iBRoad

Individual Building
Renovation Roadmaps

The iBRoad field test experience

Bulgaria, Poland, Portugal, Germany

ifeu – Institute for Energy and Environmental Research

August 2019

www.ibroad-project.eu

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I. EXECUTIVE SUMMARY

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. Prior to field-testing, project partners from the pilot countries received an online train-the-trainer seminar. 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. Energy auditors received comprehensive training before the field test: in each pilot country, a one-day face-to-face auditors´ training was given. The training events were organised locally by the country partners ADENE, EnEffect and KAPE. One trainer from ifeu carried out the training in all three pilot countries in cooperation with the respective country partner. With the training, auditors received the iBRoad handbook and the training presentation explaining all relevant details.

Overall, the partners from the pilot countries considered the field test a success: the field test process, the training as well as the preparation and training material for energy auditors were appreciated. No major problems occurred during the field test, and the developed iBRoad tools were in principle positively received.

In Germany, the field test concentrated on the iBRoad Logbook only. An article in an energy auditors´ magazine invited auditors to a free testing period of the Logbook. Auditors applied for the test via a specific contact email. They received comprehensive training material that was adapted to the Logbook and partly translated to German, where helpful.

II. INTRODUCTION

The building sector accounts for approximately 40 % of total energy consumption and 36 % of CO_2 emissions in the European Union. Currently, almost 75 % of the European building stock is not energy efficient, while the building renovation rate is very low.

The Energy Performance of Buildings Directive (EPBD) requires a transformation of the majority of buildings towards a 'highly efficient and decarbonised building stock by 2050. Deep building renovation, has the potential to lead to significant energy savings and to lower CO_2 emissions and thus, contributes to the energy and climate objectives at national and European level.

The iBRoad project funded by the Horizon 2020 European programme aims at overcoming and eliminating barriers to deep renovation and at the same time avoiding the risk of lock-in effects by developing, designing and demonstrating the concept of individual Building Renovation Roadmaps for residential buildings, combined with a digital repository of building-related information – the iBRoad Logbook.

Renovating a building can be very complex and time consuming. For building owners, the lack of knowledge about what to do, where to start and in which order to implement renovation measures, is one of the main obstacles to improve the energy performance of their building. For building owners, this uncertainty typically leads to limited renovations (e. g. one-to-one replacements or installation of easy measures only) or, most often, postponement of renovation decisions. So far, appropriate tools which drive deep renovations and turn them from "a nuisance" into an "opportunity to improve the home and the living environment" are widely lacking. Thus, the individual Building Renovation Roadmap developed in this project will serve as a tool outlining a customised renovation plan with a long-term horizon for deep step-by-step renovation of single-family and small multi-family houses. The individual Building Renovation Roadmap will allow building owners to gain an overview over the full range of and time planning for renovation options, adapted to the individual building and the

preferences of the building occupants. As a result, the individual Building Renovation Roadmap is intended to facilitate the owners' decision to invest in deeper renovation.

In addition, the iBRoad Logbook developed in this project will serve as a building identity card for the building owner. It is designed to eventually store digitally all building-related information (e.g., energy bills, incentives, loan and tax documents). Also, the iBRoad Logbook will provide simple automated renovation recommendations, reminders for maintenance and, where possible, interfaces to national databases such as qualified craftsmen and building professionals.

III. iBRoad FIELD TEST

i. Objective of the iBRoad field tests

The concept of the iBRoad individual Building Renovation Roadmap and Logbook were field-tested in Bulgaria, Poland and Portugal. Additionally, the iBRoad Logbook was field-tested in Germany (as Germany had already adopted the concept of the individual Building Renovation Roadmap, both at regional and at federal level, but had not foreseen a Logbook in its building renovation strategy) (see Figure 1).

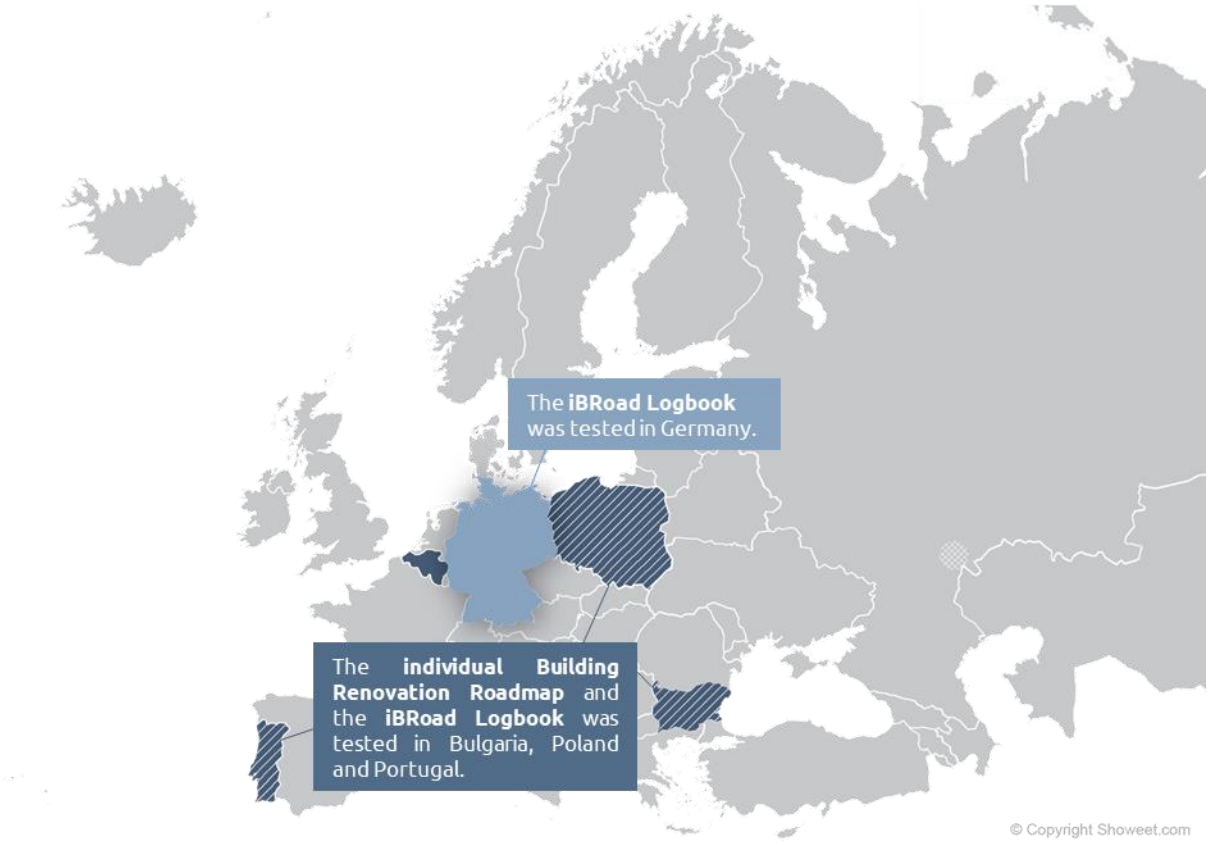

Figure 1: iBRoad field test

Overall, the objective of the field test was to test the iBRoad tools in real case examples in the four pilot countries. For this, the energetic status and renovation potential of 15 - 20 buildings per pilot

country was examined in cooperation with professional local energy auditors. The auditors were asked to create stepwise renovation plans, whenever suitable, using the iBRoad-Plan (individual Building Renovation Roadmap and roadmap assistant) and to fill in the iBRoad-Log (Logbook).

ii. Methodology of the iBRoad field tests

Preparing for the field tests

The following timetable illustrates the time schedule for preparation, execution and evaluation of the iBRoad field test (see Figure 2).

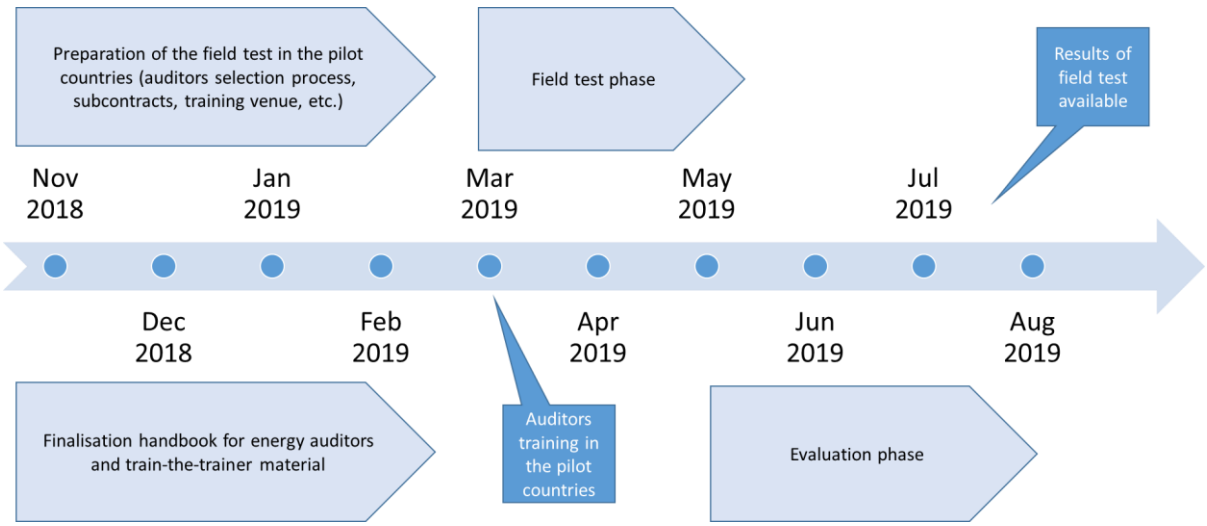

Figure 2: Time schedule field test

The partners from the pilot countries received an online train-the-trainer seminar. The seminar comprised the objectives of the field test, a content-wise preparation of the auditors´ training, logistic requirements for the auditors´ training, accompanying support during the field test, and support in managing the prepared evaluation questionnaires for auditors and homeowners. The partners were also guided through the latest versions of the iBRoad tools so as to prepare them for possible questions from auditors.

The aim was to have in each pilot country at least ten experienced energy auditors to examine in total 15 – 20 suitable single-family or small multi-family houses. Energy auditors had to fulfil the requirements illustrated in Figure 3 to be subcontracted and receive a fee after the field test. For building owners, the energy audit of their building was free of charge.

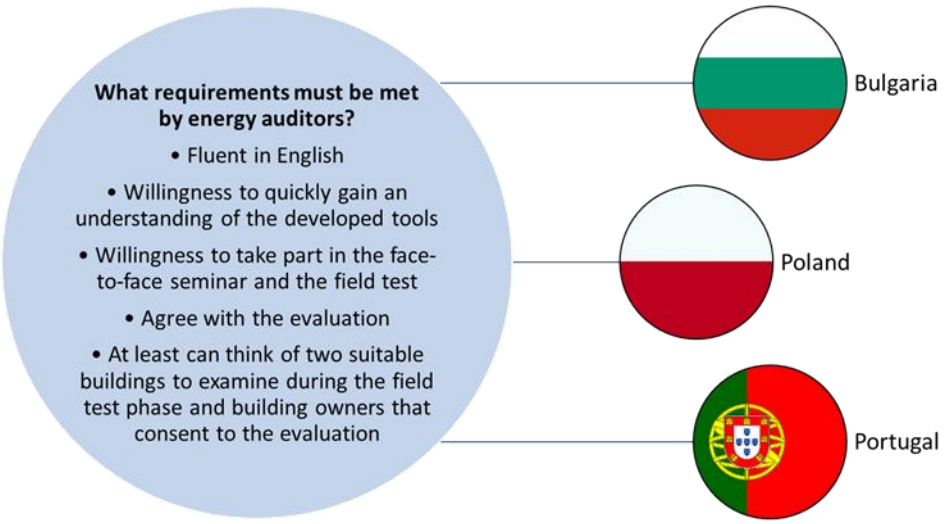

Figure 3: Auditors' requirements

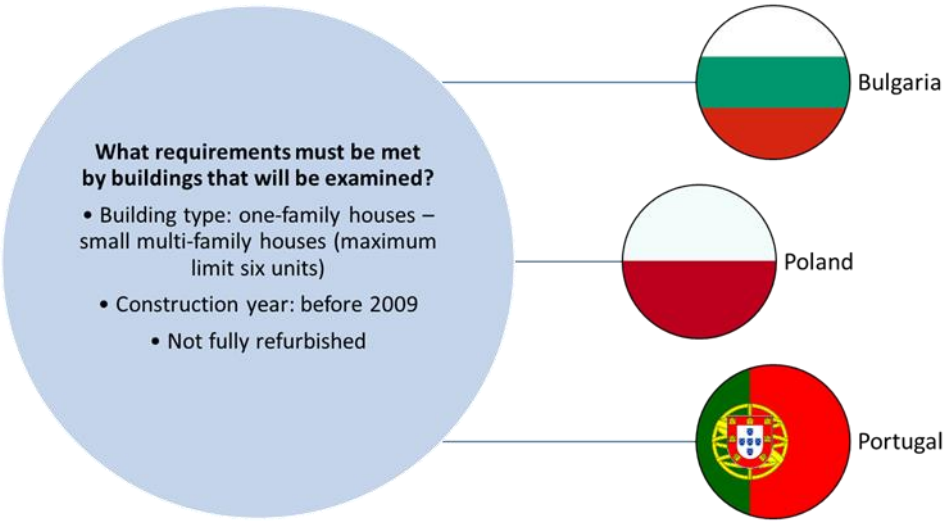

Figure 4: Building requirements

Generally, energy auditors had to be fluent in English and be able to propose at least two single-family or small multi-family houses with need for renovation, to be examined during the field test.

In total, 27 energy auditors participated in the iBRoad field test. Table 1 shows the number of auditors per country.

Pilot country	Energy auditors
Bulgaria	7
Poland	10
Portugal	10

Table 1: Distribution of auditors per country

In Poland and Portugal, ten energy auditors respectively participated in the iBRoad field test. In Bulgaria, however, only seven energy auditors participated (see iii Impressions from the pilot countries). Generally, each energy auditor carried out two audits.

Energy auditors were found and selected in close cooperation with the country partners EnEffect, KAPE and ADENE. The country partners were responsible for presenting and promoting the iBRoad project and inviting auditors to participate in the field test. Most auditors were encouraged to participate in the field test by personal approach.

The energy auditors received a full-day face-to-face comprehensive auditors´ training in their country prior to the field test. The training events were organised by the country partners ADENE, EnEffect and KAPE. One trainer from ifeu carried out the training in all three pilot countries in cooperation with the respective country partner to avoid influences on the field test results from different trainers. With the training, auditors received the iBRoad handbook and the training presentation explaining all relevant details. The handbook for energy auditors can be found at https://ibroad-project.eu/news/ibroad-handbook-for-energy-auditors/. The following figure illustrates the time schedule for the face-to-face training seminars (see Figure 5).

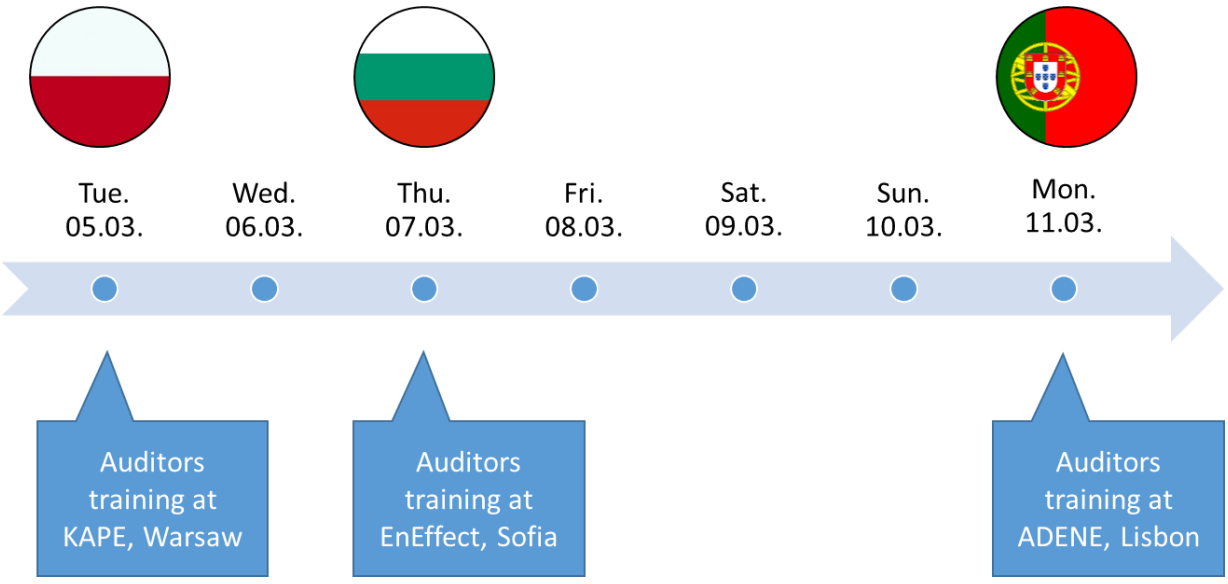

Figure 5: Time schedule face-to-face auditors' seminar

Main topics covered at the auditor´s training included:

- **The iBRoad project and the field test process:** Participants were introduced to the iBRoad project idea and the iBRoad concept. Furthermore, the field test procedure was explained in detail.

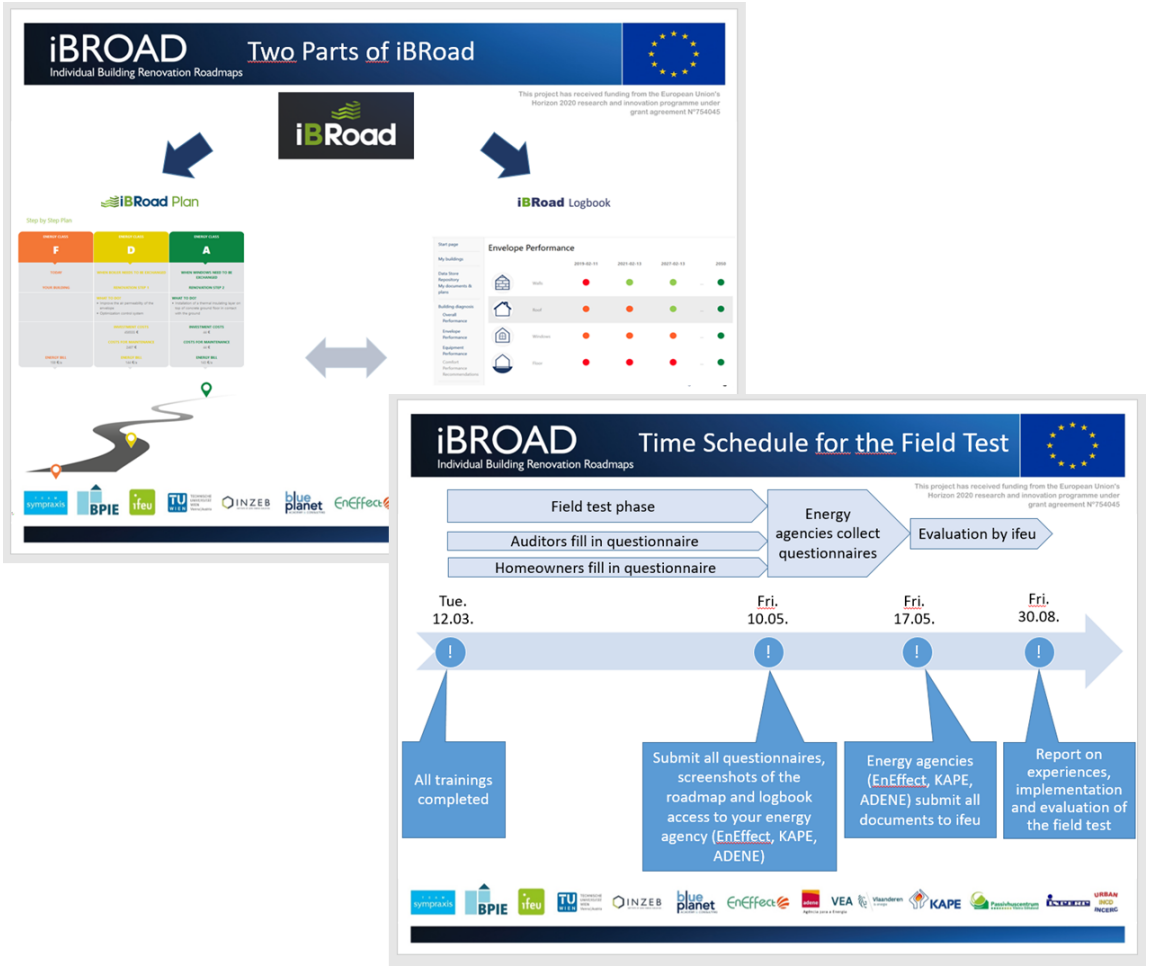

Figure 6: Excerpt 1 from the face-to-face auditors' seminar presentation

The need for a Renovation Roadmap: Obstacles to building renovation and addressing advantages of a Renovation Roadmap were discussed.

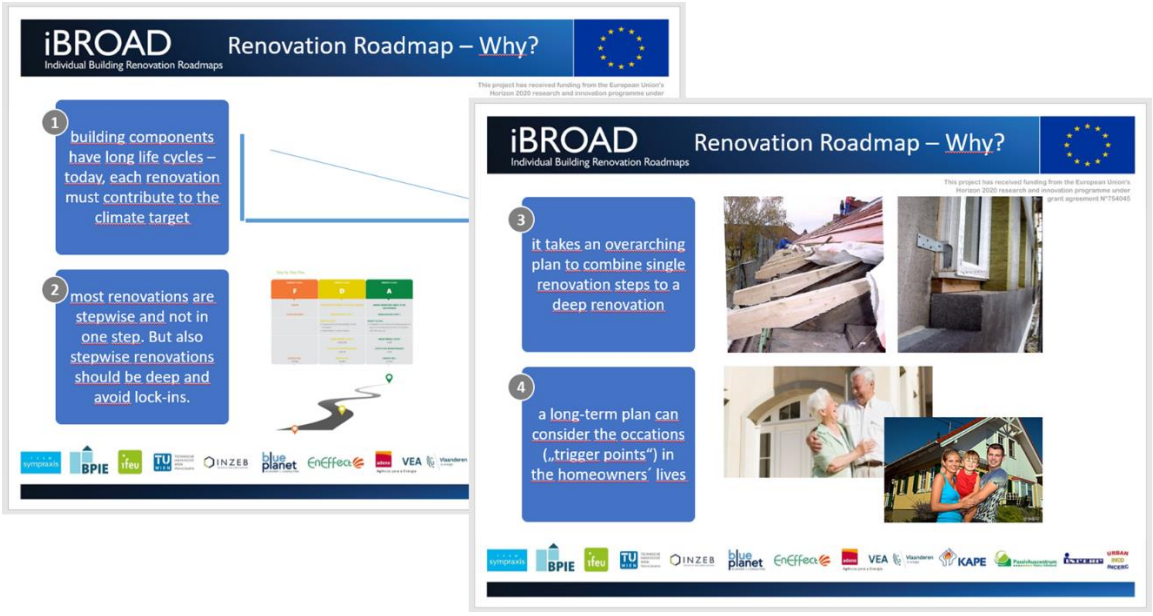

Figure 7: Excerpt 2 from the face-to-face auditors' seminar presentation

- **The presentation of the iBRoad Renovation Roadmap incl. illustration, guiding principles, creation steps, detailed understanding:** The idea and concept of the Renovation Roadmap were presented, accompanied by illustrations and detailed instructions on how to create and produce the Renovation Roadmap.

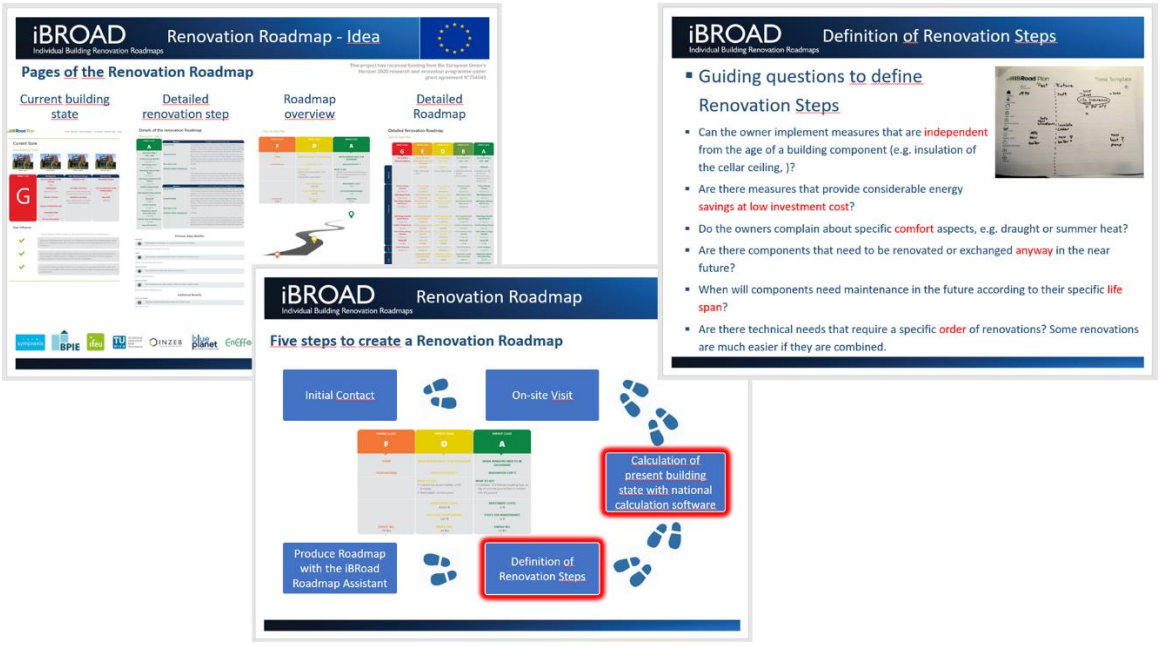

Figure 8: Excerpt 3 from the face-to-face auditors' seminar presentation

- **The need for a Building Logbook:** Obstacles to building renovation and addressing advantages of a Building Logbook were discussed.

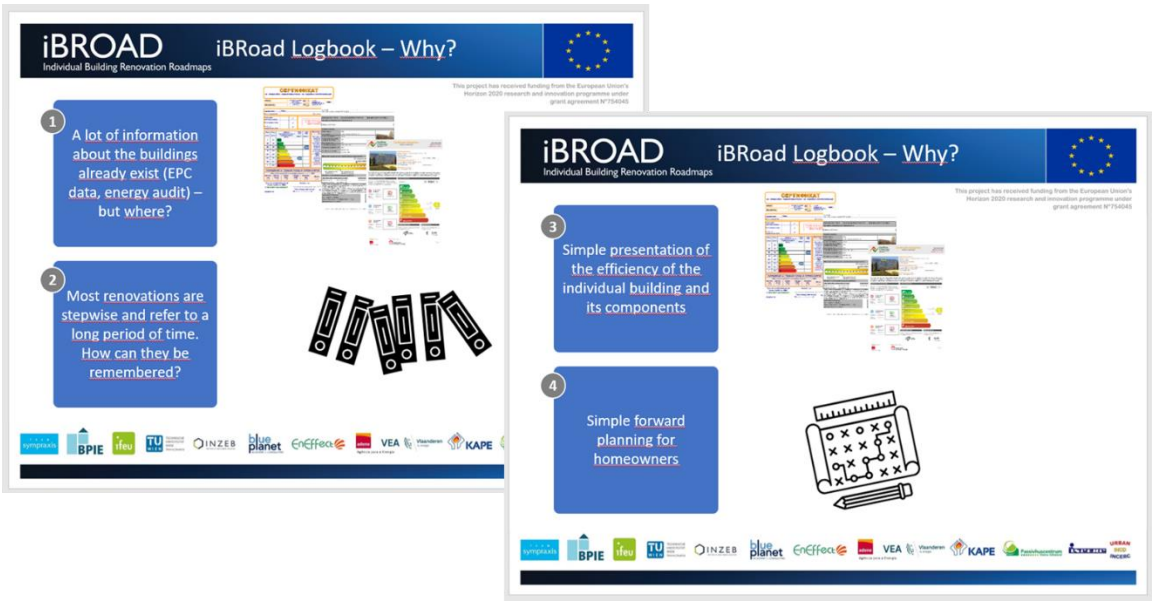

Figure 9: Excerpt 4 from the face-to-face auditors' seminar presentation

- **The presentation of the iBRoad Logbook incl. illustration, navigation and ways to produce:** The idea and concept of the iBRoad Logbook were presented, accompanied by illustrations and detailed instructions on how to create and use the Logbook.

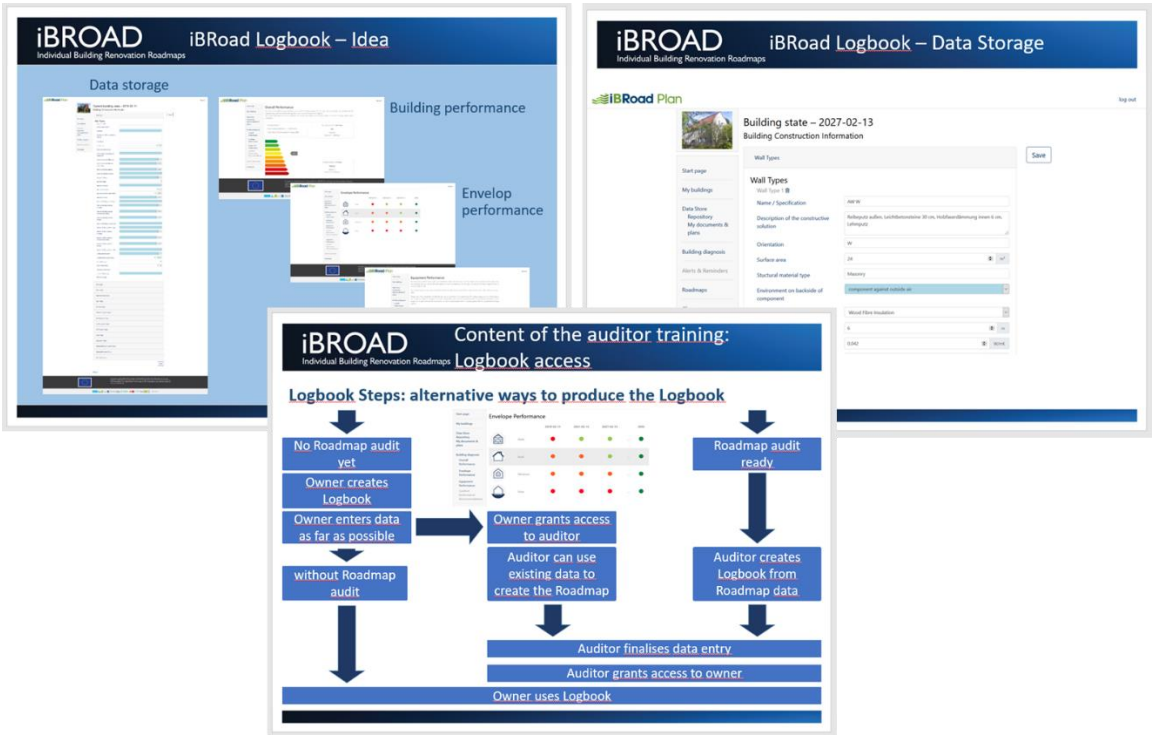

Figure 10: Excerpt 5 from the face-to-face auditors' seminar presentation

- **Evaluation:** Participants were informed that the field tests would be evaluated. For this purpose, detailed questionnaires for energy auditors and homeowners were created and introduced to the participants.

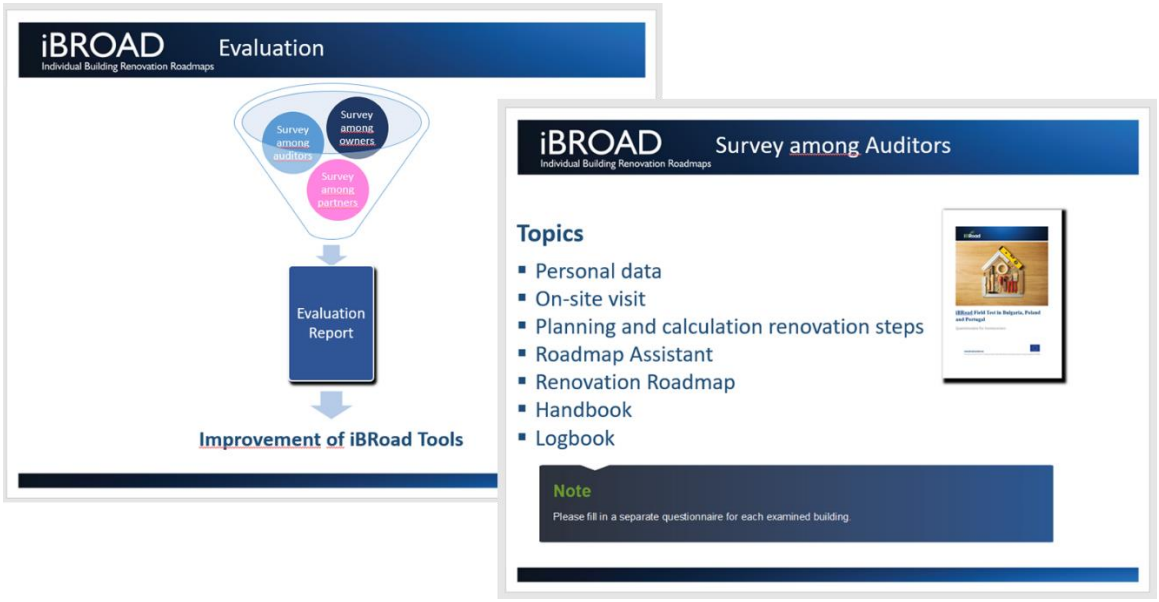

Figure 11: Excerpt 6 from the face-to-face auditors' training presentation

The field test itself

After the training sessions, energy auditors needed to find buildings suitable for renovation and building owners willing to attend the field test. Several auditors, however, had their objects of investigation fixed already before the training. The auditors started the assessments with an on-site visit in the respective buildings. The aim was, on the one hand, to acquire the technical data of the present building state, which makes the basis for the whole calculation process. On the other hand, auditors had to learn the individual preferences of the building owners, their private future plans and their financial flexibility. Auditors were equipped with a blank template, which they could use to develop a first sketch of the renovation roadmap together with the owners.

After the on-site visit, auditors first calculated the present building state in the same way they usually calculate an EPC. Based on this initial calculation and with the owners´ preferences in mind, they derived the renovation steps. For each step, they calculated the investment costs and the funding, if available. Once they had all necessary information, they entered these into the Roadmap Assistant and created the iBRoad Renovation Roadmap, and sent the links to this online document to the respective homeowners.

The auditors also filled in the relevant building data into the online iBRoad Logbook and made the Logbook accessible to the homeowners, by handing them over the log-in data. In a second on-site visit, the auditors explained the Roadmap and the Logbook to the owners.

In the beginning of the field test, homeowners and auditors received special questionnaires which they filled in - ideally subsequently shortly after each step. The partner agencies in the pilot countries gathered all questionnaires, Roadmap and Logbook information and sent them together to the ifeu-institute where they were evaluated.

iii. Impressions from the pilot countries

After the field tests, the partners from the pilot countries were asked to share their impressions about the field test, in particular with regard to energy auditors and homeowners that participated and, for instance, difficulties that occurred during the course.

Overall, the partners from the pilot countries considered the field test a success: the field test process and training as well as the preparation and training material for energy auditors, were appreciated. No major problems occurred during the field test, and the developed iBRoad tools were in general positively received.

However, the pilot countries had to overcome some difficulties, for instance, the language of the iBRoad tools or finding field test participants (see Figure 12).

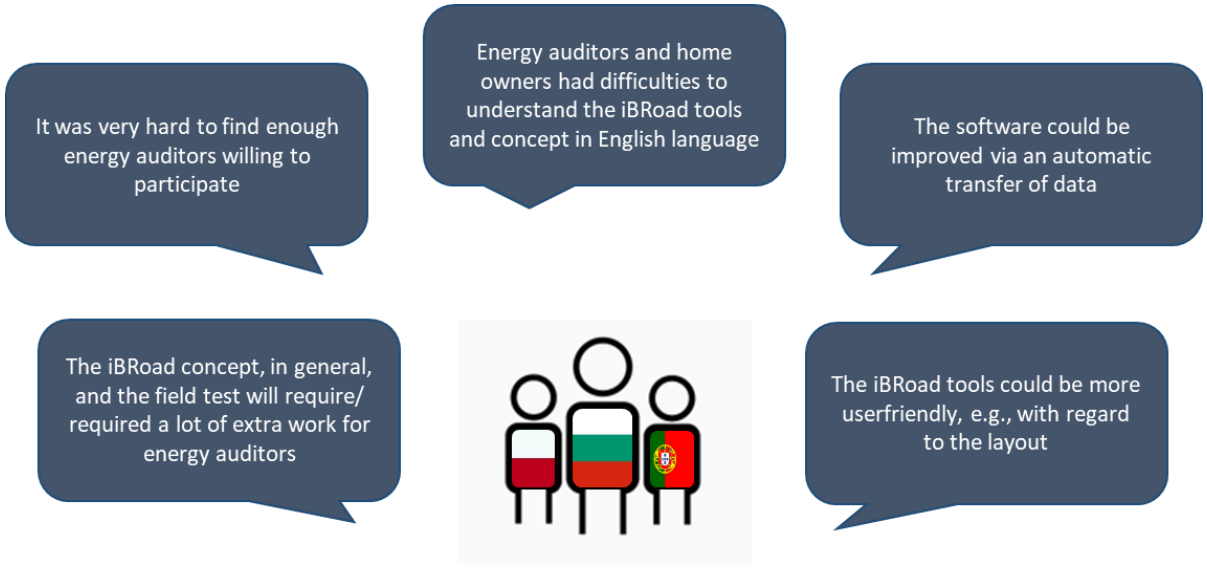

Figure 12: *Identified difficulties within the course of the field test*

The main difficulty experienced in Bulgaria was to find energy auditors willing to participate in the field test. Although there are well-trained energy auditors available, there are no incentives for audits in single-family houses. As a result, auditors are not used to such customers and Bulgarian homeowners are not familiar with energy audits.

In Poland and Portugal, the search for participants was comparatively easier. Major difficulties were not reported.

Language proved to be a barrier in all three pilot countries. Both energy auditors and homeowners would have preferred to have the iBRoad tools adjusted to their respective national language.

Auditors from all three pilot countries also recommended an automated data transfer between the national building calculation software and the iBRoad tools.

Portuguese participants also remarked that the iBRoad tools could be more user-friendly, e.g. in terms of layout but also as concerns the large amount of data required.

iv. German field test

In Germany, the field test focussed on the iBRoad Logbook only. An individual building Roadmap (iSFP) is already in place since 2017, so there was no need to implement the iBRoad Roadmap in parallel. In order to recruit energy auditors for the field test, an article was launched in an energy auditor´s magazine[1].

FACHWISSEN Weitblick

Tester gesucht

PROJEKT IBROAD – EIN LOGBUCH FÜRS GEBÄUDE In dem geförderten Projekt IBRoad arbeiten zwölf Partner aus neun europäischen Ländern zusammen, um eine Energieberatung für schrittweise Sanierungen zu entwickeln. Wer dabei an den deutschen iSFP denkt, liegt genau richtig: die Renovation Roadmap funktioniert ganz ähnlich und wird deshalb in Deutschland natürlich nicht eingeführt. Das Logbuch dagegen kann eine interessante Ergänzung zum iSFP sein. Sie können jetzt unter den Ersten sein, die das Logbuch testen. Peter Mellwig

Im Projekt iBRoad (sprich Ei-Bi-Road) wurden zwei sich ergänzende Produkte entwickelt: das Gebäude-Logbuch und die Renovation Roadmap. Das Projektkürzel steht für „individual Building Renovation Roadmap". Die Idee des Logbuchs ist, die vielen Daten, die über ein Gebäude vorhanden sind, elektronisch zu speichern. Gerade bei einer Sanierung gibt es viele neue Informationen, die für die Eigentümer auch nach langer Zeit noch einmal interessant sein können: die Adressen der Handwerker, die Bezeichnung des Dämm-Materials, die Kosten der Wärmepumpe, um nur einige Beispiele zu nennen. Wenn für das Gebäude eine energetische Berechnung durchgeführt wird, können die einmal erfassten Eingabedaten ebenfalls im Logbuch gespeichert werden. Der Bauherr kann sie dann für künftige Planungen oder Energieausweisberechnungen zur Verfügung stellen.

Das Logbuch kann unterschiedlich genutzt werden. Ein Gebäudeeigentümer kann es z.B. auch ganz ohne Energieberater nutzen und Daten nur so weit eintragen, wie sie ihm vorliegen. Es ist aber auch möglich, dass ein Energieberater das Logbuch für seinen Kunden ausfüllt und ihm dann übergibt. Dazu ist geplant, eine Datenschnittstelle anzubieten, mit der die Gebäudedaten aus der Berechnungssoftware bequem importiert werden können.

In der Regel wird als erstes der Istzustand eines Gebäudes eingetragen. Bei Veränderungen am Gebäude (z.B. neuer Heizkessel) wird ein neuer Gebäudezustand angelegt (als Kopie des Istzustands) und hier die Änderung vermerkt (der neue Heizkessel eingetragen). Der Istzustand bleibt bestehen und kann eingesehen werden. Nach diesem Muster können beliebig viele Gebäudezustände eingetragen werden. Wie ein Logbuch auf einem Schiff zeigt das Gebäude-Logbuch den gesamten Weg des Gebäudes durch die Sanierungen.

Es können auch Sanierungen, die in der Vergangenheit durchgeführt wurden, bis zurück zum Zustand bei Errichtung des Gebäudes dokumentiert werden.

Auch geplante Sanierungen können eingetragen werden. Wenn ein iSFP erstellt wurde, können alle zukünftigen Gebäudezustände schon elektronisch gespeichert werden. Falls einzelne Sanierungsschritte anders ausgeführt werden sollten als im

Anmeldung zum Test

Wenn Sie das Logbuch testen wollen, schreiben Sie bitte eine E-Mail mit dem Betreff „iBRoad Logbuch Testzugang" an ibroadtools@ibroad-project.eu. Sie erhalten dann die Zugangsdaten zum Logbuch, Lehrmaterial sowie den Link zur Online-Umfrage. Auf der Webseite finden Sie noch viele weitere Informationen über das Projekt:

https://ibroad-project.eu/

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Figure 13: Article in German auditor´s magazine to call for testers

The article briefly described the general objectives of the iBRoad project and explained the steps to take to attend the field test. Auditors were invited to explore the Logbook and to test all its functionalities for a limited period of time. They were ensured that all data entries would be erased after the test period. A reminder regarding the field test was sent in the magazine´s email newsletter ten days after the article´s release.

Both the article and the newsletter offered a contact email address (ibroadtools@ibroad-project.eu) which started an automated reply email. The email gave a detailed description of the steps to take during the field test. It provided the auditors with the log-in data, excerpts from the iBRoad Handbook and auditor´s training presentation. In addition, a telephone hotline was offered during the field test period. Auditors were asked to report on their impressions and experiences via an online platform, email or telephone.

[1] "Der Gebäude Energieberater" 05/2019

IV. CONCLUSION

The iBRoad field test was successfully completed. The participating country partners attended a train-the-trainer seminar giving the detailed objectives, the logistic requirements and a deep insight to the developed tools. The country partners organised the training venues, invited experienced energy auditors and prepared the general frame for the full-day training events.

Thanks to the very helpful support of the pilot countries, auditors´ training was carried out successfully. Ten auditors received comprehensive training in each pilot country. They were provided a printed iBRoad Handbook, the printed training presentation and additional documents for the onsite visit. Questions and discussions about the iBRoad Renovation Roadmap and Logbook were translated, whenever helpful.

After the auditors´ training, the country partners translated the questionnaires and documents, and supported the participating auditors and homeowners with telephone hotlines during the entire field test.

In Germany, the field test concentrated on the iBRoad Logbook only. An article in an energy auditors´ magazine invited auditors to a free testing period of the Logbook. Auditors applied for the test via a specific contact email. They received comprehensive training material that was adapted to the Logbook and partly translated to German, where helpful.

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