



# ePANACEA

Smart European Energy Performance Assessment & Certification



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## **3rd REBs conclusion report**

**Minutes of 3rd Set of Meetings of Northern, Western, Central, Southwestern and Southeastern Regional Exploitation Boards (REBs)**

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EASt – Energy Agency of Styria  
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## OVERVIEW OF THE ePANACEA PROJECT

After 10 years of track record, the current EPCs schemes across the EU face several challenges which have led to not fully accomplish their initial objectives: lack of accuracy, a gap between theoretical and real consumption patterns, absence of proper protocols for inclusion of smart and novel technologies, little convergence across EU schemes, lack of trust in the market and very little user awareness related to energy efficiency.

The objective of the ePANACEA project is to develop a holistic methodology for energy performance assessment and certification of buildings that can overcome the above-mentioned challenges. The vision is ePANACEA becoming a relevant instrument in the European energy transition through the building sector. ePANACEA comprises the creation of a prototype (the Smart Energy Performance Assessment Platform) making use of the most advanced techniques in dynamic and automated simulation modelling, big data analysis and machine learning, inverse modelling or the estimation of potential energy savings and economic viability check.

A relevant part of the project is to have a fluent dialogue with European policy makers, certification bodies, end-users, and other stakeholders through two types of participatory actions: on the one hand a feedback loop with policy makers will be carried out through the so-called Regional Exploitation Boards (REBs) covering EU-27+Norway+UK, and the dialogue with the end-users will be established by means of specific thematic workshops. Thanks to these participatory actions we will ensure that ePANACEA approach is aligned with and meets the needs of national public bodies, end-users, and other stakeholders with a view to test the acceptance and to validate the methodology developed.

ePANACEA will demonstrate and validate reliability, accuracy, user-friendliness, and cost-effectiveness of the methodology through 15 case studies in 5 European countries.

## EXECUTIVE SUMMARY

The Regional Exploitation Boards (REBs) represent an important pillar of ePANACEA. The project aims to establish a fluent dialogue with different European stakeholders with special focus on national/regional policy makers and certification bodies, which are directly involved in the implementation of the different EPC schemes and are responsible for energy regulations development in their own regions/countries. Therefore, the REBs are composed of these important regional European stakeholders, as well as consumer associations, building products manufacture associations, professional associations, etc. The dialogue is moderated by the ePANACEA project partners. This document summarizes the content of the third five Regional Exploitation Board meetings which took place in May 2023. In total, 41 different and highly relevant stakeholders from 15 different countries primarily discussed the topics during the five online sessions.

The third round of Regional Exploitation Board meetings was comprehensive and covered several important topics and objectives. This presentation provided an overview of the methods and highlighted their respective features. The meeting then focused on discussing the differences between these methods, likely utilizing a decision matrix to emphasize their distinguishing characteristics. The testing procedure and the results obtained were also presented, which is crucial for assessing the effectiveness and reliability of the methods.

Another significant aspect of the meeting was the exploration of the future market perspective of the ePANACEA methods. This discussion aimed to evaluate the potential impact and viability of these methods in the energy performance market. Understanding their market potential will assist in making informed decisions and strategies for further development and adoption.

The meeting agenda also included a crucial emphasis on designing the new Energy Performance Certificate (EPC) while considering insights from an end-user perspective. The goal is to create a user-friendly and informative EPC that aligns with the expectations of end-users. By incorporating their perspectives and needs, the aim is to enhance the overall usability and effectiveness of the EPC.

In addition, an interactive session using the Poll-Everywhere platform was conducted to gather insights on building renovation passports and building logbooks initiatives across European countries. This participatory approach ensured a diverse range of perspectives were considered and facilitated benchmarking with other European initiatives.

Furthermore, the agenda addressed the linkages to other initiatives and upcoming projects, with a specific emphasis on the final conference. The conference provides an opportunity to connect with other relevant projects, share knowledge and experiences, and foster collaborations that can contribute to the advancement of energy performance practices.

It is highlighted that this document provides an evaluation on different subjective opinions from several experts from different member states. The conclusions summarize valuable feedback for the upcoming project activities related to the ePANACEA methodology development.



# 1. INTRODUCTION

The **Regional Exploitation Boards (REBs)** represent an important pillar of ePANACEA. The project aims to establish a fluent dialogue with different European stakeholders with special focus on national/regional policy makers and certification bodies, which are directly involved in the implementation of the different EPC schemes and are responsible for energy regulations development in their own regions/countries. Therefore, the REBs are composed of these important regional European stakeholders, as well as consumer associations, building products manufacture associations, professional associations, etc. The dialogue is moderated by the ePANACEA project partners.

The REB members will be involved in the definition of the energy assessment methodology, in its validation and evaluation, and in supporting local dissemination actions. This feedback loop will allow ePANACEA to develop an upgraded EPC methodology, suitable for national requirements of the stakeholders.

The REBs are organised based on their geographical location. In total, there will be five REBs established, in order to cover all EU Member States (EU27+Norway+UK). The following

Figure 1 gives an overview on the five different REBs. Each REB is led by one ePANACEA project partner.

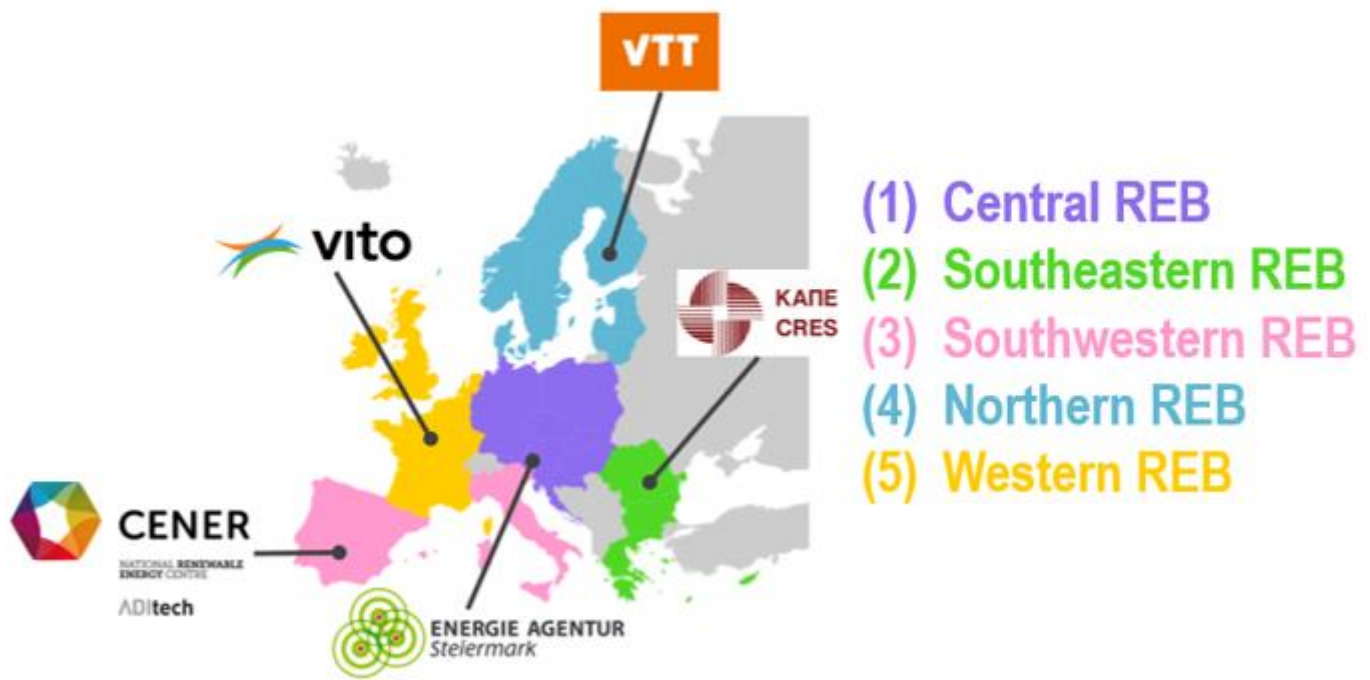


Figure 1: Overview on the REB structure

Each REB will meet three times during the project lifetime. The 3<sup>rd</sup> REB meetings took place in May 2023, as specified below:

- **Northern REB**, led by VTT (Technical Research Centre of Finland) **on 04th May 2023**
- **Central REB**, led by EAST (Energy Agency of Styria) **on 05th May 2023**
- **Western REB**, led by VITO (Vlaamse Instelling voor Technologisch Onderzoek N.V) **on 17th May 2023**
- **Southwestern REB**, led by CENER (National Renewable Energy Centre of Spain) **on 31st May 2023**
- **Southeastern REB**, led by CRES (Center for Renewable Energy Sources) **on 08th May 2023**

The third round of Regional Exploitation Board meetings is shown in Figure 2. The 3<sup>rd</sup> regional exploitation board meeting agenda encompasses several important topics and objectives. Firstly, there was a presentation on the three ePANACEA Energy performance Methods, which provided an overview of these methods and their respective features. The agenda then moved on to discussing the differences between these methods, likely utilizing a decision matrix to highlight their distinguishing



characteristics. Additionally, the meeting delved into the testing procedure and present the results obtained, which is crucial for assessing the effectiveness and reliability of these methods.

Another significant aspect of the meeting was the exploration of the future market perspective of the ePANACEA methods. This discussion aims to shed light on the potential impact and viability of these methods in the energy performance market. Understanding their market potential will assist in making informed decisions and strategies for further development and adoption.

The meeting agenda also included an important focus on the new Energy Performance Certificate (EPC). This entails designing the new EPC and considering insights from an end-user perspective. By incorporating the perspectives and needs of end-users, the aim is to create an EPC that is user-friendly, informative, and aligned with their expectations.

Furthermore, an interactive session using the Poll-Everywhere platform was performed to gather insights on building renovation passports and building logbooks initiatives across European countries. This participatory approach ensured a diverse range of perspectives are considered and enables benchmarking with other European initiatives.

Lastly, the agenda addressed the linkages to other initiatives and upcoming projects, with a specific emphasis on the final conference. This conference provides an opportunity to connect with other relevant projects, share knowledge and experiences, and foster collaborations that can contribute to the advancement of energy performance practices.

Overall, the 3<sup>rd</sup> Regional Exploitation Board meeting agenda covers key areas such as the ePANACEA methods, future market perspectives, the new EPC, engagement with end-users, collaboration with other initiatives, and upcoming projects. These discussions and activities aim to drive progress, innovation, and collaboration in the field of energy performance.

## 4. MEETING OF THE REGIONAL EXPLOITATION BOARD

05.05.2023 – 13:00-15:00 MS Teams  
place: **online** – duration: **approx. 2 hours**

### AGENDA

- The 3 ePANACEA Energy Performance Methods
  - Presentation of the Methods
  - Differences between the Methods (decision matrix)
  - Testing procedure and results
- Future market perspective of the ePANACEA methods
- The new EPC
  - Design of the new EPC
  - Insights from end user perspective
- Link to other initiatives and upcoming projects (final conference)



*Figure 2. Representative presentation of the agenda of the third Central REB meeting on 5 May 2023 organised and hosted by the project partner Energy Agency Styria.*

It is highlighted that this document provides an evaluation on different subjective opinions from several experts from different member states. The conclusions summarize valuable feedback for the upcoming project activities related to the ePANACEA methodology development.



## 2. PARTICIPANTS OF THE 3<sup>RD</sup> REB MEETINGS

The following Table 1 and Figure 3: Overview on participants’ structure among the five REB meetings gives an overview of the participants of the five 3<sup>rd</sup> REB meetings and their structure. In total, 41 different and highly relevant stakeholders from 15 different countries attended the meetings and discussed the topics.

Table 1: Overview on participating REB institutions; \*Austrian partners participated in 1/5 meetings

REB	Participants (including project partners PPs)	Countries
Western REB	4 (3 PPs)	2 BE, IRL
Southwestern REB	9 (4 PPs)	2 ES, PT
Central REB	11 (4 PPs)	5 AT, DE, SI, PO, HU
Southeastern REB	10 (2 PPs)	2 GR, RO
Northern REB	8 (5 PPs)	4 AT, ES, FI, NO
<b>Total</b>	<b>42 (41 different)</b>	<b>15 (14 different)*</b>

In terms of the fields of activity of the 24 participating external stakeholders, the following picture became apparent. Most of the participants (8 / 33%) are not assigned to any category. If we take a deeper look into this category, it was seen that this “other stakeholders” are institutions strongly linked to policy makers and certification bodies, supporting them in developing and implementing EPC schemes. Then followed by national or regional policy makers 5 (21%). 4 (17%) participants were certification bodies or professional associations, and 2 (8%) participating organisations were EPC experts or energy auditors. The smallest number of participating organisations could be assigned to the category of building products manufacture associations (1 / 4%).

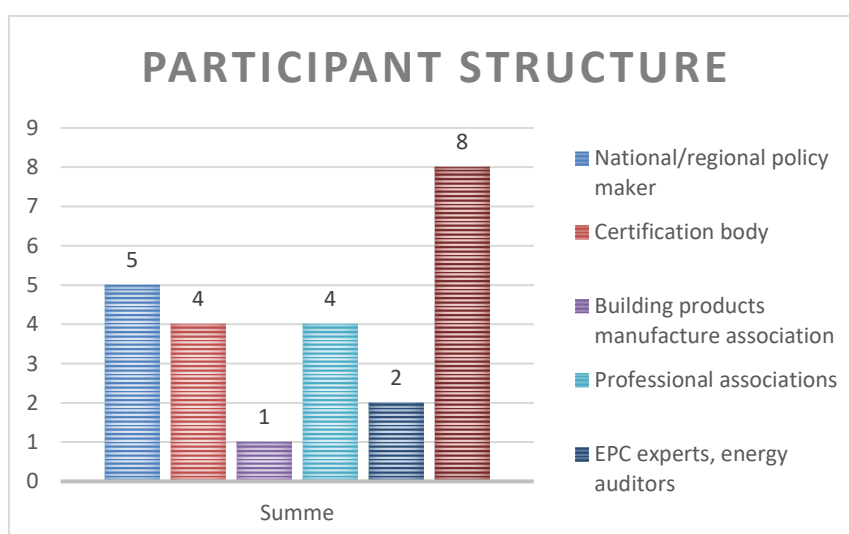


Figure 3: Overview on participants’ structure among the five REB meetings



### 3. CONCLUSIONS OF THE FIVE REB MEETINGS

As the third round of REB meetings was the last series of meetings in the ePANACEA project, the focus was more on the presentation of the results. Feedback was collected in the interactive part of the session and summarized in the respective chapter.

The three methods, their testing process and detailed practical insights into the methods and a decision matrix for the methods and related tools were presented. Most of the participant’s questions focused on details and clarifications about the methods themselves.

Further, the results of a market penetration study for the products developed in ePANACEA were presented. Here, too, comprehension questions were diligently answered.

Furthermore, the final version of the energy certificate layout developed within ePANACEA project was presented and the first 4 sheets and their contents were briefly introduced. Here was room for questions and answers and a lively discussion was going on in some REB regions.

This was followed by an exciting presentation of the results of a survey with the target group of end users about their opinion on the ePANACEA energy certificate. The presentation, peppered with many tables and graphs, stimulated discussion.

In the last part of the presentation, interactive questions were asked about the linking of the ePANACEA Energy Performance Certificate with digital building logbooks and renovation passports. After each question, the audience was asked about a short explanation of the chosen option and certain trends were summarized and justified. In this part of the presentation the participation in the discussion was the highest.

In the graph below you can see a selection of the most interesting statements from the last REB meetings within the ePANACEA project.

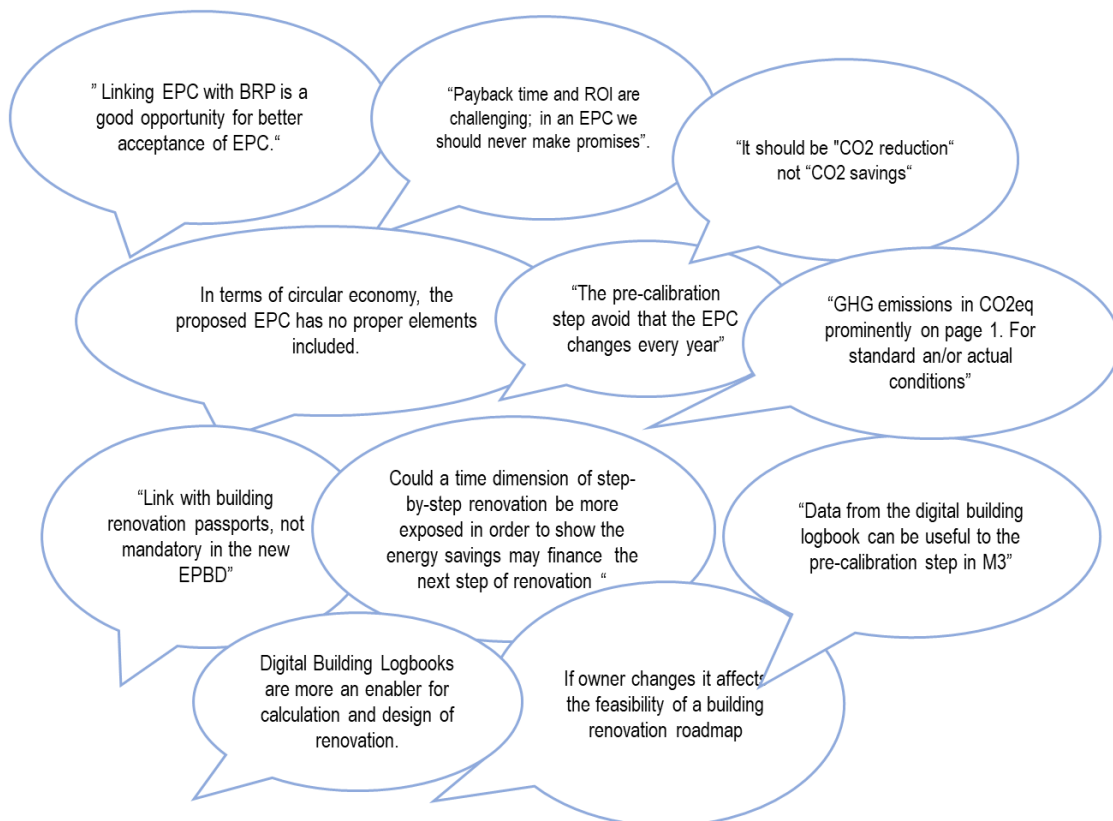


Figure 4: Overview on some chosen statements from REB members during the 3<sup>rd</sup> REB meetings



## 3.1. The 3 ePANACEA Energy Performance Methods

There was a presentation on the three ePANACEA Energy Performance Methods, which provided an overview of these methods and their respective features. The agenda then moved on to discussing the differences between these methods, likely utilizing a decision matrix to highlight their distinguishing characteristics. Additionally, the meeting delved into the testing procedure and present the results obtained, which is crucial for assessing the effectiveness and reliability of these methods. For further information on the methods see the documents provided on the webpage <https://epanacea.eu/results/> corresponding to the methods. See also the YouTube channel of the ePANACEA project (<https://www.youtube.com/@HorizonePANACEAproject>) for tutorials of the developed the methods.

### 3.1.1. Presentation of the methods

The three methods were described starting with an overview of the proposed scheme and the basic approaches. Followed by the EPC cycle that showed the detailed idea of calibration of the method 3. It was also shown which tools were necessary to calculate the results and which data has to be collected. After this a graph explained the calibration and the NMBE<sup>1</sup> and RMSE<sup>2</sup> error values. Finally the process of calibrating the model for method 3 was shown and explained. After the calibration the background and the process of bringing a model back to standard was explained.

A challenge that came up here was the that the development of the methods was not finished leading the discussion to be quite at a general level.

A question was if there are any plans to have different tools for different categories/ type of buildings (residential, office, etc)? Because 3 methods are 3 different tools; it is difficult to use the same tool for residential and for hospital which is very complex building. The question was answered in the next section of the presentation using the decision matrix.

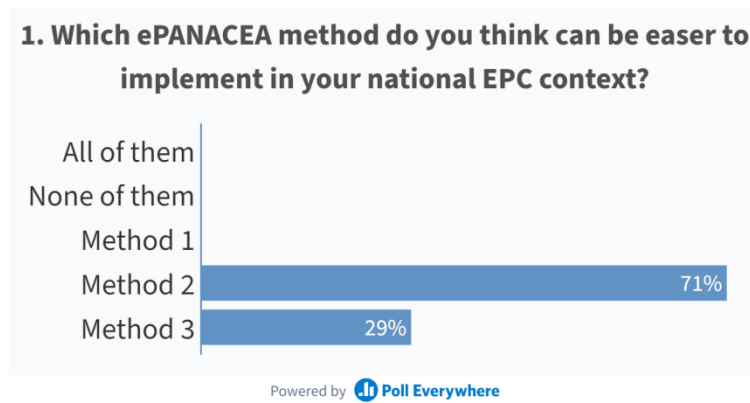
The majority of stakeholders expressed consensus that the EPC challenges outlined in the ePANACEA presentation of the methods remain applicable to their countries. During the Western-REB meeting, particular emphasis was placed on the significant relevance of the gap between standard EPC outcomes and actual consumption patterns in Ireland. This pertains to various factors, including the integration of innovative technologies such as group systems and low-carbon fuel sources.

After the presentation of the methods, in the Southwest REB meeting there was a question introduced which method would be the easiest to implement in the stakeholders' countries. It came out that 71% voted for method 2 that uses the ISO standard. No one voted for method 1 (it method was presented more appropriate for cold climates), and 29% for method 3.

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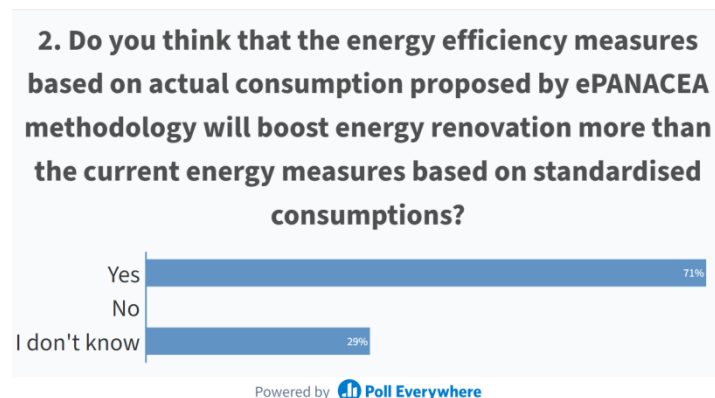
<sup>1</sup> NMBE: Normalized Mean Bias Error - Measures average prediction bias

<sup>2</sup> RMSE: Root Mean Square Error - Measures prediction accuracy dispersion



*Figure 5: Question about Methods and their implementation in the Southwest REB*

There was another survey introduced by the Southwest REB meeting. The survey aimed to gauge participants' opinions on whether energy efficiency measures based on actual consumption, as proposed by the ePANACEA methodology, would have a greater impact on boosting energy renovation measures compared to the current approach based on standardized conditions. The results revealed that 71% of respondents answered affirmatively, indicating their belief in the potential of the proposed methodology. Surprisingly, none of the participants responded negatively, suggesting a unanimous agreement among those surveyed. However, a notable 29% of respondents were unsure or lacked sufficient knowledge to form an opinion. This suggests a need for further education and awareness regarding the ePANACEA methodology and its potential benefits in promoting energy renovation measures. Overall, the survey indicates a strong inclination towards the efficacy of energy efficiency measures based on actual consumption, highlighting the importance of implementing such approaches in future energy renovation endeavours.



*Figure 6: Survey SW REB - Do you think that the energy efficiency measures based on actual consumption proposed by ePANACEA methodology will boost energy renovation measures more than the current energy measures based on standardised conditions?*

There was another survey introduced by the Southwest REB meeting. The survey aimed to assess participants' perspectives on whether the operational label, based on actual conditions, could potentially replace the current asset label in their respective countries, not only as an informative tool but also from a compulsory perspective. The results indicated that none of the respondents answered affirmatively, with 71% firmly expressing their disagreement with the notion. This suggests that the majority of participants do not perceive the operational label as a suitable replacement for the current asset label in their countries. However, a significant 29% of respondents were unsure or lacked sufficient knowledge to provide a definitive answer. This response is consistent with the vision and previous policy maker's statements that came up in the past REB meetings (see D6.1 – 1st REBs conclusion report and D6.2 – 2nd REBs conclusion report, the idea of keeping the primary purpose of EPC as an



energy efficiency comparison tool. The perception of the operational rating as a complement or additional information was highlighted by the audience. “This second phase can be useful to end-users because it enables to provide tailored energy efficiency measures for renovation, but not as a comparison tool used for real state transactions”. So, this second phase could become a “second EPC” or a complement to the “official” EPC providing information to end-user based on real consumption and more tailored investment costs.

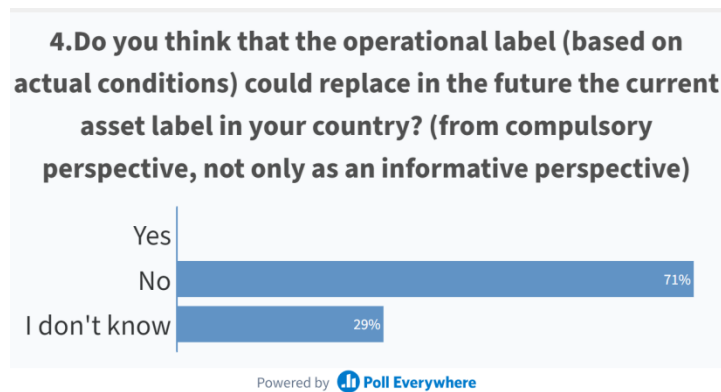


Figure 7: Survey SW REB - Do you think that the operational label (based on actual conditions) could replace in the future the current asset label in your country? (from compulsory perspective, not only as an informative perspective)

### 3.1.2. Testing procedure and results

In the presentation of the 3 ePANACEA Energy Performance Methods, a significant aspect to explore is the testing procedure employed to evaluate their effectiveness and reliability. The testing procedure serves as a crucial step in assessing the performance and validity of these methods, ensuring their suitability for practical implementation.

During the testing procedure, the ePANACEA Energy Performance Methods undergo rigorous evaluation and analysis. Various parameters, metrics, and criteria are considered to measure their accuracy, consistency, and overall performance. These parameters may include energy consumption, efficiency ratings, predictive capabilities, and other relevant indicators.

Through meticulous testing, the aim is to validate the methods and assess their capabilities across different scenarios and building types. The testing procedure may involve simulations, case studies, and comparisons with established benchmarks or existing energy performance evaluation frameworks.

By discussing the testing procedure and presenting the results, the presentation aimed to provide transparency, credibility, and evidence-based support for the ePANACEA Energy Performance Methods. This information helps build confidence among stakeholders, including policymakers, industry professionals, and end-users, regarding the applicability and effectiveness of these methods in real case studies from their regions.

Discussion came up and the content is summarized divided by the methods:

M1: There was discussion about the use of the curves in the results tab as they are just one way to show the energy usage. Provision of alternative presentations could be thought of.

M2: During the discussion, the focus was on the precision and calibration of Method 2. The calibration discussion specifically involved the ASHRAE 14-2002 NMBE (Normalized Mean Bias Error) values. The NMBE calibration results were as follows:

a) For district heating, simulated as a natural gas boiler, the NMBE was 19.26%.

b) For electricity, the NMBE was -12.49%.

The observed curves appeared to align with the expected shape, indicating that the calibration was in line with anticipated outcomes.

M3: A discussion was about the graphs used in the method. However, the whole process was not in final form bringing the discussions to a general level. On the average the specialists were interested to hear more in the future when the method progresses and the reports are available.

### **3.1.3. Differences between the methods using the decision matrix**

A key focus is on exploring the differences between these methods using a decision matrix. This decision matrix serves as a valuable tool for objectively comparing and evaluating the distinct characteristics, features, and advantages of each method.

The decision matrix enables a structured and systematic approach to understanding the variations and nuances between the ePANACEA Energy Performance Methods. It provides a framework for assessing multiple factors such as accuracy, complexity, applicability, data requirements, and computational resources.

By utilizing the decision matrix, the presentation aims to present a comprehensive overview of the strengths and weaknesses of each method. This analysis facilitates a comparative assessment that assists stakeholders in making informed decisions based on their specific requirements, resources, and priorities.

The decision matrix also helps highlight the unique value propositions offered by each ePANACEA Energy Performance Method. It enables stakeholders to identify which method aligns best with their goals, constraints, and desired outcomes. This information is instrumental in selecting the most suitable method for implementation, whether it be for energy performance evaluations, energy-efficient design considerations, or retrofitting strategies.

Through this part of the presentation, the decision matrix provides a clear and concise visualization of the differences between the ePANACEA Energy Performance Methods. It serves as a tool for facilitating discussions, enhancing understanding, and aiding decision-making processes, ultimately empowering stakeholders to make informed choices based on a comprehensive and comparative analysis of the methods.

Overall, the decision matrix analysis adds depth and clarity to the presentation, allowing stakeholders to appreciate and comprehend the distinct characteristics and implications of each ePANACEA Energy Performance Method.

Question from a REB member: Are industrial buildings included in the building uses? The industrial processes are very difficult to assess energy performance. Suggestion and question if the SEPAP tools can assess industrial processes.

In the Southwest REB meeting there were additional questions regarding the implantation of the different methods in the stakeholders' countries.

A Portuguese representative highlighted that M3 is already in line with the Portuguese certification scheme expectations in many ways, in the integration in different contexts, one is the comparison to other buildings, end-user use, the integration in the roll out of building renovation passports, cost optimal, etc.

Another stakeholder highlighted the introduction of a pre-calibration step to adjust climate data and other parameters based on impact knowledge, as a good point. He encourages the ePANACEA team to keep working on it.

Data from the digital building logbook can be useful to the pre-calibration step.

A stakeholder suggests that the pre-calibration step avoids yearly changes in the EPC, improving accuracy for comparisons. The second step, calibration, resembles an energy audit and offers personalized energy efficiency measures for renovation. It can serve as a "second EPC" or complement the official EPC, providing information based on actual consumption and costs. This



second EPC can be integrated into the digital building logbook and renovation passport, allowing easy updates with new energy bills.

Also a big discussion about calibration and pre-calibration arises. The importance of the technician's knowledge and the quality of input data into the model is underlined. It influences in the result.



## 3.2. Future market perspectives

This segment aimed to provide insights into the potential impact, opportunities, and challenges that lie ahead in the energy performance market. Not all the REB meetings presented this part of the presentation and no discussion came up as this part is really theoretically.

Understanding the future market perspectives is crucial for stakeholders, including policymakers, investors, and industry professionals, as it helps shape strategies, investments, and decision-making processes. By examining the market trends, emerging technologies, policy developments, and consumer demands, stakeholders can align their efforts with the evolving landscape and position themselves for success.

This part of the presentation aimed to shed light on the market potential of the ePANACEA Energy Performance Methods and the SEPAP platform. It explores the expected demand, adoption rates, and market acceptance of these methods in CE. Additionally, it considers factors such as regulatory frameworks, financial incentives, and sustainability goals that influence the market dynamics.

Furthermore, the future market perspectives section may delve into potential barriers and challenges that could impact the widespread adoption of these methods. This analysis helps stakeholders anticipate and address hurdles related to technology integration, market awareness, cost-effectiveness, and stakeholder engagement.

By presenting the future market perspectives, the presentation tried to provide stakeholders with a holistic view of the opportunities and challenges that lie ahead in the energy performance market. It empowers them to make informed decisions, identify strategic partnerships, and allocate resources effectively to maximize the impact and uptake of the ePANACEA Energy Performance Methods and the SEPAP platform.

For further information on the future market perspectives and the corresponding report visit the webpage <https://epanacea.eu/results/>.

## 3.3. The new ePANACEA EPC

In the first part of this section the design of the new Energy Performance Certificate (EPC) and its key features, improvements, and potential benefits were introduced.

A second part of the presentation showed the insights from end users regarding the new ePANACEA EPC report layout that were gathered during the 3<sup>rd</sup> round of users workshops in AT, BE-Flanders, ES, FI and GR (see report D3.5 Impact assessment from final user perspective regarding the new EPC). The presentation aimed to understand their perspectives, experiences, and attitudes towards the EPC, gathering feedback for further improvement.

During an interactive session, stakeholders had the opportunity to share their opinions, ideas, and concerns regarding the new EPC and its integration with building renovation roadmaps and digital logbooks. The discussions aimed to gather insights on topics such as the feasibility of implementing these initiatives, the potential benefits they offer, and the challenges that may arise.

For further information on the new ePANACEA EPC see the documents provided on the webpage <https://epanacea.eu/results/> corresponding to user perception.

### 3.3.1. Design of the new ePANACEA EPC

In the presentation, a significant component focused on the design of the new Energy Performance Certificate (EPC) report layout (see Chapter 7.6 Design of the new EPC6.1.) developed within ePANACEA project. This segment aimed to introduce and provide insights into the revamped EPC, highlighting its key features, improvements, and potential benefits.

The Energy Performance Certificate plays a crucial role in providing information about the energy efficiency of buildings. With the redesign, the presentation aimed to address the evolving needs of stakeholders, including property owners, tenants, policymakers, and energy professionals.

By presenting the developed four pages of the new EPC the goal was to showcase enhancements that improve its usability, accuracy, and relevance. This includes factors such as improved visual layout, clearer energy performance indicators, standardized reporting formats, and user-friendly presentation of energy consumption data.

The introduction of the new EPC is a response to the changing energy performance landscape and the need for a more intuitive and informative certificate. The presentation aims to demonstrate how the redesign aligns with emerging best practices, international standards, and feedback from end-users.

Additionally, the presentation highlighted the integration of new technologies or features in the new EPC design. This could include considerations for the smart readiness indicator, renovation roadmaps or comfort indicator aiming to provide stakeholders with more comprehensive and actionable information.

By introducing the design of the new EPC, the presentation aimed to create awareness, generate interest, and foster understanding among stakeholders about the improvements and benefits it offers. It sets the stage for further discussions on the potential impact of the new EPC in promoting energy efficiency, facilitating decision-making processes, and supporting sustainable building practices.

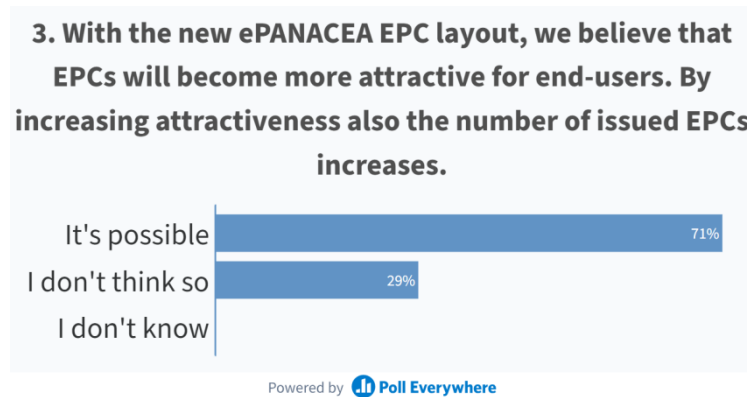
Questions and comments in this section were:

- Include the GHG emissions and CO<sub>2</sub>eq prominently on page 1. for Standard an/or actual conditions. Not just primary energy.
- Can the gradual progression of renovations over time be highlighted to demonstrate how energy savings can finance subsequent renovation steps or unlock funding options for building owners? Building owners often face budget constraints and tend to look for renovation opportunities within a timeframe of approximately five years. If it is possible to demonstrate the accumulated savings over a five-year period, it could be beneficial to include cash flow projections.
- Questions about the actual costs for the renovation measures
- Payback time and ROI are challenging; in an EPC we should never make promises. Concrete numbers are difficult because of price increase and a classification could be an idea for this section.
- “Total primary energy use“ is not clear.
- Why the total is less than the non-RES? It is confusing, because the value of RES (i.e. 83 kWh/m<sup>2</sup>) is below the text “Total primary energy” – it’s matter of positioning.
- Not clear if the conditions are standard or statistical. Which standards are used?
- It should be "CO<sub>2</sub> reduction“ not “CO<sub>2</sub> savings“. CO<sub>2</sub> emissions are not saved, they are reduced.
- Benchmarking: is the final energy use the total one? No primary? Gas and electricity cannot be summed. It has to be converted to primary.
- ACTUAL AND STANDARD CONDITIONS: they have to be well explained/described so the end user understands the user behaviour impact. Energy assessors should present/explain the EPC to the users to understand its value/importance and the work carried out to develop/issue an EPC, otherwise they are not willing to pay.

There was also a survey introduced by the SW REB leader about the new EPC layout. The survey aimed to examine participants' perceptions regarding the impact of the new ePANACEA Energy Performance Certificate (EPC) layout on its attractiveness for end users. The results revealed that 71% of respondents believed that the revised layout would indeed make EPCs more appealing, resulting in an increased number of issued EPCs. Notably, no participants responded with "I don't know," indicating a strong level of certainty among the respondents. However, 29% of participants expressed skepticism, stating that they did not



think the new layout would lead to an increase in issued EPCs. This dissenting opinion highlights the existence of differing viewpoints on the efficacy of the ePANACEA EPC layout in enhancing its attractiveness for end users.



*Figure 8: Survey SW REB: With the new ePANACEA EPC layout, we believe that EPCs will become more attractive for end users. By increasing attractiveness also the number of issued EPCs increases.*

### 3.3.2. Insight from end user perspectives

In this section of the REB meeting, a significant portion showed the insights from an end-user perspective regarding the Energy Performance Certificate (EPC) gathered during the 3<sup>rd</sup> round of end-user workshops (see report “Impact assessment from final user perspective regarding the new EPC” on the webpage <https://epanacea.eu/results/>). This segment aims to explore the perspectives, experiences, and attitudes of end users towards the EPC, providing valuable feedback and considerations for further improvement. Some of the REBs skipped this section because of lack of time.

The presentation also explored the perceived ease of use and usefulness of the presented EPC, gauging how user-friendly and beneficial the certificate is in their view. It delved into their overall perception of the EPC, evaluating factors such as clarity, relevance, and comprehensibility.

Furthermore, the insights gained from end users extend to evaluating new EPC features. This examination includes their feelings about the EPC, their attitude towards energy efficiency, and their behavioural intention to use the EPC in decision-making processes related to buildings.

Additionally, the presentation explored the willingness of end users to pay for the EPC and their perceptions of the overall system surrounding the EPC. This assessment considered the financial aspect and the perceived value of the certificate within the broader context of energy efficiency practices.

By incorporating the insights from the end user perspective, the presentation aims to inform the design and development of an EPC that better meets the needs, expectations, and preferences of its intended users. It underscores the importance of user-centric approaches in enhancing the effectiveness and acceptance of the EPC, ultimately encouraging sustainable behaviours and energy-conscious decision-making.

### 3.3.3. Interactive part with focus new ECP and Building Renovation Roadmap and Digital Logbooks

In this part, an interactive survey was conducted in Poll-Everywhere in four of the five REB meetings. In Western REB, the interactive tool was not used and the questions were answered in the form of a discussion. This discussion, as well as the discussions from the other REB countries, were each added under the evaluation of the standardized questions.



The Poll-Everywhere tool provided valuable insights into stakeholders' perspectives on the proposed EPC and its connections to building renovation passports, digital building logbooks, energy-efficient products, building logbooks as instruments for end-users, and building renovation roadmaps. These insights helped inform the ePANACEA project and its future directions. The four REB meetings conducted using the poll-everywhere tool addressed various questions related to the proposed Energy Performance Certificate (EPC) and its connection to building renovation roadmaps and digital logbooks.

**3.3.3.1. The link between the proposed EPC and building renovation passports**

With about 96% of all votes the participants agreed that there is a strong link between the proposed EPC and building renovation passports. Only one participant disagreed with this statement (see Figure X). There had been 27 responses in total for this question. There are no responses of Western REB for the whole survey (5 questions).

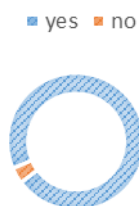


Figure 9: Approval rate – The link between the proposed EPC and building renovation passports

**Discussion summary:**

Linking EPC with BRP is a good opportunity for better acceptance of EPC

The linkage with Building Renovation Passports (BRPs) is not mandatory in the new Energy Performance of Buildings Directive (EPBD), and the ongoing discussion in Ireland revolves around whether it should be implemented or not. Currently, the consensus is that while the EPC is suitable for new buildings, it may not provide sufficient information for existing buildings that require renovation. This is particularly crucial for developing roadmaps towards achieving nearly zero or zero energy levels, as accurate knowledge of the building's physical characteristics is essential. Method 1, which relies on assumptions, can pose a challenge in this regard. Transitioning from an assumption-based recommendation to an accurate renovation plan can be difficult. In Ireland, BRP assessors are required to conduct on-site visits. Provisional BRPs, based on plans and drawings, are utilized for compliance purposes in the case of new buildings.

**3.3.3.2. The link between the proposed EPC and digital building logbooks**

About 70% of all participants agreed that there is a strong link between the proposed EPC and digital building logbooks. 8 participants (about 30%) had a different opinion (see Figure X), although 7 of these 8 votes came from the Central REB. 26 participants responded this question.

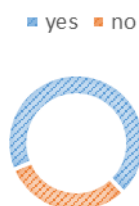


Figure 10: Approval rate – The link between the proposed EPC and digital building logbooks



Discussion summary:

In terms of circular economy the propose EPC has no proper elements included. Detailed stock of building parts is missing and GWP indicators, grey energy and other ecological factors are missing.

The need for digital building logbooks, which are currently not mandated but defined in the EPBD, is highlighted. While there is a repository for Energy Performance Certificates (EPCs) in Ireland, data protection regulations prevent the sharing of uploaded information. Establishing logbooks for buildings would provide valuable information to homeowners, but significant effort is required to reach that stage.

**3.3.3.3. The renovation/energy efficient products are boosted by the proposed EPC**

About 80% of all participants responded that the proposed EPC will boost renovation/energy efficient products. 5 participants voted (20%) against this statement (see Figure), 2 participants of Central REB and 3 of Northern REB. This question was answered by 24 participants.



Figure 11: Approval rate – The renovation/energy efficient products are boosted by the proposed EPC

According to a discussion in Western REB, the proposed Energy Performance Certificate (EPC) is expected to have a positive impact on boosting renovation and energy-efficient products. The clarity and transparency of the EPC were identified as factors that can stimulate homeowners' interest. Additionally, it was emphasized that the calculation of the cost of measures should align with market conditions and be regularly updated to ensure accuracy and relevance.

**3.3.3.4. Building logbooks (digital storage of building information) as interesting instrument for end-users**

For the evaluation of this question the responses of each participant within a REB had been summarized. For this question the participants had 3 possible answers. These 3 answers had been ranked by the participants according to their estimation of benefit gains for end-users by building logbooks (digital storage of building information). The participants of all REBs agreed that having more transparent information about the building is the largest advantage of building logbooks for end-users. Except Central REB, all REBs ranked improving energy efficiency of the building as 2<sup>nd</sup> largest advantage for end-users. According to this survey, building logbooks (digital storage of building information) have the smallest impact on increasing renovation rates and hence it is less beneficial for end-users. This ranking is shown by Figure X. The vertical axis represents the number of REBs, e.g. the answer “to improve energy efficiency of the building” had been ranked as 2<sup>nd</sup> most advantageous for end-users by 3 REBs and as 3<sup>rd</sup> most advantageous by 1 REB, no REB ranked it as most advantageous. 22 participants answered this question.



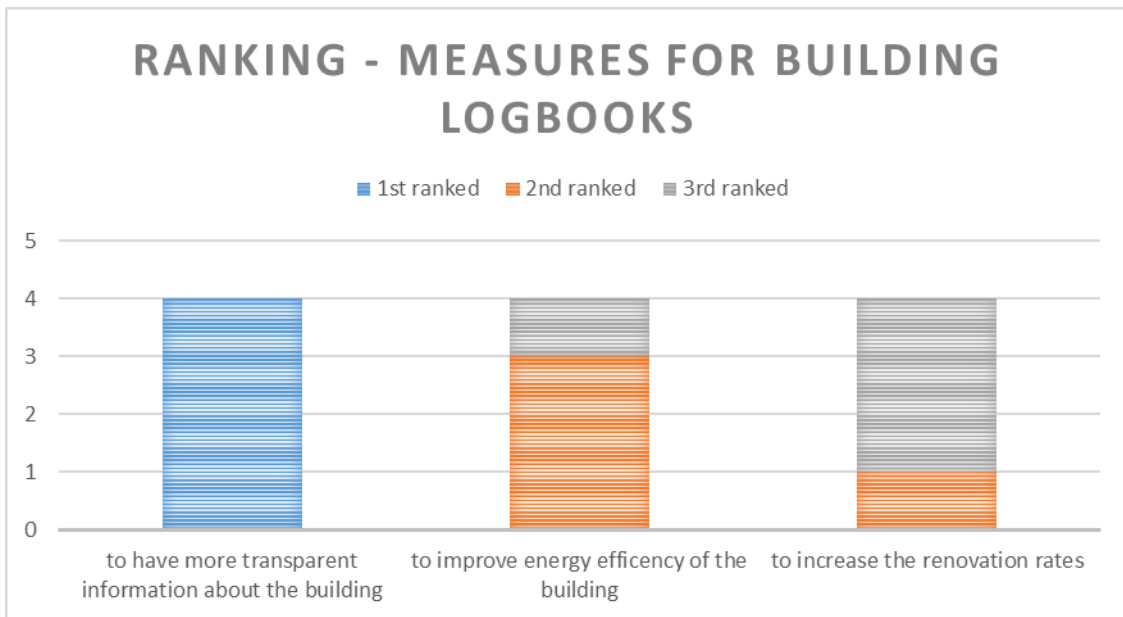


Figure 12: Ranking - Building logbooks (digital storage of building information) as interesting instrument for end-users

Statement from stakeholders: The building logbook is deemed valuable for end-users as it provides transparent information about the building. However, it is not expected to directly contribute to increasing renovation rates or efficiency. Instead, its primary role is to facilitate the calculation and design processes involved in renovation projects.

### 3.3.3.5. Building renovation roadmaps (staged or stepwise renovation plans) as interesting instrument for end-users

For the evaluation of this question the responses of each participant within a REB had been summarized. For this question the participants had 3 possible answers, only South East REB had a different and larger set of possible answers (5 possible answers). These 3 (5) answers had been ranked by the participants according to their estimation of benefit gains for end-users by building renovation roadmaps (staged or stepwise renovation plans). Except Northern REB, all REBs ranked increasing the innovation rates as the largest advantage for end-users. Northern REB ranked the awareness increase about necessary measures as the largest advantage for end-users, all the other REBs ranked this answer as 2nd best. All REBs, excluding South East REB, agreed that other instruments are more important than the implementation of the measures as the 3rd largest benefit for end-users. The 3 possible answers: to implement the measures, the investment costs are too high to improve all the measures and other instruments are more important, had been only available for participants of South East REB. Therefore, they have only one vote (4th and 5th advantageous). The described ranking is shown by Figure X. The vertical axis represents the number of REBs, e.g. the answer “to increase innovation rates” had been ranked as most advantageous for end-users by 3 REBs and as 2<sup>nd</sup> most advantageous by 1 REB, no REB ranked it as 3<sup>rd</sup>, 4<sup>th</sup> or 5<sup>th</sup> advantageous. There had been 27 responses for this question.



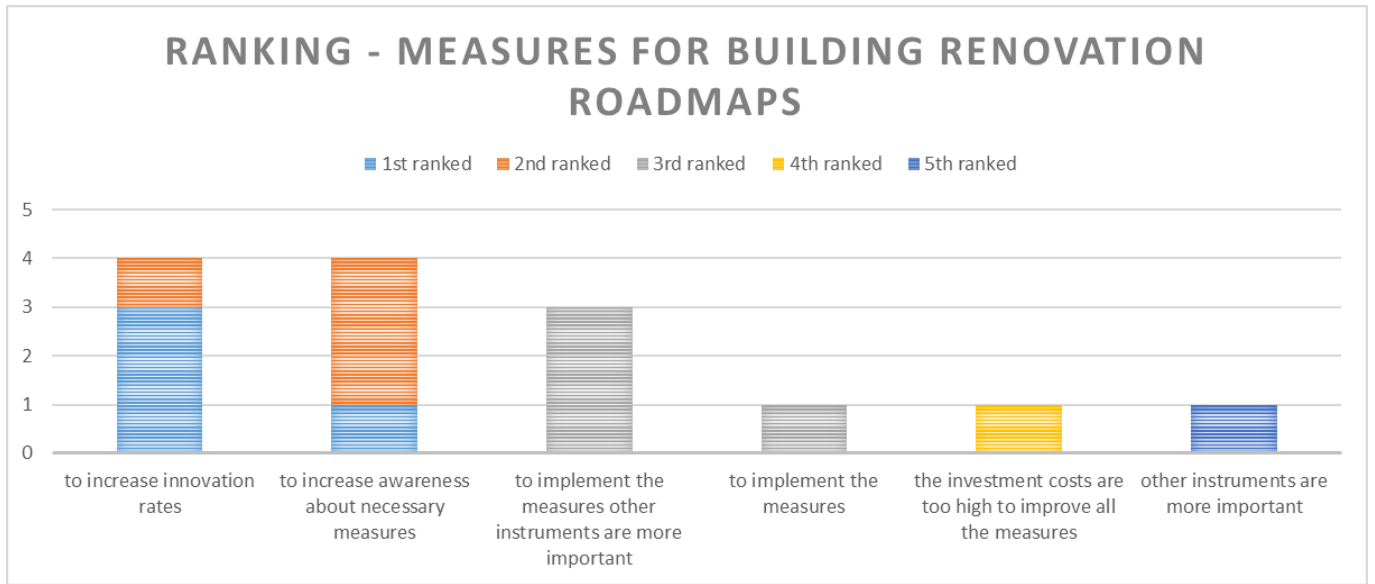


Figure 13: Ranking - Building renovation roadmaps (staged or stepwise renovation plans) as interesting instrument for end-users

Statement from stakeholder: If owner changes it affects the feasibility of a building renovation roadmap.



## 4. SUMMARY AND NEXT STEPS

### 4.1. General conclusions:

In conclusion, the feedback from stakeholders regarding the summary of the feedback from five REB meetings highlights several important points.

Firstly, the presentation of the methods was generally well-received, with stakeholders appreciating the overview of the proposed scheme and the detailed explanation of the calibration process. However, it was noted that the development of the methods was not yet complete, leading to discussions at a general level. Stakeholders also raised questions about the use of different tools for different building categories and the challenges in incorporating smart and novel technologies.

The survey conducted during the Southwest REB meeting showed that 71% of participants voted in favor of method 2, which uses the ISO standard, as the easiest to implement in their countries. There was also a high level of agreement among respondents regarding the potential impact of energy efficiency measures based on actual consumption, with 71% answering affirmatively. However, a notable 29% of respondents were unsure or lacked sufficient knowledge to form an opinion, indicating the need for further education and awareness regarding the ePANACEA methodology.

The discussions around the testing procedure and results highlighted the importance of evaluating the effectiveness and reliability of the ePANACEA Energy Performance Methods. Stakeholders expressed interest in alternative ways of presenting energy usage data, discussed the accuracy and calibration of the methods, and emphasized the significance of technician expertise and input data quality.

The decision matrix analysis provided a valuable tool for comparing and evaluating the differences between the methods. It enabled stakeholders to assess factors such as accuracy, complexity, applicability, data requirements, and computational resources. This analysis facilitated informed decision-making based on stakeholders' specific requirements and priorities.

Regarding the new ePANACEA Energy Performance Certificate (EPC), stakeholders expressed various opinions and suggestions. They emphasized the importance of including GHG emissions prominently on the certificate, showcasing the time dimension of step-by-step renovations, providing information on actual costs for renovation measures, and addressing challenges related to payback time and return on investment. Clarity on terminology and standards used, as well as explanations of actual and standard conditions, were also requested. Additionally, there were discussions about the layout of the new EPC and its potential impact on its attractiveness for end users.

The feedback from the REB members regarding the methodologies and the new Energy Performance Certificate (EPC) developed by ePANACEA has been positive and encouraging. They appreciate the well-structured nature of the methodologies, which offer different levels of complexity and data input based on the assessors' needs and expertise. This flexibility allows for tailored assessments and ensures that the methodologies can accommodate various types of buildings and evaluation requirements.

Regarding the new EPC, the stakeholders find it highly informative and believe that it provides important and useful data. They recognize its potential as a valuable tool in the decision-making process for building energy renovations. By offering clear and comprehensive information, the new EPC empowers end users to make informed choices regarding energy efficiency measures and encourages sustainable building practices.

The positive feedback from the REB members highlights the strengths of the methodologies and the new EPC, indicating that they have the potential to enhance energy performance evaluations, support energy-efficient design considerations, and promote effective building renovations.

## 4.2. The ePANACEA EPC and Building Logbooks and Renovation Passports

The surveys conducted during the chapter provided insights into stakeholders' opinions regarding digital building logbooks and building renovation roadmaps. The majority of participants agreed that there is a strong link between the proposed Energy Performance Certificate (EPC) and building renovation passports, as well as digital building logbooks. They believed that the proposed EPC has the potential to boost renovation and energy-efficient products. The stakeholders highlighted the importance of transparent information for end-users through building logbooks but noted that logbooks may not directly increase renovation rates or efficiency. Regarding building renovation roadmaps, participants recognized the significance of increasing innovation rates and creating awareness about necessary measures. However, some participants in the South East REB expressed that other instruments may be more crucial than implementing the measures due to high investment costs. Overall, the surveys shed light on the perspectives and considerations surrounding digital building logbooks and building renovation roadmaps in the ePANACEA project.

## 4.3. Upcoming REB activities

The third round of REB meetings marked the conclusion of its series within the ePANACEA project, signifying that there are no further scheduled meetings with the REB members. However, to ensure continued engagement, all interested stakeholders were cordially invited to the project's final conference held in Brussels on the 26th of May 2023. Recognizing the importance of accessibility, the option to join the conference online was also communicated, allowing participants to engage remotely.

Additionally, in an effort to facilitate knowledge sharing and maintain the project's impact beyond its conclusion, the documents pertaining to the individual REB meetings were republished on the exclusive area of the ePANACEA project homepage. This strategic move aimed to provide stakeholders with the opportunity to revisit and retrieve crucial information at a later stage. By ensuring the availability of these documents, the ePANACEA project aimed to guarantee the continued utilization of its content throughout the project's lifecycle.

Through the final conference and the publication of REB meeting documents, ePANACEA demonstrated its commitment to sustaining stakeholder involvement and knowledge dissemination. By fostering accessibility and promoting the ongoing use of project materials, ePANACEA aimed to maximize the long-term impact of its endeavors.

To ensure continuous communication and updates, the project team will send regular emails and provide relevant documents about the methods and other topics to the REB exclusive area on the project website for REB members. These channels will keep the members informed about the project progress, developments in methods, and any relevant information or updates. This approach enables efficient and convenient dissemination of project-related information, fostering collaboration and maintaining transparency between the project team and the REB members.



## 5. REFERENCES

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### 5.2. Tables

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## 6. ANNEX

### 6.1. Design of the new EPC

Energy performance certificate



**Building ID** IES Plaza de Cruz  
**Address** Cruz square Spain  
**Country** SPAIN, Pamplona

**Year of construction** 1910  
**Last renovation** 2020  
**Reference floor area** 1446 m<sup>2</sup>  
**Climatic Zone** D1  
**Sea level** 443 m NN  
**Building use** Education building

**Date of issue** 15/11/2022  
**Certifier name** Albert McGibert  
**Date of validity** 15/11/2032

**Heating** District heating  
**Cooling** -  
**DHW** mechanical  
**Ventilation** -  
**Solar** -  
**PV** 100 m<sup>2</sup>  
**Power storage** -

#### Current rating of your building

	standard conditions	actual conditions	Total primary energy use kWh/m <sup>2</sup> y	Final Energy Use kWh/m <sup>2</sup> y	Greenhouse gas emissions CO <sub>2</sub> -eq
<b>A</b>	≤ 80	≤ 25			17
<b>B</b>	≤ 160	≤ 50			19
<b>C</b>	≤ 220	98		105	≤ 40
<b>D</b>		290	290	≤ 150	≤ 50
<b>E</b>		330		≤ 200	≤ 60
<b>F</b>	≤ 400	≤ 250			≤ 70
<b>G</b>	> 400	> 250			> 70

**Total primary energy** standard conditions **83 kWh/m<sup>2</sup>y** **247 kWh/m<sup>2</sup>y** Share of renewables systems

*This graph shows the share of the total primary energy that is renewable 25% which generated on-site and/or sourced externally. 75 % is classified as non renewable.*

**Purpose of this document:**

- Compare current ratings of properties to see which properties are more energy efficient
- Find out how you can save energy by installing improvement measures

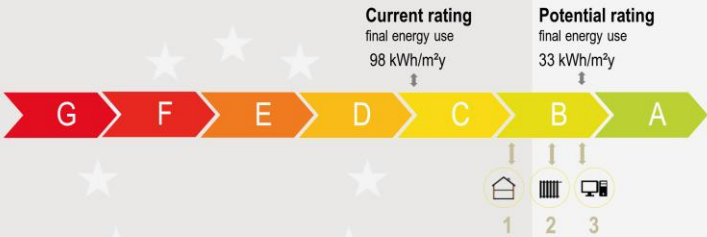
#### Recommendations and energy efficiency potential:

	Savings kWh/m <sup>2</sup> y	Cost savings per year	Investment total	Green House Gas emissions saving
1  An additional thermal insulation on the wall of 18 cm decreases the U-value to 0.19 W/m <sup>2</sup> K.	46 kWh/m <sup>2</sup> y	9 200 €/y	140 000 €	3 925 kgCO <sub>2</sub> -eq/y
2  Solar collector	15 kWh/m <sup>2</sup> y	3 350 €/y	15 000 €	1 280 kgCO <sub>2</sub> -eq/y
3  Room thermostat	4 kWh/m <sup>2</sup> y	580 €/y	4 000 €	340 kgCO <sub>2</sub> -eq/y

**Investment and cost savings:** calculated at the date of issue of the EPC; using prices from the database:  
 Statistic Austria: 05 / 2022 district heating: 10 Cent/kWh

**Current rating** final energy use 98 kWh/m<sup>2</sup>y

**Potential rating** final energy use 33 kWh/m<sup>2</sup>y



*This illustration suggests energy efficiency measures in a sensible sequence which takes into account the cost-effectiveness of the measures and the individual situation of your building. It shows the potential rating that your house would achieve after the respective cumulative measures. The recommendations assume actual conditions. For the energy rating of buildings, EPB services are taken into account (i.e. heating, cooling, domestic hot water, ventilation, and lighting).*

building envelope  
 heating  
 cooling  
 dynamic envelope  
 Renewable energies on-site or nearby  
 control systems or user behaviour





# Energy performance certificate



## Energy performance of building components and installations standard conditions



U [W/m<sup>2</sup>K] = heat transfer coefficient (weighted average);  
 η<sub>s,h</sub> = seasonal space heating energy efficiency  
 η<sub>s,c</sub> = seasonal space cooling energy efficiency

ACH = air changes per hour  
 VEEI = Limit Value of Energy Efficiency (VEEI-Spanish acronymic)

## Potential of renewable primary energy, generated on-site or nearby from different renewable energy sources

	Actual use	Necessary to cover energy use of the building	Means to achieve covering	Potential on site total	Means to achieve potential
<b>Photovoltaic</b> [kWh/y]	1 000	5 715	extra 28 m <sup>2</sup> , 5 kWp, direction angle: 180° (south), inclination 30°	38 016	216 m <sup>2</sup> , direction angle: 180° (south), inclination 30
<b>Solar thermal system</b> [kWh/y]	0	12 150	27 m <sup>2</sup> , direction angle: 180° (south), inclination 30°, 450 kWh/m <sup>2</sup> y solar yield estimated	24 300	extra 54 m <sup>2</sup> would be possible on the roof
<b>Biomass</b>	0	0	Biomass boiler, wood chip	0	Biomass boiler, wood chip
<b>Indicator</b> renewable For example: hydropower, wind	0	0		0	

### Definitions

- on-site / nearby definition see ISO 52000-1:2017: 9.5. Boundary parameters
- kWh produced by electrical gain from PV and by thermal gain from Solar thermal system: final energy is equal to primary energy
- The primary energy from biomass: calculation with the heating demand, the annual efficiency and the primary energy renewable factor
- For thermal energy taken from environmental heat sources: the annual COP differs on the source: air: 2.5, geothermal probe: 4 ground collector: 3.5, ground water: 5 final energy is equal to primary energy.
- The renewable primary energy from district heating: calculation with the heating demand, the annual efficiency and the primary energy renewable factor for district heating
- The potential of renewable energy technologies must be considered separately because not all measures can be combined with each other. The information about actual and potential use of renewable energy generated on-site assumes standard conditions.



# Energy performance certificate

End-user



### Final energy use

Standard conditions*	Actual conditions**
<b>Current</b> <span style="background-color: #FFD700; padding: 5px;">105 kWh/m<sup>2</sup> year</span>	<b>Current</b> <span style="background-color: #FFD700; padding: 5px;">98 kWh/m<sup>2</sup> year</span>
<b>Potential***</b> <span style="background-color: #9ACD32; padding: 5px;">42 kWh/m<sup>2</sup> year</span>	<b>Potential***</b> <span style="background-color: #9ACD32; padding: 5px;">33 kWh/m<sup>2</sup> year</span>

*\*Calculated values under **standard conditions** (e.g. 22°C indoor temperature). This allows a better comparability of the energy performance between buildings, but provides less accurate information.*  
*\*\*Calculated values under **actual conditions** (considering climate, building and use). Calculations under actual conditions of use provide more individual information, which is however less comparable between buildings.*  
*\*\*\*Potential energy rating after implementation of recommendations*

### Thermal comfort

Fanger model, predictive mean vote (PMV)

The Fanger model is worldwide used to assess thermal comfort based on the PMV. The box plots show the minimum, first quartile, median, third quartile and maximum PMV in office and hall.

### Indoor air quality

CO<sub>2</sub> (ppm)

Air quality can be assessed based on CO<sub>2</sub> concentrations. The box plot shows the minimum, first quartile, median, third quartile and maximum of CO<sub>2</sub> concentrations with which a certain air quality can be associated.

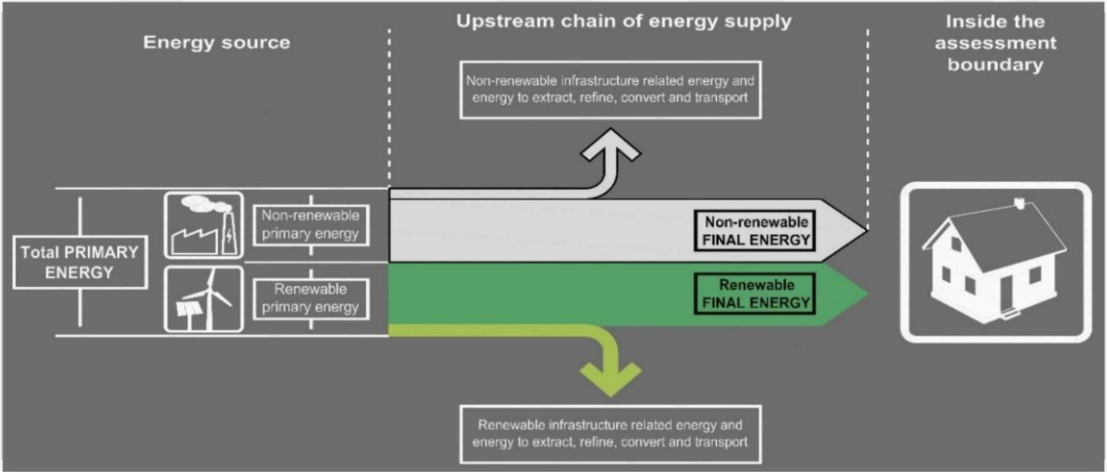
### Thermal energy demand standard conditions

Heating demand 58 kWh/m<sup>2</sup>y  
 Cooling demand ---

### Smart readiness Indicator (SRI)

**SRI**

- Energy Savings & Maintenance: 43%
- Comfort, Ease & Wellbeing: 48%
- Grid Flexibility: 44%
- Additional indicator: 25%



Primary energy is energy from fossil fuel and renewable sources that has not undergone any conversion or transformation process. Final energy is the energy that reaches the consumer, for example in the form of fuels or electrical energy.



# Energy performance certificate

End-user



## Final energy use and associated costs of energy services

	standard conditions* kWh/m <sup>2</sup> year € /m <sup>2</sup> year		actual conditions** kWh/m <sup>2</sup> year € /m <sup>2</sup> year	
Heating	91	9.1	87	8.7
Cooling	-	-	-	-
Hot water	10	1	6	0.6
Ventilation	-	-	-	-
Lighting	4	0.88	5	1
<b>Sum EPB services</b>	<b>105</b>	<b>10.98</b>	<b>98</b>	<b>10.3</b>
Equipment / other services	25	5.5	21	4.62
<b>Sum EPB services + other services</b>	<b>130</b>	<b>16.48</b>	<b>119</b>	<b>14.92</b>

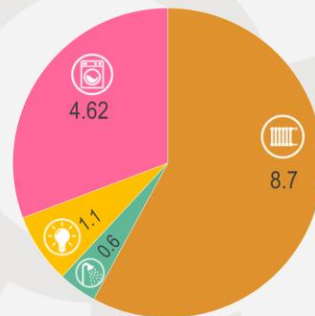
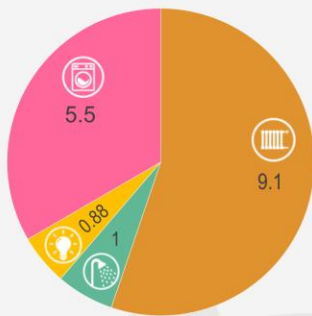
This section informs about the energy use and costs per m<sup>2</sup> and year, disaggregated for energy services. It considers EPB services (included in the energy rating of buildings): heating, cooling, domestic hot water, ventilation, and lighting.

It provides the information based on standard and actual conditions.

This section informs you about the final energy use of EPB services and other services in addition to the energy rating above services of the household like cooking or washing are included.

Standard conditions\*  
16.48 €/m<sup>2</sup>y

Actual conditions\*\*  
14.92 €/m<sup>2</sup>y



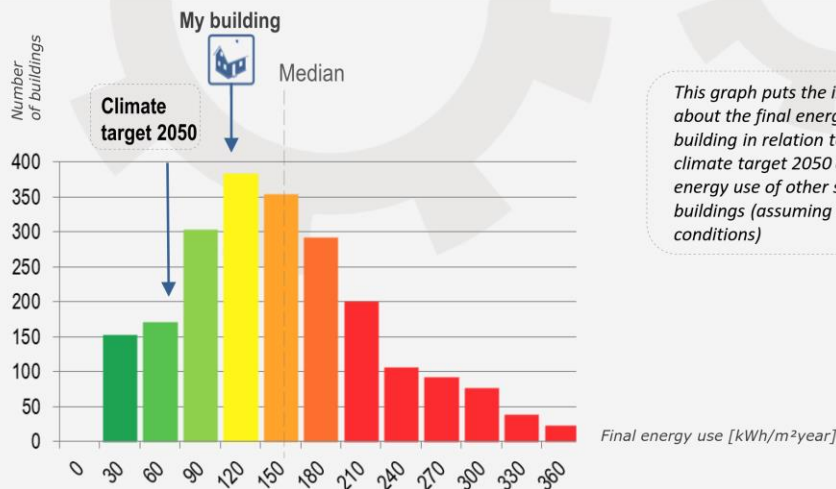
The costs per m<sup>2</sup> and year are additionally shown as pie charts. Costs are expected to change over time.

\* Calculated values under standard conditions of use, 22°C indoor temperature

\*\* Calculated values under actual conditions of climate, use & building

Price: date of issue of the EPC (15/11/2022): 22 Cent/kWh electricity, 10 Cent/kWh district heating national database: Statistic Austria 11/2022

## Benchmarking final energy use



This graph puts the information about the final energy use of your building in relation to the national climate target 2050 and the final energy use of other similar buildings (assuming standard conditions)

Climate target 2050

80 kWh/m<sup>2</sup> year

My building

105 kWh/m<sup>2</sup> year