Report on EPC short-comings and national priority approaches to their resolution

QualDeEPC H2020 project

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WI: Wuppertal Institut für KLIMA, UMWELT, ENERGIE gGMBH

CRES: Centre for renewable energy sources and saving

DENA: Deutsche Energie-Agentur GmbH (dena)

EAP: Energy agency of Plovdiv Association

EKODOMA

ENERGIAKLUB: Energiaklub Szakpolitikai Intezet Modszertani Kozpont Egyesulet

E-P-C: EPC Project Corporation Climate. Sustainability. Communications. mbH

FEDARENE: Federation euopeenne des agencies et des regions pour l'energie et l'environnement

ESCAN: Escan SL

CIT ENERGY MANAGEMENT AB

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PUBLISHABLE SUMMARY

Work package 2 of the QualDeEPC project aims to develop the priorities for elements of EPC schemes that should be improved, and for which the project will develop proposals. As a part of WP2, this deliverable, D2.3, analyses the gaps and shortcomings in the current EPC schemes in the QualDeEPC country partners, and national priority approaches to their resolution. The previous deliverable D2.1 presents an overview of the current situation in the EU member states, including the seven partner countries. Based on these data, a further gap analysis is presented in this Deliverable D2.3. Through interviews, the country partners collected the feedback from stakeholders to assess the local situation in the partner countries and their assessment on priority needs for improvement of various EPC elements in the existing EPC schemes. Building on all these inputs, the QualDeEPC project identified a long list of options as candidates for its further work on enhanced EPC schemes. Furthermore, as a part of task 2.3, partner countries organized stakeholder workshops in each country. There, all potential options for enhancing the existing EPC schemes have been discussed, but with a special emphasis on the long list of options identified by the QualDeEPC project.

Therefore, this report (D2.3) has been an important step in identifying gaps in current EPC schemes and the contribution of EPCs to deep energy renovation, and consequently in analysing and discussing potential priorities for the project's further work on enhanced EPC schemes and deep renovation. It has reduced the original list of almost 50 potential options for enhancing EPCs and their use to a longlist of around 20, and collected priorities of stakeholders for which options to address in the project. Improving the recommendations on energy renovation that have to be included in the EPCs along with actions to use these recommendations in marketing of deep renovation to investors, but also improving the user-friendliness of the EPCs and other actions to improve their use in building markets were seen as priorities in most countries.

Based on the feedback from stakeholder interviews and country partners (section 3.1), and from stakeholder workshops (section 3.2), the project team will decide on a joint shortlist of EPC elements that will be taken up during the course of the project for further development and (potential) implementation. This will be a step in the implementation of Task 2.4. Thereby, findings from this report (D2.3) will feed into the Task 2.4 and its deliverable (D2.4), which is to draft the development strategy plan for the development of next-generation EPC schemes in WP3 of the QualDeEPC project.

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1 INTRODUCTION

Considering that 40% of the European Union's energy consumption can be traced back to its buildings, it is essential to improve energy efficiency in buildings to achieve the EU's overall energy efficiency targets. Both the rate of energy renovation and its depth, i.e. the amount of energy savings during a renovation, need to be improved. Energy Performance Certificates (EPC), regulated by the EU's Energy Performance of Buildings Directive (EPBD) is an important instrument to enhance the market uptake of energy-efficient new buildings and the energy-efficient renovation of existing buildings.

Against this background, the Horizon2020 funded project QualDeEPC will work on EU-wide convergence of the building assessment and the issuance, design, and use of quality-enhanced EPCs as well as their recommendations for building renovation. The aim is to make these recommendations coherent with deep energy renovation towards a nearly-zero energy building stock by 2050. Under the coordination of the Wuppertal Institute, the project partners will work to create consensus in the participating countries and beyond, and to implement as many improvements as possible during the project period, involving certification bodies, energy agencies, building sector and certification stakeholders, and other relevant organisations. Specifically, QualDeEPC aims to enhance:

1. The quality and cross-EU convergence of Energy Performance Certificate (EPC) schemes, and
2. The link between EPCs and deep renovation.

Work package 2 of the QualDeEPC project aims to develop the priorities for elements of EPC schemes that should be improved, and for which the project will develop proposals. As a part of WP2, this deliverable, D2.3, analyses the gaps and shortcomings in the current EPC schemes in the QualDeEPC country partners, and national priority approaches to their resolution. The analysis has been based on tasks 2.1 and 2.3.

As a part of task 2.1, the previous deliverable D2.1 presents an overview of the current situation in the EU member states, including the seven partner countries. As an extension of the deliverable D2.1, a further gap analysis is presented in this Deliverable D2.3. Furthermore, the country partners collected the feedback from stakeholders to assess the local situation in the partner countries and their assessment on priority needs for improvement of various EPC elements in the existing EPC schemes. For this purpose, the country partners conducted bilateral interviews with various stakeholder groups and filled in special questionnaires, where they assessed the priority for improvements, ease of implementation and importance of various EPC elements, addressing almost 50 potential options for enhancing the existing EPC schemes. Based on the preliminary results from these questionnaires, a preliminary long list of options for priority for improvement of various EPC elements has been prepared. As a part of task 2.3, partner countries organized stakeholder workshops in each country, where all potential options for enhancing the existing EPC schemes have been discussed, with a special emphasis on the long list of options.

These outcomes from task 2.1 and 2.3 have been presented in this report, which will be used to identify the priorities for improvement in the existing EPC schemes in the partner countries and also feed contributions to the work in Task 2.4 – priorities and planning for development of the next generation of EPCs. The report is structured as follows:

- Chapter 2 presents a summary of existing EPC practices (based on task 2.1 results) and the gap analysis (which is a result of task 2.3, like all the following content).
- Chapter 3 presents the priorities for improvement of existing EPC practices and is further divided into two sections:
    - Section 3.1 presents the results from the bilateral stakeholder interviews and the preliminary long list of options that have been identified as priority for improvement. This section also provides the reasons for including an option in the long list or not, and which concrete improvements the QualDeEPC project could develop and possibly implement for the options in the long list.
    - Section 3.2 presents the results from the first stakeholder workshops regarding EPC elements that have been identified as priority for improvement, e.g. out of the long list in section 3.1.
- Chapter 4 presents conclusoins and outlook to the next tasks of the QualDeEPC project.
- The Appendix holds the reports from the national workshops.

2 SUMMARY OF EXISTING EPC PRACTICES AND GAP ANALYSIS

This section summarizes existing EPC practices in various EU member states and analyses the extent of gaps in the existing EPC schemes as well as of divergence between different member states. The summary is organized in five categories as shown below and has been described in the following sub-sections:

1. Assessment and certification
2. Requirements for qualified experts
3. Independent control systems
4. Use of EPC data, including in wider building-related databases
5. Embedding EPCs in wider policies and public activities to stimulate deep renovation

The database for this analysis is the Deliverable 2.1 of the QualDeEPC project, Report on local EPC situation and cross-country comparison matrix (Wuppertal Institut 2020). For each of the five sections, an overview table summarizes the existence/implementation of an element in all 27 member states plus UK as well as in which of the seven QualDeEPC partner countries. The analysis focuses on these elements with large deviations between various member states or unavailability of an EPC element in many member states.

2.1 Assessment and certification

Objective aspects of different EPC elements, as described in the Deliverable 2.1, are summarized in the figure below. Large deviations between various member states or unavailability of an EPC element can be observed in the following elements:

1. Online tool for comparing EPC recommendations to deep energy renovation recommendations: An online tool that compares energy consumption as per EPC with market average/typical buildings is available in only six member states, including one QualDeEPC partner country. An online tool on energy efficiency renovations is available in 15 member states, including three QualDeEPC partner countries. This reflects the absence of such tools in most QualDeEPC partner countries.
2. On-site inspection during EPC assessment: 15 member states, including five QualDeEPC partner countries, have requirements for mandatory on-site inspection during EPC assessment for all buildings. In another 5 member states, on−site inspection is mandatory for some buildings (e.g., existing/new/residential/non−residential/public). Assessing whether to introduce such requirements could be a priority for the two QualDeEPC partner countries, who do not yet have them; but the implementation, cost, or control and enforcement may also need to be enhanced in the partner countries, which already have this requirement.
3. Improving the renovation recommendations towards deep renovation: Producing the renovation recommendations in a way to become the first step towards individual buildings deep renovation passports/roadmaps varies highly among different member states, and in general different aspects pertaining to this EPC element are absent in the majority of the QualDeEPC countries. This had already been identified as a gap and a potential contribution by the QualDeEPC project anyway.
4. EPC for new buildings compatible with NZEB requirements: Existing EPC schemes for new buildings are compatible with NZEB requirements in 14 member states, including 6 QualDeEPC partner countries. Although the definition of NZEB requirements may vary, this option may not be a priority need for enhancement of EPC schemes, since it has already been implemented in most QualDeEPC partner countries already.

5. Updating of EPCs: Provision for updating of EPCs when there are changes in the legislation is available only in one QualDeEPC partner country in total. This is clearly an implementation gap, and chapter 3 will analyse whether it should also be an option with priority for enhancement.
6. EPC calculation procedure in adherence with new CEN OAS standard: New CEN OAS standards are considered/being considered to be included in EPC calculation procedures in 7 member states, including two QualDeEPC countries. This is also an implementation gap, and chapter 3 will analyse whether it should also be an option with priority for enhancement. It is also likely that the parallel U-Cert project will analyse it with priority.
7. Include smart readiness indicator: The smart readiness indicator (SRI) is available only in two member states, including one QualDeEPC partner country. Although the SRI is part of the provisions of the EPBD that support modernisation of buildings in the EU, including through a wider and faster uptake of smart technologies, this is a new requirements; therefore, it is no wonder that its representation on EPC appears to be very limited.
8. EPC provides data on both asset and operational rating as basis for energy and CO_2 savings: Such a provision is available only in one member state.

In contrast to these, unavailability does not seem to be a problem in most member states and QualDeEPC partner countries for the following elements:

9. Official or certified EPC software to ensure quality and comparability of assessments
10. EPC software: default values or validity ranges for input parameters
11. High user-friendliness of EPCs (at least regarding the concrete features analysed here)
12. Compliance between EPC rating and operational rating.

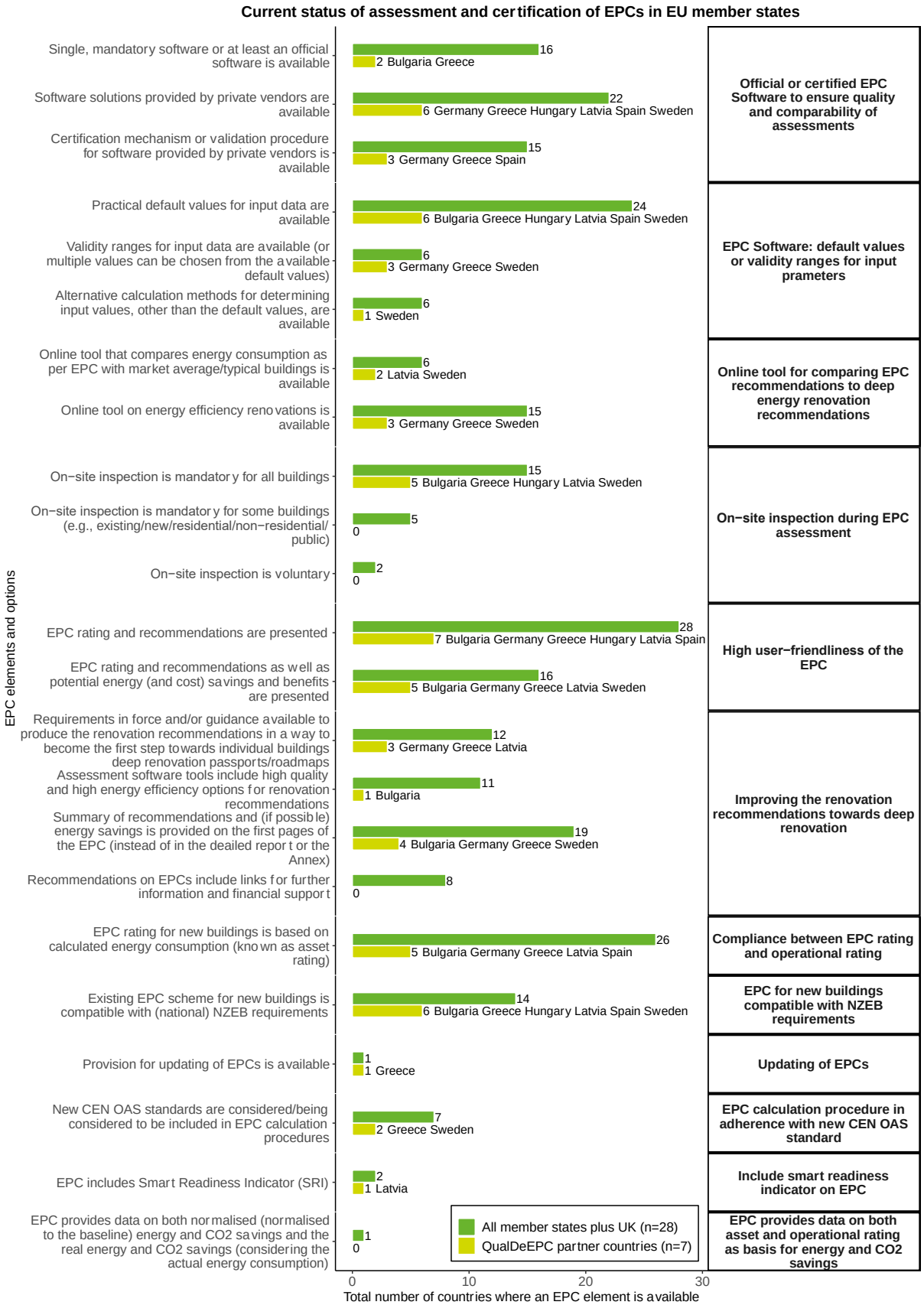

Figure 1: Current status of assessment and certification of EPCs in EU member states

2.2 Requirements for qualified experts

Objective aspects of different EPC elements under 'requirements for qualified experts', as described in the Deliverable 2.1, are summarized in the figure below. Large deviations between various member states or unavailability of an EPC element can be observed in the following elements:

1. Regular mandatory EPC assessor training on assessment and recommendations required for certification and registry: Mandatory training requirement for EPC assessors is available in 14 member states, including three QualDeEPC partner countries. Besides, mandatory periodic training for maintaining certification and registration as EPC assessor after validity period of current certification is required only in eight member states, none of which are QualDeEPC partner countries. However, in many countries without the requirements for mandatory training, there are opportunities for voluntary training, and most often candidates should pass an examination for certification, undergoing mandatory training on EPC assessment and providing recommendations for being certified as an EPC assessor and included in the registry, which also enables EPC assessors to avoid common mistakes.
2. Renewal of EPC assessor certification through an examination: In a mere six member states, including one QualDeEPC partner country, periodic verification through an examination is mandatory for renewal of EPC assessor certification. However, some stakeholders and QualDeEPC partner countries have expressed an opinion that periodic examinations tend to increase the administrative costs for EPC assessors, which will be passed on to the customers, and may cause excessive red tape.
3. Regular events and workshops on innovative solutions for deep renovation: In six member states, including one QualDeEPC partner country, trainings with focus on renovation recommendations are available. However, the content of these trainings and their link to deep renovation, including innovative solutions cannot be easily accessible, limiting the possibilities for its adaptation in other countries.

There do not seem to exist implementation gaps in most EU member states plus UK and most QualDeEPC partner countries for the following elements:

4. Registry of EPC assessors
5. Eligibility requirements (pre-qualification) for EPC assessor certification.

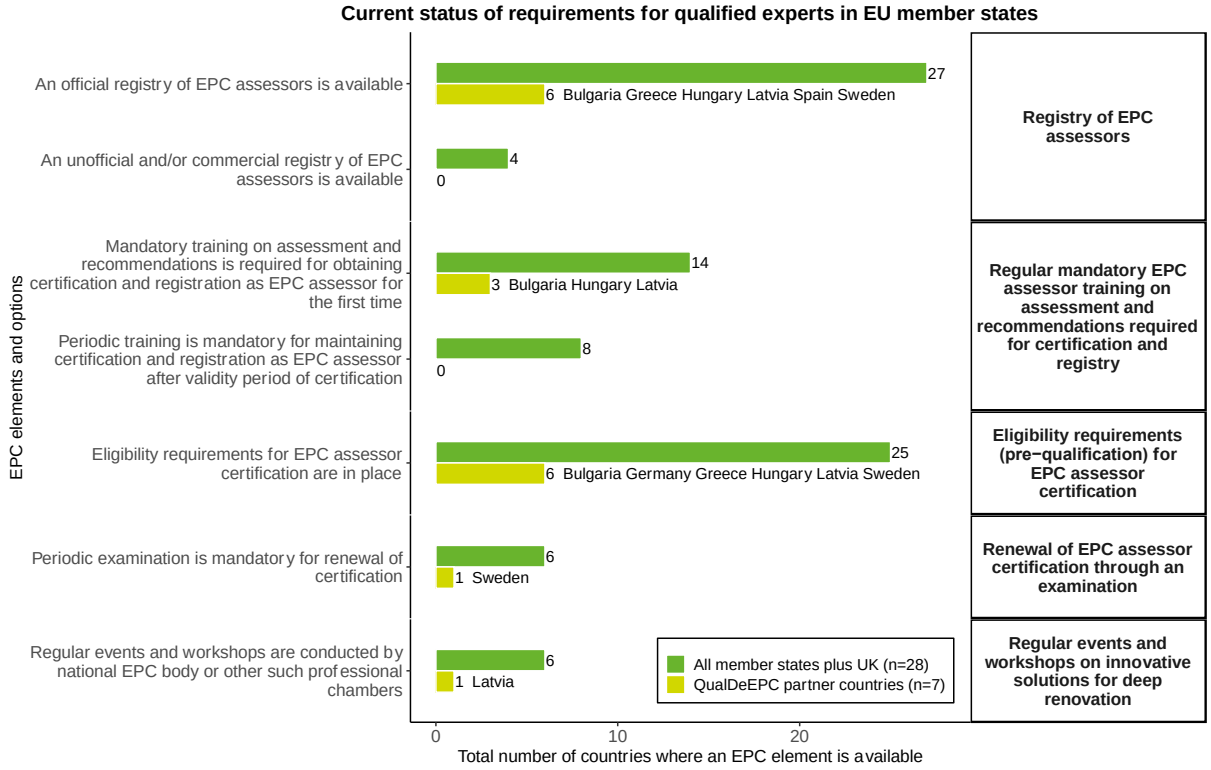

Figure 2: Current status of requirements for qualified experts in EU member states

2.3 Independent control systems

Objective aspects of different EPC elements under 'independent control systems', as described in the Deliverable 2.1, are summarized in the figure below. Large deviations between various member states or unavailability of an EPC element can be observed in the following elements:

1. Performing automatic validity/quality check: An automatic validity or quality check of the EPC assessments is implemented in 18 member states, including 5 QualDeEPC countries. Performing an automatic validity/quality check during the assessment and/or during upload to EPC database/registry for all EPCs, e.g., through an automatic online register to fill in the EPC characteristics and an integrated tool checking these, will considerably increase the quality of EPCs and reduce the necessities for increased quality control measures at a later stage. Countries that do not have this in place should consider introducing it.
2. Reporting of errors in EPC assessments identified during controls, for learning purposes: A central database for reporting errors or faulty procedures from EPC assessments, identified during controls, for analysis and learning is available only in three member states, none of which are QualDeEPC partner countries. Reporting errors or faulty procedures in a central database allows creating statistics of common mistakes, and identifying assessors with high error rates. The common mistakes can also be highlighted in the assessor trainings, so that assessors learn to avoid them in the future.
3. Channelling revenues from sanctions for enhancing EPC schemes: although this may be a wise use of the revenues, it has not been implemented in any EU member state or the UK. However, usually the amount of revenues from sanctions is negligible in most member states, so it may not be a priority to implement this element.

Unavailability does not seem to be a problem in most EU member states plus UK and most QualDeEPC partner countries for the following elements:

4. Quality control of both EPCs and assessors
5. Achieving C or C* level control of EPC assessments for the sample, according to the EPBD
6. Sanctions and penalisation for EPC assessors.

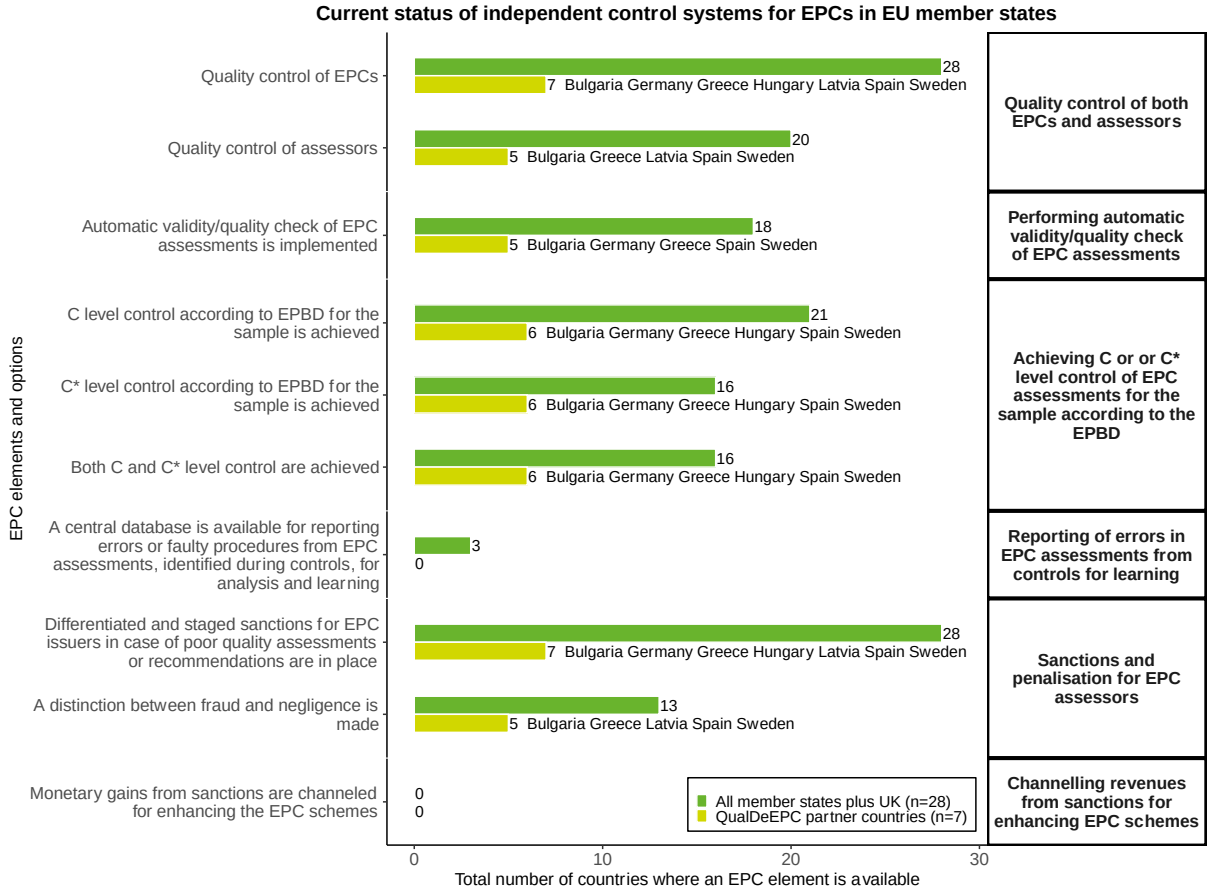

Figure 3: Current status of independent control systems for EPC in EU member states

2.4 Use of EPC data, including in wider building-related databases

Objective aspects of different EPC elements under 'Use of EPC data, including in wider building-related databases', as described in the Deliverable 2.1, are summarized in the figure below. Large deviations between various member states or unavailability of an EPC element can be observed in the following elements:

1. Presenting EPC to official building sales bodies (i.e. notaries, etc.) as an obligatory/mandatory measure: Presentation of EPCs to official building sales bodies, such as notaries, is mandatory for sales of buildings in 15 member states, including three QualDeEPC partner countries. Such mandatory presentation improves compliance with the requirement to own an EPC.
2. Advertisement guidelines for presenting EPCs in real-estate advertisements during sale and rental: While such guidelines are available in most EU member states, none of the QualDeEPC partner countries has them. This is an opportunity for the partner countries to learn from the other member states.
3. Public database of EPCs: Public access to databases of EPCs is available in 16 member states, including 4 QualDeEPC partner countries.
4. Linking EPC database to other buildings- or energy-related databases: Such links are available in nine member states, including one QualDeEPC partner country. Linking EPC databases to other buildings- or energy-related databases, e.g. on general building information, PV poten-

tial, or green certificates, helps in planning informed polices and design novel financial schemes for deep renovation.

Unavailability does not seem to be a problem in most EU member states plus UK and most QualDeEPC partner countries for the following elements, with the first three indicating compliance with the requirements of the EPBD:

5. Mandatory presentation of EPC during sale and rental of buildings
6. Sanctions for building owners with missing EPCs
7. Controlling and enforcing the mandatory use of EPCs in real-estate advertisements, although partners in three QualDeEPC partner countries seem to have doubts about the effectiveness of the controls and enforcements, and these countries may wish to improve them.

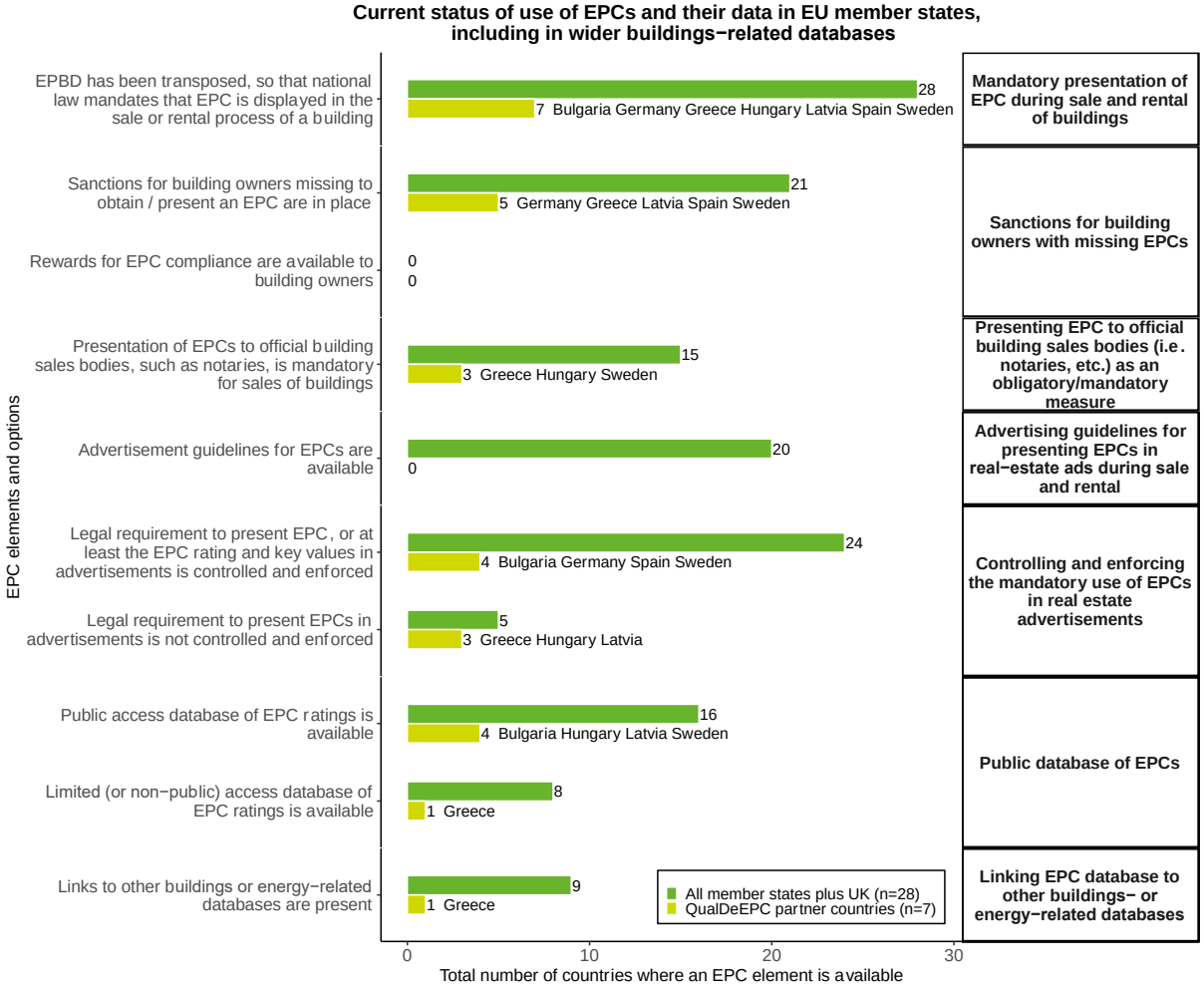

Figure 4: Current status of use of EPCs and their data, including in wider buildings-related databases in EU member states

2.5 How are EPCs embedded in wider policies and public activities to stimulate deep renovation?

Objective aspects of different EPC elements under 'how are EPCs embedded in wider policies and public activities to stimulate deep renovation', as described in the Deliverable 2.1, are summarized in the figure below. Large deviations between various member states or unavailability of an EPC element can be observed in almost all elements under this category.

For example, in very few member states, EPCs are linked to detailed energy audits. Most countries consider them as two different procedures, and they are carried out by different personnel. Although most energy auditors are also authorised as EPC assessors, the vice versa is mostly not true. Notable exceptions from this usual practice are the QualDeEPC partner countries Bulgaria and Latvia, where EPCs and detailed energy audits are linked to each other.

In the majority of the QualDeEPC partner countries, asset rating EPCs are mandatory before and after renovation for financial incentive/financing schemes. This offers opportunities of learning for other EU member states and QualDeEPC partner countries.

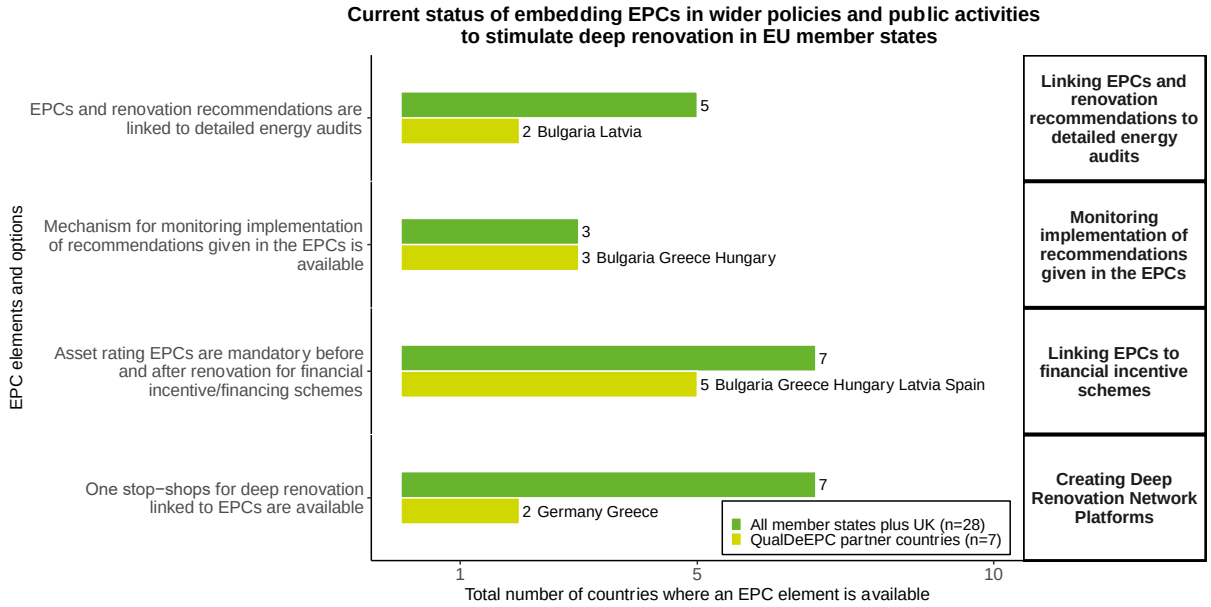

Figure 5: Current status of embedding EPCs in wider policies and public activities to stimulate deep renovation in EU member states

3 PRIORITIES FOR IMPROVEMENT OF EXISTING EPC PRACTICES

A two-step approach has been followed to identify priorities for improvement of existing EPC practices.

First, priorities have been sought from stakeholders and implementing country partners in QualDeEPC partner countries through a structured questionnaire (section 3.1). This has resulted in the preparation of a long-list of options identifying priorities for improvement of existing EPC practices (section 3.2). The long-list of options includes at least one EPC element from each sub-section as described in chapter 2. For each EPC element in the long-list of options, it has been briefly identified what exact and specific improvements QualDeEPC could develop and implement in the project partner countries.

Second, stakeholder workshops have been organized in each QualDeEPC partner country to discuss the shortcomings of the existing practices and brainstorm improvement options, with special emphasis on the elements and specific improvement measures outlined in the long-list of options (section 3.3). Country partners have then presented a revised list of priorities based on stakeholder workshops.

3.1 Feedback from stakeholders and country partners and long-list of options identifying priorities for improvement of existing EPC practices

For identifying priorities for improvement of existing EPC schemes, structured questionnaires were used to collate responses from stakeholders and country partners. The questionnaire included subjective fields for remarks and comments and objective fields marking whether an EPC element:

1. Is a priority for improvement (Yes/No) (country partners have to choose at least one element from each category)
2. Is easy to implement (rank on a scale of 1-5; 1 being extremely easy and 5 being extremely difficult)
3. Is important for a good practice EPC scheme (Yes/No/Maybe)

However, it has to be noted that the number of responses from each partner country varies, approximately from 4 to 13. Furthermore, stakeholders from the same country also indicated different priorities for improvement. In addition, when a certain EPC element is absent in a country, it might receive an overwhelming number of votes from that country, compared to other countries. Therefore, the analysis has taken results from subjective and objective fields of the questionnaire into consideration, including the current status of the EPC element in the partner country and across member states (see report D2.1) and gaps (see section 2). A long-list of options has been prepared by conducting a subjective analysis by using the results from the questionnaires. The analysis has been organized in the same five sub-sections as described in chapter 2. In each sub-section, first, the priority for improvement as identified by stakeholders and the country partners is shown, followed by the analysis on the inclusion/exclusion of EPC elements in/from the long-list.

3.1.1 Assessment and certification

The following figures show the results from assessments by stakeholders and QualDeEPC country partners on priority for improvement and the ease of implementation of various EPC elements, and the importance of an EPC element as a good practice EPC element under the category 'assessment and certification'. The EPC element - improving the renovation recommendations towards deep renovation, which also includes few aspects of high user-friendliness of EPCs, has received the highest number of votes for priority for improvement from both stakeholders and QualDeEPC country partners. Furthermore, stakeholders assess that this element will require medium effort for implementation. Besides this, although there are no clear favourites from QualDeEPC country partners, stakeholders have clearly indicated the first four EPC elements in Figure 6 as priority for improvement.

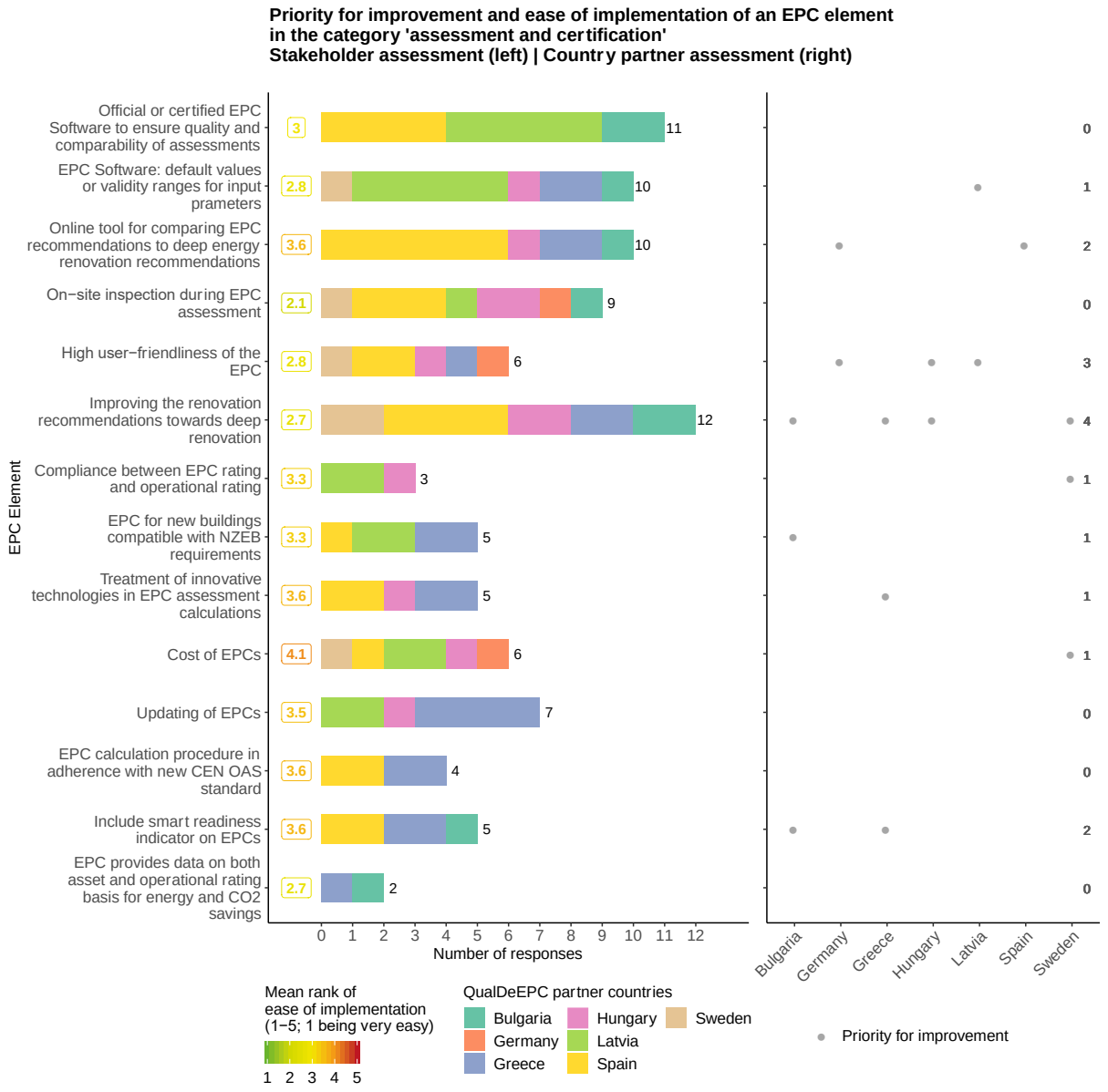

Figure 6: Priority for improvement and ease of implementation of an EPC element in the category 'assessment and certification'

These five elements are also among those receiving the highest number of support from stakeholders and mostly also from QualDeEPC country partners, as Figure 7 shows. In addition, high user-

friendliness of the EPC is valued highly important by stakeholders and QualDeEPC country partners alike. Stakeholders also assessed that it is important for EPCs for new buildings to be compatible with nZEB requirements.

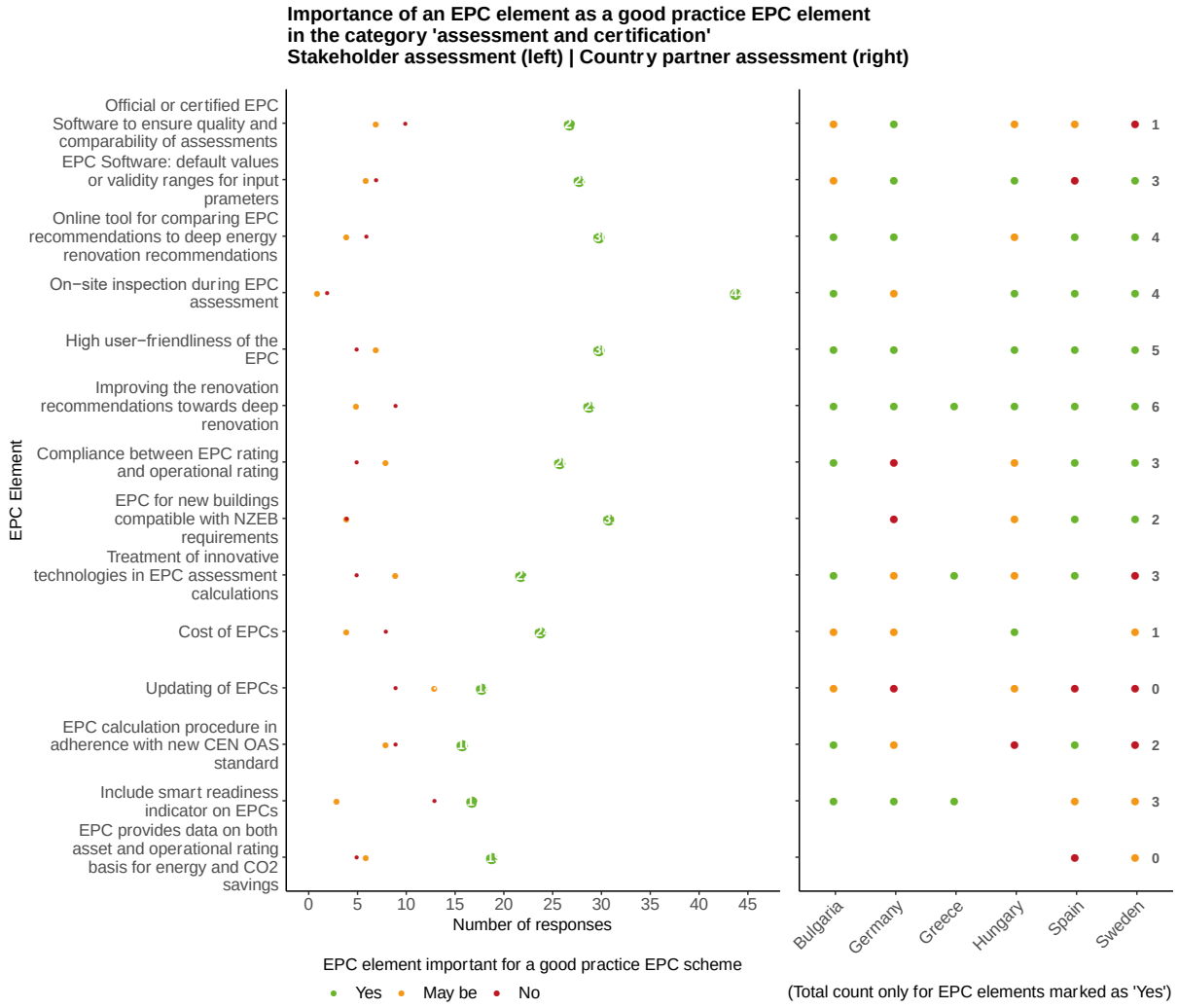

Figure 7: Importance of an EPC element as a good practice EPC element in the category 'assessment and certification'

The following table presents an analysis for preparing a long-list of EPC elements for the category 'assessment and certification', which are identified as priority for improvement.

EPC Element – assessment and certification	Reason for inclusion/exclusion in/from the long-list
Official or certified EPC software to ensure quality and comparability of assessments	No. Not a significant gap (cf. chapter 2.1) and not considered a priority by QualDeEPC country partners (Figure 6)
EPC software: default values or validity ranges for input parameters	Yes. Not a significant gap (cf. chapter 2.1) but still considered a priority by stakeholders and one QualDeEPC country partner (Figure 6)
Online tool for comparing EPC recommendations to deep energy renovation recommendations	Yes. Identified as a significant gap (cf. chapter 2.1) and considered a priority by stake-

EPC Element – assessment and certification	Reason for inclusion/exclusion in/from the long-list
	holders and two QualDeEPC country partners (Figure 6)
On-site inspection during EPC assessment	Yes. Identified as a gap (cf. chapter 2.1) in two QualDeEPC partner countries and considered a priority by stakeholders and one QualDeEPC country partner (Figure 6)
High user-friendliness of the EPC	Yes. Not a significant gap in the aspects analysed (cf. chapter 2.1) but still considered a priority by three QualDeEPC country partners (Figure 6)
Improving the renovation recommendations towards deep renovation	Yes. Identified as a significant gap (cf. chapter 2.1) and considered a priority by stakeholders and four QualDeEPC country partners (Figure 6)
Compliance between EPC rating and operational rating	No. Not a significant gap (cf. chapter 2.1) and not considered a priority by QualDeEPC country partners (Figure 6)
EPC rating for new buildings compatible with NZEB requirements	No. Identified as a potential gap (cf. chapter 2.1) but not considered a priority by stakeholders and many QualDeEPC country partners (Figure 6)
Updating of EPCs	No. Identified as a potential gap (cf. chapter 2.1) but not considered a priority by many stakeholders and by QualDeEPC country partners (Figure 6)
EPC calculation procedure in adherence with new CEN OAS standard	No. Identified as a potential gap (cf. chapter 2.1) but not considered a priority by stakeholders and QualDeEPC country partners (Figure 6)
Include smart readiness indicator on EPCs	No. Identified as a potential gap (cf. chapter 2.1) but not considered a priority by stakeholders and many QualDeEPC country partners (Figure 6)
EPC provides data on both asset and operational rating basis for energy and CO_2 savings	No. Identified as a potential gap (cf. chapter 2.1) but not considered a priority by stakeholders and QualDeEPC country partners (Figure 6)

Table 1: Analysis of stakeholder and country partner feedback on EPC elements in the category assessment and certification

Based on the above table, the table below shows the EPC elements that have been included in the long-list of options for further deliberation, along with information on what exactly the QualDeEPC project can develop and implement during the course of the project.

EPC Element	Description	What exactly can QualDeEPC develop	What exactly can QualDeEPC implement
EPC Software: default values or validity ranges for input parameters	Assessment Software: Practical default values for input data that come close enough to real data of a building; or in other cases, rather than exact default values, certain validity ranges for input parameters.	To be discussed in WP 2 which defaults or validity ranges may be needed and can be developed by the project.	• Organise stakeholder discussion process on project's proposals; • Work with certification bodies and software providers to include consensus data in software
Online tool for comparing EPC recommendations to deep energy renovation recommendations	Online tool that compares energy consumption and recommendations as per EPC with market average/typical buildings; with specific deep energy renovation recommendations, which are consistent with typical elements of an individual deep renovation passport/roadmap	Develop tool (probably limited to residential buildings)	Adapt and provide the tool or work with authorities who are willing to provide the tool
On-site inspection during EPC assessment	During EPC assessment, on-site inspection (including interview/consultation with the owner) ***Note: this will also allow improved renovation recommendations***	Develop pragmatic but effective proposal for on-site inspection, and whether it should be mandatory	Include project's proposal in the stakeholder discussion process organised by the project (WP 5) / policy debate
High user-friendliness of the EPC	Very high user-friendliness of various aspects of EPC, such as energy consumption, presentation of rating and recommendations, potential energy (and cost) savings and other benefits ***Note: this is partly also relevant for supporting deep renovation***	Develop enhanced EPC design	• Test enhanced design with market actors (Task 4.3, Tasks 5.2, 5.5) • Policy debate and marketing
Improving the renovation recommendations towards deep renovation	Improving the renovation recommendations provided on the EPC so that they become the first step towards individual buildings deep renovation passports/roadmaps. Assessment software tools should provide such high-energy efficiency options in high quality as their output for the renovation recommendations. The first pages of the EPC should present an overview of such recommendations and (if possible) energy savings, together with links for further information and financial support.	Develop improved set of recommendations, also for the online tool, 'probably limited to residential buildings	• Include in stakeholder debate • Work with assessment software suppliers • Include recommendations in trainings (partners, other training providers) • Communicate recommendations to experts, stakeholders, and public (WP 6)

Table 2: Long list of EPC elements identified as priority for improvement in the category assessment and certification

3.1.2 Requirements for qualified experts

The following figures show the results from assessments by stakeholders and QualDeEPC country partners on priority for improvement and the ease of implementation of various EPC elements, and the importance of an EPC element as a good practice EPC element under the category 'requirements for qualified experts'. The EPC element pertaining to regular mandatory training for EPC assessors as a requirement for certification and registry has received the highest number of votes for priority for improvement from both stakeholders and QualDeEPC country partners. Besides that, three other EPC elements received a relatively similar number of votes from stakeholders and the country partners. Stakeholders assess that most of the EPC elements require moderate efforts for implementation.

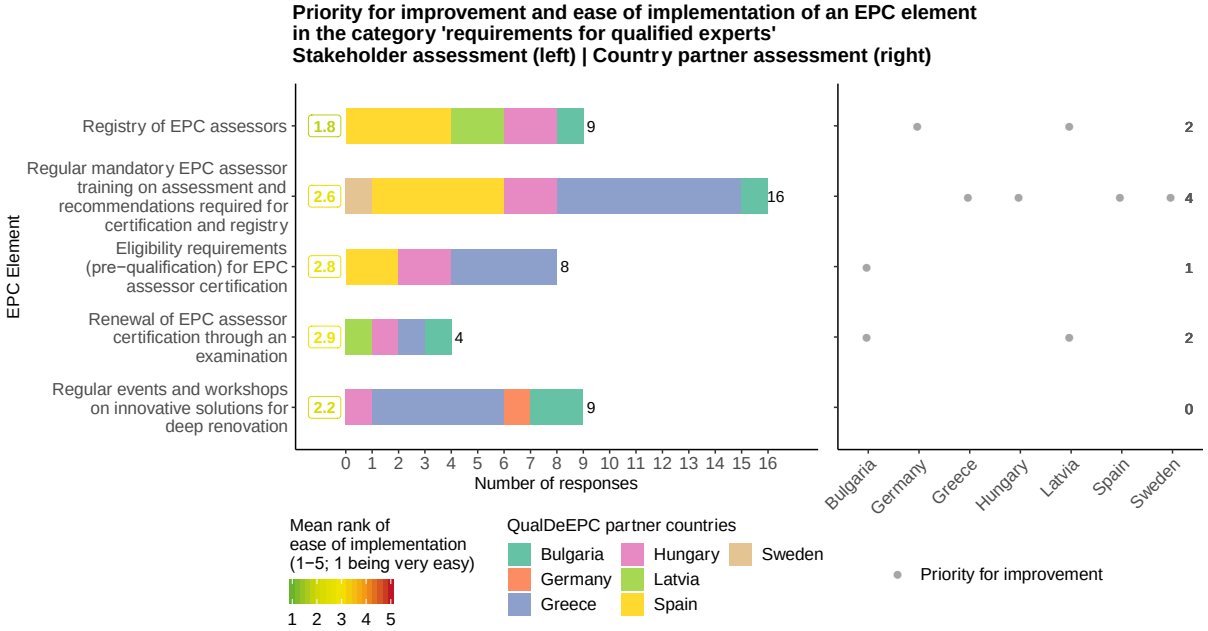

Figure 8: Priority for improvement and ease of implementation of an EPC element in the category 'requirements for qualified experts'

In terms of importance for a good practice EPC scheme, a registry of assessors received the highest score in this category 'requirements for qualified experts', followed by the regular mandatory training for EPC assessors (cf. Figure 9).

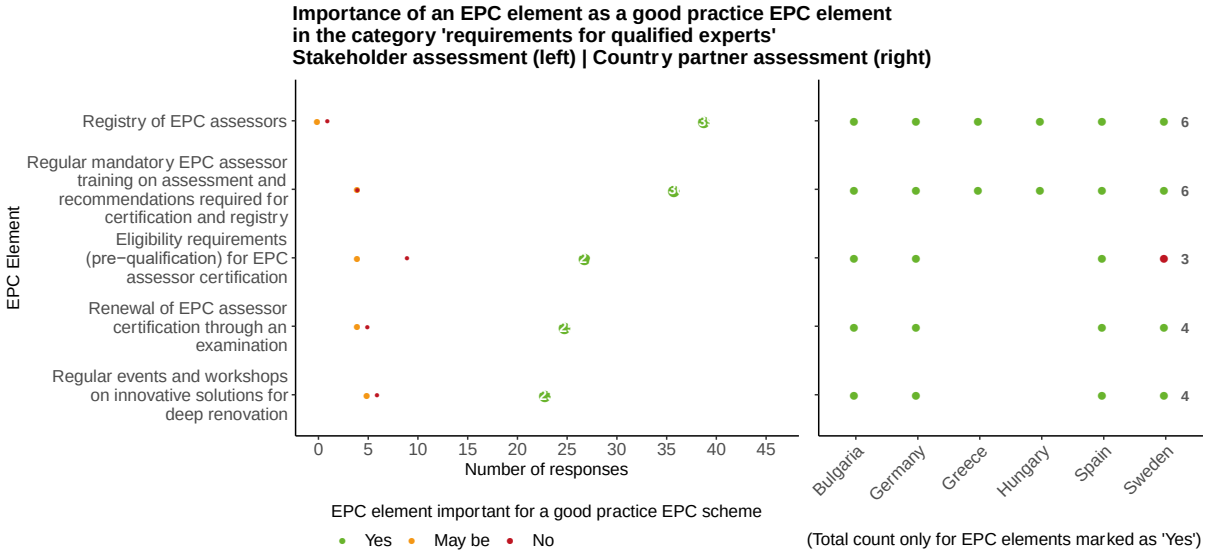

Figure 9: Importance of an EPC element as a good practice EPC element in the category 'requirements for qualified experts'

The following table presents an analysis for preparing a long-list of EPC elements for the category 'requirements for qualified experts', which are identified as priority for improvement.

EPC Element – requirements for qualified experts'	Reason for inclusion/exclusion in/from the long-list
Registry of EPC assessors	Yes. Not identified as a significant gap (cf. chapter 2.2) but still considered a priority by many stakeholders and two QualDeEPC country partners (Figure 8)
Regular mandatory EPC assessor training on assessment and recommendation required for certification and registry	Yes. Identified as a significant gap (cf. chapter 2.2) and considered a priority by the highest number of stakeholders and QualDeEPC country partners in this category (Figure 8)
Eligibility requirements (pre-qualification) for EPC assessor certification	No. Not identified as a significant gap (cf. chapter 2.2) nor considered a priority by many stakeholders or QualDeEPC country partners (Figure 8)
Renewal of EPC assessor certification through an examination	No. Identified as a significant gap (cf. chapter 2.2) but not considered a priority by many stakeholders and only by two QualDeEPC country partners (Figure 8)
Regular events and workshops on innovative solutions for deep renovation	Yes. Identified as a significant gap (cf. chapter 2.2) and considered a priority by many stakeholders, although not by QualDeEPC country partners (Figure 8); could be important to support enhancing the renovation requirements on EPCs to become the first step towards deep renovation

Table 3: Analysis of stakeholder and country partner feedback on EPC elements in the category requirements for qualified experts

Based on the above table, the table below shows the EPC elements that have been included in the long-list of options for further deliberation, along with information on what exactly can QualDeEPC project can develop and implement during the course of the project.

EPC Element	Description	What exactly can QualDeEPC develop	What exactly can QualDeEPC implement
Registry of EPC assessors	An official registry of EPC assessors is needed for credibility of the EPC scheme.	Develop pragmatic but effective proposal for an official registry of EPC assessors, including qualification requirements	Include proposal in stakeholder discussion process / policy debate
Regular mandatory EPC assessor training on assessment and recommendations required for certification and registry	Regular mandatory EPC assessor training on EPC assessment and on renovation recommendations required for certification and inclusion in registry. Such training should also enable them to avoid common mistakes.	Develop pragmatic but effective proposal for policy but also for training content	• Include proposal in stakeholder discussion process / policy debate • Include content in trainings (partners, other training providers)
Regular events and workshops on innovative solutions for deep renovation	Organisation by the national EPC body of regular events and workshops presenting innovative solutions for deep renovation and implementing more intelligent and advanced energy measures	Develop pragmatic but effective proposal for policy but also for training content	Include proposal in stakeholder discussion process / policy debate Include content in trainings (partners, other training providers)

Table 4: Long list of EPC elements identified as priority for improvement in the category requirements for qualified experts

3.1.3 Independent control systems

The following figures show the results from assessments by stakeholders and QualDeEPC country partners on priority for improvement and the ease of implementation of various EPC elements, and the importance of an EPC element to be part of a good practice EPC scheme under the category 'independent control systems'. Most of the stakeholder and country partners have voted the EPC element - reporting of errors in EPC assessments from controls for learning as a priority for improvement have received highest number of votes for priority for improvement from both stakeholders and QualDeEPC country partners. Besides that, three other EPC elements received relatively similar number of votes from stakeholders and the country partners. Stakeholders assess that most of the EPC elements require moderate to high efforts for implementation.

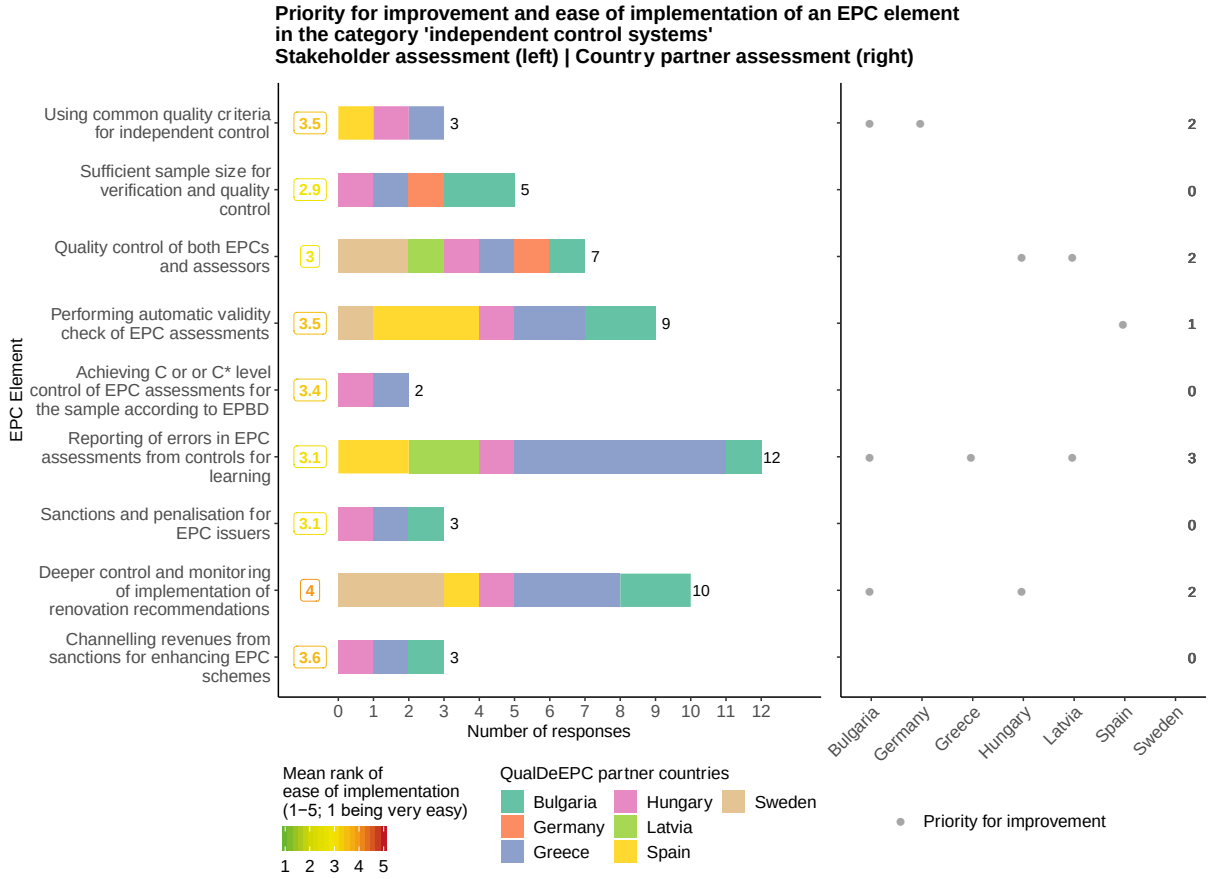

Figure 10: Priority for improvement and ease of implementation of an EPC element in the category 'independent control systems

Regarding importance of the elements for a good practice EPC scheme, automatic validity checks and reporting errors received the highest scores in this category, followed by the quality control of both EPCs and assessors, and using quality criteria common between member states for the control (cf. Figure 11).

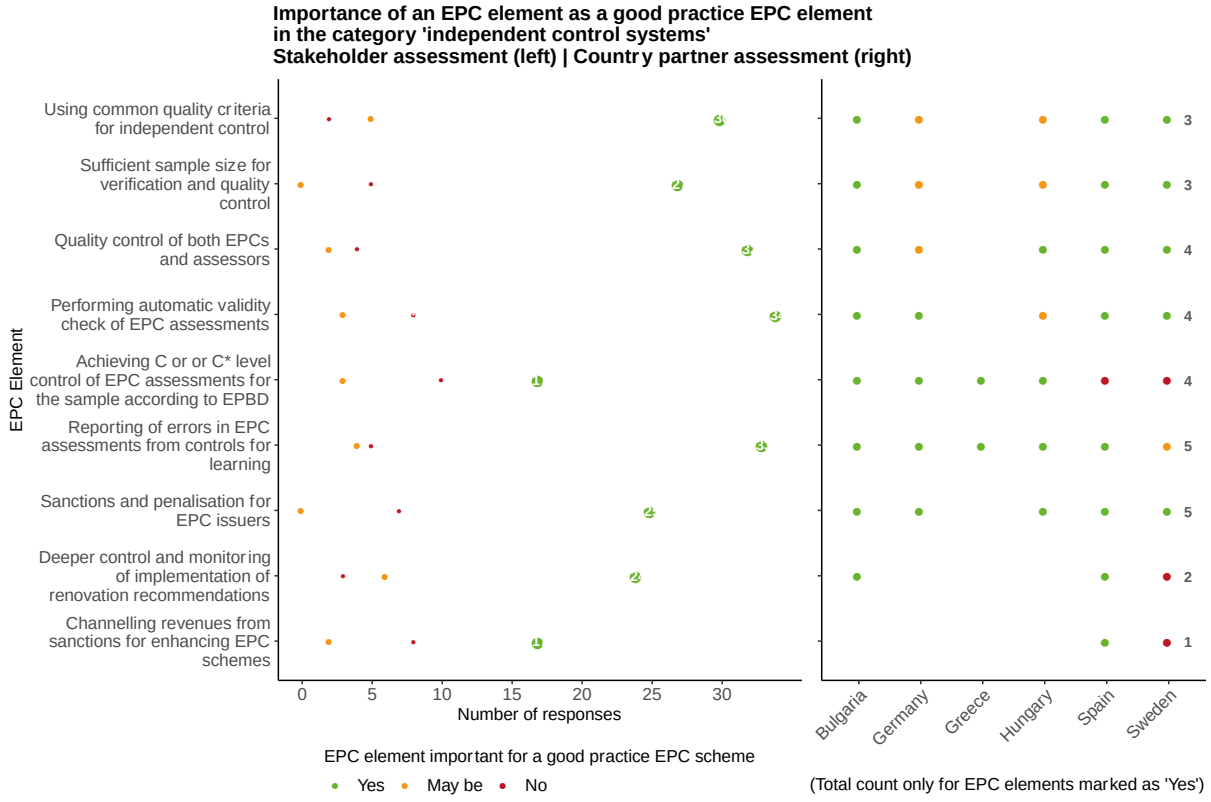

Figure 11: Importance of an EPC element as a good practice EPC element in the category 'independent control systems'

The following table presents an analysis for preparing a long-list of EPC elements for the category 'independent control systems', which are identified as priority for improvement.

EPC Element – independent control systems	Reason for inclusion/exclusion in/from the long-list
Using common quality criteria for independent control	No. Not identified as a significant gap (cf. Deliverable 2.1) nor considered a priority by many stakeholders and only by two QualDeEPC country partners (Figure 10)
Sufficient sample size for verification and quality control	No. Not identified as a significant gap (cf. Deliverable 2.1) nor considered a priority by stakeholders and QualDeEPC country partners (Figure 10)
Quality control of both EPCs and assessors	Yes. Not identified as a significant gap (cf. chapter 2.3) but still considered a priority by many stakeholders and two QualDeEPC country partners (Figure 10); considered important for a good practice EPC scheme
Performing automatic validity check of EPC assessments	Yes. Identified as a significant gap (cf. chapter 2.3) and considered a priority by many stakeholders and one QualDeEPC country partner (Figure 10)
Achieving C or C* level control of EPC assessments for the sample, according to EPBD	No. Not identified as a significant gap (cf. chapter 2.3) nor considered a priority by stakeholders and QualDeEPC country partners (Figure 10)

EPC Element – independent control systems	Reason for inclusion/exclusion in/from the long-list
Reporting of errors in EPC assessments, from controls, for learning	Yes. Identified as a significant gap (cf. chapter 2.3) and considered a priority by the highest number of stakeholders and QualDeEPC country partners in this category (Figure 10)
Sanctions and penalisation for EPC issuers	No. Not identified as a significant gap (cf. chapter 2.3) nor considered a priority by stakeholders and QualDeEPC country partners (Figure 10)
Deeper control and monitoring of implementation of renovation recommendations	Yes. Identified as a significant gap (cf. chapter 2.5 on a second element with a very similar content) and considered a priority by many stakeholders and two QualDeEPC country partners (Figure 10)
Channelling revenues from sanctions for enhancing EPC schemes	No. Identified as a significant gap but with little use to implement (cf. chapter 2.3) and not considered a priority by stakeholders and QualDeEPC country partners (Figure 10)

Table 5: Analysis of stakeholder and country partner feedback on EPC elements in the category independent control systems

Based on the above table, the table below shows the EPC elements that have been included in the long-list of options for further deliberation, along with information on what exactly can QualDeEPC project can develop and implement during the course of the project.

EPC Element	Description	What exactly can QualDeEPC develop	What exactly can QualDeEPC implement
Quality control of both EPCs and assessors	Performing quality control of both EPCs (random sample – compliance with quality criteria overall) and EPC assessors by an authorised public body	Development needs to be assessed in WP 2, e.g. what should be quality criteria, how to control quality of EPCs and experts	Work with verification bodies
Performing automatic validity check of EPC assessments	Performing automatic validity/quality check during assessment and/or during upload to EPC database for all EPCs, e.g through automatic online register to fill in the EPC characteristics and an integrated tool checking these	Develop a concrete proposal how this could be done in general and in each of the 7 Member States	Include proposal in stakeholder discussion process / policy debate
Reporting of errors in EPC assessments, from controls, for learning	Reporting errors or faulty procedures in a central database to create statistics of common mistakes ***for training purposes***, and identify assessors with high error rates	Develop a concrete proposal for the content and processes of such a database	Include proposal in stakeholder discussion process / policy debate
Deeper control and monitoring of implementation of renovation recommendations	Deeper control and monitoring (a set-up of quality control scheme) of whether building owners implemented the energy efficiency actions suggested in EPC, especially for public buildings; easy if	Develop concrete national proposals for such monitoring	Include proposal in stakeholder discussion process / policy debate

	EPC is linked with financial incentive/financing schemes, or if recommendations are stored in an EPC database		

Table 6: Long list of EPC elements identified as priority for improvement in the category independent control systems

3.1.4 Use of EPCs and their data, including in wider building-related databases

The following figures show the results from assessments by stakeholders and QualDeEPC country partners on priority for improvement and the ease of implementation of various EPC elements, and the importance of an EPC element for a good practice EPC scheme under the category 'Use of EPCs and their data, including in wider building-related databases'. The EPC element 'controlling and enforcing the mandatory use of EPCs in real estate advertisements' received the highest number of votes from the stakeholders, while the EPC element pertaining to linking EPCs with other buildings or energy related databases received the highest number of votes from the country partners. Cumulatively, both voluntary and mandatory advertising guidelines have also received a high number of votes. Stakeholders assess that most of the EPC elements require moderate to high efforts for implementation.

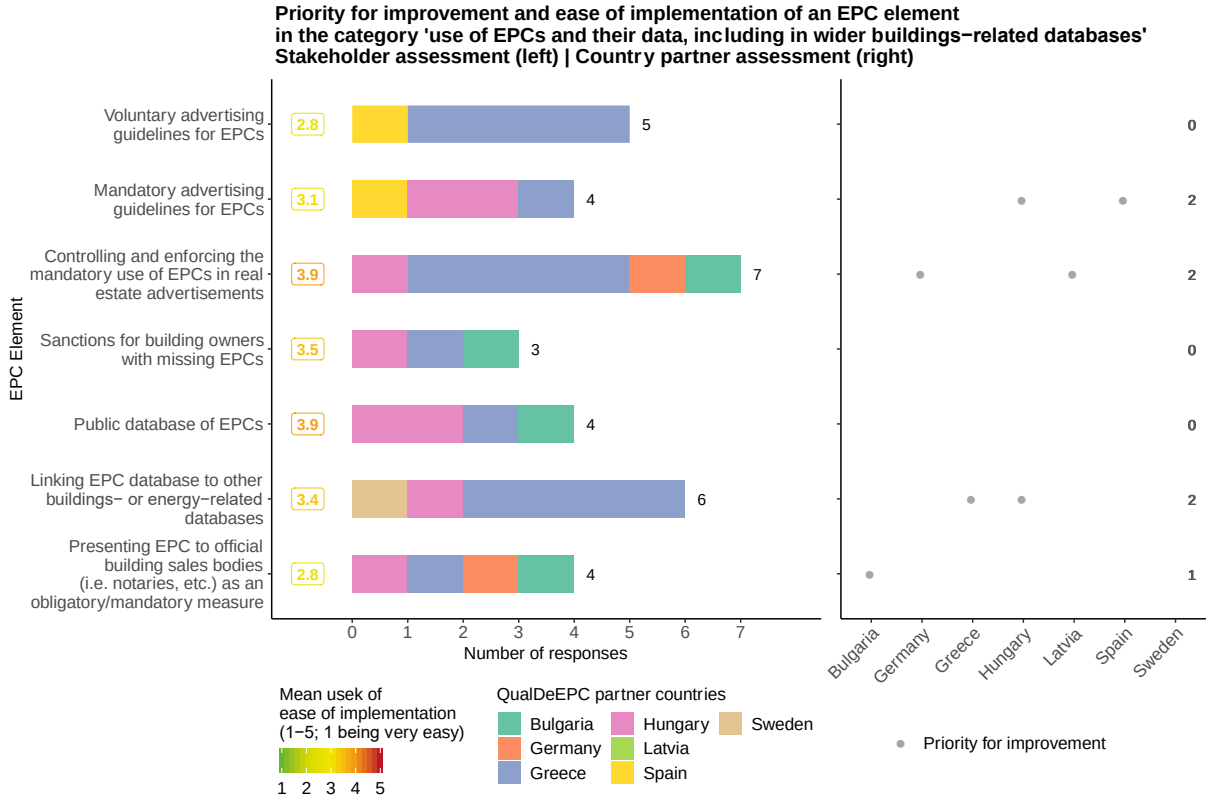

Figure 12: Priority for improvement and ease of implementation of an EPC element in the category 'use of EPCs and their data'

Cumulatively, both voluntary and mandatory advertising guidelines have also received the highest score for importance from QualDeEPC country partners (Figure 13), while stakeholders assigned the highest importance to presenting EPCs to official sales bodies, followed by 'Controlling and enforcing the mandatory use of EPCs in real estate sales advertisements' and a public database of EPCs.

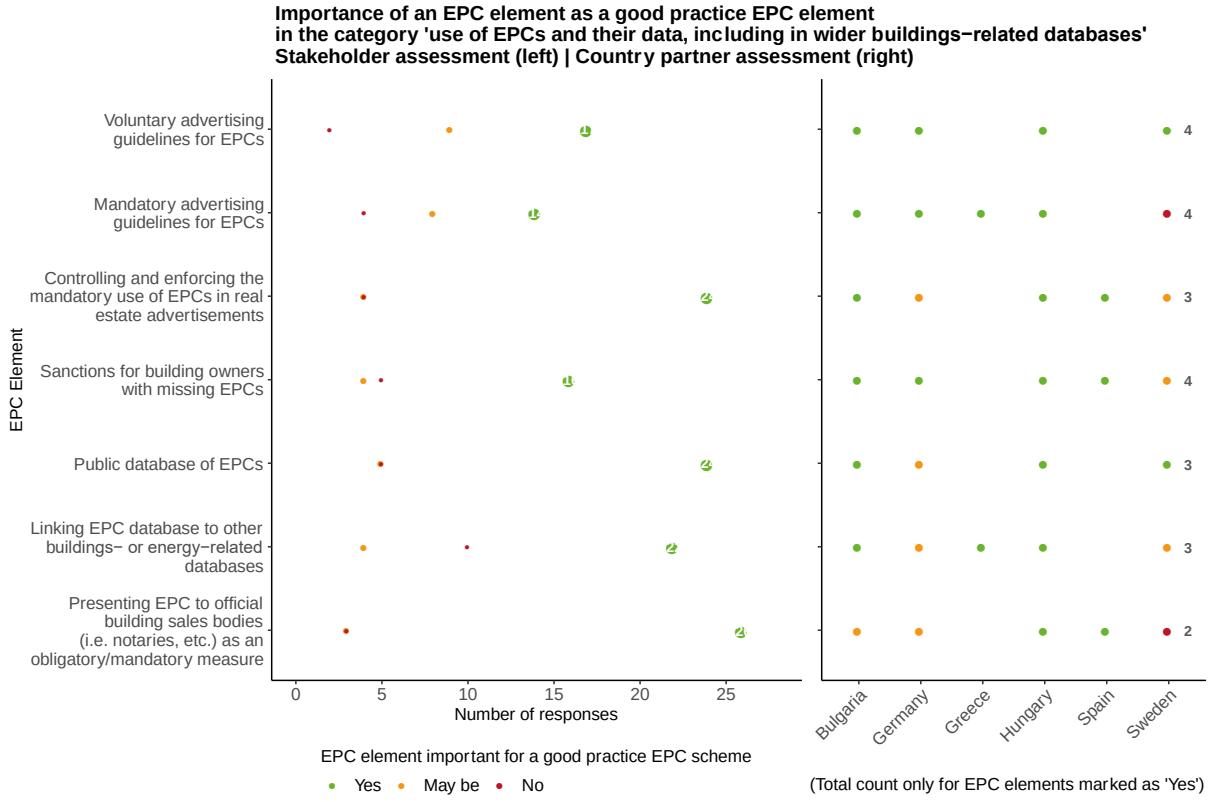

Figure 13: Importance of an EPC element as a good practice EPC element in the category 'use of EPCs and their data'

The following table presents an analysis for preparing a long-list of EPC elements for the category 'use of EPCs and their data', which are identified as priority for improvement.

EPC Element – use of EPCs and their data	Reason for inclusion/exclusion in/from the long-list
Voluntary advertising guidelines for EPCs	Yes. Together with mandatory advertising guidelines, identified as a significant gap (cf. chapter 2.4) and considered a priority by many stakeholders and two QualDeEPC country partners (Figure 12)
Mandatory advertising guidelines for EPCs	Yes. Together with voluntary advertising guidelines, identified as a significant gap (cf. chapter 2.4) and considered a priority by many stakeholders and two QualDeEPC country partners (Figure 12)
Controlling and enforcing the mandatory use of EPCs in real estate advertisements	Yes. Identified as a significant gap in three QualDeEPC partner countries (cf. chapter 2.4) and considered a priority by many stakeholders and two QualDeEPC country partners (Figure 12)
Sanctions for building owners with missing EPCs	No. Not identified as a significant gap (cf. chapter 2.4) nor considered a priority by stakeholders and QualDeEPC country partners (Figure 12)

EPC Element – use of EPCs and their data	Reason for inclusion/exclusion in/from the long-list
Public database of EPCs	No. Identified as a significant gap (cf. chapter 2.4) but not considered a priority by stakeholders and QualDeEPC country partners (Figure 12); in addition, considered difficult to implement
Linking EPC database to other buildings- or energy-related databases	Yes. Identified as a significant gap (cf. chapter 2.4) and considered a priority by many stakeholders and three QualDeEPC country partners (Figure 12)
Presenting EPC to official building sales bodies (i.e. notaries, etc.) as an obligatory /mandatory measure	No. Identified as a significant gap (cf. chapter 2.4) but not considered a priority by stakeholders and only by one QualDeEPC country partner (Figure 12)

Table 7: Analysis of stakeholder and country partner feedback on EPC elements in the category use of EPCs and their data

Based on the above table, the table below shows the EPC elements that have been included in the long-list of options for further deliberation, along with information on what exactly the QualDeEPC project can develop and implement during the course of the project.

EPC Element	Description	What exactly can QualDeEPC develop	What exactly can QualDeEPC implement
Voluntary/mandatory advertising guidelines for EPCs	Guidelines for use of EPCs in advertisements of sales/rentals of buildings/dwellings, issued by energy agencies/public authorities, either for voluntary or mandatory use	Develop proposal for guidelines and their use; develop towards actual set of voluntary guidelines	• Publish and advertise as voluntary guidelines • Include proposal in stakeholder discussion process / policy debate
Mandatory advertising guidelines for EPCs	"	Develop proposal for legislation making the use mandatory	Include proposal in stakeholder discussion process / policy debate
Controlling and enforcing the mandatory use of EPCs in real estate advertisements	*Effectively* controlling and enforcing the legal requirement to present EPC or at least the EPC rating and value in advertisements of sales/rentals of buildings/dwellings.	Develop a concrete proposal for routines of control and enforcement, including sanctions, building on existing good practice	Include proposal in stakeholder discussion process / policy debate
Linking EPC database to other buildings- or energy-related databases	Linking EPC database to other buildings- or energy-related databases ***Note: this is partly also relevant for supporting deep renovation and could include a regulation requiring provision of EPC input data for subsequent energy audits***	Develop concrete national proposals for such linking	Include proposal in stakeholder discussion process / policy debate

Table 8: Long list of EPC elements identified as priority for improvement in the category use of EPCs and their data

3.1.5 *Embedding EPCs in wider policies and public activities to stimulate deep renovation*

The following figures show the results from assessments by stakeholders and QualDeEPC country partners on priority for improvement and the ease of implementation of various EPC elements, and the importance of an EPC element for a good practice EPC scheme under the category 'embedding EPCs in wider policies and public activities to stimulate deep renovation'. The EPC element 'Creating deep renovation network platforms' received most votes from stakeholders and the partner countries. Stakeholders assess that most of the EPC elements require moderate to high efforts for implementation.

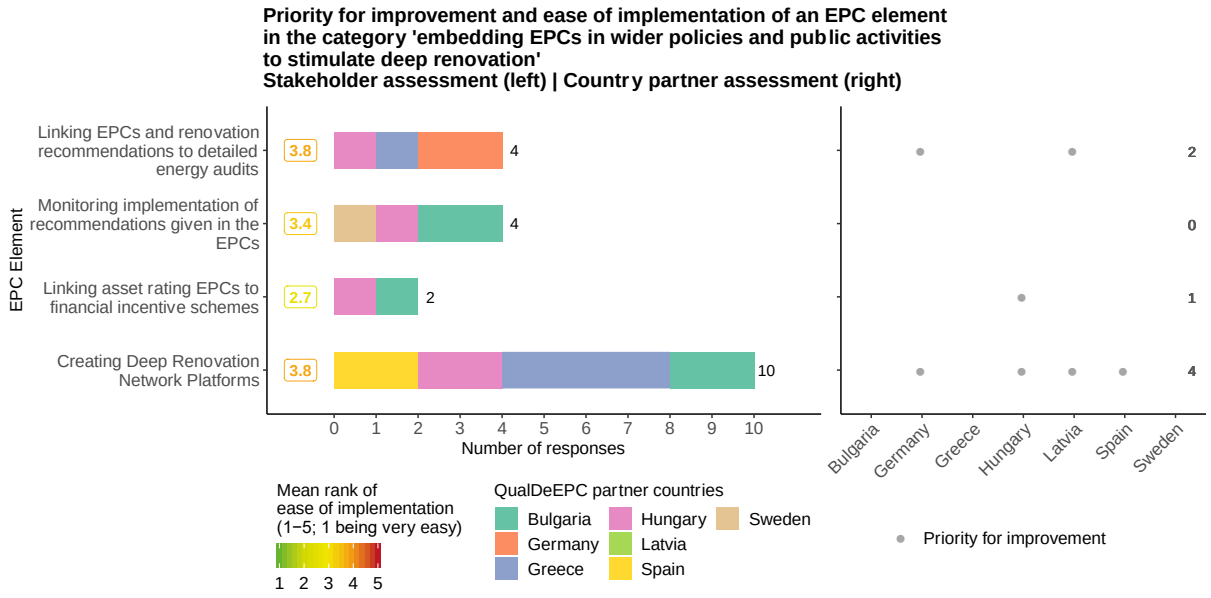

Figure 14: Priority for improvement and ease of implementation of an EPC element in the category 'embedding EPCs in wider policies'

The EPC element 'Creating deep renovation network platforms' also received the highest number of votes in terms of importance for a good practice EPC scheme (Figure 15).

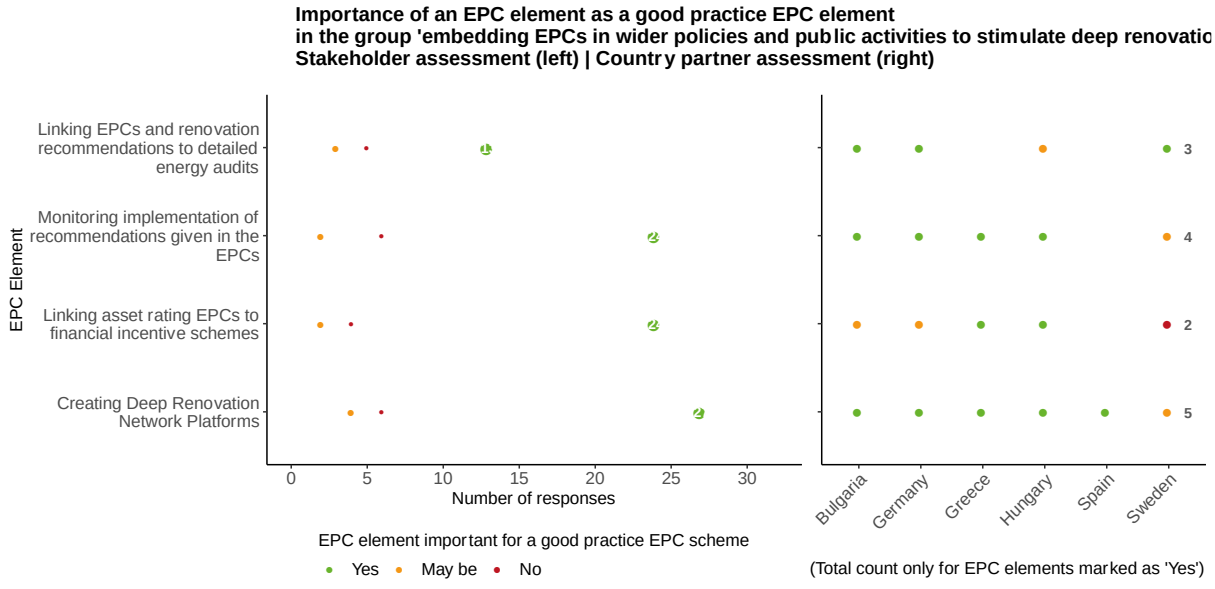

Figure 15: Importance of an EPC element as a good practice EPC element in the category 'embedding EPCs in wider policies'

The following table presents an analysis for preparing a long-list of EPC elements for the category 'embedding EPCs in wider policies', which are identified as a priority for improvement.

EPC Element – embedding EPCs in wider policies	Reason for inclusion/exclusion in/from the long-list
Linking EPCs and renovation recommendations to detailed energy audits	No. Identified as a significant gap (cf. chapter 2.5) but not considered a priority by stakeholders, albeit seen as a priority by two QualDeEPC country partners (Figure 14); however, considered difficult (costly) to implement
Monitoring implementation of recommendations given in the EPCs	Yes. Identified as a significant gap (cf. chapter 2.5) but not considered a priority by stakeholders for this element (Figure 14); however, is basically the same as the element 'Deeper control and monitoring of implementation of renovation recommendations' in the category 'Independent control systems (chapter 3.1.3), which is included in the longlist; merged with this element for the longlist.
Linking asset rating EPCs to financial incentive schemes	No. Identified as a significant gap (cf. chapter 2.5) but not considered a priority by stakeholders, albeit seen as a priority by one QualDeEPC country partner (Figure 12); however, considered difficult to implement
Creating Deep Renovation Network Platforms	Yes. Identified as a significant gap (cf. chapter 2.5) and considered a priority by stakeholders and QualDeEPC country partners (Figure 14)

Table 9: Analysis of stakeholder and country partner feedback on EPC elements in the category embedding EPCs in wider policies

Based on the above table, the table below shows the EPC elements that have been included in the long-list of options for further deliberation, along with information on what exactly the QualDeEPC project can develop and implement during the course of the project. The element 'Monitoring implementation of recommendations given in the EPCs' has been merged with the element 'Deeper control and monitoring of implementation of renovation recommendations' in the category 'Indepedent control systems (chapter 3.1.3), which has been discussed in Table 6 above.

EPC Element	Description	What exactly can QualDeEPC develop	What exactly can QualDeEPC implement
Creating Deep Renovation Network Platforms	Creating Deep Renovation Network Platforms providing one-stop-shops for deep renovation linked to EPCs, including administrative, energy advice, financial, and supply-side information to building owners, with active marketing of deep renovation and EPC, and coordinating supply-side actors and supporting their marketing, training, and quality.	Develop general concept and adaptation to MS circumstances and partners' possibilities; minimum = online platform providing one-stop-shop for information	• Implement to the extent possible with the limited resources of the project (cf. WP 3 and 5 texts), and continue to operate thereafter according to sustainability strategy • Include other elements of the concept in stakeholder discussion process / policy debate

Table 10: Long list of EPC elements identified as priority for improvement in the category embedding EPCs in wider policies

3.1.6 Summary of long list

As a basis for obtaining stakeholder feedback, the EPC elements in the long list of options were grouped in a different way, reflecting functions of the improvement, as shown below, rather than adhering to the steps in the certification process.

1. Improving the usefulness and use of EPCs for supporting deep renovation
2. Improving the quality and precision of EPCs in general
3. Certification and training of EPC assessors/issuers
4. Usefulness and use of EPCs in building markets

The following tables present the overview by four groups but include the previously analysed five broad categories of improvement for information in the last column.

3.1.6.1 Improving the usefulness and use of EPCs for supporting deep renovation

EPC Element	Description	Area of improvement
Improving the renovation recommendations towards deep renovation	Improving the renovation recommendations provided on the EPC so that they become the first step towards individual buildings deep renovation passports/roadmaps. Assessment software tools should provide such high-energy efficiency options in high quality as their output for the renovation recommendations. The first pages of the EPC should present an overview of such recommendations and (if possible) energy savings, together with links for further information and financial support.	Assessment and certification
Online tool for comparing EPC recommendations to deep energy renovation recommendations	Online tool that compares energy consumption and recommendations as per EPC with market average/typical buildings; with specific deep energy renovation recommendations, which are consistent with typical elements of an individual deep renovation passport/roadmap	Assessment and certification And Embedding EPCs in wider policies and public activities to stimulate deep renovation
Deeper control and monitoring of implementation of renovation recommendations	Deeper control and monitoring (a set-up of quality control scheme) of whether building owners implemented the energy efficiency actions suggested in EPC, especially for public buildings; easy if EPC is linked with financial incentive/financing schemes, or if recommendations are stored in an EPC database	Independent control systems And Embedding EPCs in wider policies and public activities to stimulate deep renovation
Creating Deep Renovation Network Platforms	Creating Deep Renovation Network Platforms providing one-stop-shops for deep renovation linked to EPCs, including administrative, energy advice, financial, and supply-side information to building owners, with active marketing of deep renovation and EPC, and coordinating supply-side actors and supporting their marketing, training, and quality.	Embedding EPCs in wider policies and public activities to stimulate deep renovation

Table 11: Improving the usefulness and use of EPCs for supporting deep renovation

3.1.6.2 Improving the quality and precision of EPCs in general

EPC Element	Description	Area of improvement
On-site inspection during EPC assessment	During EPC assessment, on-site inspection (including interview/consultation with the owner) ***Note: this will also allow improved renovation recommendations***	Assessment and certification
EPC Software: de-fault values or validity ranges for input parameters	Assessment Software: Practical default values for input data that come close enough to real data of a building; or in other cases, rather than exact default values, certain validity ranges for input parameters.	Assessment and certification
Performing automatic validity check of EPC assessments	Performing automatic validity/quality check during assessment and/or during upload to EPC database for all EPCs, e.g. through automatic online register to fill in the EPC characteristics and an integrated tool checking these	Independent control systems
Quality control of both EPCs and assessors	Performing quality control of both EPCs (random sample – compliance with quality criteria overall) and EPC assessors by an authorised public body	Independent control systems
Reporting of errors in EPC assessments, from controls, for learning	Reporting errors or faulty procedures in a central database to create statistics of common mistakes ***for training purposes***, and identify assessors with high error rates	Independent control systems

Table 12: Improving the quality and precision of EPCs in general

3.1.6.3 Certification and training of EPC assessors/issuers

EPC Element	Description	Area of improvement
Regular mandatory EPC assessor training on assessment and recommendations required for certification and registry	Regular mandatory EPC assessor training on EPC assessment and on renovation recommendations required for certification and inclusion in registry. Such training should also enable them to avoid common mistakes.	Requirements for qualified experts
Regular events and workshops on innovative solutions for deep renovation	Organisation by the national EPC body of regular events and workshops presenting innovative solutions for deep renovation and implementing more intelligent and advanced energy measures	Requirements for qualified experts

Table 13: Certification and training of EPC assessors/issuers

3.1.6.4 Usefulness and use of EPCs in building markets

EPC Element	Description	Area of improvement
High user-friendliness of the EPC	Very high user-friendliness of various aspects of EPC, such as energy consumption, presentation of rating and recommendations, potential energy (and cost) savings and other benefits ***Note: this is partly also relevant for supporting deep renovation***	Assessment and certification

EPC Element	Description	Area of improvement
Linking EPC database to other buildings- or energy-related databases	Linking EPC database to other buildings- or energy-related databases ***Note: this is partly also relevant for supporting deep renovation and could include a regulation requiring provision of EPC input data for subsequent energy audits***	Use of EPC data in wider policies
Voluntary/mandatory advertising guidelines for EPCs	Guidelines for use of EPCs in advertisements of sales/rentals of buildings/dwellings, issued by energy agencies/public authorities, either for voluntary or mandatory use	Use of EPC data in wider policies
Controlling and enforcing the mandatory use of EPCs in real estate advertisements	*Effectively* controlling and enforcing the legal requirement to present EPC or at least the EPC rating and value in advertisements of sales/rentals of buildings/dwellings.	Use of EPC data in wider policies

Table 14:Usefulness and use of EPCs in building markets

3.2 Feedback from first stakeholder workshops

QualDeEPC partners in each country have organized a stakeholder workshop to discuss the shortcomings of the existing practices and brainstorm improvement options outlined in the long list of options. In general, the workshops have been organised in three parts:

1. First, the priority for improvements has been discussed for all EPC elements, as described in sections 2.1-2.5.
2. Second, the priority for improvements has been discussed from the overall long list of EPC elements, as described in sections 3.1.6.1-3.1.6.4.
3. Third, a final priority for improvements has been identified from the above-mentioned two categories.

This section presents the summary of the workshop proceedings in the following table as follows:

- For each partner country, suggestions for improvement, based on all EPC elements have been summarised under the five categories, as described in section 2.1-2.5.
- EPC elements incorporated into the long list of options are highlighted.
- EPC elements identified as a priority for improvement by country partners, as a result of stakeholder workshops, are highlighted and the totals are presented.

Note that only a brief summary/overview has been presented in the tables below. For each partner country, full workshop proceedings that provide more information improvement measures and suggestions for implementation for identified EPC elements can be found in the Appendix. They will be useful for WP3 – development of enhanced EPC schemes. For Hungary, the priorities are only provisionally indicated based on the stakeholder interview, as the national workshop is yet to take place. Also in some countries (e.g., Spain), after the workshop was carried out, members of National Expert Fora who could not attend the Workshop have been consulted and their views are represented in the workshop results.

These results will form a main basis for the decision of the QualDeEPC project on the final list of priorities for further development, national and EU-level debate, and implementation as far as possible in the further implementation of the project's work programme.

Table 15 presents a summary of feedback from stakeholder workshops for all EPC enhancement elements in the long list and the original list, plus a number of new improvement options proposed during the workshops.

Comments regarding EPC enhancement options that are seen as a priority for improvement in the country (and hence for the QualDeEPC project) are written in bold letters; otherwise, the information is useful as a comment, but the option is not seen as a priority.

Table legend									
Plain font with green back-ground	= EPC element in long list of options but not country priority	**Bold font with green back-ground**	= EPC element in long list of op-tions & country priority	Plain font with grey background	= EPC element not in long list of options & not country priority	**Bold font with grey back-ground/**	= EPC element not in long list of options but in original list and country priority	**Bold font with yellow back-ground**	= New EPC element that has not been discussed in sec-tion 2 and 3 but suggested as a country priority during the work-shops

EPC Element – assessment and certification								
EPC element	**Bulgaria**	**Germany**	**Greece**	**Hungary**	**Latvia**	**Spain**	**Sweden**	**Total**
Official or certified EPC software to ensure quality and comparability of assessments					**Simplified EPC issu-ing and calculation method for EPCs, which are issued for selling or renting a building are re-quired.** ***(background: cur-rently all EPCs in Latvia are based on a detailed energy audit)***			1
EPC software: de-fault values or validi-ty ranges for input parameters			Already Implemented in Greece Proposal: to use certain validity rang-es for input parame-ters for automatic control of EPCs		**Some work on these is on-going right now in Latvia. Improve-ment is needed.**	It is not so relevant to choose between default values or validity ranges; the important issue is that the values are up to date	**There is a need for development/update**	2

EPC element	Bulgaria	Germany	Greece	Hungary	Latvia	Spain	Sweden	Total
Online tool for comparing EPC recommendations to deep energy renovation recommendations	**Improvement needed.**		**Such a tool already exists in Greece. The tool design could aim at improving user engagement by enabling game-design elements (gamification).**			**Currently, such online tools are unavailable. Development of such online tools are a requirement and a priority**		3
On-site inspection during EPC assessment		An on-site inspection would be helpful to increase the quality and should replace a mere online issuance of EPCs.	Already Implemented in Greece Improve "consumer awareness" on the EPC's in-formation and further usage (during on-site visits and direct communication of auditor/client)	**Improvement needed.**		**It is suggested that on-site inspection during EPC assessment should be mandatory**		2

EPC element	Bulgaria	Germany	Greece	Hungary	Latvia	Spain	Sweden	Total
High user-friendliness of the EPC	Consideration may be given to proposing an energy certificate supplement that summarizes the technical parameters in "understandable language" and which gives an idea of some additional benefits of implementing energy efficiency measures. EPC should be a market mechanism measure also.	**Content and wording of EPCs is not easy to understand for final consumers. There is often confusion regarding the two types of EPCs (consumption-based vs, calculated, also known as operational vs. asset rating) and legal revisions. Therefore, additional information structures (QR-Code, online platform) and easy language explanation of terminology might be useful.** **Comparability of information is also important, e.g. CO_2 emissions**	**High user-friendliness will motivate owners/users to read and understand the data & information presented on the EPC.** **EPC recommendations to be linked to "Deep Renovation Roadmap".**		**Improvement needed.**	**The contents of the EPC should be comprehendible by the general public, for example, including monetary units for energy consumption, comparison with similar buildings, including QR codes with links to further information etc.** ***(comment: QR codes have been included in other databases of energy related products)***	**It is important to make sure that the EPCs and recommended measures are actually a benefit for the property owners (reduced energy use, reduced costs, improved indoor environment). Especially, there is a need for clearer and also traceable figures. Energy and hot water use should be demonstrated both before and after normalization.**	5
Improving the renovation recommendations towards deep renovation	**With regard to the possibility of introducing a step-by-step renovation, an energy renewal passport could be developed as an integral part of the energy certificate. The energy**	**Improvement needed**	**EPC's recommendations need to be linked to a "Deep Renovation Roadmap" with the specification that 'Deep Renovation' takes place 'gradual-**	**Improvement needed.**	**Improvement needed.**	**A mandatory establishment of a deep renovation report as an Annex to the EPC rather than simply providing a list of energy efficiency recommendations on the EPC is rec-**	**The requirement that recommended measures must be cost-effective should be reviewed.**	7

	audit documents should provide information for drawing up a long-term plan for the step-by-step implementation of energy-saving measures in the buildings under examination, with the ultimate goal being a complete deep renovation.		**ly' over time**			**ommended, including a version of the use of the property and dealing with qualitative aspects.**		
EPC element	**Bulgaria**	**Germany**	**Greece**	**Hungary**	**Latvia**	**Spain**	**Sweden**	**Total**
Compliance between EPC rating and operational rating	Improvement needed	Improving the comparability of EPCs (asset vs. operational rating)						
EPC rating for new buildings compatible with NZEB requirements								
Updating of EPCs						Currently, as per legislation, EPCs should be updated every 10 years		
EPC calculation procedure in adherence with new CEN OAS standard								

Include smart readiness indicator on EPCs						This is not very well known by stakeholders and only one stakeholder identified this as a relevant requirement		
EPC provides data on both asset and operational rating basis for energy and CO_2 savings								
EPC Element – requirements for qualified experts								
EPC element	**Bulgaria**	**Germany**	**Greece**	**Hungary**	**Latvia**	**Spain**	**Sweden**	**Total**
Registry of EPC assessors			Already Implemented in Greece Proposal: EPC assessors registry to be linked to Technical Chambers Members Registry	**Improvement needed.**				1
Regular mandatory EPC assessor training on assessment and recommendation required for certification and registry			**Regular EPC assessors training should be mandatory in Greece.** **Open discussion whether the certification process and inclusion in the registry should be linked to exams or to be based on the training**	**Improvement needed.**	**Improvement needed.**	There is a need for training EPC assessors to increase the quality of both assessors and EPCs.	**Measures to increase the quality of EPC assessor education/training are required, including increased knowledge of how to consider and calculate savings due to decreased ancillary costs. But the training should**	4

			certificates received. **Regular renewal of the certification (e.g. every 3 years)**				**be voluntary.**	
EPC element	**Bulgaria**	**Germany**	**Greece**	**Hungary**	**Latvia**	**Spain**	**Sweden**	**Total**
Eligibility requirements (pre-qualification) for EPC assessor certification				**Improvement needed.**		At European level, a suggestion is a possible harmonization issue that EPC assessors could be certified by bodies accredited with ISO 17024 by National Accreditation Entities. Something similar is available in Spain.		1
Renewal of EPC assessor certification through an examination						It has been suggested that a number of completed EPCs or attending to yearly workshops or courses should be mandatory for renewing EPC assessor certification.		
Regular events and workshops on innovative solutions for deep renovation	**Improvement needed**		Very useful element Discussion on possible assignment of an "official EPC body of regular events and workshops" The national EPC		**Yes. An opportunity for upgrading the professional qualification of energy auditors could be to focus efforts on informing individuals with regard to inno-**		**Envisaged through the development of an online forum for increased networking between EPC assessors (certified energy experts).**	3

			body for regular events/workshops could also undertake the regular training programmes in Greece		**vative materials, technologies and modern solutions for building renovation and consumption management. This would contribute to their professional development and competitiveness.**			
New EPC element						**(First time) Certification of EPC issuers based on exams.**		1
EPC Element – independent control systems								
EPC element	**Bulgaria**	**Germany**	**Greece**	**Hungary**	**Latvia**	**Spain**	**Sweden**	**Total**
Using common quality criteria for independent control		Necessity of standardisation in quality controls: e.g. definition of a building (incl. front door? Staircase to building?)						
Sufficient sample size for verification and quality control								
Quality control of both EPCs and assessors						**Identified as a priority for improvement.**	**Identified as a priority for improvement.**	2

EPC element	Bulgaria	Germany	Greece	Hungary	Latvia	Spain	Sweden	Total
Performing automatic validity check of EPC assessments			Already Implemented in Greece • Intensify the on-site quality control check by the authorized public body • Increase sanctions			Most regional governments do not comply with performing automatic validity check, needs improvement.		
Achieving C or C* level control of EPC assessments for the sample, according to EPBD								
Reporting of errors in EPC assessments, from controls, for learning	**Having a database of common mistakes (from the suggestions above) is a good idea in order to improve the quality of the EPC issuance process.**		Very useful for the identification of weak points/gaps and enhancement of training curricula			Another suggestion is that a database with the most common errors should be very convenient; this database could be very useful for the administrations that manage the EPC registers and EPC issuers.		1
Sanctions and penalisation for EPC issuers	The introduction of a working sanctions enforcement mechanism is an integral part of an effective system for ensuring and verifying the							

	quality of examinations and certificates. It is necessary to specify and sanction the penalties in the legislation.							
Channelling revenues from sanctions for enhancing EPC schemes								
EPC Element – use of EPCs and their data								
EPC element	**Bulgaria**	**Germany**	**Greece**	**Hungary**	**Latvia**	**Spain**	**Sweden**	**Total**
Voluntary/ mandatory advertising guidelines for EPCs	**Improvement needed**		**Improvement needed.**	**Improvement needed.**	**Improvement needed.**	**Design of mandatory advertisement guidelines; two guidelines for EPCs are needed; one by the real state agencies and the other for private building sellers, owners.**		5
Controlling and enforcing the mandatory use of EPCs in real estate advertisements	**Improvement needed**		**Legislation improvement is needed in order to enforce the legal requirement to present EPC:** **1. Before placing an advertisement for sale/rent of a building** **2. To the real estate**	**Improvement needed.**	**Improvement needed.**	**Controlling and enforcing the mandatory use of EPCs in real estate advertisements is needed and a three-step procedure has been suggested.**		5

			agents					
EPC element	**Bulgaria**	**Germany**	**Greece**	**Hungary**	**Latvia**	**Spain**	**Sweden**	**Total**
Sanctions for building owners with missing EPCs								
Public database of EPCs				**Improvement needed.**		It is suggested that a national EPC database be created first in Spain. Currently, the databases are at regional level and there are about 16 databases with ECPs of the Regions.		1
Linking EPC database to other buildings- or energy-related databases	**Improvement needed**	**A central and public buildings database could lead to more. However, it needs to be clearly defined how the data can be used and how it can be financed.**				And then this database should be linked to other databases; examples: databases of renewable energies, database of smart meters, data base of health, cadaster, etc.		2
Presenting EPC to official building sales bodies (i.e. notaries, etc.) as an obligatory /mandatory measure						The EPC should be part of the Technical Inspection of the Building and the Building Evaluation Book, ITE promoting the execution of energy efficiency		

						measures.		
EPC Element – embedding EPCs in wider policies								
EPC element	**Bulgaria**	**Germany**	**Greece**	**Hungary**	**Latvia**	**Spain**	**Sweden**	**Total**
Linking EPCs and renovation recommendations to detailed energy audits		**Funding program for enhanced EPCs**	Partially implemented. Link to Technical Chamber's Members Registry DB. Link to other DBs via "building ID"			Strengthening the linking of EPCs to Strategy for Energy Rehabilitation in the building sector managed by Ministry of Transport, Mobility and Urban Agenda (is proposed or discussed)	It would be good to coordinate the EPC system with the system for Mandatory energy audit for large enterprises.	1
Monitoring implementation of recommendations given in the EPCs	The control over the implementation of energy saving measures is based on legal requirements (fact and currently). It is far more fruitful to mobilize efforts to persuade building owners of the direct and indirect benefits of implementing the measures than threatening them with controls and sanctions.		Definitely for buildings of the Public Sector. Deeper control could be linked to the National EPC Registry and monitoring by the Energy Auditors should be obligatory in this case. For non-public buildings: Linked with the financial incentives (i.e. tax deduction), in cases where renovation interventions do not require/ result from EPCs.			**Currently, there is no law for monitoring the implementation. An improvement would be that implementation of recommendations given in the EPCs should be mandatory, although difficult to implement. A mechanism for monitoring of implementation of the energy saving measures by the owners should be established.**	Previous EPCs must be saved in order to make monitoring of energy use as well as implementation and impact of recommended measures possible. As feedback to the system, it would also be good if measures implemented since the last EPC were reported when making a new one.	1

EPC element	Bulgaria	Germany	Greece	Hungary	Latvia	Spain	Sweden	Total
Linking asset rating EPCs to financial incentive schemes						All energy efficiency programs implemented with public funds should be subject to controls and penalties for failure to meet energy-saving targets.		
Creating Deep Renovation Network Platforms	**Improvement needed**	**Improvement needed**	OSS Platforms are not developed in most of EU MS; developing a network of such platforms is a question. The cost for developing, updating and maintaining an OSS platform appears to be high taking into account the compatibility specifications needed so as to create a Network of OSS platforms.	**Improvement needed.**	**Improvement needed.**	**Such a consolidated platform is needed, because currently, energy performance certification and deep renovation information is available in several different websites.**		5

Table 15: Priority for improvement - all EPC elements - workshop proceedings

Table 16 presents an overview of EPC elements chosen as priorities for further development, mainly based on the long list (see section 3.1.6), as a result form the workshops. Any other EPC elements not in the long list but chosen as priorities in the country can be found in the table 15 above.

	Improving the usefulness and use of EPCs for supporting deep renovation								
EPC element	**Description**	**Bulgaria**	**Germany**	**Greece**	**Hungary**	**Latvia**	**Spain**	**Sweden**	**Total**
Improving the renovation recommendations towards deep renovation	Improving the renovation recommendations provided on the EPC so that they become the first step towards individual buildings deep renovation passports/roadmaps. Assessment software tools should provide such high-energy efficiency options in high quality as their output for the renovation recommendations. The first pages of the EPC should present an overview of such recommendations and (if possible) energy savings, together with links for further information and financial support.	X	X	X	X	X	X	X	7
Online tool for comparing EPC recommendations to deep energy renovation recommendations	Online tool that compares energy consumption and recommendations as per EPC with market average/typical buildings; with specific deep energy renovation recommendations, which are consistent with typical elements of an individual deep renovation passport/roadmap	X		X			X		3
Deeper control and monitoring of implementation of renovation recommendations	Deeper control and monitoring (a set-up of quality control scheme) of whether building owners implemented the energy efficiency actions suggested in EPC, especially for public buildings; easy if EPC is linked with financial incentive/financing schemes, or if recommendations are stored in an EPC database								0
Creating Deep Renovation Network Platforms	Creating Deep Renovation Network Platforms providing one-stop-shops for deep renovation linked to EPCs, including administrative, energy advice, financial, and supply-side information to building owners, with active marketing of deep renovation and EPC, and coordinating supply-side actors and supporting their marketing, training, and quality.	X	X		X	X	X		5

Improving the quality and precision of EPCs in general									
EPC element	**Description**	**Bulgaria**	**Germany**	**Greece**	**Hungary**	**Latvia**	**Spain**	**Sweden**	**Total**
On-site inspection during EPC assessment	During EPC assessment, on-site inspection (including interview/consultation with the owner) ***Note: this will also allow improved renovation recommendations***				X		X		3
EPC Software: default values or validity ranges for input parameters	Assessment Software: Practical default values for input data that come close enough to real data of a building; or in other cases, rather than exact default values, certain validity ranges for input parameters.					X		X	2
Performing automatic validity check of EPC assessments	Performing automatic validity/quality check during assessment and/or during upload to EPC database for all EPCs, e.g. through automatic online register to fill in the EPC characteristics and an integrated tool checking these								
Quality control of both EPCs and assessors	Performing quality control of both EPCs (random sample – compliance with quality criteria overall) and EPC assessors by an authorised public body						X	X	2
Reporting of errors in EPC assessments, from controls, for learning	Reporting errors or faulty procedures in a central database to create statistics of common mistakes ***for training purposes***, and identify assessors with high error rates	X							1
Certification and training of EPC assessors/issuers									
EPC element	**Description**	**Bulgaria**	**Germany**	**Greece**	**Hungary**	**Latvia**	**Spain**	**Sweden**	**Total**
Registry of EPC assessors	An official registry of EPC assessors is needed for credibility of the EPC scheme				X				1
Regular mandatory EPC assessor training on assessment and recommendations required for certification and registry	Regular mandatory EPC assessor training on EPC assessment and on renovation recommendations required for certification and inclusion in registry. Such training should also enable them to avoid common mistakes.			X	X	X		X	4
Regular events and workshops on innovative solutions for deep renovation	Organisation by the national EPC body of regular events and workshops presenting innovative solutions for deep renovation and implementing more intelligent and advanced energy measures	X				X		X	3

Usefulness and use of EPCs in building markets									
EPC element	**Description**	**Bulgaria**	**Germany**	**Greece**	**Hungary**	**Latvia**	**Spain**	**Sweden**	**Total**
High user-friendliness of the EPC	Very high user-friendliness of various aspects of EPC, such as energy consumption, presentation of rating and recommendations, potential energy (and cost) savings and other benefits ***Note: this is partly also relevant for supporting deep renovation***		X	X		X	X	X	5
Linking EPC database to other buildings- or energy-related databases	Linking EPC database to other buildings- or energy-related databases ***Note: this is partly also relevant for supporting deep renovation and could include a regulation requiring provision of EPC input data for subsequent energy audits***	X	X						2
Voluntary/mandatory advertising guidelines for EPCs	Guidelines for use of EPCs in advertisements of sales/rentals of buildings/dwellings, issued by energy agencies/public authorities, either for voluntary or mandatory use	X		X	X	X	X		5
Controlling and enforcing the mandatory use of EPCs in real estate advertisements	*Effectively* controlling and enforcing the legal requirement to present EPC or at least the EPC rating and value in advertisements of sales/rentals of buildings/dwellings.	X		X	X	X	X		5

Table 16: Priority for improvement - long list of EPC elements - workshop proceedings

4 CONCLUSIONS AND OUTLOOK

This report (D2.3) has been an important step in identifying gaps in current EPC schemes and the contribution of EPCs to deep energy renovation, and consequently in analysing and discussing potential priorities for the project's further work on enhanced EPC schemes and deep renovation. It has reduced the original list of almost 50 potential options for enhancing EPCs and their use to a long list of around 20, and collected priorities of stakeholders for which options to address in the project. Improving the recommendations on energy renovation that have to be included in the EPCs along with actions to use these recommendations in marketing of deep renovation to investors, but also improving the user-friendliness of the EPCs and other actions to improve their use in building markets were seen as priorities in most countries.

Based on the feedback from stakeholder interviews and country partners (section 3.1), and from stakeholder workshops (section 3.2), the project team will decide on a joint shortlist of EPC elements that will be taken up during the course of the project for further development and (potential) implementation. This will be a step in the implementation of Task 2.4. Thereby, findings from this report (D2.3) will feed into the Task 2.4 and its deliverable (D2.4), which is to draft the development strategy plan for the development of next-generation EPC schemes in WP3 of the QualDeEPC project.

5 APPENDIX I FIRST STAKEHOLDER WORKSHOP REPORTS FROM QUALDEEPC PARTNER COUNTRIES

5.1 Bulgaria

The 1st Bulgarian National Workshop in QualDeEPC was held in Sofia on 11th of March 2020.

5.1.1 Attendees

There were representatives from the following organisations:

- National EPC Body:
  - Sustainable Energy Development Agency
- National authorities
  - Ministry of Regional Development and Public Works – Housing Policy Directorate
  - Bulgarian Academy of Sciences
  - Other Local authorities
- NGOs:
  - EnEffect;
  - Bulgarian Energy and Mining Forum
  - Sofian Energy Agency
  - Energy Consultants and experts
  - Citizens

Figure 16: Worksop in Bulgaria

The workshop started with presentation of the project and its objectives, discussion on existing problems in the local scheme and good practices. The second part was dedicated to discussion of the specific measures suggested by the project.

The workshop outcomes could be concluded as follow:

5.1.2 Discussion on EPC elements

1. **What do you think needs to be improved in your county in terms of**

- EPC assessment, issuance, content and design?
    - Finding a compromise between the strictly technical parameters of a process or product and reaching a sufficient level of understanding from the general public has always been difficult to achieve. Consideration may be given to proposing an energy certificate supplement that summarizes the technical parameters in “understandable language” and which gives an idea of some additional benefits of implementing energy efficiency measures. For this purpose, a sociological analysis of attitudes, the level of understanding in the general public, as well as the elements that have the greatest impact on it, are needed. On the other hand, despite the existence of a number of European trials and projects, the additional benefits of implementing energy efficiency measures are still very difficult to evaluate, which hinders their proper communication. Having valid assessment methods at European level would facilitate this process.
- Requirements for qualified experts?
    - With respect to the requirements to the registered auditors Bulgaria is one of the few Member States which has introduced detailed and legal requirements regarding the education, qualification, professional experience and technical security of these persons. An opportunity for upgrading and upgrading the professional qualification of energy auditors could be to focus efforts on informing individuals with regard to innovative materials, technologies and modern solutions for building renovation and consumption management. This would contribute to their professional development and competitiveness.
    - For the purposes of a high-quality energy audit, periodic training of energy auditors is required, with a focus on innovative solutions, their technical and economic feasibility, as well as information on good energy efficiency practices.
- Independent control systems?
    - Having a database of common mistakes (from the suggestions above) is a good idea in order to improve the quality of the EPC issuance process. Approach is an incorrect audit firms to be "sanctioned" by listing them in the wrong list of companies. This approach is somewhat appropriate, but its implementation should not be straightforward, since the definition of "incorrect" should be based on very clearly defined criteria. Otherwise, there is a risk of unfair competition. The control over the implementation of energy saving measures is based on legal requirements (fact and currently). It is far more fruitful to mobilize efforts to persuade building owners of the direct and indirect benefits of implementing the measures than threatening them with controls and sanctions.
    - The introduction of a working sanctions enforcement mechanism is an integral part of an effective system for ensuring and verifying the quality of examinations and certificates. It is necessary to specify and sanction the penalties in the legislation.
    - It should be established a mechanism for monitoring of implementation of the energy saving measures by the owners.
    - All energy efficiency programs implemented with public funds should be subject to controls and penalties for failure to meet energy-saving targets.

- Use of EPCs and their data in building markets and beyond?
    - Communication of energy performance certificates, not only as a legal requirement but also as a market mechanism for the real estate market.
    - Creating and maintaining a public platform with a database of energy classes for certified buildings and recommended energy-saving measures.
    - Raise the awareness of real estate market participants about the benefits and obligations of energy efficiency about the conditions for tax exemptions.
- Linking EPCs to other policies and services for deep renovation?
    - The requirement for issuing an EPC in relation to other policies and financial instruments is currently available. Improving this can only be directed towards creating market incentives for implementing measures that go beyond the EPC.
    - The energy-saving measures recommended in the energy certificate are part of the necessary measures that are related to the concept of basic renewal under the Spatial Planning Act, Additional Provisions, paragraph 5, p.66 («Basic Renovation» of a construction is a complex of construction and assembly works related to the implementation of the basic requirements under Article 169, Paragraphs 1 and 3, which are carried out during the operation and affect the structural elements of the construction, including the surrounding structures and elements of buildings, facilities and elements of the technical infrastructure - heating In this regard, in Article 2a (1) (b) of the revised ECG, it is added that Member States are required to take into account "any relevant points for intervention, if any in the life cycle of the building. "
    - The time for intervention may be:
        - transaction (eg sale, lease, refinancing or change of purpose);
        - renewal (eg more energy-related non-energy upgrades already planned);
        - incident (eg fire, earthquake, flood).
    - Synchronizing energy efficiency improvement activities with other necessary repairs or pre-planned construction works will result in cost-effective renovation and will ensure that energy efficiency improvement measures are not ignored or overlooked at a later stage. the life cycle of the building.

2. **How can EPCs be made more useful for building owners, sellers, buyers, property owners, and tenants, as well as banks?**

- Communication of energy performance certificates, not only as a legal requirement, but as a market mechanism
- The Energy Performance Certificate contains information on the energy performance of buildings as well as prescribed energy-saving measures. With regard to the possibility of introducing a step-by-step renovation, an energy renewal passport could be developed as an integral part of the energy certificate. An energy renewal passport is an electronic or paper document that outlines a long-term and step-by-step roadmap for renewal (with possible steps / steps defined) of a particular building as a result of an EE audit. In this way the energy certificate will enable the owners of buildings, customers, investors, tenants and more. to plan forthcoming activities and necessary financial resources.

3. **How can EPCs support or trigger deep renovation?**

- The energy audit documents should provide information for drawing up a long-term plan for the step-by-step implementation of energy-saving measures in the buildings under examination, with the ultimate goal being a complete deep renovation.
- The major renovation of buildings in operation could be promoted through:
    - analyzing the possibilities and instructions for the gradual introduction of energy-saving measures in the buildings under examination, with the overall aim of overall deep renovation;
    - increasing the regulatory requirements for the energy efficiency of buildings in operation;

- introduction of a statutory time limit for the implementation of the prescribed energy saving measures after the results of the energy audit have been adopted.

5.1.3 Shortlist of selected priorities:

1. Improving the renovation recommendations provided on the EPC so that they become the first step towards individual buildings deep renovation passports/roadmaps. Assessment software tools should provide such high-energy efficiency options in high quality as their output for the renovation recommendations. The first pages of the EPC should present an overview of such recommendations and (if possible) energy savings, together with links for further information and financial support.
2. Online tool that compares energy consumption and recommendations as per EPC with market average/typical buildings; with specific deep energy renovation recommendations, which are consistent with typical elements of an individual deep renovation passport/roadmap
3. Creating Deep Renovation Network Platforms providing one-stop-shops for deep renovation linked to EPCs, including administrative, energy advice, financial, and supply-side information to building owners, with active marketing of deep renovation and EPC, and coordinating supply-side actors and supporting their marketing, training, and quality.
4. Reporting errors or faulty procedures in a central database to create statistics of common mistakes for training purposes, and identify assessors with high error rates
5. Organisation by the national EPC body of regular events and workshops presenting innovative solutions for deep renovation and implementing more intelligent and advanced energy measures
6. Linking EPC database to other buildings- or energy-related databases
7. Guidelines for use of EPCs in advertisements of sales/rentals of buildings/dwellings, issued by energy agencies/public authorities, either for voluntary or mandatory use
8. Effectively controlling and enforcing the legal requirement to present EPC or at least the EPC rating and value in advertisements of sales/rentals of buildings/dwellings.

5.2 Germany

5.2.1 Attendees

The attendees are from the following organizations:

- dena
- EPC gGmbH
- Energieberaterverband
- BMI
- VZBV
- Verbraucherzentrale NRW
- Degewo AG
- GdW
- GIH / LFE
- Kenstone / HypZert
- Berlin Hyp AG
- KfW

5.2.2 Agenda

Nr.	from / to	Topic	
0	10:00 – 10:15	Reception, welcome coffee	
1	10:15 – 10:30	Welcome and short presentation of the QualDeEPC project	dena
2	10:30 – 10:45	Aims and procedure of the workshop	E-P-C
3	10:45 – 11:45	Open group discussion "Rethinking the Energy Performance Certificate"	All participants
4	11:50 – 12:30	Discussion on the resulting contents of the energy performance certificate; prioritization	All participants
	12:30 – 13:30	**Lunchtime snack**	
5	13:30 – 14:00	Presentation of possible optimisations of an energy performance certificate (longlist) from the QualDeEPC project	dena
6	14:00 – 15:30	Discussion: Formulation of 8 priorities from the results of the morning and the long list	All participants
7	15:30	Concluding remarks	Dena, E-P-C

Table 17: Agenda for workshop in Germany

5.2.3 Results

5.2.3.1 Current deficits and barriers - partly requirements for the energy certificate (see also Figures 17 and 18)

- Consumers do not understand or do not know the energy performance certificate (contents, terms...)
- Blank pages of the EPC are confusing, should be avoided
- Thermal insulation becomes more important against summer heat - should be included

- Lack of comparability of energy certificates due to two types of certificates (consumption-based/operational rating vs. calculated energy demand/asset rating), as well as due to legal changes (EnEV 2007/2009/2014)
- International comparability not given - important for the financial sector
- CBI standard based on consumption - basis for valuation in the financial sector / only asset-rating EPCs would be too little against that background
- Reality versus EnEV boundary conditions "benchmark" (consumers expect realistic consumption values): Expectations for the energy certificate
- Data records not publicly available
    - Regulation of data access?
    - Potential? (What added value would the data have?)
    - Desire for a central and accessible building database by most participants (housing industry sees this critically, no interest in the release of data, which are then used by third parties)
- Heating costs are not visible (energy performance certificate is building-related - costs for apartments in one MFH can vary, costs change during the validity of the EPC, some of the information given is not realistic, primary energy is not meaningful as information for tenants)
- Highly erroneous energy certificates (both on operational and asset rating)
    - Examples Degewo company: 50% errors with externally created EPC
    - invalid EPC in circulation
    - Quality assurance by authorities does not actually take place
- Definition of "building" not clear (therefore prone to errors)
- Net floor space versus living space leads to susceptibility to errors
- CO_2 emissions - no uniform calculation method (note: will be regulated in the new building energy law (GEG), still voluntary information)
- Modernisation information not suitable for rented buildings
    a. Discussion whether tenants should possibly be informed about upcoming renovations or whether they'd rather be frightened by that
- Online issuance of energy certificates questionable (quality!)
- Confusion about energy demand (calculated) versus energy consumption (historic actual data)
- Transparency in calculations? (e.g. vacancy)
- Energy certificates in the EU not comparable
- Expectations regarding the quality of the energy performance certificate are very high - costs for high quality EPC are not paid, however, => establish correlation / costs arise mainly from data collection and depth of analysis of the buildings
- Not suitable as a tool for backing financing contracts, because deviations are too large, quality is not consistent
- On-site inspections!
- "Building inspection"?
- EPC is not a basis for financial incentives, because important information is missing

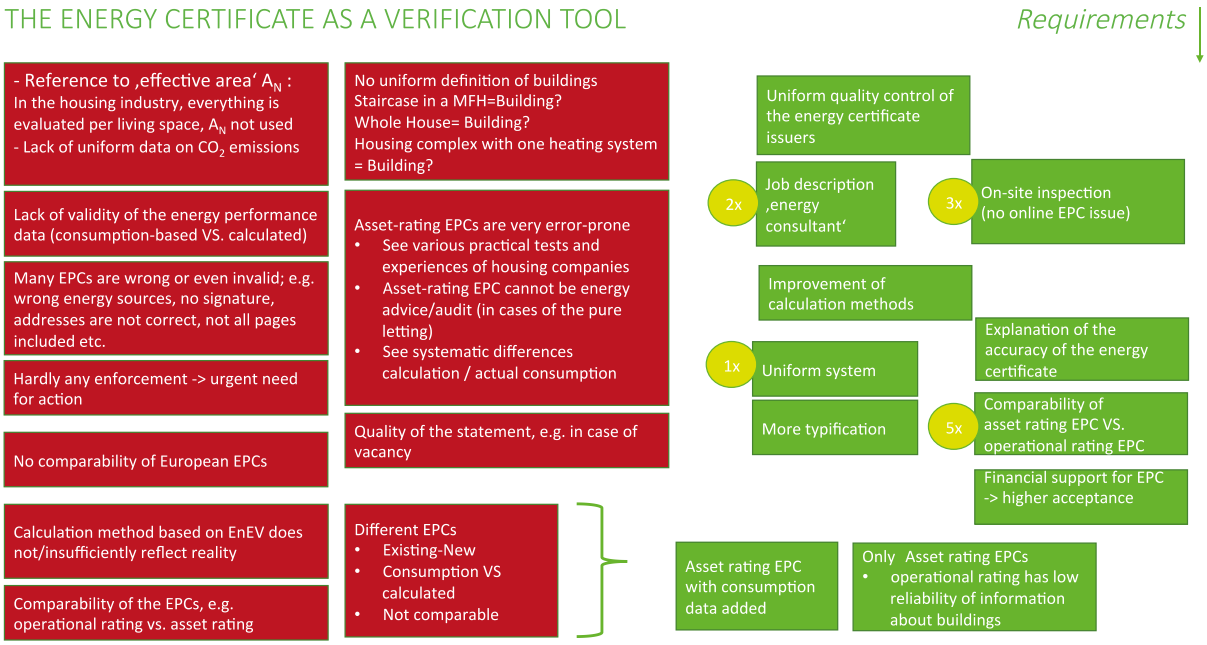

Figure 17: Results Flip-Chart 'verification tool' including priority counting

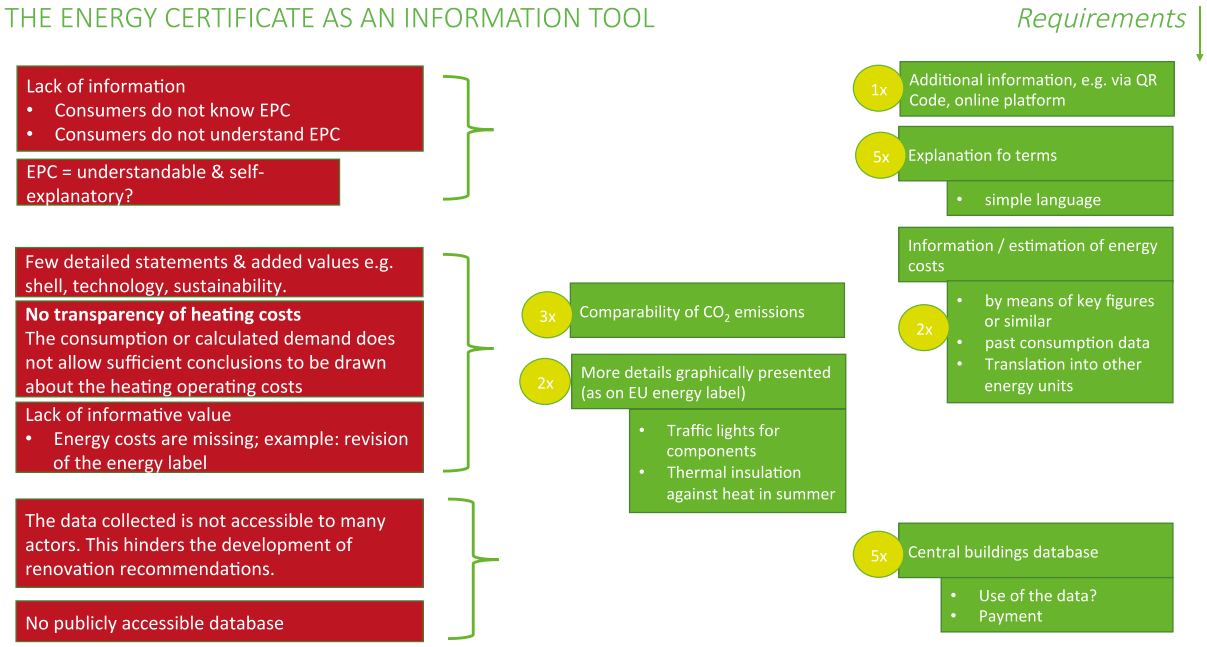

Figure 18: Results Flip-Chart 'information tool' including priority counting

5.2.3.2 Requirements for the energy certificate

- Little feedback on the energy performance certificate as an entry point into energy efficiency renovation (see Fig. 19)
    - Is the information in the renovation recommendations (called ‘modernisation measures’ on the German EPC) useful for tenants? or deterrent?
    - Housing industry is a special case and does not need the EPC for portfolio management

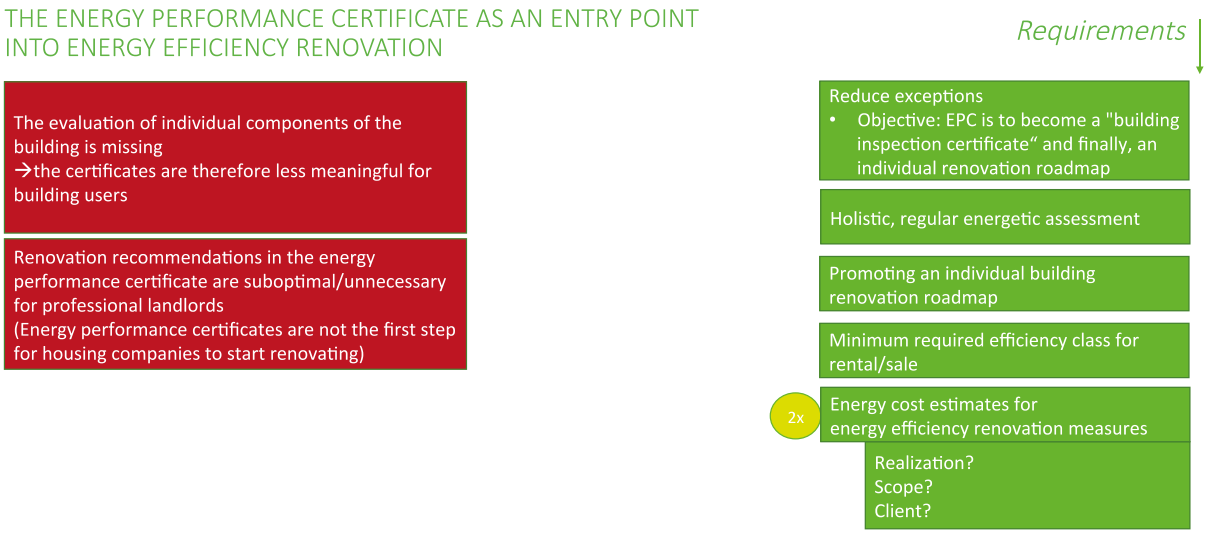

Figure 19: Results Flip-Chart 'Entry into renovation' including priority counting

5.2.3.3 Priorities

- Need for on-site inspections depends on target groups, e.g. actors in the housing industry know their stocks very well
    - Quality versus costs
- Building database:
    - Discussion: Registration and data access
- Financial incentives coupled to new requirements?
- E.g. financial support programme for "extended" energy certificates
- Energy demand certificate (asset-rating EPC) with the possibility of further information, such as energy consumption, heating costs, explanations via QR code or similar.
- Uniform calculation of CO_2 emissions
- Detailed renovation recommendations ('modernization measures')
- Improved comprehensibility for consumers or visibility of energy costs

5.2.3.4 Discussion points and ideas (views of participants)

- EPC and energy advice should be (kept) separated - the EPC is rather unsuitable as an instrument for entry into energy efficiency renovation
- Present the relationship of the EPC to other instruments (which instrument offers what to whom?)
- Make interfaces to other instruments clear - close gaps if necessary
- Maybe a QR Code on the EPC with reference to the homepage will help; further information?
- EU energy label could be a role model
- EPC could be a basic instrument for implementing legal framework conditions (e.g. limit on rent increases, ...) - but sufficient quality is required
- Quality controls should be made public and transparent
- Quality assurance only for the EPC ? The entire construction process is not quality assured throughout - should this not be tackled as a whole?
- The financial sector could have a higher impact on the demand for energy efficiency, but this requires a high-quality and reliable basis
- Benchmarks for building types necessary for classification / evaluation of buildings - for this purpose, an EPC database would be helpful

5.2.3.5 Existing documents / studies

- Survey by VZBV (German association of consumer protection agencies) among consumers
- GIH (association of energy consultants) survey on the capacities in the Federal States for quality assurance

5.2.3.6 Possible solutions:

- In addition to a basic EPC, offer an EPC with higher quality (seal of quality?) – experience by dena: there is no demand on the market for this as a voluntary instrument
- Basic EPC as legal obligation (simple, uniform standard) - supplemented by additional tools, information, etc. as required, e.g:

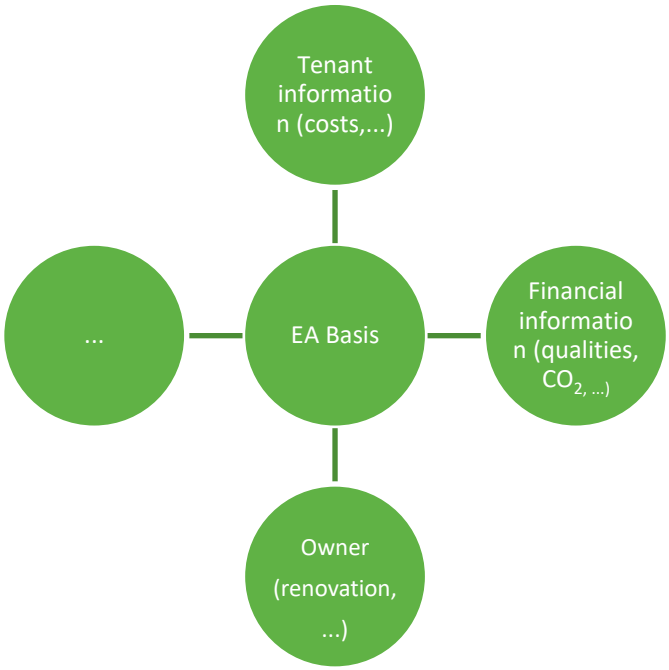

Figure 20: Improvement opportunities for EPCs in Germany

Figure 21: Workshop in Germany

5.3 Greece

5.3.1 Attendees

On the 25th February 2020, CRES hosted the 1st National Workshop on requirements for an optimized energy performance certificate outcomes & results, in the framework of **QualDeEPC** project. The CRES project team invited the key stakeholders who were interviewed during the project's phase related to the mapping of the "Current status and scope for improvements in EPC processes and implementation/Potential elements of a good practice scheme". The key types of stakeholders participated were representatives from the National policymaking body (Ministry for Environment and Energy) for the Energy Efficiency, the Hellenic Energy Inspectorate responsible for the EPC system in Greece, the Technical Chamber, the Pan-Hellenic Association of Certified Energy Inspectors.

Moreover project partners of X-tendo[1] and iBRoad[2] projects were invited so as to contribute to this event by sharing their experience.

5.3.2 Aim of the workshop

The workshop aimed at:

- Exchanging knowledge on the Greek EPC system design, content and implementation and discussing the way it should be developed in order to increase its acceptance and benefits in terms of process of issuance, results and usability.
- Compiling a priority list of elements to be developed for an improved EPC system, with the focus of making them a first step towards deep renovation.

All expert opinions will be directly incorporated into the further design and implementation of the QualDeEPC project. Identified priorities will on one hand seek to be implemented at national level as far as possible in cooperation with the responsible authorities, and on the other hand they are to be made comparable at EU level.

[1] https://x-tendo.eu/

[2] https://ibroad-project.eu/

5.3.3 Agenda

	Topic	Speaker
1	Welcome and Round table presentation	CRES All participants
2	Presentation of QualDeEPC project	L. Papamikrouli CRES
3	Synergies with other projects under the same HORIZON 2020 call for proposals Presentation of X-tendo	L. Lampropoulou E. Polychroni CRES
4	Aim and approach of this workshop	E. Korma CRES
5	Presentation of the results of the Stakeholders Interviews in Greece Discussion	E. Korma CRES - all participants
6	Introduction of the potential common EPC improvement needs identified by QualDeEPC Discussion about the priorities identified by QualDeEPC project	E. Korma L. Lampropoulou CRES - all participants
	Final remarks- end	

Table 18: Agenda for workshop in Greece

Figure 22: Workshop in Greece

5.3.4 Group discussion - Outcomes

The workshop was focused on the outcomes of the "Current status and scope for improvements in EPC processes and implementation/Potential elements of a good practice scheme" phase. An extended presentation of the findings of this phase and the results of the survey of the national stakeholders took place. The long list of the priorities for an improved EPC system identified by the stakeholders in all participating countries was presented. The main points, comments and opinions of the group discussion are summarized in the following table.

	EPC Element	Key comments- opinions
	1. Improving the usefulness and use of EPCs for supporting deep renovation	
1.	Improving the renovation recommendations provided on the EPC, so that they become the first step towards individual buildings deep renovation passports/roadmaps. Assessment software tools should provide such high energy efficiency options in high quality as their output for the renovation recommendations. The first pages of the EPC should present an overview of such recommendations and (if possible) energy savings, together with links for further information and financial support	– EPC's recommendations need to be linked to "Deep Renovation Roadmap" and – be specified that 'Deep Renovation' takes place 'gradually' over time
2.	Online tool that compares energy consumption and recommendations as per EPC with market average/typical buildings; with specific deep energy renovation recommendations, which are consistent with typical elements of an individual deep renovation passport/roadmap	Existing in Greece – Useful tool from a social point of view, for rising awareness of the building owners/users and being familiar with the concepts of 'Certification' and 'deep renovation' – The tool design could target on improving user engagement by enabling game-design elements (gamification) – Care should be taken so as to avoid confusion of cost related information with the relevant data provided by the Energy Auditor in "Energy Efficiency Study"
3.	Deeper control and monitoring (a set-up of quality control scheme) of whether building owners implemented the energy efficiency actions suggested in EPC, especially for public buildings; easy if EPC is linked with financial incentive/financing schemes, or if recommendations are stored in an EPC database	– Definitely for buildings of the Public Sector – Deeper control could be linked to the National EPC Registry and monitoring by the Energy Auditors should be obligatory in this case. – For non-public buildings: Linked with the financial incentives (i.e. tax deduction), in cases where renovation interventions do not require/ result from EPCs.
4.	Creating Deep Renovation Network Platforms providing one-stop-shops for deep renovation linked to EPCs, including administrative, energy advice, financial, and supply-side information to building owners, with active marketing of deep renovation and EPC, and coordinating supply-side actors and supporting their marketing, training, and quality.	– OSS Platforms are not developed in most of EU MS; developing a network of such platforms is a question. – The cost for developing, updating and maintaining an OSS platform appears to be high taking into account the compatibility specifications needed so as to create a Network of OSS platforms. – Proposal no1: establish a forum in Greece to review related existing OSS "Best practices" – Proposal 2: OSS platform to include indicative costs for "Energy Renovation" and to be linked to the National Observatory of fuel prices. Such proposal has

	EPC Element	Key comments- opinions
		already been submitted to the responsible Ministry in Greece by the Pan-Hellenic Association of Certified Energy Auditors - PACEI – Proposal No 3: OSS to include list/DB of products suppliers with specific criteria (i.e CE) – Proposal No 4: Sustainability of such OSS platform could be supported by PPP. Specifications for this scheme could be developed by QualDeEPC project.
	2. Improving the quality and precision of EPCs in general	
5.	During EPC assessment, on-site inspection (including interview/consultation with the owner) • *Note: this will also allow improved renovation recommendations*	Already Implemented in Greece – Improve "consumer awareness" on the EPC's information and further usage (during on-site visits and direct communication of auditor/client)
6.	Assessment Software: Practical default values for input data that come close enough to real data of a building; or in other cases, rather than exact default values, certain validity ranges for input parameters.	Already Implemented in Greece – Proposal: to use certain validity ranges for input parameters for EPCs automatic control
7.	Performing automatic validity/quality check during assessment and/or during upload to EPC database for all EPCs, e.g through automatic online register to fill in the EPC characteristics and an integrated tool checking these	Already Implemented in Greece – Intensify the on-site quality control check by the authorized public body – Increase sanctions
8.	Performing quality control of both EPCs (random sample – compliance with quality criteria overall) and EPC assessors by an authorised public body	Already Implemented in Greece
9.	Reporting errors or faulty procedures in a central database to create statistics of common mistakes *for training purposes*, and identify assessors with high error rates	Very useful for the identification of weak points/gaps and enhancement of training curricula
	3. Certification and training of EPC assessors/issuers	
10.	An official registry of EPC assessors is needed for credibility of the EPC scheme.	Already Implemented in Greece Proposal: EPC assessors registry to be linked to Technical Chambers Members Registry
11.	Regular mandatory EPC assessor training on EPC assessment and on renovation recommendations required for certification and inclusion in registry. Such a training should also enable them to avoid common mistakes.	Regular EPC assessors training should be mandatory in Greece. – Question raised: Training fees: Will they be paid by the assessors? – Open discussion whether the certification process and inclusion in the registry should be linked to exams or to be based on the training certificates received. – Regular renewal of the certification (e.g. every 3 years) – Discussion about whether the existing number EPC assessors in the National Registry should not be expanded but rather invest on regular training of the

	EPC Element	Key comments- opinions
		existing members
12.	Organisation by the national EPC body of regular events and workshops presenting innovative solutions for deep renovation and implementing more intelligent and advanced energy measures	– Very useful element – Discussion on possible assignment of an "official EPC body of regular events and workshops" – The national EPC body for regular events/workshops could also undertake the regular training programmes in Greece
	4. Usefulness and use of EPCs in building markets	
13.	Very high user-friendliness of various aspects of EPC, such as energy consumption, presentation of rating and recommendations, potential energy (and cost) savings and other benefits *Note: this is partly also relevant for supporting deep renovation*	– High user-friendliness will motivate owners/users to read and understand the data & information presented on the EPC. – Implementation of a National survey on "EPC User-friendliness- the end user opinion" by the responsible Ministry. Review of the good practices (i.e. Denmark, Sweden) – EPC field "comfort": o Include the relevant "comfort" indicators, EPC assessors to fill in estimated values o Difficulties to insert "comfort" indicators for tertiary buildings (only for non-occupied buildings based on future use) – EPC recommendations to be linked to "Deep Renovation Roadmap" – EPC necessary Improvements: o Increase the recommendations field, to enable greater number of recommendations inserted o Improvements of the information& data related to the energy consumption per energy source – Improvement of EPC credibility : o Costs of recommendations to be linked to the actual market costs o Include practical examples of EPC fill-in data in the training of EPC assessors o Improvement of EPC quality control o Include energy consumption data by end use and relative costs o Consider a different type of EPC for large buildings of the tertiary sector
14.	Linking EPC database to other buildings- or energy-related databases *Note: this is partly also relevant for supporting deep renovation and could include a regulation requiring provision of EPC input data for subsequent energy audits*	<u>Partially implemented</u> – Link to Technical Chamber's Members Registry DB – Link to other DBs via "building ID"
15.	Guidelines for use of EPCs in advertisements of sales/rentals of buildings/dwellings, issued by energy agencies/public authorities, either for voluntary or mandatory use	Using EPC in advertisements will serve as an end user awareness/training tool

	EPC Element	Key comments- opinions
16.	*Effectively* controlling and enforcing the legal requirement to present EPC or at least the EPC rating and value in advertisements of sales/rentals of buildings/dwellings.	Legislation improvement is needed in order to enforce the legal requirement to present EPC: – Before placing an advertisement for sale/rent of a building – To the real estate agents

Table 19: Group discussion outcomes in Greece

5.3.5 List of priorities

Based on the key points mentioned above, the collection of stakeholders' priorities from the national Workshop in Greece is presented below:

1. Improving the renovation recommendations provided on the EPC so that they become the first step towards individual buildings deep renovation passports/roadmaps. Assessment software tools should provide such high-energy efficiency options in high quality as their output for the renovation recommendations. The first pages of the EPC should present an overview of such recommendations and (if possible) energy savings, together with links for further information and financial support.
2. Online tool that compares energy consumption and recommendations as per EPC with market average/typical buildings; with specific deep energy renovation recommendations, which are consistent with typical elements of an individual deep renovation passport/roadmap.
3. Regular mandatory EPC assessor training on EPC assessment and on renovation recommendations required for certification and inclusion in registry. Such a training should also enable them to avoid common mistakes.
4. Very high user-friendliness of various aspects of EPC, such as energy consumption, presentation of rating and recommendations, potential energy (and cost) savings and other benefits.
5. Guidelines for use of EPCs in advertisements of sales/rentals of buildings/dwellings, issued by energy agencies/public authorities, either for voluntary or mandatory use.
6. Effectively controlling and enforcing the legal requirement to present EPC or at least the EPC rating and value in advertisements of sales/rentals of buildings/dwellings.

5.4 Hungary

Workshop in Hungary is yet to take place.

5.5 Latvia

5.5.1 Attendees

Due to unforeseen circumstances 1st National Workshop was held in narrower field of experts and stakeholders. A larger workshop planned in middle of March 2020 was postponed due to restrictions of coronavirus outbreak.

In this workshop a quite narrow field of experts were invited, mainly from the Ministry of Economic Affairs and LSGUTIS. This workshop was planned as a preliminary workshop for the main workshop that was planned to take place in middle of March. The workshop was led by Gatis Zogla from SIA Ekodoma.

5.5.2 Aim of the workshop

The aim of the workshop was:

- To discuss how the Latvian EPC system should be developed in order to increase its acceptance and benefits in terms of process of issuance, results and usability.
- Compile a priority list of elements to be developed for an improved EPC system, with the focus of making them a first step towards deep renovation.
- To prepare for the upcoming events and to have to opinion of main legislative stakeholders in the field of EPCs

All expert opinions will be directly incorporated into the further design and implementation of the QualDeEPC project. Identified priorities on the one hand to be implemented at the national level in cooperation with the responsible authorities as far as possible, and on the other hand they are to be made comparable at EU level.

5.5.3 Agenda

1. Introduction to QualDeEPC project and the aims of the workshop
2. Presentation of situation in other QualDeEPC project partner countries
3. Presentation of list of possible EPC improvements
4. Round table discussion
5. Summary and compilation of a common list of priorities

5.5.4 Results of round table discussion

5.5.4.1 General comments by workshop participants

EV:

- The existing EPC legislation already is well balanced and does not need any large improvements
- There is a need for improvements in the definition of a nZEB in Latvia because the existing requirements are too strict and can not be realistically reached in all new buildings by 2021.
- At the moment there is work being done to improve the situation with national calculation methodology and calculation standards
- In the next upcoming months work on one single mandatory calculation software could be started but it is unclear how much this would cost
- The existing requirement for EPCs in buildings that are being rented or sold is not being fulfilled because the costs of EPCs are too high

- We should consider to make a simplified EPC issuing process for buildings that are being sold or rented. This would help to lower the costs of EPC issuance and it would kick-start the EPCs for buildings that are being sold or rented.

AG:

- Latvian EPC calculation methodology will be changed in the next few months and therefore it is hard to say whether there is need for additional improvements in EPC schemes
- The existing EPC assessor control mechanism is working well and does not need to experience large changes.
- Energy auditors in any case will do the calculations in such way that they get the needed results (this was mentioned for building renovation projects that get co-financed by EU money)

MA:

- Latvia is facing sanctions from EU because of not implementing the requirements of EPBD. Therefore the first thing to do is to change those things that are asked by EU and this would help to avoid the upcoming sanctions

KT:

- We have to see exact suggestions of EPC improvements to be able to comment whether they are needed or not
- Any changes in EPC scheme will take time and are not easy to implement so we should implement only the needed things

KK:

- There is a severe need for unified default calculation values because now everybody can do their calculations as they want.
- A single mandatory software could be a solution but better it would be that there would be a possibility to use multiple software solutions (there could be system where these software tools get checked and certified for being used in issuance of EPCs)

5.5.4.2 Conclusions from General views of participants

Conclusions stated here are subjective and try to reflect the overall feeling of the workshop:

- People responsible for EPC legislation said that the things they are responsible for are in good state. It is not their fault that others are not following the legislation (for instance – when buildings are sold or rented in legislation we have said that there has to be an EPC for this building, but when building is sold or rented in real life nobody is asking for this).
- There is a need in EPC improvements but it is hard to say what exactly is needed without seeing exact proposals for enhancements
- Most likely major changes in EPC schemes will not take place in the nearest future because we have to address the “burning” questions about things for which we can be penalized by EU
- Any changes in EPC schemes have to be done very carefully

5.5.5 Long list of priorities

The predefined longlist of elements suggested for implementation or further development were discussed the workshop.

The suggested elements were grouped into four segments:

- Improving the usefulness and use of EPCs for supporting deep renovation
- Improving the quality and precision of EPCs in general

- Certification and training of EPC assessors/issuers
- Usefulness and use of EPCs in building markets

5.5.5.1 Conclusions from Part 2

A summary of the elements that the participants think should be given a high priority in Latvia is shown in Table below. This priority list is based mainly on the outcome of the workshop, but also other comments from the interviews with other stakeholders have been taken into account.

The following eight elements were included in the Latvian short list:

1A, 1D, 2B, 3B, 3C, 4A, 4C, 4D.

EPC element		This element should be prioritized	Comments from workshop participants
1A	Improving the renovation recommendations provided on the EPC so that they become the first step towards individual buildings deep renovation passports/roadmaps.	Yes	We already have mandatory renovation recommendations but they need to be improved to include ventilation systems and exact solutions for each building envelope element
1B	Online tool that compares energy consumption and recommendations as per EPC with market average/typical buildings	Maybe	We already have average consumption in EPCs for apartment buildings, educational buildings and office buildings. This could be exoanded to more types of buildings
1C	Deeper control and monitoring (a set-up of quality control scheme) of whether building owners implemented the energy efficiency actions suggested in EPC, especially for public buildings	No	What good would this bring?
1D	Creating Deep Renovation Network Platforms providing one-stop-shops for deep renovation linked to EPCs, including administrative, energy advice, financial, and supply-side information to building owners, with active marketing of deep renovation and EPC, and coordinating supply-side actors and supporting their marketing, training, and quality.	Yes	There is a question what exactly is a Deep Renovation Platform
2A	During EPC assessment, on-site inspection (including interview/consultation with the owner)	Already implemented in Latvia	Implemented and is good that this is asked
2B	Assessment Software: Practical default values for input data that come close enough to real data of a building; or in other cases,	Yes	This would help to avoid bad practices of calculating as needed for increased co-

EPC element		This element should be prioritized	Comments from workshop participants
	rather than exact default values, certain validity ranges for input parameters.		financing of building renovation projects This would help the less experienced auditors
2C	Performing automatic validity/quality check during assessment and/or during upload to EPC database for all EPCs	Partly implemented in Latvia	Some things are checked when EPC is uploaded to EPC database. Exact proposals need to be seen
2D	Performing quality control of both EPCs (random sample – compliance with quality criteria overall) and EPC assessors by an authorized public body	Already implemented in Latvia	This system has actually started working in 2020
2E	Reporting of errors and misconduct in a central database to obtain statistical statistics on common errors for the retransmission and improvement of the system and/or to identify experts with a high proportion of	No	There is also a way how reporting of bad EPCs can be done
3A	An official registry of EPC assessors is needed for credibility of the EPC scheme.	Already implemented in Latvia	
3B	Regular mandatory EPC assessor training on EPC assessment and on renovation recommendations required for certification and inclusion in registry. Such a training should also enable them to avoid common mistakes.	Yes	Who will pay for this?
3C	Regular events and workshops organized by a national body for the presentation of innovative solutions for comprehensive energy renovation and smart measurement solutions.	Yes	This would help to increase competence of energy auditors. What does mean regular? Once per year, once per month?
4A	Very high user-friendliness of various aspects of EPC, such as energy consumption, presentation of rating and recommendations, potential energy (and cost) savings and other benefits	Yes	Exact proposals needed.
4B	Linking EPC database to other buildings- or energy-related databases	No	Which are the other buildings or energy related databases?
4C	Guidelines for use of EPCs in advertisements of sales/rentals of buildings/dwellings, issued by energy agencies/public authorities, either for voluntary or mandatory use	Yes	Who would be responsible for making these guidelines?

EPC element		This element should be prioritized	Comments from workshop participants
4D	Effectively controlling and enforcing the legal requirement to present EPC or at least the EPC rating and value in advertisements of sales/rentals of buildings/dwellings.	Yes	We already have a scheme for this but this scheme is not working.

Table 20: Summary of workshop in Lativa

Table 21: Priority list for development of the Latvian EPC system

The participants of the workshop mentioned that without having exact proposals of EPC improvements it is very hard to make any comments about the benefits of the longlist priorities. Therefore there is a need for a meeting/workshop when we will have exact proposals for EPC scheme improvements.

5.6 Spain

5.6.1 Organization of the National Workshop

In November 2019 Escan professionals started to contact the main target groups of the project that can bring out their knowledge to the improvement of certification process, deep energy renovation and to identify the priorities for improvements.

The main objective of the workshop was to gather and collect the opinions and positions of different stakeholders of the certification of buildings sector: building owners, EPC issuers, policy makers, building companies, state agents, architects, innovation and science centres, engineering and consulting firms that manage this field of buildings

The place of the event is also very relevant and it is decided that this will take place in Madrid as the Ministries with competences in energy certification and building renovation are placed in that city; also the main associations of owners, associations of consumers, associations of building companies, companies that are executing the software for certification, etc. are based here.

The documentation that Escan prepared has been: a general presentation of the QualDeEPC project and a presentation of the questions for the National Workshop.

Before the National Workshop the partners elaborate a questionnaire; this questionnaire has been asked to the main stakeholder and the questions have been ranked; the questions for the national workshops have been taken from those most relevant questions.

Escan elaborated four tables of those most relevant questions about EPC and created four working groups for debate.

Escan organized this event with the subcontracting of two experts (mainly because they can bring more and high-quality participants to the workshop).

We invited the Regional Governments and Energy Agencies that are managing the certification process. Escan received emails of Catalonia and Valencia Regions that are interested in this QualDeEPC project but cannot attend it. The positive emails come from Castilla y León, Galicia, Andalucía, Madrid and País Vasco.

In the organization phase Escan wrote an article and published in the website of Escan; Fedarene also published a note in the website and Escan also provided the contents for the QualDeEPC website.

16th December 2019 article with a brief description of the main objective of the project and the first Workshop to be organized on 29th January 2020.

“QualDeEPC” project organizes the workshop about energy performance certification of buildings.

5.6.2 Agenda

The agenda of the event was designed in two parts:

Project presentation and main questions for the audience (morning session) and second part with four working groups discussion in the afternoon.

SCHEDULE¶

Item¤	Time¤	Subject¤	Speaker¤
1¤	11:00-–11:15¤	Welcome·and·introduction·to·the·QualDeEPC·project·¤	ESCAN·and·PTEC¤
2¤	11:15-–12:00¤	Aim·and·approach·of·this·workshop¤	ESCAN,·MAESWELL·¤
3¤	12:00-–13:00¤	Open·discussion·about·improvement·needs·in·EPC·certification.·¤	All¤
¤	13:00-·14:00¤	**Break¤**	
4¤	14:00-–15:00¤	Introduction·of·the·potential·common·EPC·improvement·needs·identified·by·QualDeEPC¤	ESCAN¤
5¤	15:00-·16:00¤	¶ Discussion·about·the·priorities·identified·by·QualDeEPC¤	All¤
6¤	16:00-16:30¤	¶ Final·remarks·and·END↵ ¤	ESCAN,·MAESWELL,·EREN¤

Figure 23: Agenda for workshop in Spain

The National Workshop started 11:00 a.m. because several participants travel from outside Madrid early in the morning. Escan subcontracted catering of Viena Capellanes with some sandwiches and drinks.

More than 35 participants attended this workshop coming from Ministry of Energy, Ministry of Transport and Households, Regional Governments, Energy Agencies, Building Companies, EPC issuers, Townhalls, Technological centers, Green Building Council, Owner and tenants associations, consumer associations, one journalist specialized in energy efficiency in buildings….

The chairmen of the 4 groups has been Maeswell (Energy consulting and EPC issuer), Regional Energy Agency of Castilla y Leon, EREN, Estudio Energía Edificación (Architecture and Energy Studio) and Escan with Energy Agency of Galicia, INEGA. Escan kindly paid the travel costs of four people: the participants of Andalucía, Galicia, Leon and Basque Country.

Figure 24: Workshop in Spain

5.6.3 Workshop results

5.6.3.1 What do you think needs to be improved in terms of EPC assessment, issuance, content and design?

- EPC =Energy Performance Certificate (Certificado de eficiencia energética del edificio)
- **About** EPC **assessment and issuance, it is suggested that on-site inspection during EPC assessment should be mandatory:**
  - It is essential, and it should be included in the legislation of building certification.
  - Existing buildings: one visit for performing the EPC.
  - New buildings: it was suggested two visits one when the building envelop is carried out and a second visit when the heating and air conditioning systems are installed.
- **About EPC software: default values or validity ranges for input parameters** the participants said:
  - It is not so relevant to choose between default values or validity ranges the important is that both are update values.
- **About EPC content and design:**
  - The view of the owners is that they know that a household with a B energy class is better than a household with a C or D.

- The contents of EPC are not fully understanding by them because those contents are very technical (example: primary energy consumption, energy demand, etc.)
- The units are not easy: kwh/m2, kgCO2/m2, therefore it is suggested that the units will be monetary units; for example, the energy consumption should be provided in Euro / m2 or similar.
- EPC content should be more friendly in terms that citizen could understand better o comparing the building with other similar or including the units as economic not only kwh/year

- **Development of an understandable certificate:**
  - highlighting the importance of making this certificate understandable to people who are not skilled in the subject, generating trust thanks to the existence of comparative data and that the selling agencies correctly provide the information. In this way the owners will understand it better.
  - It is required comparative data of other similar buildings to motivate the owners and then, they could better understand what the EPC assessor writes in the EPC.
  - The user of the apartment should see the EPC as an advantage and added value and no as a burden.
  - That it is perceived that the certificate is necessary, create more culture and information about EPC.

5.6.3.2 What do you think needs to be improved in terms of requirements of qualified experts?

- Exams should be obligatory to be accredited as EPC issuer.
- In Spain the University title of Engineering or Architect, also qualification of Secondary schools (Modulo or FP) with competences in energy is enough to be able by Law to perform EPCs.
- Need of EPC issuers training in order to increase the quality of experts and the quality of EPCs.
- In Spain the renovation of the accreditation of the EPC issuers is not required but, in the workshop, it has been suggested a number of completed EPCs should be mandatory for the EPC issuer renovation.
- **Quality control of EPC assessors:** At European level, a suggestion is a possible harmonization issue that EPC assessors could be certified by bodies accredited with ISO 17024 by National Accreditation Entities.
- ISO 17024 Conformity assessment – General requirements for bodies operating certification of persons.
- For example, in Spain the Agency Professional Certification of Buildings, ACP has been accredited by the National Accreditation Entity, ENAC to certify persons, for example: “energy auditor in buildings”.

5.6.3.3 What do you think needs to be improved in terms of independent control systems?

The competence of quality control is not at National level but of the Regional Governments and the differences are high. Therefore, it was suggested in the process of EPC control:

- Performing automatic validity check.
- When register the EPC, performing automatic validity check to a sample of the EPCs that has been registered every year. This needs to be improved for new and existing buildings because most regional governments do not comply.
- One improvement would be that the methodology and content of the quality control to be harmonized by all Regional Governments.
- **Also “It is required more human and economic means to be able to carry out an appropriate quality control of EPCs” for the Regional Governments.**

- Errors reporting from controls learning: Another suggestion is that a data base with the most common errors should be very convenient; this database could be very useful for the administrations that manage the EPC registers and EPC issuers.
- Monitoring implementation of recommendations given in the EPCs: At present time the law does not include that the recommendations of the EPC should be mandatorily carried out. An improvement would be that implementation of recommendations given in the EPCs should be mandatory by rule, although difficult to implement.

One example of Best EPC practice is the control system defined in the Decree 25/2019 of Pais Vasco that includes the requirements of energy performance certification and the procedure for control and requisite of EPCs

Note: DECRETO 25/2019, de 26 de febrero, de certificación de la eficiencia energética de los edificios en la Comunidad Autónoma del País Vasco, su procedimiento de control y registro.

5.6.3.4 What do you think needs to be improved in terms of use of EPCs and their data in building markets and beyond?

- Linking EPC databases to other building – energy related databases:
  - It is suggested that a national EPC database be created first in Spain. And then this database should be linked to other data bases; examples: databases of renewable energies, database of smart meters, data base of health, cadaster, etc.
  - It was also concluded the need of a greater analysis of the existing data at national and regional level.
- Design of mandatory advertisement guidelines for EPCs to be used by the real state agencies and other building sellers is needed.
- Controlling and enforcing the mandatory use of EPCs in real estate advertisements: As far as publicity advertising is concerned, it was quite concrete structuring the needs in this section in three.
  1. The suggestions have been that the inspectors should visit a sample of the real states and verify if the EPCs of the apartments and houses they sold are carried out and the information included in the publicity.
  2. The information included in the publicity is the same as the information of the EPC.
  3. Inform to the institutions that verify the certification.

5.6.3.5 What do you think needs to be improved in terms of linking EPCs to other policies and services for deep renovation?

- Strengthening the linking EPCs to Strategy for Energy Rehabilitation in the building sector managed by Ministry of Transport, Mobility and Urban Agenda
- Financing incentives for deep renovation if the renovation of the building included as recommendation report of the EPC will achieve a one better energy class.
- Awards for the better renovated building in terms of energy efficiency, comfort and feasibility.
- Decreasing a percentage of the taxes of the building when performing a deep energy renovation. Reduction of Municipal tax of the building (IBI, Impuesto de Bienes Inmuebles)

5.6.3.6 How can EPCs be made more useful for building owners, sellers, buyers, landlords, and tenant as well as banks?

- Building owners and tenants: providing information about EPC (dissemination campaigns)
  - The EPC should be part of the Technical Inspection of the Building and the Building Evaluation Book, ITE promoting the execution of energy efficiency measures.
- Building sellers:
  - They should perform the EPC before they sell the building of household and need to train sellers how to explain EPC in a proper way.
  - Real estate agents should include the information of EPC in the publicity of the buildings for sale and for rent.
  - Real estate should consider the certificate as an advantage to sell better. The agent is advised to explain to the buyer that he will save energy and money.
- Banks and surveyors:
  - Help decision makers those who are going to undertake a rehabilitation or a new construction and especially if you are going to require financing (public, private, alternative, etc.)
  - EPC is currently considered a mere bureaucratic process without giving it the importance it really has. In the real estate market, the "energy label" is not being considered an added value in the buying and selling process.

5.6.3.7 How can EPCs support or trigger deep renovation?

- EPCs can support deep renovation with a financial program that, when achieving better energy class and making a real improvement on energy saving an award is carried out.
- At this moment there are not one-stop shop for the deep energy renovation in Spain. Therefore creation of a deep energy renovation network platform.
- Regarding the Improving the renovation recommendations of the certificate, many were the ideas that have been proposed and discussed:
- At present time EPC includes Annex with a list of energy efficiency recommendations (Medidas de ahorro energia, MAE).
- The mandatory establishment of a deep renovation report as an Annex of the EPC including a version of the use of the property and dealing with qualitative aspects.
- Also include in the deep renovation report, the typology of the building because it is not the same the renovation of a hotel that a hospital.
- It should be included qualitative aspects not only the economic data for example including comfort, indoor air quality, etc.

5.6.4 Priorities identified in QualDeEPC (debate and ranking)

Four working groups have been created and Escan organized the list of participants in these 4 working groups according to the most appropriate skills.

1. Working group 1.-Improving the usefulness and use of EPCs for supporting deep renovation.
2. Working group 2.-Improving the quality and precision of EPCs in general.
3. Working group 3.-Certification and training of EPC assessors/issuers.
4. Working group 4.- Usefulness and use of EPCs in building markets.

5.6.4.1 Working group 1: Improving the usefulness and use of EPCs for supporting deep renovation

Grupo 1

	Comentarios	Puntuación

Mejora de las **recomendaciones de eficiencia energética** del certificado	• El informe de MAE es obligatorio
	• Se debe hacer un enfoque de impacto de las MAE de forma combinada, pues p.e. una mejora de la envolvente puede suponer un equipo de climatización de menor consumo
	• Incluir la visión del uso de inmueble
	• Poner en valor aspectos cualitativos además del económico (VAN, PRS) como el confort, la calidad del aire interior, habitabilidad, etc
	• Para lograr una estandarización en la calificación la nueva normativa de la UE incorpora estos conceptos:
	  • Indicador de Inteligencia del Edificio como equiparación desde el punto de viste de la Eficiencia Energética en zona UE
	  • Pasaporte del edificio: hoja de ruta hacia la descarbonización del edificio "cuándo" conviene hacer una MAE" con una propuesta de MAE progresivas en función del caso
		14

Herramienta online que ofrezca recomendaciones en el certificado dirigidas hacia una rehabilitación energética	• Se sugiere la explotación de los ficheros xml para unificar criterios y escalas de calificación en zona UE • En junio de 2020 se revisará la normativa a unas escalas más restrictivas • Se sugiere dar un enfoque de la letra de la calificación hacia la demanda además de las emisiones	
Sistema de control de calidad y seguimiento del cumplimiento de recomendaciones de eficiencia energética del certificado	• No se exige / obliga por normativa por lo que sería deseable aunque de difícil implementación	7

¿Qué temas debería incluir una **Plataforma online (tipo página web) de información** que relacione la certificación con la rehabilitación energética profunda?	• Incluir casos de éxito como la rehabilitación de viviendas en Orcasitas: reducción del consumo en un 60% y mejora de las condiciones de confort térmico gracias a un aislamiento de 8 cm SATE, medidos y verificados por el CSIC
	• Aspectos que ayudan a la implementación de MAE:
	  • Agentes de cambio que involucren a promotores
	  • "Boca a boca"
	  • Comprobación de resultados
	  • Concienciación social hacia la sostenibilidad
	  • Confort
	• Aportar un enfoque de la vida útil del edificio y del coste de vida o mantenimiento	

Table 22: Feedback from working group 1 – Workshop in Spain

Working group 1 has been focused for doing a debate about **Improving the usefulness and use of EPCs for supporting deep renovation**, for which four different topics were addressed:

- Improving the renovation recommendations towards deep renovation=1.e
- Online tool that offers recommendations.
- Quality control of EPCs and follow-up of recommendations
- Online platform (web) of information for deep renovation.

The two most voted have been **improving renovation recommendations towards deep renovation and Quality control of EPCs and follow-up of recommendations**

Although the deep renovation network platform did not come out as a priority, they generated debate and interesting terms were reached such as the unification of the criteria and scales.

In addition, there are some successful experiences in energy renovation quite instructive, so it was pointed out that the inclusion of example cases was important, highlighting the aspects that most help the implementation of the improvements.

5.6.4.2 Working group 2: Improving the quality and precision of EPCs in general

	Comentarios	Puntuación
3.1- Visita de inspección al edificio	-Indispensable, debería figura en el Reglamento -Realizada por un técnico competente. -Edificios existentes: al menos una visita en el caso de -En edificios nuevos: al menos una visita para verificar la ejecución de los aislamientos y otra para revisar el rendimiento de las instalaciones (habría que marcar hitos	4
3.2- Valores por defecto o rango de valores	Se trataron ambas posibilidades lo importante es que los valores estén actualizados.	0
3.4- Chequeo automático para validar los certificados.	Se consideró que sería de aplicación para el apartado 3.5 (Control de calidad de certificados) y se trató en ese punto	0
3.5- ¿Cuáles criterios de control de calidad de los certificadores?	- Se relaciona con el Grupo 2. formación de los certificadores -Había opiniones sobre la acreditación de algún organismo, como ENAC.	3
3.5- Control de calidad de certificados ¿Cómo?	Hay mucha variación porque no son competencia del Estado, sino de las Comunidades Autónomas. Por esto se consideraron convenientes dos líneas de actuación: A.- EN GENERAL- Chequeo automático al validar los certificados (no se hace actualmente) INSPECCIONES: -TRAS EL REGISTRO: Aleatorios, en un porcentaje determinado. Para edificios existentes y de nueva construcción. Es lo habitual en casi todas las Comunidades Autónomas, por los funcionarios o mediante Organismos de Control. - EN LA ELABORACION DEL CERTIFICADO: EDIFICIOS NUEVOS. Inspecciones de la ejecución de la obra. Esta posibilidad sólo existe en el País Vasco. Se considera más efectiva para asegurar la calidad. Obligatoriedad de inspeccionar las obras para comprobar las coincidencias de lo declarado en el Certificado de proyecto con la ejecución de la obra. Estas inspecciones las realizan Agentes acreditados, como los Organismos de Control o Entidades de Control de la Calidad de la Edificación. También la propia administración.	8
3.6- Contenidos de una base de datos de errores	Se consideró conveniente, aunque no se trató en profundidad, podría ser para las Administraciones que gestionan lo registros, para los certificadores y con una pate para el público en general	0

Table 23: Feedback from working group 2 – Workshop in Spain

The working group 2 Improving the quality and precision of EPCs in general provide their opinion to several questions of the longlist 17 January and voted as more relevant the next 2 topics:

- Mandatory on-site inspection during EPC assessment (1c of long list 17 January 2020).
- Improving quality control of both EPCs and assessors (3c of long list 17 January 2020).

The other topics of the WG that have been debated are:

- EPC software: default values or validity ranges for input parameters *(1a$_2$ of long list 17 January 2020).*
- Performing automatic validity check *(3d of long list 17 January 2020).*
- Errors reporting from controls learning *(3f of long list 17 January 2020).*

5.6.4.3 Working group 3: Certification and training of EPC assessors/issuers

	Comentarios	Puntuación
¿La acreditación de técnicos debería basarse en alguna/s de las condiciones siguientes? ❑ Formación obligatoria especifica	Temario oficial: puntos mínimos y horas de curso oficial muy necesario La formación obligatoria pensamos que es importantísima una propuesta de mejora con simulación económica.	0
❑ Examen	Riesgo de tener pocos técnicos y entonces subida de precios de los certificados.	0
❑ **X Acreditación basada en examen**	Necesarios centros formativos acreditados por ENAC para certificar a los técnicos.	6
❑ **X Renovación cada5___ años no solo con examen**	No sería necesaria , acreditando que se hace un número de certificados o asistiendo a seminarios anuales.	3
❑ Alguna otra sugerencia ____		0
En caso de **organizarse jornadas sobre certificación y propuestas de rehabilitación** energética en profundidad ¿Qué contenidos deberían incluirse?	Participar anualmente en talleres/seminarios de reciclaje cuya que la técnica avanza muy rápido (materiales, instalaciones, etc.)	0

Table 24: Feedback from working group 3 – Workshop in Spain

The group did discuss on the topics about **Certification and training of EPC assessors/issuers**

The most voted suggestions have been the accreditation of EPC issuer based on exams; the participants suggested the EPC issuers updating should be carried out showing a specific number of completed EPCs or attending to yearly workshops or courses.

5.6.4.4 Working group 4: Usefulness and use of EPCs in building markets

Grupo 4

	Comentarios	Puntuación
Desarrollo de un diseño entendible del certificado ¿Qué debería incluir el certificado para que fuera entendible?	▪ Recomendamos que la información del certificado sea fiable para generar confianza. ▪ Existan datos comparativos con otros edificios para motivar ▪ Formar a vendedores o promotores para que sepan explicarlo bien. Otros comentarios generales sobre certificados: ▪ El usuario vea mayor utilidad, no solo una obligación. ▪ Que entienda el usuario lo que indica el técnico ▪ Como es gratis, lo hace el más barato ▪ Que se perciba que es necesario, crear mayor cultura sobre el certificado	6
Relacionar base de datos de certificados con otras bases de datos de energía.	• Mayor análisis de los datos existentes a nivel nacional y regional • Pudiera ser relacionar BBDD certificados con bases de datos de : 1. Smart meters eléctricos 2. Base de datos de renovables y su potencial 3. Catastro 4. Sanidad 5. ITE	4
Contenidos de una Guía para mostrar el certificado en la publicidad de compra venta de inmuebles.	• Una guía sencilla destinada para usuarios no expertos • Una guía mas compleja enfocada a gente más cualificada en este campo.	4
Propuesta de como vigilar en la publicidad de compra-venta y alquiler. Desarrollar una propuesta de rutinas de control y cumplimiento incluyendo sanciones	1. Verificar que exista la información del certificado en la publicidad si es obligatorio. 2. Que lo que anuncia la publicidad sea igual a lo indicado por el certificado. 3. Informar a las instituciones que verifican la certificación.	6

Table 25: Feedback from working group 4 – Workshop in Spain

In this working group 4 the certificate was treated from the point of view of publicly advertising and the topics have been the following:

- Development of friendly understandable EPC.
- EPC databases linked to other databases.
- Mandatory advertisement guidelines for EPC.
- Controlling and enforcing the mandatory use of EPCs in real estate advertisements.
- Development proposals of routines for control and compliance including sanctions.

Development of friendly understandable EPC, controlling and enforcing the mandatory use of EPCs in real estate advertisements and development proposals of routines for control a compliance including sanctions have been prioritized.

Escan has created a National expert Fora a with the main stakeholders of the building certification process. The list of priorities has been agreed using the workshop and this expert group.

The priorities of improvement certification in Spain according to the Workshops and after meeting with the participants of the National Expert Fora have been:

1. Improving renovation recommendations towards deep renovation: The EPC includes some energy efficiency measures but his need to be better and deeper analyzed by the technician; the recommendations should be graded according to cost effectiveness. They need to be explained to the owners.
2. On-site inspections during EPC assessment.
3. Quality control of EPCs.
4. Monitoring advertisement guidelines for EPC.
5. Accreditation of EPC issuers based on exams.
6. The online tool and the online platform on certification and deep renovation (the common agreement and commentaries has been 1 tool that include both the online tool of certification and the platform with information for deep renovation).

5.7 Sweden

5.7.1 Attendees

Different types of stakeholders (e.g. EPC assessors, building owners, constructors, certification bodies, experts in academia, regional energy agencies, The Swedish Energy Agency, the National Board of Housing, Building and Planning) were invited to the workshop. In addition to personal invitations, the event was announced in a newsletter from LÅGAN (a national programme for buildings having very low energy use) as well as at a yearly seminar about the national EPC system (Energideklarationsdagen) and on LinkedIn and CIT Energy Management´s homepage. The workshop was led by Åsa Wahlström, Maria Haegermark and Victoria Edenhofer at CIT Energy Management. A list of attendees is shown in Table 1.

Figure 25: Workshop in Sweden

5.7.2 Aim of the workshop

The aim of the workshop was:

- To discuss how the Swedish EPC system should be developed in order to increase its acceptance and benefits in terms of process of issuance, results and usability.
- Compile a priority list of elements to be developed for an improved EPC system, with the focus of making them a first step towards deep renovation.

All expert opinions will be directly incorporated into the further design and implementation of the QualDeEPC project. Identified priorities on the one hand to be implemented at the national level in

cooperation with the responsible authorities as far as possible, and on the other hand they are to be made comparable at EU level.

5.7.3 Agenda

1. Introduction about QualDeEPC and the aims of the workshop
2. Round table presentation
3. WS Part 1: Comments and suggestions related to the following questions:
    - What do you think needs to be improved in your country in terms of:
        - EPC assessment, issuance, content, and design?
        - Requirements for EPC assessors?
        - Independent control systems?
        - Use of EPCs and their data in building markets and beyond?
        - Linking EPCs to other policies and services for deep renovation?
    - How can EPCs be made more useful for building owners, sellers, buyers, landlords, and tenants, as well as banks?
    - How can EPCs support or trigger deep renovation?
4. WS Part 2 – Group discussion based on the predefined list of elements to be developed for an improved EPC system (see Appendix)
5. Summary and compilation of a common list of priorities

5.7.4 Results from part 1

5.7.4.1 Individual comments and suggestions regarding the Swedish EPC system

DJO (expert in academia):

- In short, current requirements in the Swedish Building Regulations are not working well.
- Unfortunately, many think of EPCs as a necessary evil.

TJ (EPC assessor):

- We sometimes experience difficulties in presenting suggestions on energy renovation measures, especially for cultural buildings where there are fewer possible options.
- Cost-effectiveness as a criterion for renovation measures can be a problem. Often, we are able to identify several measures that would decrease the energy use, but they are not cost-effective, and these should therefore not be included in the EPC. In case the customer wants to receive these recommendations as well, they are described in a separate report.

PP (project leader at a regional energy agency):

- It would be good if the renovation measures recommended in the EPC were also included in the maintenance plan.
- There is often a lack of recommendations in the EPCs, especially in those carried out for housing cooperatives. Often the EPCs appear to be the result of a routine job, with standard solutions, and that little time has been spent.

PA (program manager at the Swedish Energy Agency):

- You have to make sure there's a benefit to the property owners. The ambition must be that measures to reduce energy use should actually be implemented.
- Mandatory energy audit for large enterprises and EPCs must be coordinated and synchronised. It is not good to come up with legislation that indicates that the building owners should do the same thing twice. The current time interval for EPCs (10 years) is too long and does not match the time interval of Mandatory energy audit for large enterprises (4 years).

- It would also be desirable to have continuous execution of EPCs instead of having 10-year peaks as we have today.

AS (EPC assessor):

- Regarding the quality of EPCs, I have seen the full scale - from cheaters to ambitious very actors. However, I have seen a positive development over the last few years. There is more and more focus on making sure that it is done properly. Also, today many clients want to receive an EPC of high quality, and are willing to pay for this.

vPJ (PhD student)

- Old EPCs were previously overwritten by New EPCs in the national EPC database (Gripen). Now, there is a new database, but still only the latest EPC is saved. Consequently, making comparisons and follow-up of the development is very difficult.
- In addition, new and updated rules and methods for calculation and normalization, change of identification number etc. makes It difficult to connect new EPCs with old ones. This problem might however be hard to avoid.
- It would be interesting to follow up on implemented deep renovation measures and also to evaluate the impact of recommended measures.
- It is clear that there has been an improvement in energy performance in Sweden since the last round of EPCs, but it is not possible to point out the role and significance of the EPC system.
- Correcting the energy performance to normal use is a challenge.
- Other participants agree that previous EPCs must be kept in order to make it possible to monitor energy use as well as implementation and impact of recommended measures. This is important to get feedback to the system and enabling future improvements.

KP (EPC assessor and Chair of the lobby organisation Energirådgivarna (energy advisors)):

- We have heavily systematised the process of conducting EPC assessments to be able to offer the EPCs at a competitive price, while maintaining high quality.
- Since renovation measures recommended in the EPCs need to be profitable, there will be fewer and fewer recommendations over time. Today, many building owners have already implemented the most profitable measures.
- Not many EPC assessors (energy experts) take into account savings other than reduced cost of energy (kWh). For example, savings due to reduced return temperature or reduced power (kW). The cost of peak power is becoming an increasingly larger share of the total energy cost. Today, users and many energy experts do not know how include this in the calculation of savings. Thus, there is a missed potential here. Other comment: Power control will be a big thing in the near future. Other comment: Also reduced water costs are most often forgotten in the calculations of savings. Reduced water use is not considered.
- There is no forum where EPC assessors (energy experts) can turn to with questions. As the experts need support and a possibility to discuss different issues with each other, this would be good to have. It would most likely increase the quality of EPCs. There are good examples of such forums for other actors in the Swedish construction and energy sector.
- The National Board of Housing, Building and Planning has developed an online energy handbook with answers to many questions related to the EPC system. Other comment: This is good, but how to find the handbook, as well as its layout, can be improved. Other comment: The handbook also has a part with questions and answers as well as the possibility to ask questions directly to the National Board of Housing, Building and Planning. The later seems to be working well according to attending EPC assessors.

CA (EPC assessor):

- What the customer requests differs a lot. The larger building owners usually want a proper EPC and also an additional report with a more detailed description of all identified measures to reduce the energy demand, including the ones that are not necessarily cost-effective. These customers are also willing to pay more for the EPC. Smaller building owners often only do an EPC because they have to and are not willing to pay more than what is needed. These EPCs are often more routine-like, and often include standard recommendations.

SG (calculation tool developer):

- The National Board of Housing, Building and Planning does a good job considering the given conditions.
- A problem for many EPC assessors is the many changes of regulations in recent years. It makes it difficult to keep up. Also, many EPC assessors find it difficult to make comparisons between different EPCs.
- Too much time and effort is today spent on the collection of data. Little time is then left for presenting renovation recommendations. Due to a combination of lack of time and shortage of competence, the recommendations are often inadequate.
- Regarding single-family houses, it is a difficult situation. The owner just wants to sell the house and normally does not want to get a lot of measures suggested in the EPC.
- The presentation of energy rating in advertisements of buildings for sale can be better.

JM (national certification body):

- There is an expressed need for a forum/platform/organisation that supports efforts related to these issues. It would be better to raise different issues and try to influence the policy makers as a united voice. A good example is FunkiS (forum for inspectors of ventilation systems).
- EPC assessors (certified energy experts) have different backgrounds (HVAC, construction, etc.), which is also noticeable in EPCs and recommended measures. There is a lack of consensus.
- The possibility to follow-up is lost when the form of EPCs keeps changing. It is strange that it should be like this – that EPC assessors suddenly need to deliver other types of EPCs. The possibility to follow-up is also lost when only the latest EPCs are saved in the registration database, and not previous ones.
- In the past, there were more or less no complaints about EPC assessors, but in recent years there have been some complaints saying that data given in EPCs cannot be accurate. (Note: which may be due to difficulties to understand the normalized energy performance that was introduced 2016).
- There is a risk that EPCs in reality are carried out by people who do not have the proper skills, i.e. by other persons than the EPC assessor himself. However, this would be very difficult for KIWA to prove.
- We have had a lot of opinions about the EPC system over the years, but we have had difficulties getting any response.

PU (national certification body)

- It is often a good idea to occasionally zoom out. Why are we doing EPCs? What are the financial incentives? There must be financial incentives for building owners to implement measures and the link between energy use and costs must be clear to them. When ordering an EPC, you often don't see a connection to the benefits. This needs to be made clearer.
- To include in the picture: Energy price is a good regulator. Increased energy prices means that there is an increased incentive for property owners to reduce energy use.
- There is a discrepancy between the ambition of all EPC assessors to be experts, and the actual competence level among EPC assessors (who often do standard-EPCs).
- It would be good to have a standardization regarding the digital tools used in the assessment of EPCs.

- On-site inspection is a problematic area. It is not clear that, as a EPC assessor, you have to inspect the building yourself.
- Would it perhaps be enough with many years of experience in the field in order to become a certified EPC assessor, instead of as today - that a certain education is needed?

GJ (national certification body)

- Agree with points already mentioned.

5.7.5 Conclusions from Part 1

In conclusion, most of the participants agreed on the following needs and suggestions for development of the Swedish EPC system:

- The requirement that recommended measures must be cost-effective should be reviewed.
- Increased knowledge of how to consider and calculate savings due to decreased ancillary costs is needed.
- It is important to make sure that the EPCs and recommended measures are actually a benefit for the property owners (reduced energy use, reduced costs, improved indoor environment). It is also important to ensure that this is made clear, so that EPCs are not considered a necessary evil.
- It would be good to coordinate the EPC system with the system for Mandatory energy audit for large enterprises.
- Previous EPCs must be saved in order to make monitoring of energy use as well as implementation and impact of recommended measures possible.
- As feedback to the system, it would also be good if measures implemented since the last EPC were reported when making a new one.
- There is a need for a network forum for EPC assessors and energy experts. Such a forum should be run privately, but to get started it would probably need financial support and commitment from the authorities.

5.7.6 Results from part 2

The predefined longlist of elements suggested for implementation or further development were discussed in three separate groups. For each element, the attendees were asked whether it is relevant for an effective EPC system in general (with a focus on deep renovation), and also to rank the need for development in Sweden. Own ideas, in addition to the predefined suggestions, were also welcomed.

The suggested elements were grouped into four segments:

- Improving the usefulness and use of EPCs for supporting deep renovation
- Improving the quality and precision of EPCs in general
- Certification and training of EPC assessors/issuers
- Usefulness and use of EPCs in building markets

The longlist of elements along with the opinions of the workshop attendees is presented in the Appendix.

5.7.7 Conclusions from Part 2

A summary of the elements that the participants think should be given a high priority in Sweden is shown in table below. This priority list is based mainly on the outcome of the group discussions in Part 2, but also other comments from the workshop have been taken into account.

The following seven elements were included in the short list:

1A, 2B, 2C, 2D, 3D (new), 3E (new) and 4A.

EPC element		The element was given priority by group:			This element should be prioritized
		1	2	3	
1A	**Improving the renovation recommendations provided on the EPC so that they become the first step towards individual buildings deep renovation passports/roadmaps.**	**x**	**x**	**x**	**Yes**
1B	Online tool that compares energy consumption and recommendations as per EPC with market average/typical buildings	(x)		(x)	No
1C	Deeper control and monitoring (a set-up of quality control scheme) of whether building owners implemented the energy efficiency actions suggested in EPC, especially for public buildings		(x)		No
1D	Creating Deep Renovation Network Platforms providing one-stop-shops for deep renovation linked to EPCs, including administrative, energy advice, financial, and supply-side information to building owners, with active marketing of deep renovation and EPC, and coordinating supply-side actors and supporting their marketing, training, and quality.			x	No
2A	During EPC assessment, on-site inspection (including interview/consultation with the owner)		(x)	x	Already implemented and mandatory with few exceptions. Different opinions about need for review.
2B	**Assessment Software: Practical default values for input data that come close enough to real data of a building; or in other cases, rather than exact default values, certain validity ranges for input parameters.**	x			**Yes** Need for development/update
2C	Performing automatic validity/quality check during assessment and/or during upload to EPC database for all EPCs	(x)	(x)	x	Exists, but **possibly** a need for an update

EPC element		The element was given priority by group:			This element should be prioritized
		1	2	3	
2D	**Performing quality control of both EPCs (random sample – compliance with quality criteria overall) and EPC assessors by an authorized public body**	x		x	**Yes** There seems to be very little control at the moment
2E	Reporting of errors and misconduct in a central database to obtain statistical statistics on common errors for the retransmission and improvement of the system and/or to identify experts with a high proportion of	(x)	(x)		Possibly, but if so - only for feedback.
3A	An official registry of EPC assessors is needed for credibility of the EPC scheme.				No, already in place
3B	Regular mandatory EPC assessor training on EPC assessment and on renovation recommendations required for certification and inclusion in registry. Such a training should also enable them to avoid common mistakes.				No, but voluntary training could be organized through the forum proposed according to C4
3C	Regular events and workshops organized by a national body for the presentation of innovative solutions for comprehensive energy renovation and smart measurement solutions.				No, but this could be organized through the forum proposed according to C4
3D **New suggestion**	**Online forum for increased networking between EPC assessors (certified energy experts).**	x	x	x	**Yes**
3E **New suggestion**	**Measures to increase the quality of EPC assessor education/training.**			x	**Yes**
4A	**Very high user-friendliness of various aspects of EPC, such as energy consumption, presentation of rating and recommendations, potential energy (and cost) savings and other benefits**	x			**Yes** Especially, there is a need for clearer and also traceable figures. Energy and hot water use should be demonstrated both before and after normalization.
4B	Linking EPC database to other buildings- or energy-related databases				No, but save EPCs and building ID
4C	Guidelines for use of EPCs in advertisements of sales/rentals of buildings/dwellings, issued by energy agencies/public authorities, either for vol-				No

EPC element		The element was given priority by group:			This element should be prioritized
		1	2	3	
	untary or mandatory use				
4D	Effectively controlling and enforcing the legal requirement to present EPC or at least the EPC rating and value in advertisements of sales/rentals of buildings/dwellings.				No

Table 26: Priority list for development of the Swedish EPC system

5.7.7.1 Comments from other stakeholders

The results presented in this report has been commented by two stakeholders representing building owners not able to attend the workshop. Both of them point out that it is difficult to draw conclusions about the general opinion in Sweden from the workshop, given the composition of the participant group. Account must be taken to the fact that neither building owners, buyers or tenants participated in the workshop and that their voices are not represented in the result.

Comments by Rikard Silverfur, Head of Development & Sustainability at Fastighetsägarna Sverige (the national building owner association):

- Given the group of stakeholders participating, it is logic that they want to develop and extend the EPCs in a way that more work is needed.
- The main purpose of EPCs is still to inform prospective tenants/buyers. According to me, that purpose is overrated.
- Evaluation of the EPC system should include interviews with prospective tenant/buyers if they even take the EPC into account at all, and if yes, how it affected their decision. It is important to include both property owners and users. In general, the latter is rarely included in evaluations.
- As long as the main purpose of EPCs is to inform the buyer (tenant/buyer), the purpose to stimulate energy efficiency measures will not be fulfilled.
- Consideration should be given to transforming EPCs into what is referred to as BRP (building renovation passports) in the new EPBD.

Comments by Mari-Louise Persson, energy strategist at Riksbyggen (a company owned by the building unions, local housing associations and other national co-operative associations):

- I agree that historic data should be saved. Previous EPCs should not be overwritten.
- I do not agree that the EPCs should be performed more often. It is better to make sure that they take a 10-year perspective and synchronize with the maintenance plan.
- Already today, energy experts have the chance to offer updates of the EPC at a lower cost to property owners who want to implement measures and get a better energy class.
- Moreover, it is already possible to report measures that have been implemented since the previous EPC in the form sent to the Swedish EPC database (Gripen).

5.7.8 APPENDIX: Discussion and feedback on long list of priorities in Sweden

1. Improving the usefulness and use of EPCs for supporting deep renovation

EPC element		• **Relevance for the effectiveness of EPCs** 1 = very relevant 2 = somewhat relevant 3 = not relevant	• **Priority for Sweden** 1 = should definately be development 2 = should perhaps be developed 3 = the existing system is good as it is • **Comments and suggestions**
1A	**Improving the renovation recommendations provided on the EPC so that they become the first step towards individual buildings deep renovation passports/roadmaps. The first pages of the EPC should present an overview of such recommendations and (if possible) energy savings**	1 *1, 2 or 3*	1 • Adapt to different target groups. • Differentiate based on preconditions. • It would be better with a commitment • In Sweden the recommended measures in the EPCs must be cost-effective. This was questioned by several of the participants. Also, often they don't give the full picture. Different aspects are overlooked.
	• Is an assessment software tools that helps the certified energy expert to provide energy efficient renovation recommendations and perform calculation of such measures necessary.	[x] *Yes* [x] *No*	*The discussions groups did not agree on this point.* • *If* such software is provided it should be a simple software for simple buildings • It would be difficult to acheive. Simplicity is important, but on the other hand, if it is too simple it could questioned as well. • It is important to have one or a few official software tool (for Sweden), not too many different ones. • Regular updates would be needed. Who should be responsible for keeing it up to date? • No, this is something that the energy expert should know already. Also, a lot of information is available on the webpage of the Swedish Energy Agency. • I am not against the tool as such, but it should not be connected to the EPC system. It is inappropriate to officially recommend certain renovation measures.
	• Is it important that the EPC present a clear overview of recommendations and approximate energy savings?	[x] *Yes* [ ] *No*	• It must be very clear that the presented savings is an estimation/approximate value. It is more important that a recommendation is included at all, than making an exact calculation. • Consider the target group. It is important that the EPC present a simple and clear message to the property owner. Today, the energy prices in Sweden are too low to motive energy renovations on its own. • The legal aspect regarding the responsibility of presented recommendations needs to be considered. The EPC should give an overview of recommended measures. Actual implementation of recommended measures can not be based directly on the EPC. • The EPC should rather point out the most relevant aspects and recommendations. However, it the EPC should be seen strictly as information, its significance is lost to some extent. • As the EPCs are designed today, they are not very infomative. • Many energy experts view the EPC as first step to bigger assigments.
	• Should the recommendations be presented together with links for further information and financial support?	[ ] *Yes* [ ] *No*	Links to information related to deep renovation is a good idea, but they should be presented seperate to the EPC (not be included in the EPC).

1B	**Online tool that compares energy consumption and recommendations as per EPC with market average/typical buildings**	**2** *1, 2 or 3*	**3** The general opinion is that there is no need for this in Sweden. However, there is a need for a network for personal interaction between energy experts. *Comments:* • What would the target groups be for such a tool? • The Swedish Energy Agency already has a lot of information on its webside. • Such an online tool may be good, but maybe not for EPCs. It would be more useful at an educational level. • It is sufficient that a comparison is made with energy use and/or energy class of a typical building • If such a tool is developed, it should also include recommended measures. • It could perhaps be of interest to develop an online tool for some building categories, but it would probably still be difficult to do it well.
1C	**Deeper control and monitoring (a set-up of quality control scheme) of whether building owners implemented the energy efficiency actions suggested in EPC, especially for public buildings**	**2** *1, 2 or 3*	**3** • This would cost a lot and the preconditions are currently non-existent. First, we must start saving historical values and EPC. • First priority must be to present recommendations in the EPCs. • If we come to a situation where implemention of suggested measures are required, his may be the case in the long term. • Today, there is no obligations to implement measures, and really no to control and monitoring. Perhaps you should be required to report back what has been done since the last ED. (There is however a possiblity to do so alredady today.) • Recommendations and the entire ED should be saved historically. • How should the state be able to control energy use in buildings? Energy price is one thing. Are there other possible incentives? Taxes/premiums for doing well? Today, it is possible to receive a reduced mortgage rate at a certain energy rating. • If a directive to implement measures was introduced, implementations would have to be followed up.
	• Should this focus on public buildings?	☐ *Yes* ☐ *No*	Maybe. See comment below.
	• Should the EPC be linked with financial incentive/financing schemes?	☐ *Yes* ☐ *No*	• It should be the other way around. Link the support to the EPC scheme. • It would be interesting to investigate the possibility to increase the incentives for deep renovation with financial support/beneficial financing schemes. However, the primary purpose should to be to increased monitoring and control, although this can turn out to be a side effect. • Perhaps support for deep renovations for buildings in rural areas or support for public building owners in order for them to guide the way as good examples. • Upcoming requirements on individual measurement and debit for multi-family buildings with high energy consumptions will put extra pressure on this group to lower the energy demand. • What about green loans?
	• Should recommendations be stored in an EPC database	☒ *Yes* ☐ *No*	• This is already done in Sweden. However, previous EPCs and historic data must also be saved!

1D	**Creating Deep Renovation Network Platforms providing one-stop-shops for deep renovation linked to EPCs, including administrative, energy advice, financial, and supply-side information to building owners, with active marketing of deep renovation and EPC, and coordinating supply-side actors and supporting their marketing, training, and quality.**	**2** *1, 2 or 3*	**3** In general: No. • It would be a better idea to develop the networks that already exists and to keep working closely with enegy advisors at regional energy agencys. • Different groups with different needs. In Sweden, there should not be a large need for such platform. A lot of information can be found information tillgänglig och samlad på exempelvis.. På EU-nivå finns troligen ett större behov. Bör göras privat. EEF (?) . Energirådgivare viktiga
	• Should such platform offer energy advice and administrative support?	☐ *Yes* ☐ *No*	*If* such plattform would be developed - yes.
	• Bör en sådan plattform erbjuda information om exempelvis finansiering, produkter, lösningar och leverantörer?	☐ *Yes* ☐ *No*	*If* such plattform would be developed - yes.
	• Bör en sådan plattform möjliggöra koordinering av leveratörer och erbjuda dem verktyg för marknadsföring, träning och kvalitetsförbättring?	☐ *Yes* ☐ *No*	This could require too much work. There is a risk that it would not be carried out as planned.
1E	**Suggestion based on previous interviews with Swedish stakeholders:**		
	• Would it be interesting to investigate the possibility of linking EPCs to maintenance plans?	☒ *Yes* ☒ *No*	Yes - There are both housing cooperatives and and larger building owners that work proactively with this. Perhaps it would be good to spread good examples to others by interviewing those who do it successfully and make recommendations? No - Only guidance
	• Would it be interesting to also show the savings from a set of renovation measures in ED (not only for each measure seperately)?	☐ *Yes* ☐ *No*	Maybe, but it would probably be a challenge.

2. Improving the quality and precision of EPCs in general

	EPC element	• Relevance for the effectiveness of EPCs 1 = very relevant 2 = somewhat relevant 3 = not relevant	• Priority for Sweden 1 = should definately be development 2 = should perhaps be developed 3 = the existing system is good as it is • Comments and suggestions
2A	**During EPC assessment, on-site inspection (including interview/consultation with the owner)**	1 *1, 2 or 3*	2 • In general, yes. • There should be a requirement that the on-site visit is carried out by a certified energy expert. • This should be part of the main purpose with EPCs?
	• Should on-site visits be mandatory for all buildings?	☐ *Yes* ☐ *No*	*Slightly different views among the participants:* • In general yes, but perhaps with a few exceptions. • Mandatory for all buildings where an EPC is required. • Yes. Even if e.g. the building year is the same for two buildings, they may have different energy performance and need for renovation. • There are a few exceptions today. These ar okay but there is no need for more. • Buildings with low energy demand should not be excepted. A low energy demand could be a result of poor indoor environment. On-site visits should optimally therefore also include a control on indoor environment parameters. • *Note: There are other stakeholders in Sweden that would like to see more buildings beeing excepted from the mandatory inspection.*

2B	**Assessment Software: Practical default values for input data that come close enough to real data of a building; or in other cases, rather than exact default values, certain validity ranges for input parameters.**	**2** *1, 2 or 3*	**1** • Relevant for the quality of EPCs • In Sweden, such data exists but need to be updated.
2C	**Performing automatic validity/quality check during assessment and/or during upload to EPC database for all EPCs**	**1** *1, 2 or 3*	**2** In Sweden, there is already an automatic validity check when uploading the EPC to the database. It might need to be updated. Low priority.
	• Should an automatic validity check identify obvious mistakes and large deviations from normal values?	[x] *Yes* [ ] *No*	
	• Should an automatic validity check also give a warning in case of a smaller deviations from normal values?	[x] *Yes* [ ] *No*	
2D	**Performing quality control of both EPCs (random sample – compliance with quality criteria overall) and EPC assessors by an authorised public body**	**1** *1, 2 or 3*	**1** • There is a quality control system in place in Sweden, but few EPCs and EPC assessors are checked. • With the purpose to give feed-back to the system and support to EPC assessor, more quality control actions would be good. • Today, the EPC assessors (energy experts) need to send a yearly report to the certification body. However, it is unclear how this material is used. Could it be used in for enhanced control? • The quality of the EPC is also highly dependant on the education for energy expert (prior to certification). *See the suggestion given in 3E.* • Who should carry out random sampling and how should this be done?
2E	**Reporting errors or faulty procedures in a central database to create statistics of common mistakes for training purposes**	**2** *1, 2 or 3*	**2** Only type of common errors should be reported. For feed-back and development.
	• Should such database also identify assessors with high error rates?	[ ] *Yes* [x] *No*	

3. Certification and training of EPC assessors/issuers

	EPC element	• Relevance for the effectiveness of EPCs 1 = very relevant 2 = somewhat relevant 3 = not relevant	• Priority for Sweden 1 = should definately be development 2 = should perhaps be developed 3 = the existing system is good as it is • Comments and suggestions
3A	**An official registry of EPC assessors is needed for credibility of the EPC scheme.**	1 *1, 2 or 3*	3 Already in place.
3B	**Regular mandatory EPC assessor training on EPC assessment and on renovation recommendations required for certification and inclusion in registry. Such a training should also enable them to avoid common mistakes.**	3 *1, 2 or 3*	3 Opinion in general: There is no need for more education or training. There is however a need for a forum for EPC assessors: see suggestion 3D below. Maybe optional education/training.
3C	**Organisation by the national EPC body of regular events and workshops presenting innovative solutions for deep renovation and implementing more intelligent and advanced energy measures.**	3 *1, 2 or 3*	3 *No, not by a national EPC body. Workshops other events could however be arranged within the forum suggested in C4.*
3D	**Suggestion based on previous interviews with Swedish stakeholders:** Online forum for increased networking between EPC assessors (certified energy experts).		1
3E	**Suggestion based on previous interviews with Swedish stakeholders:** Measures to increase the quality of EPC assessor education/training.		1 Hitgher quality of the courses and continuous follow-up is needed. The training courses should follow specific criteria regarding time and content. An accreditation of educators would be good.

4. Usefulness and use of EPCs in building markets

	EPC element	• Relevance for the effectiveness of EPCs 1 = very relevant 2 = somewhat relevant 3 = not relevant	• Priority for Sweden 1 = should definately be development 2 = should perhaps be developed 3 = the existing system is good as it is • Comments and suggestions
4A	**Very high user-friendliness of various aspects of EPC, such as energy consumption, presentation of rating and recommendations, potential energy (and cost) savings and other benefits**	1 *1, 2 or 3*	1 • More clear, and also traceable, figures are requested. The preconditions must be clear (today they are not). • Hot water consumption should also be highlighted. • Specific energy use should be presented both before and after correction to normal use. • The current figure used to describe potential savings is difficult to understand and relate since it is not used in other contexts. There are other profitability measures, such as pay-back time (not simple), that are easier to understand. Perhaps it would be good to clarify investment costs and savings? • Today it is difficult to compare EPCs because of changes to the system over time.
4B	**Linking EPC database to other buildings- or energy-related databases**	*1, 2 or 3*	3 Low priority. For now, it is enough to save EPCs and ID.
4C	**Guidelines for use of EPCs in advertisements of sales/rentals of buildings/dwellings, issued by energy agencies/public authorities, either for voluntary or mandatory use**	*1, 2 or 3*	3 *1, 2 or 3*
4D	**Effectively controlling and enforcing the legal requirement to present EPC or at least the EPC rating and value in advertisements of sales/rentals of buildings/dwellings.**	*1, 2 or 3*	3 *1, 2 or 3*