



iBRoad Virtual Meetings

Key Notes and Findings

INZEB – Institute of Zero Energy Buildings August 2020



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depositphotos.com/nmedia

Published in November 2020 by iBRoad.

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All of iBRoad's reports, analysis and evidence can be accessed from iBRoad-project.eu

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INTRODUCTION

The iBRoad project works on lifting the building renovation barriers by developing an Individual Building Renovation Roadmap for single-family houses. This tool looks at the building as a whole and provides a customised renovation plan (iBRoad-Plan) over a long-term horizon. The renovation roadmap is, at its core, a home-improvement plan which considers the occupant's needs and specific situation (e.g., age, financial situation, composition and expected evolution of the household, etc.) and avoids the risk of 'lock-in' future renovation solutions due to a lack of foresight. The iBRoad-Plan is combined with a repository of information, i.e., a building logbook or passport (iBRoad-Log) on aspects like the energy consumption and production, executed maintenance and building plans.

Within the frame of the iBRoad Stakeholders Open Dialogue Journey and following the consultation workshops with national stakeholders in the eight participating countries, a series of five virtual events was designed and delivered during the period February 2020 – June 2020, with the aim to maintain the relations with various stakeholders and interested parties.

This report presents a summary of the context and content for each of the five delivered virtual events, namely:

- How to implement building roadmaps in the market: policy approaches.
- Test driving the Individual Building Renovation Roadmap and Logbook.
- Building Renovation Passports: How can Member States implement iBRoad?
- How are building renovation passports created? A real time tour of the iBRoad software.
- iBRoad and Building Renovation Passports: stakeholder's views.

The recordings of the virtual events are available at the iBRoad Youtube channel.



VIRTUAL EVENTS CONTEXT & CONTENT

How to implement building roadmaps in the market: policy approaches

Delivered on Wednesday 19 February 2020

Virtual Event Narrative

The individual building renovation roadmap is a tool to support owners to cost-effectively make their buildings highly efficient and decarbonised, either stepwise or in one go, while considering individual conditions, trigger points and additional benefits. However, only when embedded in a supportive policy surrounding, the recommendations of the building roadmap will, with a high probability, be properly implemented and practically transferred into successful renovation activity. A supportive policy surrounding refers mainly to three basic fields of action: informational, economic, and regulatory instruments.

The speakers of this virtual event and their topics presented were:

Alice Corovessi, INZEB

Welcome

Alexander Deliyannis, SYMPRAXIS Team

iBRoad project at a glance and webinar introduction

Dr Martin Pehnt, ifeu

How to implement building roadmaps in the market: policy approaches

Jonathan Volt, BPIE

EPBD19a feasibility study on building renovation passport – definition, EU's policy options and their potential impacts

Records of virtual event

Alice Corovessi (INZEB) introduced to the public the purpose of the webinar series as well as the main topics to be presented through each webinar.

Following the introduction, Alexander Deliyannis (SYMPRAXIS Team) presented the iBRoad project at a glance, what is the project's aim and the concept of the Building Renovation Passports. He stated that renovating a building can be complex, especially if done in several steps, as most house renovations are performed in Europe. To help homeowners, iBRoad has worked on the Building Renovation Passport concept, specifically developing, and testing an Individual Building Renovation Roadmap, which provides a customised long-term (5-20 years) renovation plan. This is further supported by a Logbook — a repository of building information such as blueprints, works implemented, energy consumption and production, etc. He also emphasised the importance of economic, regulatory and information instruments to support a synergistic approach. The iBRoad project has produced a logic to support developing individual building renovation roadmaps specifically, for single-family houses but with potential to be adjusted to other building typologies. The tool looks at the building as a whole but provides a custom renovation plan over a long-term horizon considering the occupants' needs and specific situations, e.g., their age, financial situation, household composition and expected evolution, etc. The roadmap also helps to avoid "lock-in"; "lock-in" is when someone's present choices limit the renovation potential in the future.

Another thing that can help, as Alexander Deliyannis continued, is to have a reference, a repository for information related to the building. This is the Logbook which includes aspects like blueprints works, implemented energy consumption and other information of the building, static and dynamic.

The Building Renovation Passport is the combination of the Logbook and the Building Renovation Roadmap. Building Renovation Passports are mentioned since 2018 in the Energy Performance of Buildings Directive (EPBD), in support of long-term, step-by-step renovation. Alexander Deliyannis highlighted that work under the iBRoad project included:

- Reviewing the national context relevant to the implementation of Energy Performance Certificates and energy audits in 8 countries and analysing in particular examples of Building Renovation Passport related initiatives from Belgium, France, Germany, and Denmark.
- An analysis of national conditions in the three 'pilot' countries for implementation –Bulgaria, Poland, Portugal– from the part of end users, homeowners and through professional public opinion research.
- Following the above work, the specific data elements to be included in a typical building Logbook –also relevant for the roadmap– were identified, organised, and prioritised in the project context.
- They then became the background for envisaging the Logbook and Roadmap in respect to their basic functions
- Then, the architecture of the iBRoad tools was developed into a concrete model including techno-economic methodologies expressed in functional modules and computer code.
- Several stakeholder meetings were organised in 2 series to collect the opinions of stakeholders of the market; one on the iBRoad preliminary concept and another on the tools themselves.
- An important point, as the speaker stressed out, is that the iBRoad project has opted for a
 modular logic to its tools: the iBRoad-Plan and iBRoad-Log can be used in conjunction or
 independently, depending on the specific context. For example, something similar to the
 Logbook may already exist in some countries.
- The software tools and methodologies were adapted for testing in the three pilot countries, plus Germany for the Logbook. The testing entailed setting parameters for national requirements, finding and training professional auditors on the iBRoad methodology and tools, arranging the implementation of the methodology and producing the Roadmaps and Logbooks for suitable buildings. The methodology and training material is presented in the Handbook for Energy Auditors and in the iBRoad Training Toolkit while the experience and the results from the field tests have been summarised in "The iBRoad field test experience" report and in the "Test-driving the individual Building Renovation Roadmap and Logbook" report.

Following the tests and insights extracted, the iBRoad concept was further elaborated into policy proposals and guidelines supporting implementation of the Building Renovation Passport across the EU, as Alexander Deliyannis mentioned. He concluded that the large majority of iBRoad outcomes are public and freely available from its website and the intention is to spark interest on the concept and provide the tools to those interested in applying them further –primarily energy authorities and agencies across Europe.

Martin Pehnt (ifeu) focused on the surrounding policy instruments, that are necessary or that could help to support the iBRoad approach. He started with the assumption that there is some kind of energy audit/energy consultancy scheme like the Renovation Roadmap, in place. So, there are energy auditors available in the country who go on site, visit the building, prepare some kind of report, as the one developed within the iBRoad project, showing the current building state, giving detailed advice to the homeowner about the renovation steps and preparing a roadmap in order to fulfil the overall target.

Afterwards, he briefly presented the philosophy behind the roadmap with four key points:

- 1. Building components have long life cycles -from today, each renovation must contribute to the climate target.
- 2. Most owners renovate step by step. But also, stepwise renovations have to be deep and avoid lockins.
- 3. It takes an overarching plan to combine single renovation steps to a deep renovation.
- 4.A long-term plan can consider the renovation occasions ("trigger points") in the homeowners' lives.



Continuing with the prerequisites for the Roadmap he referred to the relevant infrastructure of the building that is the first thing that is necessary. Also, in the country where the Roadmap needs to be implemented, a software to calculate the building energy demand today and after the renovation steps, is needed. Furthermore, trained, and familiar with the principles and the tools of the roadmap energy auditors are crucial, as well as authorities like energy agencies, national or regional, to administrate the programme, are needed. It would be very helpful if there is already an existing programme for building energy audits/consultancies, as he stressed out.

Next, he focused on the surrounding policy, with the hypothesis that to make the roadmap a tool with a lot of impact, additional instruments, like **Informational**, **regulatory**, and **economic**, are needed.

He talked about awareness and information campaigns for iBRoad and suggested for this purpose the "brand" creation and clear contact points creation. He also suggested that there should be target oriented campaigns, e.g., for elderly people or people who have to exchange their old boiler, and the integration into existing EPC (Energy Performance Certificate) schemes.

Subsequently, he emphasised the need for financial support of iBRoad by having additional economic instruments, within 4 approaches.

Approach 1: To support roadmap and energy audit financially. Better support for implemented measures when they are recommended by a roadmap.

Approach 2: Combining with existing support schemes.

Approach 3: Have the roadmap as a prerequisite for funding.

Approach 4: Funding for deep-renovation compatible measures.

There are many more ways, as the speaker pointed out; the above are only four examples of economic ways for supporting the Roadmap.

Finally, he gave a few ideas on how to implement the roadmap into regulatory measures as well.

Approach 1: Connect the Roadmap to EPC.

Approach 2: Making the Roadmap mandatory.

Approach 3: Combining iBRoad with efficiency or renewable heating obligations.

As the speaker stated, these are just a few examples to combine and to support the renovation Roadmap.

He continued with the evaluation of the different measures in terms of the impact of the dissemination. That means how known is the tool, its quality, if it really leads to the implementation of additional measures, if it supports the national renovation rates and if it leads to additional renovation depth in the individual measures. So, he introduced a kind of qualitative score, scaled from low impact to high impact. The results showed that the **informational measures** help in the one hand to make the campaign known, and on the other hand the auditors' training improves the quality, due to the expertise of the auditor. The **economic tools** had focus more on the dissemination because they made the building roadmap more attractive, but also made the implementation more likely because people got financial reward when they had a building roadmap. Also, these economic measures are more likely to introduce a higher renovation rate and higher renovation depth because people get more support from them. The **regulatory measures** really increased the dissemination and the diffusion of the roadmap into the market, whereas the impact on renovation rate and renovation depth was high but not as high as in the sense of the economic measures.

In conclusion, he highlighted that the qualitative assessment especially for the regulatory measures, depends a lot on the country's specific conditions and that without surrounding policies the roadmap will be an interesting consultancy approach, but it will not unfold its full impact.

Jonathan Volt (BPIE) presented the technical study performed as part of the European Commission's EPBD art. 19a feasibility study on Building Renovation Passports. He noted that the term Building Renovation Passport concerned the renovation Roadmap and not the renovation Logbook. The study consisted of three main parts.

The 1st step was to review existing Building Renovation Passport schemes and related initiatives. The 2nd was about the analysis of the relevance, feasibility, and possible scope of measures for Building Renovation Passports at EU level, and the 3rd step was about the selection of policy options for Building Renovation Passports and analysis of related potential impacts.

In the 1st step, 32 existing cases were listed, mostly from Europe but also from beyond, that had one or two building renovation or renovation roadmap characteristics that provided tailored renovation advice preferably in the long term, for individual homeowners. The speaker then presented the key findings, as listed below.

- A survey of 1006 Danes who bought a property in 2015, shows that 65% stated that they read the whole report that comes with the EPC.
- 45% of owners living in a building with a lower EPC rating (E-F-G) have implemented at least one of the EPC-listed energy-saving measures (for people living in D=35%, C=16%, B=15%, and A=7%).
- When asked about the importance of the EPC when they bought their building, 22% described the EPC as very important, while 36% saw it as somewhat important.
- Most building owners were satisfied with an EPC rating C (37%), followed by D (22%). Only 7% desired an EPC rating A to be satisfied.
- 38% of the building owners implemented measures because it was "financially attractive", while 28% did so in conjunction with other renovation work.
- 6% said they would have renovated if the EPC report included more detailed information.
- The most commonly implemented measures from the recommendations related to windows (42%), roof (39%), heating system (28%), doors (21%) and external wall (19%).

As Jonathan Volt pointed out, part of the study was the proposal of a definition for the Building Renovation Passport. The proposed definition was: Building Renovation Passport provides a long term, tailored renovation roadmap for a specific building, following a calculation based on available data and/or an on-site audit by an energy expert. The instrument identifies and outlines deep renovation scenarios, including steps to implement energy saving measures that could improve the building's energy performance to a significantly higher level over a defined period of time. The instrument can be complementary to energy performance certificates and/or combined with digital Logbooks.

Continuing with his presentation, he mentioned the 3 main policy options for the EU to consider.

The **first option** is to leave the implementation, design and everything related to the Building Renovation Passport to the Member States to decide.

The **second option** is to set a common reference framework, clear guidance documents or even standards for what the Building Renovation Passport should be comprised of and maybe also guidance on how it could or should be implemented.

The **last** and most ambitious one according to Jonathan Volt, is to make the Building Renovation Passport a future EPBD requirement to be included as an article.

Six policy packages were created out of these three policy options. For each one of them, a relatively <u>soft</u> policy package regarding the policy ambition was created, and one that was more <u>stringent</u> or <u>ambitious</u>. Then, the speaker referred to the types of measures of the policy packages. They consist, as presented, of direct measures, as the ones just mentioned, and of supporting measures, which are enabling measures, policy measures, financial instruments, and legislative instruments (see example in Figure 1).



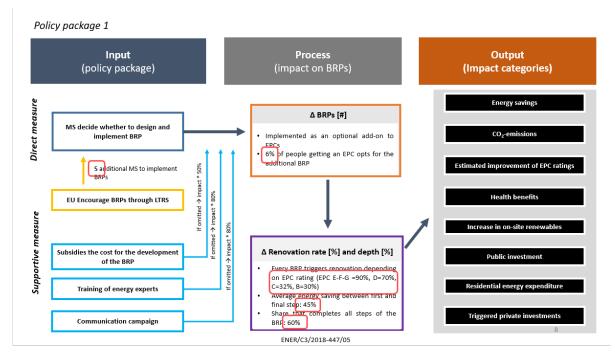


Figure 1: Logic model for policy package one

He also presented a diagram (Figure 2), which shows the residential and non-residential energy demand. The dotted line is the no action scenario and each of the coloured lines are different policy packages; the range between the policy packages for residential buildings is between 3% and 10%, and for non-residential between 2,5% and 8%. Also, as he noted, the policy packages 5 and 6 are the ones that will trigger the move to higher energy demand and they are also the ones where the Building Renovation Passport is assumed to become part of a future EPBD directive.

Energy demand

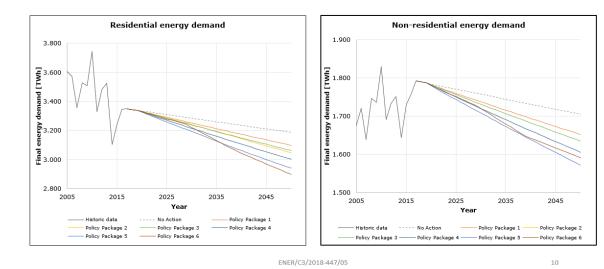


Figure 2: Residential and non-residential energy demand

As shown in Figure 3, there are also health benefits involved in upgrading residential buildings: people living in buildings with conditions better for health —an aspect which heavily correlates with more efficient buildings— will have fewer sick days. Also, based on the number and the share of renovations, an estimation could be made on how much savings this society would do thanks to the reduction of the sick days. The gains to be made at EU level go beyond the pure energy and cost savings from these renovations.

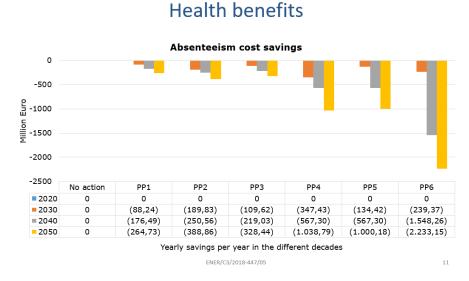


Figure 3: Health benefits in residential buildings

He concluded that:

- The review shows that Building Renovation Passports (BRP) are effective in alleviating two of the main barriers; low awareness of the benefits of energy renovation and insufficient knowledge of what measures to implement and in which order.
- The potential impact of BRPs on renovation activity is largely threefold:
 - o It can trigger building owners with no previous intention to renovate to invest in energy efficiency measures.
 - o It enhances the quality, performance, and overall depth of the renovation measures.
 - o It triggers people that have planned to renovate to do so earlier.
- All policy packages are expected to trigger energy and CO₂-emission savings.
- Impact of selected policy package varies depending on the indicator, i.e. energy demand in residential sector is estimated to be between 3-10% lower by 2050, a similar reduction is estimated for CO₂ emissions.
- The impact of the BRPs will be limited unless coupled with financial, communication and training measures. BRPs without accompanying measures will not have a considerable effect.
- To increase the attractiveness and effectiveness of BRPs, indoor environmental quality should be integrated.

The last session of the webinar was the Q&A session where important points and questions were presented and discussed with the webinar attendees. Alexander Deliyannis started by marking a couple of points. The first one was to that, while a Building Renovation Passport is by itself useful, its impact



is influenced by other measures, because the buildings market in particular is very complex. Thus, as he stated, in order to promote renovations a lot of things need to happen.

The question he addressed to Martin Pehnt and Jonathan Volt was, "Are there key points that can be pushed forward already, either by agencies, or citizens, or by the market, and have we already seen such examples?". Martin Pehnt took the floor and noted that the introduction of a roadmap is a process so it does need some time. That means that depending on the circumstances in each pilot country, there are practical issues like how someone calculates the buildings performance, which tools can be used, etc. The auditors that are available to be trained must be found, so the renovation is a process that needs to be prepared and it is a good idea to start now. Also, the roadmap should be attractive, handy and useful in order to make it happen.

The next question was "In the presented regulatory examples, are there already cases of minimum renovation requirements and incentives to implement renovation?" Martin Pehnt answered that there are many examples of minimum requirements in the building code for existing buildings, e.g., minimum new values when you renovate anyway, but this is on the level of technical components. In fact, these were recently collected for the EPBD Concerted Action. On the other hand, there are overall renovation obligations, e.g., buildings must be renovated to a certain efficiency class; some countries are now in the process of introducing this kind of renovation requirements. He added that he is not aware of a measure where a building roadmap is made mandatory in certain occasions and that it is really important to have this long-term target in the building code so that people know that within the next two or three decades it will be necessary to bring the buildings to a decarbonised status quo. By having this knowledge, every renovation step will be influenced by this long-term target. He concluded that the roadmap does not need to be part of the building code, but the philosophy of the roadmap, this long-term thinking, and the avoidance of lock ins can be implemented as a requirement as well.

Test driving the Individual Building Renovation Roadmap and Logbook

Delivered on Thursday 27 February 2020

Virtual Event Narrative

The iBRoad tools, consisting of the individual Building Renovation Roadmap and Logbook, were field-tested in Bulgaria, Poland, and Portugal during the period March to May 2019. Additionally, the iBRoad Logbook was field-tested in Germany. During the field test, 15 – 20 buildings per pilot country were examined in cooperation with local certified energy auditors. In total, 27 energy auditors participated in the iBRoad field test. The auditors were asked to create stepwise building renovation plans, whenever suitable, using the iBRoad-Plan (individual Building Renovation Roadmap and roadmap assistant) and to fill in the iBRoad-Log (Logbook). This virtual event presented the successful preparation, execution, and evaluation of the field test. Lessons learnt and positive examples from the pilot countries were presented, highlighting the effectiveness of the iBRoad products.

The speakers of this webinar and their topics were the following:

Alice Corovessi, INZEB

Welcome

Alexander Deliyannis, SYMPRAXIS Team

iBRoad project at a glance and webinar introduction

Peter Mellwig, ifeu

Test driving the Individual Building Renovation Roadmap and Logbook – preparation, execution and evaluation of the field test"

Julia Lempik, ifeu

What did we learn from the field test? Positive examples and further development of the iBRoad Renovation Roadmap and Logbook

Records of virtual event

The focus of the second virtual event was on the successful preparation, execution and evaluation of the individual building renovation Roadmap and Logbook field tests that took place in the project's pilot countries Bulgaria, Poland, Portugal, and Germany. The field tests took place in the period March – May 2019 as **Alice Corovessi** mentioned during her introductory speech. The focus of the webinar was also on the lessons learned and the positive examples from the four pilot countries and the aim was to highlight the effectiveness of the iBRoad tools that were developed during the project period.

Alexander Deliyannis, during his speech, made a brief update of the project, three months before its ending. As he mentioned, most of the work was completed by this time. He said that the project has brought a concept for the Building Renovation Passport, along with proposals for surrounding policy instruments, which were quite essential in order to have a good result. Then he explained that the Building Renovation Passport is a tool for building renovation support, which is a challenge for most homeowners. As he indicated, acknowledging the step-by-step nature of the building and home renovations in Europe, a plan is very important in order for the renovation to be done in the right way. Then he referred to the Logbook proposal, which is a repository of building information, not only in the initial stage but also along the way, with any kind of improvement steps of the building and energy performance aspects. The combination of the renovation Roadmap and the Logbook is the concept proposal for the Building Renovation Passport, as he mentioned. Also, he said that the work of the iBRoad started with the review of the EPC framework in 8 countries. Afterwards, he referred to the survey implemented in the 3 countries, Bulgaria, Poland and Portugal and following work on the the Roadmap and Logbook data. Furthermore, he emphasised the work with the stakeholders for the proposals' testing. The result was a modular tool that can be adjusted depending on the situation in the country where it is going to be implemented. The handbook, all the training material and the reports are available at the project's website, as the speaker informed the public during his presentation.

Peter Mellwig started his presentation by referring to the two core tools developed during the iBRoad project. The one is the **iBRoad plan**, which is the renovation roadmap for the building owners and the second is the **iBRoad Logbook**, they both are interconnected. The purpose of the field test that was designed was mainly to test these two tools. So, the field test was designed to test these two tools in three pilot countries: Bulgaria, Poland, and Portugal. There were ten energy auditors in each country, each auditor should test two buildings, so 20 buildings in each country, that makes in total 60 Roadmaps and 60 Logbooks. Additionally, in Germany only the Logbook was tested, as in Germany there is already a roadmap available and thus it was not possible to test another one in parallel.

Then, he shortly presented the field test schedule which included auditors' selection process and preparation of the field test, auditors' training, the evaluation phase, the finalisation of the handbook for energy auditors, train-the-trainers material, questionnaires and evaluation scheme, and the field test phase.

An auditors' training seminar was held in the three countries in the form of an on-site training, full day training. The auditors were provided with a toolkit and access to the online tools, assistance to create the roadmap, access to the Logbook, the iBRoad Handbook and a checklist. During the field tests, a telephone hotline was run in their native language by the energy agency in the respective country. Both handbook and the training toolkit can be downloaded on the website.

Peter Mellwig presented the five steps to create a renovation roadmap:

- initial contact with the owner
- on-site visit
- calculation of present building state using the national calculation software
- definition of renovation steps
- produce Roadmap with the iBRoad Roadmap Assistant.

The speaker explained that the core feature of the renovation roadmap consists of the renovation steps and how to define them, and this was something very new to the auditors who were therefore provided with guiding questions and principles for issuing the Roadmap and helpful templates. The most important iBRoad principle, as the speaker pointed out, is the "Best-Possible-Principle" which indicates that in order for the climate targets to be reached, every possible opportunity has to be used and, as building components have long life cycles like 40 or 50 years, this has to be done in the best possible way. As he explained, best does not mean no matter the cost, but best in this specific or individual case. The other iBRoad principles which auditors must fulfil concern the individual context, the long-term perspective, the timing and sequencing and making the roadmap attractive and motivating.

The last step of the training was about the creation of a real roadmap. Auditors here had to enter the energy performance calculation results into the roadmap online assistant tool, which is similar to a printing device, that transfers these into the unified design of the renovation roadmap. The final outcome are the pages of the renovation roadmap.

After this, Peter Mellwig talked about the Logbook. The Logbook mainly consists of four parts of which the most important is the data storage, as the speaker mentioned. This part comprises a lot of data which, once entered, assesses the building's, the envelope's and the equipment's' performance, shown in a range of colours.

He emphasised that the thing about the Logbook is that you can have different building states, e.g., for each renovation that is done there can be a new building state, so one can follow the building development in time.

Lastly, Peter Mellwig explained the field test evaluation process. He mentioned that field test evaluation itself consisted of three printed questionnaires, most in multiple choice format to facilitate the homeowners and the auditors in the filling in process. First, a survey among the auditors stated how they got along with the tools. The other survey addressed building owners and country partners, and the third the energy agencies that supported the field test. Altogether, the collected information is included in an evaluation report, available for download. Furthermore, suggestions for tool improvements were collected and fed back into the process of tool development.

Julia Lempik's presentation was more oriented to the results and followed Peter Mellwig's presentation. She presented the results of the field test.

She started her presentation by presenting the number of participants. From the pilot countries seven energy auditors from Bulgaria, ten energy auditors from Poland and ten energy auditors from Portugal participated, as she mentioned. The Polish and the Portuguese energy auditors examined 20 buildings and the Bulgarian 15. Not all auditors filled a questionnaire for each building, except for Bulgaria. In Bulgaria's case all homeowners returned the questionnaire completed. In addition, the generated Roadmaps and Logbooks were collected and evaluated in order to check that the iBRoad principles were correctly understood and implemented.

Regarding the buildings, almost all building owners had experience with renovation and had renovated their buildings to reduce energy consumption. Nearly all Portuguese homeowners had an EPC. Most examined buildings were owner occupied; single family houses were built before 1970s – early 1980s.

The questionnaire for energy auditors was shown. The question asked to the <u>energy auditors</u> was: "To what extent do you agree with the following statement to the iBRoad Renovation Roadmap.?" with scale answers from "completely agree" to "completely disagree".

The three statements were:

- 1. "The iBRoad Renovation Roadmap is providing the building owner with a long-term renovation strategy for this building." In this statement only the Polish energy auditors responded more cautiously.
- 2. "The iBRoad Renovation Roadmap will help the building owner to avoid misinvestment." In this statement, there was also agreement in general and just the Bulgarian auditors had lower level of agreement.
- 3. "The iBRoad Renovation Roadmap enables and motivates the building owner to realise concrete renovation measures in the near future." The auditors agreed to this statement.

The question regarding the renovation Logbook was "To what extend do you agree with the following statements to the iBRoad Logbook?" with scale answers from "completely agree" to "completely disagree".

The three statements were:

- 1. "It was easy to navigate through the iBRoad Logbook." There was agreement to this statement but less than before, especially the Portuguese energy auditors disagreed the most.
- 2. "The iBRoad Logbook is providing the homeowner with a long-term possibility to track all building related information." The energy auditors seemed to think of the Logbook as a good tool to track data, especially the Bulgarian ones.
- 3. "The iBRoad Logbook enables and motivates the homeowner to realise concrete renovation measures in the near future." There was also agreement, but more cautiously, especially from the Portuguese.

At the end, the energy auditors were asked if they would recommend the renovation roadmap and the Logbook to their colleagues. Nearly all auditors recommended the tools "in any case" or "likely". Nevertheless, as the speaker emphasised, further development on the tools was in progress.

Then she continued with the questions to the <u>homeowners</u>.

The question asked again was: "To what extend do you agree with the following statement to the iBRoad Renovation Roadmap?". The answers could range again from "completely agree" to "completely disagree" for the following statements.

- 1. "The iBRoad Renovation Roadmap is providing me with a long-term renovation strategy for my building." There was a high level of agreement especially from the Bulgarian homeowners.
- 2. "The iBRoad Renovation Roadmap will help me to avoid misinvestment." Again, there was a high level of agreement except for Poland's answers, that were the most "I don't know".
- 3. "The iBRoad Renovation Roadmap enables and motivates me to realise concrete renovation measures in the near future." There was a high level of agreement.

The next question was "To what extend do you agree to the following statements related to the iBRoad Logbook?". The answers ranged again from "completely agree" to "completely disagree" for the following statements.

- 1. "It was easy to navigate through the iBRoad Logbook." There was a high level of agreement, except for the Portuguese, like the auditors, found the navigation difficult.
- 2. "The iBRoad Logbook is providing me with a long-term possibility to track all my building-related information." There was a medium level of agreement to the statement, and again the Portuguese were more critical.
- 3. "The iBRoad Logbook enables and motivates me to realise concrete renovation measures in the near future." There was agreement but more cautiously and again the Portuguese homeowners as the energy auditors were not sure that the Logbook enables them to realise concrete renovation measures in the near future.

The last question was: "Would you recommend the iBRoad tools to your family or friends? (Renovation Roadmap, Logbook)". Nearly all homeowners would recommend the tools "in any case" or "likely". Some Portuguese however answered "unlikely" for the Renovation Roadmap and "no, never" for the Logbook.

The overall feedback from the homeowners was positive; they agreed that the iBRoad tool contains useful functionalities that motivate them to carry out renovation measures on the building.

Regarding manageability of the tools, some auditors emphasised that the tools should be translated to the respective languages. They also wished for automated data transfer between national EPC software and the Logbook, as well as for the navigation and the printable copy of the renovation roadmap to be improved, because at the time there was just an online version.

As for the content of the tools, some auditors required more flexibility and more space for comments and descriptions in free text. Both homeowners and auditors regarded a comparison of different variants in the Roadmap as useful.

Concerning the feedback from the country partners, it was noted that the iBRoad concept in general and the field test in particular required a lot of extra work for energy auditors. It was really hard to find sufficient energy auditors willing to participate. Both energy auditors and homeowners had difficulties to understand the iBRoad tools and concept in English language. They also said that the software could be improved via an automatic transfer of data and that the tools could be more user friendly, e.g., with regard to the layout.

So, the speaker highlighted that all this critic was well received, and some points had already been implemented or were about to be released at the time of the webinar. Regarding the tool language, the tools were ready to be translated into different languages. Also, a printable version of the roadmap was created as well as an interface for the data import from national calculation software to the Logbook. As for the navigation, navigation in the roadmap assistant and Logbook were about to be improved.

The speakers' presentation was followed by the Q&A session. During this session, the key points and questions were discussed with the webinar attendees.

The first question addressed to Peter Mellwig was "You mentioned that training on the stepwise approach was new to auditors. Did they generally consider that renovations have to take place in one go?". He answered that this was not the main point and that most auditors were not used to look further ahead, further than maybe 3 or 4 years whereas the renovation roadmap points to 30 or 35 years ahead and that was new to them. The importance of the stepwise approach due to the fact that most renovations are done stepwise was explained during the training.

The second question was "Was the principle of the best possible solution well accepted?". Peter Mellwig answered, that "This is the crucial part of the whole thing. On the one hand we have to go neutral and on the other hand homeowners at the moment are sentenced to invest for this and the auditors are those who bring the bad news and of course they identified this crucial point very quickly. Nevertheless, they created many roadmaps that led to very high efficiency classes. The good thing about it is that you don't have to reach this efficiency in one step, so the investment can be spread over a long time and that makes it easier for the homeowners and for the auditors."

The next question was "In the examples shown from Portugal some building roadmaps show a very high improvement, e.g., from F to A+. Is this something we see often?". Julia Lempik answered that yes, there can be small steps and small changes on the buildings, with very high efficiency.

A complementary question asked was "In your experience, is there a possibility for bundling several buildings together when planning their deep renovation, to comprise one unified energy investment?". Peter Mellwig answered that this is possible; in particular, e.g., for a municipality that manages a portfolio of similar buildings, it is possible to use one renovation roadmap for more than one building. On the other hand, if one building is built earlier then the plan needs to be translated to another time span.

"Is the Life Cycle Cost a driver for the determination of the optimal solution?" was the next question. Peter Mellwig answered that "This is an approach, if you renovate one component earlier then you start to save energy cost earlier, so it's not necessarily combined with the lifecycle of the component and of course it is sensible to combine certain building components even if they are not expired."

The next question addressed to Peter Mellwig was "Did you see a preference of auditors for prefabricated solutions that may be easier to install, or did they go looking deep into the components in order to achieve the best result for the specific building?". He answered that they wanted the best solution and mostly they did not go for prefabricated solutions, but rather for usual insulation materials and renewable energy.

"Did you see that aspects of comfort played an important role in choosing specific solutions or investing more?" was the next question. Julia Lempik explained that there are two options to insert comfort levels. The one is in the Logbook; this option wasn't broadly used by the energy auditors. The other is in the renovation roadmap where comfort, aesthetic improvements, etc. can be given in the form of a symbol; energy auditors were more keen on using the comfort symbols. In all cases, they tried to improve the measures and provide best comfort status. Peter Mellwig added that "It was obvious that the comfort assessment was something energy auditors were not really used to because it goes beyond the technical approach and maybe it's too clear for them to mention that of course if you insulate the



building the thermal comfort will rise. But it is not only about energy and saving money, it's also about improving the building and improving the wellbeing in that building."

The next question was "Methodology of Cost optimality as per EU regulation 224/2012 could be a common base of evaluation?". Peter Mellwig answered that "Cost optimality and the climate targets are not the same. We are looking for suited instruments to close the gap between cost optimality and climate target. It should be a balance of what the owner is capable of doing and what he is supposed to do to reach the climate target."

"Do you assess comfort issues with a specific software?" was the next question. Peter Mellwig answered that there are many aspects and evaluation methods for comfort, thermal comfort on the one hand but also sound comfort, aesthetics or indoor wellbeing, which is something very objective. If there is a scheme to evaluate these, one must weight how much is health worth compared to thermal comfort. This was not considered possible to include in the current development.

Building Renovation Passports: How can Member States implement iBRoad?

Delivered on Thursday 23 April 2020.

Virtual Event Narrative

The webinar aimed at providing a summary of the essential aspects that should be considered when replicating iBRoad across Europe. Deliberate efforts are required to scale up the concept into a widely accepted instrument, to benefit more people while at the same time anchoring renovation policies and programs to a long-term perspective. During the webinar, the challenges and enablers for successful design and implementation were unpacked, and the guiding steps to a feasibility study were unfold. Moreover, an outline of the concrete measures to be taken to implement the iBRoad in a specific country were presented.

The speakers of this webinar and their topics were the following:

Alice Corovessi, INZEB

Welcome

Alexander Deliyanis, SYMPRAXIS Team

The iBRoad at a glance

Vivian Dorizas, BPIE

An overview of the critical aspects to be considered

Peter Mellwig, ifeu

"Guidelines for the implementation of iBRoad

Records of virtual event

Alice Corovessi introduced the aim of this webinar, that was to provide the summary of the essential aspects that should be considered when replicating the iBRoad across Europe. Also, she mentioned that during the webinar all the challenges and enablers for a successful design and implementation would be unpacked, as well as that the guiding steps to accessibility study, would be unfold and the outline of the concrete measures to be taken for the iBRoad implementation in a specific country, would be presented. She completed her introduction by presenting the speakers of the webinar.

After Alice Corovessi's introduction, Alexander Deliyannis took the floor to present the iBRoad project at a glance. He briefly presented iBRoad, a concept for Building Renovation Passport, as a solution to support deep renovation. It is further supported by a Logbook as he continued, which is a repository for building information, such as blueprints, works implemented, energy production consumption, etc. He emphasised that the methodologies and the tools that had been produced, are flexible and can be adapted to different situations. He referred to the need for surrounding policy instruments in order for the full potential to be achieved. He spoke about the challenging nature of the building renovation, for the homeowners that are not specialists and how the iBRoad project supports the logic of building renovation roadmap that outlines all the steps that need to be done for reaching best performance standards. The focus was on the single-family houses, but the principle can be used elsewhere as well. The building renovation roadmap is supported by a Logbook, and at this point he noted that the house developments that can be included in a Logbook and in the renovation roadmap, do not have to do just with energy efficiency. Although, energy efficiency and energy performance are very important and they are the starting point, any other kind of renovation could also be part of such a planning and should be planned accordingly, Alexander Deliyannis said. The combination of the renovation Roadmap and the Logbook is the Building Renovation Passport. He presented the renovation passport as now mentioned in the Energy Performance of Buildings Directive. Also, he referred to research conducted at the time, about what was happening in terms of the surrounding policy framework in 8 countries, and looked at the specific front running projects regarding to the Building Renovation Passport in three countries, with different approaches in each. Furthermore, he emphasised the work with the



stakeholders for the tools' testing. The result was a modular tool that can be adjusted depending on the situation in the country where it is going to be implemented. The handbook, all the training material and the reports are available at the project's website, as the speaker informed the public during his presentation.

In her presentation **Vivian Dorizas**, gave the *Overview of critical aspects to consider*. She started with the main objectives being the key challenges and enablers of a successful design and implementation of iBRoad that would enable the replication of the concept as well as the guiding steps to a feasibility study for countries interested in implementing the iBRoad concept.

According to the inputs collected from the stakeholders and experts contributed, the critical aspects to design and implementation of the iBRoad concept across the EU are economic viability, technical feasibility, legal feasibility, and human-related restrictions. Once identified and addressed, a successful implementation of the concepts across the EU is possible.

She continued her presentation by analysing these aspects one by one. Regarding the economic viability, the challenge is how to finance the preparation, design, development, implementation, operational, maintenance and evaluation stages. Another challenge highlighted by the speaker is how much building owners are willing to pay for an instrument such as the iBRoad? Subsidising the development cost might be required. The economic assessment of the business case for energy auditors is a crucial aspect as well. It should include the costs of training, audits, registrations and the use or purchase of calculation/simulation software programmes and tools which should be financed by public or private funds, aiming to allow a smooth rollout of the iBRoad concept.

Regarding the technical feasibility, this should be evaluated before launching a renovation roadmap, to assess the viability of the technical aspects and risks. The iBRoad project examined technical aspects related to the renovation roadmap and the Logbook.

The **renovation roadmap** provides detailed and individualised renovation advice to building owners. The key elements of a renovation roadmap are the on-site visit and energy audit, performance indicators to measure progress, recommendations for the building owner and simplified summary information. Tools and equipment needed by energy auditors, such as EPC software, should also be considered. The software used to insert data needs to be adapted to the local conditions, including language, and integrated with existing software, as the speaker suggested.

The **Logbook** is the main repository of all relevant building information (including energy bills, equipment maintenance recommendations, insurance and property obligations, and financing options available in the area for renovation projects, e.g., incentives, tax credits, green loans). The key elements of the Logbook are data gathering, functionalities and ownership.

As the speaker moved on with her presentation, she referred to the legal and regulatory feasibility, norms and regulations that should be assessed before design to ensure the concept can be applied and implemented in that specific country or region. The legal and regulatory feasibility is split in two dimensions: the one is the local adaptation, and the other concerns data privacy and the availability of resources. Concerning the local adaptation, the national legislation should be adapted to facilitate the uptake of the iBRoad concept and also the level of mandatory and voluntary implementation should be explored. Concerning the data privacy and availability of resources, as the Logbook contains legal, administrative, and technical operational aspects, confidentiality, integrity, and availability issues are raised. So, data privacy and security are protected by the EU legislation, and every kind of digital documents such as this, containing confidential information needs to respect the GDPR.

Another critical aspect relates to human related restrictions.

The renovation roadmap and Logbook will only be successful if people find them useful, as the speaker highlighted. People are likely to be hesitant to enter data in the Logbook unless it is in their interest to

do so. Feasibility and replicability thus depend not only on designing and implementing the basic elements of the instrument, but also on creating a vision that can entice people to use it.

The iBRoad project has put effort into the comprehensive training of auditors, communication, and adaptation of existing training schemes, as this is essential for the success of the iBRoad tools. From its conceptualisation, the iBRoad has emphasised user-friendliness and adjustability to country-specific conditions. Those responsible for implementing the tool should make a special effort to ensure it does not lose its focus on user-friendliness as well as considering behavioural aspects and insights. So far, the iBRoad has been established in non-technical language that the end-users (homeowners) can fully understand (simple and directed at non-specialists). Regions and countries interested in adopting the iBRoad concept should maintain its non-technical language.

Next, an overview of the feasibility steps of the iBRoad concept in the EU, was briefly presented. The concept initiation was the first to be presented. The iBRoad concept could be initiated by different actors, depending on the local circumstances, the process could be launched by public (e.g., Flanders: Woningpass) or private actors (e.g., Denmark: BetterHome) or even a mixture of both. The iBRoad tools could support countries' commitments to targets (e.g., climate resilience target, improving living standards, etc.). However, launching the tool with support from public authorities also came with potential disadvantages like the longer time needed for implementation, their expectations (e.g., do they want to have access to information?) and being linked to election and public budget cycles.

The iBRoad concept could also be initiated and managed by private companies or individual actors (e.g., energy suppliers, insulation companies, heating industry, private agencies). The main benefits of the instruments initiated by private actors were the expertise in creating a competitive product as well as a better knowledge of its commercialisation in the market. The concept could also be a mixture of both public and private actors. This model could combine the benefits of the other two options and take advantage of what the public authorities and the private actors do best (e.g., market analysis, quality control, coordination with other instruments).

The second step to be presented was the preliminary analysis. On the preliminary analysis, first, the scope has to be defined. The iBRoad tools should first outline a plan, including what it aims to achieve, how it intends to achieve it, who is involved and how it should be developed. A market analysis should follow the scope. This could include the investigation of what kind of renovations were performed in the country, what was the situation of the building stock, what was the homeowners' willingness to invest, what were the renovation services offered by the construction sector, and of course the understanding end-users needed. Also, the legal part and the enabling policies that promote deep renovation & financing mechanisms should not be forgotten, as the speaker pointed out.

Moving on to the end-user needs and stakeholder engagement, it is important to understand the end-users and other stakeholder needs, preferences and expectations related to the new instrument, as she said. As mentioned above, the market analysis provides a first stage for a preliminary exploration of stakeholder needs; this stage coveres a more in-depth analysis of their needs and expectations. Understanding the behaviour, the preferences and the decision-making process of clients including end-users and other stakeholders is crucial.

Another aspect is the comparison and integration with relevant tools. The tools, programmes, and schemes (e.g., EPCs) already available on the market (private or public) ought to be explored to investigate whether iBRoad should further build on these, offer a parallel product or develop a new independent tool.

The financial aspects are also crucial. The required resources and potential financial risks to implement the proposed idea need to be identified. There are three main categories involving financial aspects and requiring investments, which are the development, the execution and the renovation works. Also, it is important to see if the financing could come from private or public sources.



Lastly, another important aspect is the impact assessment. We should have in mind that the objective of implementing the iBRoad concept across the EU, should have a significant positive impact on social, economic, and environmental fields, so this could affect a broad group of stakeholders, as the presenter stated.

Peter Mellwig's presentation followed up from Vivian Dorizas presentation. During his presentation, Peter Mellwig showed how a Renovation Roadmap looks like. The auditor goes to the home and calculates the current building state, and based on that calculates the renovation steps, which are showed in detail. He also referred to the iBRoad Logbook, which is mainly a data storage, as has already been clarified in previous presentations and this data can be used for some assessment, showing for instance the building performance, the envelope performance of the building in a non-technical way, and the equipment performance. Furthermore, he presented the concrete measures for the roll out of the iBRoad, which came after the feasibility check. These measures included, firstly, setting a very concrete action plan. Also, the consultation with stakeholders. The concrete implementation of the tool and policy framework implementation. Then the physical roll out and afterwards comes the monitoring, the quality check and the evaluation and of course further development.

In particular, the action plan had to define what exactly was the need for action, what exactly were the targets and priorities, how could they be reached, when, by whom, and how to be financed exactly. The stakeholder consultation was extremely important through this process. The more stakeholders' support, the better it would work in the whole implementation. Moving on to the tool implementation, the domain of the online tools needed to be decided, the speaker said. Also, decisions needed to be made regarding the data management and the storage location. The iBRoad tools had to be translated to the national language and the national labels for buildings, building components, building technology, national building codes and typologies needed to be adapted as well. Additionally, adaptation of Logbook data sets to national calculation standards, existing data bases and evaluation requirements needed to be made and adaptation of the calculation software to the iBRoad interface. Lastly, field test with the adapted versions of the tools had to be done.

Afterwards, he analysed the policy framework implementation prerequisites. The prerequisites were: software tool to calculate the building energy demand (today and after the renovation steps), ideally including renovation costs, trusted and trained energy auditors/renovation experts, authorities to administer a roadmap programme including auditor training and ideally an already existing programme for building energy audits/consultancies. He moved on to the roll out step, which means to bring the policy framework into force, the communication of it into trusted communication channels. The deployment of software, the training material and the handbook needed to be managed. The auditors needed to be trained via face-to-face seminars, webinars, video tutorials and of course the software support had to be organised. After a certain time with experience with the tool, the monitoring, quality check and evaluation were crucial. The objectives, the implementation process and the results were the main things that needed to be checked. The last step was the further development of the tool, by developing the software tools, the funding schemes, the regulations themselves, the management of the audit and the marketing and communication.

The Q&A session followed as usual, where quite a few questions from the attendees were addressed and discussed with the speakers. The first question was "Regarding the initiation of the iBRoad replication in an area, would it be possible for a local authority to do this, rather than the state government? Would it be possible even for a sectoral authority, for example one dealing with social housing?" Peter Mellwig answered that this is absolutely possible, and that in Germany this is already happening.

The second question was, "In your experience, is the situation in EU Member States so different to need such a sophisticated process to implement iBRoad?". Peter Mellwig answered that during the development of the tools, there was always this thought of how much can this be standardised and how much they need to be adapted to the requirements of the Member States. That was not always easy, but at the end it was decided that 80% can be standardised and the rest 20% really needs to be

adapted. So, in order for the homeowners to not be confused, the products should look like they are in the EPC. As he stressed out, it is not always easy to have this semi flexible structure, so you have certain fixed issues and other ones that really can be adapted.

"Has anyone done anything to adapt the tool for buildings used by small and medium sized businesses?" was the next question to be addressed. Peter Mellwig answered there was at the time a report under finalisation which addresses adaptability and replication for other uses. He added that the first iBRoad that was presented was especially for single-family houses, small multi-family houses, that were usually run by the owners. So, in the case of bigger houses or of non-residential buildings, different information and technical focus is needed in the roadmap, as many of these buildings are run by a facility management and explicit technical information is needed. He concluded that the report is yet to come and of course it is possible and valuable to decide the level of flexibility in the reports and in the whole tool due to the range and the variety of the buildings, though the total flexibility is not possible, but a right balance is needed.

"It is crucial, in the short / medium / long term, to help the owner. I would like to ask a question about whether there is any possibility of requesting support from the European Union in countries to support measures involving energy savings?" was the next question. Peter Mellwig answered that at least in Germany there was not such an EU funding, so the main support was the BRP mention in the EPBD and that it is a common target to have such BRPs that look further than the next renovation step, develop a roadmap for renovation, but beyond that there was any further support received. Vivian Dorizas agreed and added that a further funding could be a future target.

Another question asked referred to known examples of the property tax being linked to the EPC of a building in Europe, mentioning that in Ireland it is linked to property value which has no relation to the EPC. Peter Mellwig answered that there are ideas of linking it with building performance as well, but this gets more complicated. Less tax is considered helpful but not an economic benefit, property tax is not that expensive compared to building renovation, so it is seen more like a reminder that comes every year. Vivian Dorizas added that the development of the renovation package will increase the number of the individual deep renovations and this will also affect the local employment quality of works and it will also increase the real estate value and the property prices, so there will be an effect there as well.

"Are there relevant experiences in Europe applying building renovation roadmaps in multi-family buildings?" was the next question addressed to the speakers. Peter Mellwig answered that there are no experiences with this. The difference for multi-family buildings lies mostly in the distinction between investor and occupant; is it one and the same person or distinct persons? In Germany, there are some experiences with the renovation roadmap on multi-family buildings but they are usually owner-occupied. The vast majority are unoccupied single-family buildings. Alexander Deliyannis added that several municipalities are now focusing on multi-family buildings and are looking into options like the building renovation roadmap, where the main challenge they are looking at is ownership and decision-making. Once they solve these issues, they will be able to adapt the renovation passports.

The last question was "Does iBRoad have a ready-to-use online calculator, which can be adapted and tailored by member states?". Peter Mellwig answered that there is no calculator in this way. The energy auditor can fill the results of the calculation into the roadmap assistant, but the calculation itself is done with the official EPC calculation software. Some minor calculations are performed in the Logbook; these concern new value minor calculations, e.g., for the assessment of building component performance. Alexander Deliyannis added that iBRoad has also developed a simplified energy demand calculation tool which actually is an open-source code software, however it is preferred that energy demand is calculated with the software that exists in each country. The iBRoad tools are customisable per country, and certain fields in both the Roadmap and the Logbook can be adapted to specific country data, whereas some fields include a universal value which can be used directly. Indeed, what happened for the preparation of the pilot testing was this kind of country adaptation; now this is further undertaken for countries that were not originally included as pilot countries.



How are building renovation passports created? A real time tour of the iBRoad software

Delivered Thursday 4 June 2020.

Virtual Event Narrative

The virtual event aimed at providing a live demonstration on the iBRoad software tools. How do they work, what are their functionalities, who are the main users? The above and more questions were answered.

The speakers of this webinar and their topics were the following:

Alice Corovessi, INZEB
Welcome
Alexander Deliyannis, SYMPRAXIS Team
The iBRoad project at a glance
Peter Mellwig, ifeu
A tour of the iBRoad Software Tools: Roadmap and Logbook

Records of virtual event

Alice Corovessi presented the webinar's aim being to provide a live demonstration of the iBRoad software tools, the Logbook and the Roadmap. How they work, what the functionalities are, who are the main users were also main questions to be answered during the webinar.

Alexander Deliyannis gave a brief summary of the work conducted. He presented the iBRoad as a solution to a problem most of the people are aware of, that of the complexity of building renovation. The logic behind the project is deep renovation, in a the holistic approach of the building and with stepby-step planning through the use of the renovation roadmap. Then, he presented the Logbook which is the repository of all the information that is related to the building, even the snapshots of the renovation along the way. He talked about the background research to all this and on some interesting examples across Europe and how several countries handled energy performance of buildings and renovations. Research about what the end users, homeowners, want and work on data regarding buildings around Europe and how this could be organised in a way that is relevant both to the European perspective and to the national conditions. He referred to the methodologies for energy demand calculation, specific tools and software supporting the Roadmap and the Logbook. He also mentioned the stakeholders' meetings and the feedback gathered from them regarding the tools. Then, he highlighted the adaptation of the tools for specific countries to support field tests. Training toolkits and a handbook for energy auditors to support their training were presented. Moreover, pilot testing and post-evaluation, as well as proposals for implementation in other countries were also mentioned. Finally, he announced iBRoad's candidacy, as a finalist, in the innovation category of EU's Sustainable Energy Week awards 2020.

In his presentation, **Peter Mellwig** held a brief introduction to the intention of the project tools. Firstly, he presented the iBRoad-Plan, which is a renovation roadmap, and the iBRoad-Log, being the building Logbook, two potentially interconnected tools. He also presented the idea behind the project within the following four points.

- 1. Climate targets are ambitious. Yet building components have long life spans.
- 2. Today most renovations are stepwise. Still, they need to lead to a carbon neutral building stock.
- 3. It takes an overarching plan to combine single renovation steps to a deep renovation.
- 4. A long-term plan can consider the renovation occasions ("trigger points") in the homeowners' lives.

So, the Roadmap is a diagnosis tool, an energy audit tool and a step-by-step renovation plan for building owners, as he pointed out. The main features are the long-term renovation strategy, developed individually together with the owner, from its outset including targeted measures to finally lead to deep renovation.

He continued his presentation showing an overview of how the pages of the roadmap look like. There is one page that is showing the current building state, another page showing the roadmap overview, next there is a page of the detailed roadmap and a page with detailed renovation steps. Then, he emphasised the importance of distinguishing between renovation measures and renovation steps. As he explained, renovation measures refer to one single building component - that might be the façade or the roof or the boiler- while a renovation step means a construction period during which certain measures, more than one, might be combined. Afterwards, he presented the roadmap assistant tool, which is like a printing device, a formula where the data can be entered – usually by the energy auditorand then are shown in the renovation roadmap.

Subsequently, he gave an online live demo of the tools, showing some examples and features. He showed some existing renovation roadmaps in the renovation assistant, and also showed the "Create New Roadmap" button which, once clicked, allows the naming and creation of a new roadmap. Then, the first data that is asked from the tool are general building facts, e.g., the building address, the number of residential units, the building type, and more. Next, as he browsed, he showed another field that concerns "User Influence" or else behaviour. "Advices for efficient Use of the Building" is another tool feature, where the auditor can enter habits of the owners that he 'd like to address. The auditor does not have to invent the texts, as there is a button that, once clicked, displays some predefined typical advice which, can automatically be copied into the text.

Next, he showed the central navigation page of the roadmap assistant which has the options to "Edit Building", "Edit Current building state", "Show Roadmap Preview for Building Owner" and there also are "Renovation steps" which contain renovation measures. As he stressed out, the starting point is always the current building state. Once you click on that, you can enter the building's energy data and energy sources. Then, renovation steps have to be entered and then measures need to be edited. If a new measure is created, it has to go through a system of filter questions.

When the roadmap is ready to be finalised, the next step is to choose "Show Roadmap Preview for Building Owner"; by clicking this, a whole new page opens in the browser and shows an overview of the Roadmap, and a link which can be copied to be shared with the customer or building owner, in order to receive the Roadmap as an online version. Here, all details and information are available by clicking the buttons "Roadmap", "Detailed Roadmap", "Your Building", "Renovation Step". The Roadmap can also be printed as PDF and on paper.

Peter Mellwig then gave a tour of the Logbook. He explained the usefulness of the Logbook through four point-questions.

- 1. A lot of information about the buildings already exist (EPC data, energy audit) but where?
- 2. Most renovations are stepwise and refer to a long period of time. How can they be remembered?
- 3. Simple presentation of the efficiency of the individual building and its components.
- 4. Simple forward planning for homeowners.

In general, the iBRoad Logbook is a digital repository for all building related information, which saves complete data set of each building state, tracks all the changes to the building and has a connection to the Roadmap.

He then presented an overview of the Logbook pages, i.e., the data storage page, the building performance page, the envelope performance page, and the equipment performance page. In the data storage page, it is possible for any kind of data to be inserted. He showed how the Logbook really looks like. If you open the Logbook there is a "My Buildings" button. There is possibility to choose "New Building", where you may enter the country you are from, the year of construction of the building, and



there is a field for uploading an image of the building, if available. Then he browsed to the "Data Store" which contains the three main points of the Logbook, namely: The "Repository", "My documents & plans", and "Building states". If you click on "Repository", there you can add some general information like address, renovation year and more. Next you can add the "Building Construction Information", e.g., wall types, roof types, etc. Then, you can edit the "Building Equipment", the "Building Energy Performance", the "Building Operation and Use" and the "Smart Information" fields and so, step-by-step fill in all the relevant data for the building. Once all these data are inserted, then an assessment can be done. The "Overall Performance" actually shows the energy performance entered, and compared to the other buildings. The "Envelope Performance" can also be assessed, as can the "Equipment Performance". The Logbook includes a Glossary explaining technical information. The Logbook finally includes a link to the Roadmap, if one exists; as already explained, the tools can also exist and work independently.

During the Q&A session that followed the speakers' presentations, the 29 attendees had the chance to discuss with the speakers and raise their questions. The first question was "In the example you mentioned about entering the cost of a new boiler in the roadmap, is the net cost after subtracting the grant?". Peter Mellwig answered with an example, of a regular boiler of approx. 25 years old, prone to be replaced. One option would be to go for another normal boiler, whereas the alternative would be to choose for a condensing boiler. The normal boiler would cost $7.000 \le$, the condensing boiler would cost $8.000 \le$. When the condensing boiler is chosen, the renovation cost relevant to energy saving amounts $8.000 \le$; however, since the owner would anyway have to spend $7.000 \le$, the difference to be paid for energy efficiency is $1.000 \le$."

"Can you clarify if the projected energy and costs are calculated by the tool or entered by the auditor in the roadmap?" was the next question. Peter Mellwig answered that "Of course all these energy labels have to be in line with the national calculation norms and formulas so this is very important and that's why we don't calculate within this tool, because there might be differences to the national calculation, and we don't want this. So, usually, an energy auditor would issue an EPC and then he has the calculation of the current building state already in place."

The next question was: "Assuming that these tools can only be filled by auditors, how much effort does it require from them to issue?". Peter Mellwig answered that during the field test it was seen that a major effort is needed and the auditors that attended the field test complained a bit about that. As a result, an interface is recently being considered that would automatically take data from the national calculation software and imports it to the Logbook, which is mainly the same data. In this option, the auditors would only have to fill in the calculation software and, hopefully, just by clicking a button they would be able to export it from there and automatically feed into the Logbook; then the effort would be nullified.

"What additional training and qualifications are necessary for energy auditors to be able to produce the Roadmap and Logbook?" was the next question. Peter Mellwig answered that auditors usually are (qualified) experts but there would be a recommendation for having an additional special training for explaining the whole intention behind this step-by-step approach, because this is not always clear. Also, there are a lot of advice and hints on how to proceed, how to define the steps and these must be learned.

One additional question was "You showed two roadmaps for the same building; should we assume that one is an updated version of the other?". Peter Mellwig explained that these are different roadmaps; the roadmap would change if the strategy for the building would change, usually there is no need for a new one to be issued after each step.

The last question was "Who will own the data and who will have access to it? All public agencies, private companies? Homeowners could be afraid to add data on renovation if they're afraid that the property tax would increase.". Alexander Deliyannis answered a part of the question by mentioning that an upcoming report from iBRoad will cover the aspects of personal data protection based on the GDPR.

There are also other data that are relevant and that have been handled at the level of the data management and data organisation, mostly in the Logbook. However, for this kind of personal-sensitive data, the principle is that the result of this work comes to the ownership of the homeowner who can choose to provide access to part of it to specific third parties, e.g., technicians, etc. However, this also depends on whether this information is already available elsewhere. Peter Mellwig added that the homeowners really have trust in the tools and that is why they would not be commercialised or similar.



iBRoad and Building Renovation Passports: stakeholder's view

Delivered Wednesday 10 June 2020

Virtual Event Narrative

The online event focused on the views of the national and EU stakeholders as captured during the second round of the iBRoad meetings. The reactions for the Roadmap and Logbook tools development, the possible connection of the tools with existing or potential national financial schemes, the ideal national business models and the replicability potential were the main axles to be presented.

The speakers of this webinar and their topics were the following:

Alexander Deliyannis, SYMPRAXIS Team
Welcome and a short presentation of iBRoad
Alice Corovessi and Eleftheria Touloupaki, INZEB
iBRoad and Building Renovation Passports: stakeholders' views

Records of virtual event

Alexander Deliyannis presented a brief overview of the project. The original concept of the project is the intention to make building renovation easier, more consistent, and more efficient. He expressed the belief, that this has been achieved, through the project tools provided which are the building renovation Roadmap on the one hand and the Logbook on the other hand. Then he explained that the Building Renovation Passport is a tool for building renovation support, which is a challenge for most homeowners. As he indicated, acknowledging the step-by-step nature of the building and home renovations in Europe, a plan is very important in order for the renovation to be done in the right way. Then he referred to the Logbook proposal, which is a repository of building information, from administrative information to construction, to operation and use and, in the near future, to smart information, e.g., smart energy meters, etc. The combination of the renovation Roadmap and the Logbook is the concept proposal for the Building Renovation Passport, as he mentioned. Also, he mentioned that the work of the iBRoad started with the review of the EPC framework in 8 countries. Afterwards, he referred to the survey implemented in the 3 countries, Bulgaria, Poland and Portugal and the following work on the Roadmap and the Logbook data. Furthermore, he emphasised the collaboration with stakeholders during the project development. The result was a modular tool that can be adjusted depending on the situation in the country where this is going to be implemented. The handbook, all the training material and the reports are available at the project's website, as the speaker informed the public during his presentation.

Alice Corovessi and Eleftheria Touloupaki presented some parts of the views received during the two stakeholder meetings that took place in the participating countries of the iBRoad project. Alice Corovessi presented the 8 participating countries, which were Greece, Bulgaria, Romania, Austria, Poland, Germany, Belgium, and Portugal. During the 36month project, two rounds of meetings with stakeholders were foreseen to be delivered and organised, as stakeholders are considered to be a critical aspect of the project due to the market-oriented nature of the project. The first round took place in February and March 2018, with 114 stakeholders participating, while the second round was conducted during November and December 2019, with 188 stakeholders participating.

At the first meetings, which took place at the beginning of the iBRoad development, the iBRoad concept was introduced as were the tools that were planned to be developed. Secondly, the aim was to identify the sustainability potential of the project in each country, as well as the interconnection with existing national tools and strategies, and to discuss the potential adaptation process, implementation barriers and ways to overcome these.

The topics discussed during the second meetings included the Roadmap, the Logbook, the financial incentives, potential synergies, business models and replicability of the developed tools.

Eleftheria Touloupaki presented the main views received both from the first and the second meeting for the 8 countries. She presented an overview of what was discussed during the 2018 stakeholder meetings in comparison to 2019 meetings, in each country separately.

Regarding the iBRoad Roadmap, it was at first discussed that in **Austria**, the renovation support and advice is a responsibility of the regions and the preferred renovation strategy is the one-step renovation, due to advantages regarding economic effectiveness and energy efficiency improvements. During the second meeting, it was concluded that it would be better to limit the number of steps in the Roadmap to no more than 3 and this would result in a better user-experience. Regarding the Logbook, during the first meeting it was discussed that EPC-databases were not available in all provinces, while during the second meeting, a the challenge identified concerned server capacity and data protection issues for third parties' access to the Logbook information.

About the financial incentives, in the first meeting it was discussed that there is a limited willingness from customers to pay for energy consultancy inspections - people do renovations as long as there are subsidies available. During the second meeting, there were no specific proposals received from Austrian stakeholders to link the tools to the current or any possible future national financial incentives.

Regarding the synergies topic, in the 2018 meeting it was stated that each province uses different software to calculate EPCs, and some of them are working on integration between EPC calculation software and other energy consultancy tools. During the second stakeholder meeting, the Austrian stakeholders deemed the further development of non-energy benefitsassessment as an important step towards assessing existing building renovation strategies.

About the business models, it was at first stated that individual building renovation roadmaps effectively coordinate the stepwise renovation measures to avoid lock-in effects, while in the 2019 meeting similar tools and software solutions that are already available in the market were mentioned as examples, e.g., the ETU Trend, Wohn / Nichtwohngebäude and ECOTECH Energieausweis.

Regarding the replicability, the overall conclusion was that the market needs tools to support energy auditors, and iBRoad is a solution for that. Nevertheless, the iBRoad tools also have a potential to help software developers to bring up digital solutions to support energy auditing activities.

In **Belgium**, during the 2018 stakeholder meeting, regarding the iBRoad Roadmap, the primary concern was whether the Roadmap should be mandatory or optional. Being mandatory was considered a good option, otherwise it would not be frequently used. Encouraging the use of the Roadmap, even if it is optional, was deemed vital to make links with mandatory legislation (e.g., application of building permits in the dwelling passport). In the second meeting, the stakeholders deemed the renovation of a house to be an ongoing process, in which the Roadmap should be the starting point. To further extend the functionality of the Roadmap, a dynamic, rather than static nature would be necessary for it to be open to adjustments during the lifetime of a building.

Concerning the Logbook, at the 2018 meeting it was suggested that the Logbook should be free to use, but renovation advice should be paid. During the second meeting, it was stated that the Logbook is a useful tool and should be applicable also for general work on a building, such as structural works, humidity issues and not only the application of energy-efficiency measures.

Regarding the financial incentives, at the first meeting, it was proposed that higher financial incentives could be given to those end users/building owners who have a renovation Roadmap, but these financial incentives would have to be determined by the public authorities. At the second meeting, the stakeholders concluded that subsidies, as well as other financial incentives, could improve the renovation rates and encourage the use of the Roadmap as a tool, if proposed in the context of a general renovation plan.

Moving on to the synergies, as Eleutheria Touloupaki continued her presentation, at the first stakeholder meeting, it was stated that the links with existing subsidies could encourage the use of the



Roadmap; during the second meeting, a key element of success of the Roadmap was seen in the connection of building owners to certified technicians who would execute the works in a high-quality manner.

Regarding the business models, during the first meeting it was stated that the communication of the long-term strategy, as well as the long-term and mid-term energy goals would help building owners or tenants to better understand the renovation advice. At the second meeting, it was discussed that in Belgium, the Regions have already initiated the implementation of the Logbook and Roadmap and have defined their business models.

Concerning the overall replicability of the iBRoad tools, it was concluded that even if the Logbook presents some limitations for the citizens, it would be useful for the administration to explore further. In the Walloon Region, the preparation of a Logbook is already in progress, but new ideas are always welcome, and therefore the Logbook model of the iBRoad has potential to prevail.

In **Bulgaria**, during the 2018 meeting, it was stated that the iBRoad project must focus on developing market-based solutions regarding the iBRoad Roadmap, as single-family buildings are mostly outside the scope of the legal requirements for energy audits. During the second meeting, it was concluded that the Roadmap could be a very useful tool with a high potential for significant impact on the quality of the renovation works. In Bulgaria, its significance is particularly high because real life renovations usually already take place in a step-by-step manner, but do not follow any methodology and often fall in the trap of lock-in effects.

At the 2018 meeting, the iBRoad Logbook seemed very promising if established at the individual level, possibly with the support of local authorities. At the second meeting, it was concluded that the Logbook is able to stimulate the renovation market, providing sufficient and transparent information for the structural condition and actual energy performance of the building, therefore encouraging investments in renovation.

On the topic around financial incentives, during the 2018 stakeholder meeting, it was initially stated that the market for single-family houses was virtually non-existent, and enquiries for renovations were rare. Also, that demand for professional services was non-existent, the intellectual labor was not valued, and most of the renovations in single-family buildings are Do-It-Yourself. However, during the second meeting it was discussed that in Bulgaria, renovation action takes place when prompted by public support and that it is believed that initial public support for the renovation Roadmap is necessary.

About the synergies, at the first meeting it was stated that the organisation of one-stop-shops for indepth energy renovation projects, providing general guidance to renovation leading to more comprehensive paid services -including links to companies-, could be complementary to the iBRoad tools and be part of an integrated approach. At the second meeting it was stated that both the Roadmap and the Logbook should be considered in the development of the long-term renovation strategy and the obligatory introduction of the building renovation passport for existing buildings pending in 2022.

Continuing with the business models, the stakeholders' view in 2018 meeting was that there is a strong need to educate end-users, possibly via a web platform outlining benefits and financial aspects of typical retrofit solutions. During the second meeting, it was discussed that the market implementation, although heavily depending on public support, can be accelerated by the active involvement of two stakeholders' groups whose potential has been largely untapped, real estate companies and public authorities.

Lastly, about replicability, the overall conclusion was that the iBRoad tools can be applied in the national strategic documents and implementation programmes which were at the time under development. Additionally, it was agreed that there is potential for replication in neighbouring countries with similar building traditions and ownership patterns.

In **Germany**, the renovation Roadmap was not discussed since there is already a Roadmap introduced in the form of the "individueller Sanierungsfahrplan".

Regarding the iBRoad Logbook, at the first stakeholder meeting it was stated that data protection should play an essential role in the development of such tools and that a primary concern is to respect the autonomy of the user. During the second meeting, the stakeholders' reaction to the Logbook was overall positive and the idea of data storing was found extremely useful. Stakeholders stressed, however, that there are similar applications already available in the German market. Their main concern was who will be authorised to create different building states.

Concerning financial incentives, in the 2018 meeting it was discussed that online building tools providing advice on possible building renovations should be free of charge, and interfaces to existing funding as well as granting access to third parties (e.g., craftsmen) as desired would be considered success indicators. During the 2019 meeting, it was discussed that the tools developed by the iBRoad project could be part of, or incorporated in, the existing national financial schemes.

About the synergies, during the first meeting, it was discussed that since there are already various Logbook approaches in Germany, it was recommended to establish a common data standard, like the "Open Immo" standard (http://www.openimmo.de/). During the second meeting, the stakeholders emphasised that it would be important to not develop yet another product on the market, but rather complement or connect the existing tools with each other.

Moving on to the business models, at the first meeting it was stated that there is a need for qualitative online building renovation tools which integrate the expertise of energy consultants into the data input process; during the second meeting it was discussed that it would be nice if the interface of the iBRoad tools was as simple as possible.

About the replicability of the iBRoad tools in Germany, it was discussed that there are different providers of energy auditors' software currently in the country. Each provider would have to programme their own interface for the Logbook. If iBRoad would programme a simple interface that makes implementation easy, the tool would be a welcome addition. Stakeholders also see a market potential for property management. The Logbook would help to provide an overview of the individual buildings.

The legislative status was broadly discussed in **Greece** during the first meeting; this was at the time quite unclear, with the Greek Regulation on Energy Performance of Buildings needing review to keep pace with the EPBD. A need for tools like the building renovation Roadmap was acknowledged, among others. A significant shift of public perception was obvious at the second meeting, supporting deep step by step renovations.

Regarding the iBRoad Logbook, at the first meeting it was discussed that the tools to be developed should be compatible with the requirements of the Greek regulation KENAK. During the second meeting, the potential for the Logbook to be the basic repository of building information was discussed and was well received by the stakeholders. The need for it to be user-friendly was also highlighted.

About the financial incentives, the main question raised during the first meeting was who and under which conditions will provide financing for the energy efficiency measures; during the second meeting, the stakeholders stated that for Greece, a scheme connecting a building renovation roadmap or passport with some kind of tax relief will boost its popularity.

Creating synergies and interoperability between different tools, existing or under development national ones and the ones to be developed by iBRoad, and making them available to the market, was considered a good starting point in Greece during the first meeting. During the second meeting, it was concluded that interoperability with the Energy Performance Certificate and other tools should be investigated. Also, connection with other entities, such as public authorities, banks or private corporations could be a useful addition to be established.



As for the business models, in the 2018 meeting it was stated that a well-informing and high-quality tool can find its place in Greece, even without an official "stamp" and enforcement process. At the 2019 meeting, the proper incorporation of the tools to relevant structures and processes was highlighted, and it was discussed that maybe it would be good to involve the Technical Chamber in the process of the business model development, so that engineers could be actively engaged.

Regarding replicability, the stakeholders considered the establishment of proper criteria that are customisable to the specific needs of different countries, important. Also, they stated that it would be necessary to consider if there are differences in regions within countries.

In **Poland**, regarding the Roadmap, during the first stakeholder meeting it was discussed that it is important to draw lessons from the current EPC system and to create special regulations at scale, involving the whole country. The need for improving the EPC system quality and removing the bureaucratic barrier was also highlighted. At the second meeting, the stakeholders recognised that the meticulous preparation of the iBRoad Logbook and Roadmap, particularly for the energy auditors, paying attention to the order of the renovation steps to avoid lock-in effects, is crucial for the successful implementation of the tools.

Regarding the Logbook, during the first meeting in Poland, it was discussed that it is essential to create the position of advisor/guardian that could assist in the adoption of the proposed processes and that the Logbook must be subsidised and must be obligatory. During the second meeting, the stakeholders agreed that the Logbook should be implemented on a national level and included in the Polish Renovation Strategy. This would be beneficial for the construction market, since the contractors could use the data from the Logbook to plan renovation works or to evaluate the cost of the projects.

Continuing with the financial incentives in Poland, at the first meeting stakeholders discussed how crucial it is, for the adoption of such tools, to define the source of financing. During the second meeting, it was stated that the Roadmap should be financed by public resources, maybe not for every building, but certainly for private investors that are willing to purchase one.

About the synergies' topic, during the first meeting, it was discussed that supporting building owners with clear and approachable guidance is necessary. The Logbook and Roadmap should be as simple as can be to ensure success and positive impact, and therefore the project needs to consider a long-range approach. At the second meeting, it was stated that it would be beneficial if the iBRoad tools could be linked to current subsidy programmes in Poland, that are targeting the renovation of single and multifamily houses.

Concerning the business models, during the first meeting it was discussed that the iBRoad tools could enhance the quality of construction works and that the iBRoad tools point to renovation steps that will allow lower energy usage. A strategy for the evaluation of the cost-effectiveness of the iBRoad tools was proposed at the second meeting; this included first a calculation of the cost of preparation of the Logbook and Roadmap for a significant group of people in Poland, which could then be compared to the calculated long-term energy and cost savings, or CO₂ reductions.

Regarding the overall replicability of the tools, it was concluded that the iBRoad tools could be used as an attractive way to present renovation in every country in the EU. Implementing the Logbook in other EU countries was considered possible and valid, as the tool is already created, even though it would require certain adjustments in some countries.

In **Portugal**, the primary concern during the first meeting was how different the methodologies for the calculation process (recommendations measures) could be from the ones existing on the energy certification of buildings. During the second meeting, the stakeholders agreed that a customised renovation roadmap, which will allow the end user to better understand the renovation's effect and the added value while implementing it, would be very useful.

As for the Logbook, in the 2018 meeting, the primary concern was who could be in charge of the Logbook (database) and how non-conformity checks could be managed. During the second meeting, it was discussed that the Portuguese Government could eventually integrate the Logbook within the scope of the national Long Term Renovation Strategy, and stakeholders believed that it could be launched in the market.

Regarding the initial incentives, in the first stakeholder meeting it was discussed that the lack of financial support, the lack of knowledge about them, and the high costs for the execution of recommendations measures for renovation are the main barriers to building renovations. At the second meeting, it was pointed out that the Government should launch other consistent and dedicated incentives to boost the market, allowing to digest the price for a large-scale roll out of the renovation roadmap.

About synergies, in the 2018 meeting it was pointed out that the iBRoad brings the opportunity for creating the Logbook and the possibility to have an individual renovation roadmap, which could include the need and preferences of the building users. During the second meeting, the stakeholders agreed that the iBRoad Logbook and Roadmap are in line with some planned national strategies and tools, and may be interconnected or developed under the basis of the iBRoad concept.

Regarding the business models, initially there were concerns about the methodologies for the calculation processes to be used, specifically on the differences with the existing calculation processes used for the EPCs. At the second meeting it was discussed that the potential business model may focus on construction companies and suppliers including of course the financial incentives, otherwise there may be some limitations and barriers in implementing the iBRoad tools on a national market.

Last, about the replicability of the tools, it was stressed out that the Logbook and the Roadmap have a huge potential for replication in Portugal, and that they will bring end users closer to involved stakeholders and to the market.

In Romania, in the first stakeholder meeting, it was discussed that an important factor is to improve the regulatory framework for the energy performance of buildings, by setting minimum energy performance requirements, raising the level of ambition for performance indicators and by detailing aspects of energy performance. During the second meeting, it was commonly agreed that the renovation roadmap should contain a customised renovation roadmap for a specific house, covering more than the existing situation. The building renovation roadmap should be an evolved version of the EPC.

In the 2018 meeting, data security and protection of personal data was highlighted as being of particular importance, in need of appropriate care and solutions, both for the development of the Roadmap and for the electronic register of the building. At the 2019 meeting, it was concluded that the Logbook should be launched by the government, as a central system, while the use and input of needed data should be supported by local administrations and market players.

Regarding the financial incentives, during the first meeting it was discussed that the funds available for the energy renovation of existing buildings should be used to attract private funds to multiply the effects. During the second meeting it was discussed that, besides the funds needed for the development of a Building Renovation Passport system in Romania, its effective use and application in practice would require financial support towards building owners for the elaboration of the individual roadmap and data processing in the Logbook by the energy auditors.

About the synergies, Romanian stakeholders at first stated that there is a need to raise the level of ambition in setting clear and detailed quality and performance requirements, both in design and execution of works in collaboration with various stakeholders' groups. At the second meeting, they highlighted that there is potential for interlinkage between the iBRoad-Logbook and iBRoad-Roadmap with planned national tools, with the database of EPCs, energy audits and inspection reports.



As for the business models, the promotion of the iBRoad instruments to the banks that develop and implement energy loan programmes was discussed and considered important during the first meeting. During the second meeting, it was discussed that while the developed iBRoad concept represents a very solid starting point for the development of the Building Renovation Passport and Logbook system in Romania, a sound business model should be well defined. One option could be to start the development from already existing platforms.

Overall, the replicability potential of the iBRoad Roadmap and Logbook for Romania is high and is supported by the need to develop a sound mechanism to fill in the current quality data gap.

The detailed results can be found in the two reports of the iBRoad stakeholders' meetings, that are uploaded in the reports' section on the project's website.

Afterwards, Alice Corovessi took the floor and presented the positive feedback coming from the 8 countries. So, for Austria the final conclusion was that the iBRoad approach was considered replicable and many positive attributes were identified. For Belgium, it seems that the schemes and models used in iBRoad are inspiring for the other regions and for social housing companies, and can serve as a starting point for following up the ongoing renovation process. In Poland, the conclusion was that the iBRoad tools should be included in the Polish legislation and interlinked to existing national thermomodernisation programmes. In Portugal, the Logbook and Roadmap should be mandatory and, considering all the current transformations and developments in the construction, energy efficiency and building regulations, the concept is very suitable for Portugal, as it was concluded. In Germany, even though there are certain tools in place, the Logbook is considered a dynamic digital tool that responds to the wishes of building owners. The Building Renovation Passport should be integrated to existing tools and processes currently available in Greece. In Romania, the information available on the iBRoad Roadmap and Logbook represent a particularly useful starting point for the development of the Building Renovation Passport. Last, in Bulgaria, the tools themselves have proven to be technically flawless and applicable in many different individual situations.

A Q&A session followed the presentations for a fruitful discussion between the speakers and the 19 attendees of the webinar. The first question was "Overall, did you find energy auditors willing or reluctant to make use of new tools beyond EPCs?". Alice Corovessi first explained that dedicated iBRoad training sessions for energy auditors were organised, first as part of the iBRoad testing in the 4 pilot countries, but also adjacent to the second round of the stakeholder meetings in the other 4, non-pilot, countries. Overall, auditors considered the iBRoad tools as easy to use, and affirmed that they can support their work.

The next question was: "The market situation seems to be quite different in the various Member States; is it possible for a single tool to cover them all?". Alice Corovessi answered that what was discussed with the stakeholders was that the tools that have been developed, the Logbook and the Roadmap, can be a good basis for starting the Building Renovation Passports discussion in each country. Having these tools at a good level, they can be further developed or adapted to the national frame. So, it depends on the country, what the country wants to do with the Building Renovation Passport and how they want to use it. Alexander Deliyannis added that the logic of the tools and the outputs of the iBRoad is that they are modular so they may be useful for quite a few countries.

The last questions were "It would be interesting indeed if the iBRoad approach can be integrated in national regulations and Long-Term Renovation Strategy. Has there been any initiative for this, e.g., by a national ministry?". Alice Corovessi answered that there are currently ongoing discussions on this, which the consortium supports.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement № 754045

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