular needs and		10	8	1	5	8
Extremely useful		4	2	1	2	4
Less useful						1
Somewhat useful			1			
Very useful		6	5		3	3
To receive, through the energy expert, information about possible						
☒ possible		13	8	1	5	8
Extremely useful		3	2		1	2
Less useful						2
Somewhat useful		2	3		1	
Very useful		8	3	1	3	4
To sketch together with the energy expert the buildings' long term renovation plan						
☒ term renovation plan		13	8	1	5	8
Extremely useful		3	3		3	3
Less useful			1			
Not useful			1			1
Somewhat useful		2				
Very useful		8	3	1	2	4
☒ To understand how to plan, finance and execute renovations		8	8	1	5	8
Extremely useful		4			3	4
Not useful		1				1
Somewhat useful			2			1
Very useful		3	6	1	2	2
☒ To understand the concept and benefits of a long term		12	8	1	5	8
Extremely useful		6	2		2	3
Less useful						1
Somewhat useful		2	1			
Very useful		4	5	1	3	4
☒ To understand the concept of the smart readiness of the building		13	8	1	5	8
Extremely useful		2			1	3
Less useful		1	1			
Not useful		1	2			2
Somewhat useful		1	2	1		
Very useful		8	3		4	3
☒ To understand the status of indoor environmental quality of the		12	8	1	5	8
Extremely useful		2			1	2
Less useful		1	2			
Not useful			2			1
Somewhat useful			2	1		
Very useful		9	2		4	5

Question	How satisfied are you with the following characteristics of the iBRoad2EPC?					
Count of Answer_2	Column Labels					
Row Labels		Bulgaria	Poland	Portugal	Romania	Spain
[-] Appearance of the icons representing the technical equipment		13	8	2	5	7
Extremely satisfied		4				
Slightly satisfied			1			
Somewhat satisfied		2	3			3
Very satisfied		7	4	2	5	4
[-] Appearance of the symbols representing the building envelope		13	8	2	5	6
Extremely satisfied		4	1			
Slightly satisfied			1			
Somewhat satisfied			2	1		2
Very satisfied		9	4	1	5	4
[-] Comprehensibility of the Renovation plan		13	8	1	5	6
Extremely satisfied		5	1		1	1
Slightly satisfied						1
Somewhat satisfied			3			2
Very satisfied		8	4	1	4	2
[-] Information for the building owner/user		13	8	2	5	7
Extremely satisfied		3	3		1	
Slightly satisfied						1
Somewhat satisfied		1	2	1		1
Very satisfied		9	3	1	4	5

Question	Did you understand the graphical display of...					
Count of Answer_2	Column Labels					
Row Labels		Bulgaria	Poland	Portugal	Romania	Spain
▢...already implemented measures		13	8	1	5	7
Understood extremely well					1	1
Understood slightly well			1			
Understood somewhat well			3	1		1
Understood very well		13	4		4	5
▢...measures implemented in the current renovation step		13	8	1	5	7
Understood extremely well		1	2		2	1
Understood slightly well			1			
Understood somewhat well			2	1		1
Understood very well		12	3		3	5
▢...not implemented measures		13	8	2	5	7
Understood extremely well			1		1	1
Understood slightly well		2				
Understood somewhat well			4	1		1
Understood very well		11	3	1	4	5

Question	How useful do you consider the following content of the iBRoad2EPC?					
Count of Answer_2	Column Labels					
Row Labels		Bulgaria	Poland	Portugal	Romania	Spain
Description of preparation measures		13	8	2	5	7
Extremely useful		4	2		1	1
Not useful						1
Slightly useful						1
Somewhat useful		3	1			1
Very useful		6	5	2	4	3
Detailed description of single renovation steps		13	8	2	5	7
Extremely useful		4	3		1	1
Not useful						1
Somewhat useful		2	1			1
Very useful		7	4	2	4	4
Energy demand		13	8	2	5	7
Extremely useful		4	2		1	1
Not useful						1
Slightly useful						1
Somewhat useful		3	3	1	1	
Very useful		6	3	1	3	4
Information about possible future legal requirements		13	8	1	5	7
Extremely useful		3	2			1
Not useful						3
Slightly useful		3	1			
Somewhat useful		3	5		2	1
Very useful		4		1	3	2
Overview page		13	8	2	5	8
Extremely useful			3		1	2
Not useful						1
Somewhat useful		3	1			2
Very useful		10	4	2	4	3
Rating of the Indoor Environmental Quality (IEQ)		13	8	2	5	3
Extremely useful		3				
Not useful		1	2			1
Slightly useful		1	3	1		
Somewhat useful		3	2		1	2
Very useful		5	1	1	4	
Rating of the Smart Readiness Indicator (SRI)		13	8	2	5	3
Extremely useful		3				
Not useful			4			2
Slightly useful		3	2	1	1	
Somewhat useful		2	1		2	1
Very useful		5	1	1	2	
Renovation costs		13	8	2	5	5
Extremely useful		4	3			1
Not useful						2
Somewhat useful				1	1	
Very useful		9	5	1	4	2
Technical details and notes		13	8	2	5	7
Extremely useful		1	4	1		1
Not useful						1
Slightly useful						1
Somewhat useful		1				1
Very useful		11	4	1	5	3

Question	How do you rate the indoor environmental quality assessment?					
Count of Answer_2	Column Labels					
Row Labels		Bulgaria	Poland	Portugal	Romania	Spain
(blank)		13	8	2	5	2
Extremely easy to understand				1		
Less easy to understand		1	1	1		
Not easy to understand		1				
Somewhat easy to understand		2	5		1	2
Very easy to understand		9	2		4	

Question	How do you rate the Smart Readiness Indicator assessment?					
Count of Answer_2	Column Labels					
Row Labels		Bulgaria	Poland	Portugal	Romania	Spain
(blank)		13	8	2	5	1
Less easy to understand		1	3			
Not easy to understand			2			
Somewhat easy to understand		4	1		2	1
Very easy to understand		8	2	2	3	

Question	To what extent do you agree with the following statements?					
Count of Answer_2	Column Labels					
Row Labels		Bulgaria	Poland	Portugal	Romania	Spain
The iBRoad2EPC enables and motivates the building owner/user to realise concrete renovation measures.		13	8	2	5	8
Agree very much		3	3	2	2	1
Disagree						1
Extremely agree		5			1	2
Slightly agree			2		2	3
Somewhat agree		5	3			1
The iBRoad2EPC is easy to understand, clear and transparent for the building owner/user.		13	8	2	5	8
Agree very much		8	5	1	3	2
Disagree						1
Extremely agree		3		1	2	1
Slightly agree						1
Somewhat agree		2	3			3
The iBRoad2EPC is useful and informative for the building owner/user.		13	8	2	5	8
Agree very much		9	6	2	3	2
Disagree						1
Extremely agree		3	1		1	1
Slightly agree						2
Somewhat agree		1	1		1	2
The iBRoad2EPC looks appealing for the building owner/user.		13	8	2	5	8
Agree very much		5	6	1	2	4
Disagree						1
Extremely agree		5	1	1	1	1
Slightly agree		1			1	1
Somewhat agree		2	1		1	1
The iBRoad2EPC provides the building owner/user with an outline of a long-term renovation plan for their building.		13	8	2	5	8
Agree very much		1	4	1	3	3
Disagree						1
Extremely agree		10	1	1	2	2
Somewhat agree		2	3			2
The iBRoad2EPC will help the building owner/user to avoid misinvestments.		13	8	2	5	8
Agree very much		8	4	1	3	2
Disagree						3
Extremely agree		5				
Slightly agree					1	1
Somewhat agree			4	1	1	2

Question	Do you think that the iBRoad2EPC already contains all necessary indicators and inputs to provide an added value to owners/users or would you like to add more indicators / inputs to iBRoad2EPC?					
Count of Answer_2	Column Labels					
Row Labels		Bulgaria	Poland	Portugal	Romania	Spain
(blank)		13	8	2	5	10
0						5
Enough						3
I propose to add inputs or indicators to the iBRoad2EPC:				1		
Information on accessibility						1
Substitution of changeover to LEDs; Modernisation of electric motors in the building (ventilation, pumping, etc.) such as incorporation of frequency variators.						1
The inputs in iBRoad2EPC are sufficient		13		1		
The inputs in iBRoad2EPC are sufficient.			8		5	

Question	How should the iBRoad2EPC be connected to the regular EPC?					
Count of Answer_2	Column Labels					
Row Labels		Bulgaria	Poland	Portugal	Romania	Spain
(blank)		12	8	3	5	8
As a voluntary addition to the EPC		5	3	1	2	6
Independent from the EPC as an optional energy consultation		1	4		1	1
Mandatory for certain building types		1		2	2	1
Mandatory with every EPC		5	1			

Question	What is your opinion regarding the inclusion of the iBRoad2EPC through a QR code at the end of the EPC?					
Count of Answer_2	Column Labels					
Row Labels		Bulgaria	Poland	Portugal	Romania	Spain
(blank)		13	8	2	5	10
0						3
Easy to use		10	3	2	1	4
I did not realise there was a QR						1
I did Not realise there was a QR code		2			2	
I faced minor problems scanning the QR code		1	3			
I think that it is unnecessary to attach the digital version of the iBRoad2EPC in this manner			2		2	
Minor issues when scanning the QR (directed to another page)						1
Not necessary to attach the digital version						1

Question	Which method of presentation do you favour for the iBRoad2EPC?					
Count of Answer_2	Column Labels					
Row Labels		Bulgaria	Poland	Portugal	Romania	Spain
(blank)		13	8	2	5	10
0						2
Online						3
Online and physical						2
Online presentation (as currently implemented)		9	1		1	
Online presentation and printed document		3	4	2	3	
Physical document						3
Printed document		1	3		1	

Question	For which building types do you think iBRoad2EPC is most suitable? Multiple answers possible					
Count of Answer_2	Column Labels					
Row Labels		Bulgaria	Poland	Portugal	Romania	Spain
Buildings for culture		7	2		2	3
1		7	2			
Yes					2	3
Buildings for research and education		6	2	1	3	3
1		6	2			
Yes				1	3	3
Health and care buildings		6	2	1	4	3
1		6	2			
Yes				1	4	3
Multi-family houses		8	7	2	3	7
1		8	7			
Yes				2	3	7
Office buildings		8	6	1	3	5
1		8	6			
Yes				1	3	5
Other building types		1	1			1
1		1	1			
Yes						1
Public buildings		8	4	1	4	4
1		8	4			
Yes				1	4	4
Single-family house		5	8	2	3	5
1		5	8			
Yes				2	3	5
Sports buildings		6	2	1	2	3
1		6	2			
Yes				1	2	3
Apartments		6	3	2	1	3
1		6	3			
Yes				2	1	3
Semi-detached house		5	8	2	2	4
1		5	8			
Yes				2	2	4

Question	What would you consider the most important added value of iBRoad2EPC for you?					
Count of Answer_2	Column Labels					
Row Labels		Bulgaria	Poland	Portugal	Romania	Spain
(blank)		17	8	2	8	7
Basic information about a building renovation plan for your build		10	4		5	4
Basic information about future legal requirements and renovatix		1			2	1
Early preparation for future renovation measures		6	4	2	1	2

Question	What would you consider a reasonable additional cost for the iBRoad2EPC if combined with the EPC?				
Count of Answer_2	Column Labels				
Row Labels	Bulgaria	Poland	Portugal	Romania	Spain
=(blank)	13	8	2	5	6
Free of charge	4		1	1	1
Up to 25% surcharge on the EPC cost	5	2			3
Up to 60% surcharge on the EPC cost	2	2	1	1	
Up to 100% surcharge on the EPC cost	2	4		1	1
Up to 200% surcharge on the EPC cost				2	1

Question	Would you recommend the iBRoad2EPC to other building owners/colleagues?				
Count of Answer_2	Column Labels				
Row Labels	Bulgaria	Poland	Portugal	Romania	Spain
=(blank)	12	8	2	5	8
I do not know		3		1	
I do not think so		2			1
Yes, but only if improvements are realised	3	2	1		3
Yes, definitely	9	1	1	4	4

Annex 7 - Questionnaire for pilot country partners after the field test

Questions on recruitment process of the energy experts attending the iBRoad2EPC field test

- When and where did you recruit the experts that attended the field test?
- Which (digital and analogue) channels did you use to reach out to experts across the country?
- How many issuers showed interest in attending the field test?
 - By which parameters did you choose the attending experts if there were more experts interested than needed
- Did you face any obstacles during the recruitment process?
 - If yes, which and how did you overcome them?

Questions on the recruitment of the buildings/building owners attending the iBRoad2EPC field test

- When and where did you recruit the buildings that were assessed during the field test?
- Did you include buildings into the field test that were not proposed by the chosen energy experts?
- Did you face any obstacles during the recruitment process?
 - If yes, which and how did you overcome them?

Questions on your perspective on the iBRoad2EPC field test as a pilot country partner

- Do you have general remarks on the procedure of the field test, e.g. technical problems during the test, accessibility of the tools etc.?
- Do you consider the field test and its results helpful for the further implementation of iBRoad2EPC in your country e.g. following NAC meetings? If yes, why?
- Do you consider the field test and its results helpful for the software implementation of iBRoad2EPC in your country? If yes, why?
- Do you consider the field test helpful for a future implementation of iBRoad2EPC training in your country?
- Did the attending energy experts or buildings owners ask you for support during the field test, e.g. via hotline, email, ... ?
- Did you face and obstacles during the field test that were not foreseen or thought of? What can we learn from that to prepare for implementation in other countries?

Annex 8 - Answers from Pilot country partners

Spain

Recruitment of energy experts

- When and where did you recruit the experts that attended the field test?

The 10 experts who carried out the field test were part of the 25 who showed interest in participating in iBRoad2EPC training. These experts were first recruited from among GBCe's VERDE evaluators, and, to complete, technicians participating in a rehabilitation program in Vitoria were called, connected via Ensanche 21, the office in charge of municipal rehabilitation in Vitoria.

- Which (digital and analogue) channels did you use to reach out to experts across the country?

Via mail and phone calls

- How many issuers showed interest in attending the field test?

12

- By which parameters did you choose the attending experts if there were more experts interested than needed

To select 10 of these 12, we prioritized the 7 who completed the 4 hours of training on the day it was given, and the other 3 selected were the ones who coincided by the preference location they had chosen in relation to the buildings to study.

- Did you face any obstacles during the recruitment process?

No

- If yes, which and how did you overcome them?

Recruitment of buildings/building owners

- When and where did you recruit the buildings that were assessed during the field test?

3 buildings were offered by GBCe's VERDE evaluators, who themselves were going to study in the Field Test, and the other 7 were offered by Ensanche 21, the office in charge of municipal rehabilitation in Vitoria.

- Did you include buildings into the field test that were not proposed by the chosen energy experts?

7 edificios fueron propuestos por Ensanche 21, y ellos mismos nos pusieron en contacto con técnicos que participaban con ellos en programas de rehabilitación.

- Did you face any obstacles during the recruitment process?

No

- If yes, which and how did you overcome them?

General feedback

- Do you have general remarks on the procedure of the field test, e.g. technical problems during the test, accessibility of the tools etc.?

Everything has worked well in terms of use of the tool, and the doubts that have arisen have been resolved without any major problems.

- Do you consider the field test and its results helpful for the further implementation of iBRoad2EPC in your country e.g. following NAC meetings? If yes, why?

Yes, we have received contributions to adjust the tool and make sense according to reality, considering the vision of the building owner and the energy expert.

Respect to the NAC, more indirectly once the improvements derived from this testing are collected and shared at the next joint meeting.

Looking ahead to its future implementation, the tool has generally had good reactions; A crucial aspect will be to define an exploitation strategy appropriate to the value provided by the tool (price of the service, alliances for its continuity, etc...). In this sense, after the successive delay in the approval of the EPBD, it is assumed that soon we will begin the moment of transposition of two tools with great impact on the Assistant (Passport Renewal and Digital Registration), which will undoubtedly draw the framework of this exploitation strategy.

- Do you consider the field test and its results helpful for the software implementation of iBRoad2EPC in your country? If yes, why?

Yes, it has helped many people go through all the fields and inconsistencies can be detected with respect to how things work in each country.

On the other hand, in this first test of the Assistant, the integration with other existing tools for data entry automation could not be implemented. The line of work for a future implementation involves linking the Assistant with the official CEE software as well as with existing and future databases; in such a way that existing information and process efficiency can be improved, without duplicating the work of technicians.

- Do you consider the field test helpful for a future implementation of iBRoad2EPC training in your country?

Yes, if it involves an improvement of the assistant, an adaptation of the training is also required and having the perspective of the practical use of the tool the training will be much more precise.

- Did the attending energy experts or buildings owners ask you for support during the field test, e.g. via hotline, email, ...?

Yes, through calls and email, some doubts have arisen that have been resolved quickly

- Did you face and obstacles during the field test that were not foreseen or thought of? What can we learn from that to prepare for implementation in other countries?

It would be useful to comment on the more purely logistical problems of convincing the communities of homeowners to have their building participate, since it implied that the auditor would visit their home, make an appointment, etc. Otherwise there have been no major obstacles.

For future projects, the difficulty that renovation processes pose at a social level could be taken into account, in order to have a budget for communication and citizen participation.

On the other hand, the current moment and the Zaramaga neighbourhood in particular, as it is one of the districts identified as priorities for its renovation, is marked by aid from the NEXT funds. Carrying out a parallel project where an analysis and technical proposal is made, but which in principle will not be executed in the short term, may have led to distorting the neighbours' expectations.

Bulgaria

Recruitment of energy experts

- When and where did you recruit the experts that attended the field test?

We sought experts for the field tests in several possible ways, starting first with experts we know and know have extensive experience with energy audits and that will take the task seriously, as well as provide useful and complete feedback. We sought out these experts through personal contacts via emails and phone calls.

In addition, when attending various forums and trainings (live or online) we presented the opportunity to energy experts, such as at the annual meeting of the Association of Bulgarian Energy Agencies (ABEA) and trainings for energy experts, where we presented the opportunity during our presentations and project presentation.

- Which (digital and analogue) channels did you use to reach out to experts across the country?

Mostly through phone calls to personal contacts among energy experts, but also mailing lists and online or live presentations.

- How many issuers showed interest in attending the field test?

Due to the complicated situation around energy audits in the spring and summer of 2023, necessitated by a building renovation program coming to an end, resulting in a lack of available energy experts, we had to do two trainings, the first one on July 14 and the second one on October 12, 2023.

A total of 17 people attended the two trainings, of which 15 provided feedback on the training. From those 15, two didn't wanted to participate in the next part of the field test.

- By which parameters did you choose the attending experts if there were more experts interested than needed

The general rules for attendance at the training were that the trainees had completed or were currently undertaking an energy auditor course, and we trained all those who were interested and met the criteria, apart from those who were unable to attend either of the two online trainings we held.

- Did you face any obstacles during the recruitment process?
- If yes, which and how did you overcome them?

- Recruitment of buildings/building owners

The two main difficulties were the heavy workload of the energy experts and getting the building owners to agree to the building being considered in the project field tests and the owners, residents or maintenance to give the completed questionnaires.

We solved the first problem by delaying the start of the field tests, and the second by delegating the energy experts the right to search for buildings and thus more easily find building owners or managers who would agree to participate in the field tests.

- When and where did you recruit the buildings that were assessed during the field test?

After the training of the energy experts, they were charged with the responsibility of convincing their customers to join the field tests.

2 buildings were presented and provided by us in the months between the two trainings, but only for the energy experts who could not find buildings to test themselves.

- Did you include buildings into the field test that were not proposed by the chosen energy experts?

Only two buildings

- Did you face any obstacles during the recruitment process?
- If yes, which and how did you overcome them?
- Do you have general remarks on the procedure of the field test, e.g. technical problems during the test, accessibility of the tools etc.?

No, the field tests proceeded with very few problems which are typical in the processes of developing software platforms, such as missing some fuels in the list, there were minor technical problems with translation in places, but nothing more.

- Do you consider the field test and its results helpful for the further implementation of iBRoad2EPC in your country e.g. following NAC meetings? If yes, why?

Yes, the field tests were very useful in several areas: the introduction of the step-by-step renovation to energy experts, demonstration of the possibility to generate steps to follow the future obligations of the owners dictated by the Energy Performance Directive and other regulations and the use of pre-drafted recommendations, which makes the certification process much easier in Bulgaria, where recommendations are mandatory when issuing certificates.

- Do you consider the field test and its results helpful for the software implementation of iBRoad2EPC in your country? If yes, why?

This question is more complicated, and the answer is both yes and no.

On the one hand, Bulgaria has a mandatory complex procedure for issuing certificates, which includes a detailed energy audit, recommendations and the issuance of several documents. The iBRoad2EPC document itself, if it were an addition to these, would create further complications. What can be considered as a partial implementation is the borrowing of parts of the software to be used for future improvements of the national software and its enrichment to facilitate the energy experts and the insertion of step-by-step recommendations in it.

On the other hand, if the issuing of iBRoad2EPC instead of an energy audit report is legislated, this could facilitate the work of energy experts and thus the software could be fully implemented, however, there is still not enough consensus on this process even among NAC members and this creates further difficulties when discussing the proposal to implement the whole iBRoad2EPC procedure in the already cumbersome legislation system.

- Do you consider the field test helpful for a future implementation of iBRoad2EPC training in your country?

Yes, but again mostly parts of it because of the remarks described above. We can implement the step-by-step renovation at least in the trainings in some of the universities, even if we fail to insert it as a mandatory part of the trainings for energy experts, for which we need to initiate changes in regulation or more or more likely to be achieved to wait for the next change in regulation. Other elements can also be used in the energy auditor trainings, such as the pre-designed recommendations, which were also very much liked by the less experienced energy experts during the field tests.

- Did the attending energy experts or buildings owners ask you for support during the field test, e.g. via hotline, email, ... ?

There were several calls from the energy experts, mainly questions about the principles of determining the sequence of steps and questions about the use of the platform, as well as about reporting the minor malfunctions in the platform described above.

- Did you face and obstacles during the field test that were not foreseen or thought of? What can we learn from that to prepare for implementation in other countries?

Rather not

Poland

1. Chapter on the boundary conditions of the field test. We kindly ask you to provide information on the following subjects. We are aware that some of the following information have already been provided during the GA in Heidelberg. If there is nothing to add to the procedure you presented there, please just give us a hint on this.

Recruitment of energy experts

- When and where did you recruit the experts that attended the field test?

We recruited the experts about 1.5 months before the start of testing so that we could give them time to familiarize themselves with the project and provide training. We primarily contacted people who had worked with us on the first project, experts affiliated with ZAE (Association of Energy Auditors) and experts who had worked with KAPE on many other investments.

- Which (digital and analogue) channels did you use to reach out to experts across the country?

E-mail, telephone, information on ZAE's website

- How many issuers showed interest in attending the field test?

11

- By which parameters did you choose the attending experts if there were more experts interested than needed

We wanted experts from each "category" - beginners, intermediate, expert. The 11th person was below the iBRoad2EPC requirements in experience.

- Did you face any obstacles during the recruitment process?

no

- If yes, which and how did you overcome them?

- Recruitment of buildings/building owners

- When and where did you recruit the buildings that were assessed during the field test?

We asked each expert to choose a building that needs a new EPC or has had an EPC recently. In case the auditor failed to contact the building owner then we suggested a building from KAPE's resources.

- Did you include buildings into the field test that were not proposed by the chosen energy experts?

Yes

- Did you face any obstacles during the recruitment process?

No

- If yes, which and how did you overcome them?

- Do you have general remarks on the procedure of the field test, e.g. technical problems during the test, accessibility of the tools etc.?

The field test went very smoothly, the only slight problem turned out to be the evaluation of the SRI index, a couple of people called me back asking for help in filling out the sheet. It was a good idea to create a manual for experts, most used it and according to the participants it was quite a help in understanding the iBRoad2EPC tools.

- Do you consider the field test and its results helpful for the further implementation of iBRoad2EPC in your country e.g. following NAC meetings? If yes, why?

Yes, the test as much as possible will be useful in further discussions on the implementation of iBRoad2EPC in Poland. Positive feedback may influence NAC and other stakeholder's evaluation of the tool.

- Do you consider the field test and its results helpful for the software implementation of iBRoad2EPC in your country? If yes, why?

Yes, the test as much as possible will be useful in further discussions on the implementation of iBRoad2EPC in Poland. Positive feedback may influence NAC and other stakeholder's evaluation of the tool.

- Do you consider the field test helpful for a future implementation of iBRoad2EPC training in your country?

Yes, the field test showed what we should improve in the training (e.g., increase the amount of time spent discussing SRI and IEQ indicators, the demo of the building introduction to the tool should be more extensive, a course with theory and practice). It allowed us to see how much time it takes to create iBRoad2EPC with EPC from scratch.

- Did the attending energy experts or buildings owners ask you for support during the field test, e.g. via hotline, email, ... ?

Yes, I've got a few e-mails and one additional meeting with beginner experts.

- Did you face and obstacles during the field test that were not foreseen or thought of? What can we learn from that to prepare for implementation in other countries?

None

Portugal

Recruitment of energy experts

- When and where did you recruit the experts that attended the field test?

Experts were generally appointed by the institutions cooperating with ADENE and that provided the buildings for the test case (Construção Pública E.P.E. which manages schools, GEBALIS which manages social housing and SCML which manages private renting buildings). In some cases the appointment was made via the company already delivering energy audits, EPC's and/or renovation projects in the institution (GEBALIS). SCML appointed their own staff qualified experts which already provide EPCs for some buildings. Construção Pública E.P.E. pointed to energy experts that had already issued EPC's in the building under the test.

- Which (digital and analogue) channels did you use to reach out to experts across the country? Not applicable in our case for the experts delivering the test field as detailed above. For experts joining the training session we used targeted e-mails/phone to the following categories:

- Qualified EPC Experts working on iBRoad2EPC test phase
- Qualified EPC Experts that worked on iBRoad
- Qualified EPC Experts and other technicians from institutions providing the buildings
- ADENE's experts from other fields
- How many issuers showed interest in attending the field test?

Not quite applicable. The buildings were selected by the building owners (supported by ADENE following selection criteria in line with iBRoad2EPC standards) and the experts were appointed according to each building by the building owners also. Still the experts had always to comply with the minimum criteria defined, in line with iBRoad2EPC defined criteria. Still, there was one volunteering expert that learned about iBRoad work and contacted ADENE to be part of the field test (as part of her doctoral thesis). In this case it was an additional building/issuer using iBRoad2EPC.s

- By which parameters did you choose the attending experts if there were more experts interested than needed?

Not applicable as this was not the case.

- Did you face any obstacles during the recruitment process?
- If yes, which and how did you overcome them?

Yes, there was an issue with one of the appointed experts/companies which did not formally reply for the tendering process. In this case we simply found an alternative building and expert for replacement in one of the other institutions that own the buildings.

- Recruitment of buildings/building owners
- When and where did you recruit the buildings that were assessed during the field test?

This was the first phase of the process. ADENE approached some public or semi-public institutions managing buildings stock and with which there were already institutional relations and past/ongoing projects on related fields. From a list of possible partners, Construção Pública E.P.E. (previously Parque Escolar E.P.E) which manages schools, GEBALIS which manages social housing and SCML which manages private renting buildings agreed to participate.

- Did you include buildings into the field test that were not proposed by the chosen energy experts?

As mentioned above the process was inverted. We first selected partnering institutions which owns/manages the buildings, then selected buildings then appointed experts. There were two exceptions: the volunteer

issuer which suggested its own buildings and one of the appointed experts by the partnering institutions that decided also voluntarily to test on another single family house (not related to the partnering institutions)

- Did you face any obstacles during the recruitment process?
- If yes, which and how did you overcome them?

None.

2. To visualize the assessed buildings we are aiming to include a very brief fact sheet for each building. Therefore we need the following data for each building. If you already provided all necessary information on the buildings in Heidelberg, a hint on this would be appreciated:

- Building use (public or residential is obvious, but is it open to public or run by a public authority? What is the main purpose of the building?)
- Total useful area in m². You could also go for gross floor area.
- Year of construction - 1976 - and year of last renovation measure.
- If available, one fact that is special to the building

Building 1

- Large non-residential building - Offices - headquarters' of Construção Publica E.P.E. Public Enterprise.
- Total useful area in m². 31.578,40 m²
- Year of construction 1976 and year of last renovation measure 2000 (heating and cooling system).
- If available, one fact that is special to the building None to report

Building 2

- Secondary school in Pombal (central Portugal) - managed by Construção Publica E.P.E. Public Company.
- Total useful area in m². 10.638,17 m²
- Year of construction 1989 and year of last renovation measure 2010 (total refurbishment).
- If available, one fact that is special to the building This building was part of an extensive public schools renovation project in the 2000's.

Building 3

- Multifamily building (owned by SCML - social institution and privately rented to residents)
- Total useful area in m² 479,75 m²
- Year of construction 1930 and year of last renovation measure No records of major renovation measures. Only regular maintenance procedures.
- If available, one fact that is special to the building None to report

Building 4

- Multifamily building (social housing building managed by GEBALIS - Lisbon Social Housing company)
- Total useful area in m² 2160,00 m²

- Year of construction 1996 and year of last renovation measure No records of major renovation measures. During the duration of iBRoad2EPC maintenance works happened in the façade but no energy efficiency measures were implemented. Serious pathologies in the apartments were found such as condensing and mould.
- If available, one fact that is special to the building Part of the largest rehousing program in Portugal (PER) during the 90's. This building already has some renewable energy production (Solar DHW), but also a roof with asbestos. Needed interventions in the roof are therefore necessary but complicated.

Building 5

- Multifamily building (social housing building managed by GEBALIS - Lisbon Social Housing company)
- Total useful area in m² 1026 m²
- Year of construction 2001 - 2005 and year of last renovation measure No records of major renovation measures.
- If available, one fact that is special to the building Common areas had originally doors that enclosed some of the common areas improving energy performance by diminishing energy losses to these areas. These have been removed for social and safety reasons and it is a challenge to introduce them again.

Building 6

- Single family house building (privately rented apartments managed by SCML - social services institutions)
- Total useful area in m² 291,91 m²
- Year of construction 1932 and year of last renovation measure No records of major renovation measures. Only regular maintenance procedures.
- If available, one fact that is special to the building Building and evaluation used as a case study example for D5.3. The building has low quality envelope and windows, and the dwellings have no heating or cooling systems installed. DHW is normally prepared via small gas heaters. Two of the dwellings do not have any DHW system. Together with the current energy classification these are indicators of the likely energy poverty situation of the residents.

Building 7

- Single family house (social housing building managed by GEBALIS - Lisbon Social Housing company)
- Total useful area in m² 17,31 m²
- Year of construction 1960 and year of last renovation measure No records of major renovation measures. Only regular maintenance procedures.
- If available, one fact that is special to the building None to report. Not a typical single family house due to its size.

Building 8

- Single family house (social housing building managed by GEBALIS - Lisbon Social Housing company)
- Total useful area in m² 51,67 m²

- Year of construction 1965 and year of last renovation measure No records of major renovation measures. Only regular maintenance procedures.
- If available, one fact that is special to the building None to report.

Building 9

- Bi-family house (privately rented and managed by SCML - social services institutions)
- Total useful area in m² 66,60 m²
- Year of construction 1972 and year of last renovation measure No records of major renovation measures. Only regular maintenance procedures.
- If available, one fact that is special to the building None to report.

Building 10

- Single family house
- Total useful area in m² 28,96 m²
- Year of construction 1900 and year of last renovation measure No records of major renovation measures. Only regular maintenance procedures.
- If available, one fact that is special to the building Part of a doctoral thesis focused on refurbishing the “ilhas”: a typology of low cost housing in the city of Porto that started being constructed in the era of industrial development in the 19th century.

3. According to the GA we have to include the country partners perspective on the field test evaluation. To this end, please answer the following questions:

- Do you have general remarks on the procedure of the field test, e.g. technical problems during the test, accessibility of the tools etc.?

During the field tests several issues with the adaptation of the tools to the Portuguese context became more visible. These can be split on two categories: iBRoad2EPC and external features.

- Regarding external features, some of the tools (SRI and IEQ) were not up to date or have not been fully adapted to the Portuguese case and data. There was an extensive process of adapting these tools as much as possible including feedback and iterations with the original developers which made the process more coherent and adapted both . Unfortunately, it was not possible to fully test the improved versions as this process occurred at the same time as the field tests.
- Regarding internal iBRoad2EPC features, experts and ADENE identified some mismatch between the typology of iBRoad2ECP database and the EPC database for iBRoad2ECP even if the translation process was made with these context databases. iBRoad2EPC assistant allowed for a quick update (with administrative credentials) of some of the measures categories to further align both databases as much as possible. Still, there is room for improvement as additional measures or changes in the structure require additional work.
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- Do you consider the field test and its results helpful for the further implementation of iBRoad2EPC in your country e.g. following NAC meetings? If yes, why?

Yes, definitely. In our case, the results of the field tests are critical for our NAC members for the evaluation of critical issues in adaptation to existing national framework but also for effective preparation of adaptation to the coming requirements of the EPBD recast. With the setup in Portugal, where cooperating institutions defined the buildings and proposed auditors, it is also extremely relevant for these institutions as they manage a significant pool of similar buildings hence there is a high replication potential. The field test, having very different typologies of buildings will also allow for differentiated results, conclusions, and identification of barriers but also in identifying most relevant buildings for future implementation.

It is also important to mention that the evaluation of multifamily buildings when there are independent dwellings, is not possible in our current EPC system (EPC's are related to each dwelling and not the whole building). This was a previously identified challenge, and an approach was tested in order to cope with this issue. Generically, an iBRoad2EPC was made for each dwelling (or representative dwellings) which was part of a coherent package of interventions across the building (step and timeline approach and obvious coordination in measures applied in common areas (e.g. façade and roof)). This is an important add-on to the current state of the art in Portugal where it is theoretically possible for dwellings in the same building to have very different approaches for renovation measures, therefore undermining coherent interventions. In the Portuguese field test, multifamily buildings had only one owner and several tenants. Even if this setup allowed for an easier streamlining/planning of interventions in common areas (which are only dependent on the owner) the process tested could be applicable and adaptable for other multifamily buildings property structure. One of the most common setups in Portugal are home-owned multiapartment buildings in a condominium setting.mm

- Do you consider the field test and its results helpful for the software implementation of iBRoad2EPC in your country? If yes, why?

Yes, definitely. Feedback from experts allowed for the identification of some inconsistencies in the measures database and the administrative profile in iBRoad2EPC assistant allowed for a quick update complying immediately with the experts alerts. It should be stressed out that these changes produced backward effects, i.e., iBRoad2EPC already produced were automatically updated ensuring coherence in the process. Specific examples have also been detailed in question 1.

- Do you consider the field test helpful for a future implementation of iBRoad2EPC training in your country?

Yes, in PT's case there was sometime a lag between the training and the actual test phase. In the future this lag should be minimized and a simple field test could also be included in the training procedure directly. A long time between the training and actually implementing the system led to additional effort in recapping some of the knowledge especially when it related to the platform use in itself and new features such as IEQ and SRI. Feedback from experts allowed for the identification of some inconsistencies in the measures database and the administrative profile in iBRoad2EPC assistant allowed for a quick update complying immediately with the It should be stressed out that these changes produced backward effects, i.e., iBRoad2EPC already produced were automatically updated ensuring coherence in the process. Specific examples have also been detailed in question 1.

- Did the attending energy experts or buildings owners ask you for support during the field test, e.g. via hotline, email, ... ?

Besides the training session, there was extensive support provided to energy as mentioned. This was strongly dependent on the profile of the Some were almost fully autonomous, and others were heavily reliant on assistance. This included support on the on-site visit by ADENE but also online walkthrough through the platform pinpointing where and how EPC data should be filled-in and calculated/aggregated. This support was done via personal meetings, e-mails, web meetings and phone. We have set up a hotline but, given the small number of and building owner's which had previous access to ADENEs' project manager direct contacts, it was not a popular means of contact.

- Did you face and obstacles during the field test that were not foreseen or thought of? What can we learn from that to prepare for implementation in other countries?

No major obstacles happened, at least not foreseen, except for the slight inconsistencies found in external tools which we would expect to be more streamlined. Nothing else to report at the moment.



iBRoad2EPC

www.ibroad2epc.eu



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