X-tendo

CONCRETE IMPLEMENTATION OF NEW ENERGY PERFORMANCE CERTIFICATES FEATURES: TESTINGS AND RESULTS IN NINE COUNTRIES- FINANCING OPTIONS

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LIST OF ABBREVIATIONS

ADENE	Portuguese Energy Agency, Department of Buildings
AAECR	Romanian Association of Energy Auditors for Buildings
CDD	Cooling Degree Days
CRES	Centre for Renewable Energy Sources and Saving
DEA	Danish Energy Agency
DH	District Heating
EASt	Energy Agency of Styria
ENEA	Italian National Agency for New Technologies, Energy and Sustainable Economic Development
EST	Energy Saving Trust
HDD	Heating Degree Days
IEQ	Indoor environmental quality
MFH	Multi-family house
NAPE	National Energy Conservation Agency
SFH	Single family house
TREA	Tartu Regional Energy Agency

1 INTRODUCTION

The focus of the Horizon 2020 project X-tendo is the further development of energy performance certificate (EPCs) schemes in EU Member States. This should be done in two dimensions: on the one hand additional indicators are developed that add further relevance to EPCs. On the other hand, EPC handling should be improved to make it easier, more reliable and interconnected with other building related data. 5 features in each of the two dimensions are elaborated throughout the project. This includes the analysis of the theoretical background, the development of materials and methods, the testing of the features in concrete implementation projects, as well as the dissemination on developed ideas and materials.

The goal of the testing of the developed feature materials is to understand the practical viability and the challenges in the practical implementation of the developed ideas and materials in selected countries of the EU. Depending on the feature different types of tests and test projects have been performed. In-building tests apply the feature materials on concrete buildings, user tests consist of understanding the user perception related to the developed materials and ideas, system tests intend to understand the application of feature ideas and materials in related systems like EPC database systems.

The overall approach of testing and further developing feature materials is shown in Figure 1 and consists of the following steps:

- In the first phase of the project the feature leads (FL) developed beta versions of feature materials, hereby taking into account needs and feedback from Implementing Partners (IPs). An overview of FLs and involved IPs per feature can be seen in Table 1. These materials consist of different parts depending on the feature. In most cases these consist of guidelines, spreadsheets or program code in defined languages like sql or python.
- The beta versions of the feature materials have then been provided to the IPs to test their application in their national / regional settings. The IPs have performed different types of tests with or in the context of the developed materials. In some cases, especially for in-building tests of certain features, the tests also involved EPC assessors.
- After finishing the test projects, the IPs reported about their testing results in two different ways: on the one hand they filled previously developed questionnaires (see the annex for exemplary questionnaires). On the other hand, they wrote test result reports providing more details about the context and results of the test projects.
- The filled-out questionnaires as well as the testing results reports have been used as a basis to derive conclusions for the final reshape of the feature materials. They also serve as an input to guiding the implementation of the features in the different countries / regions.

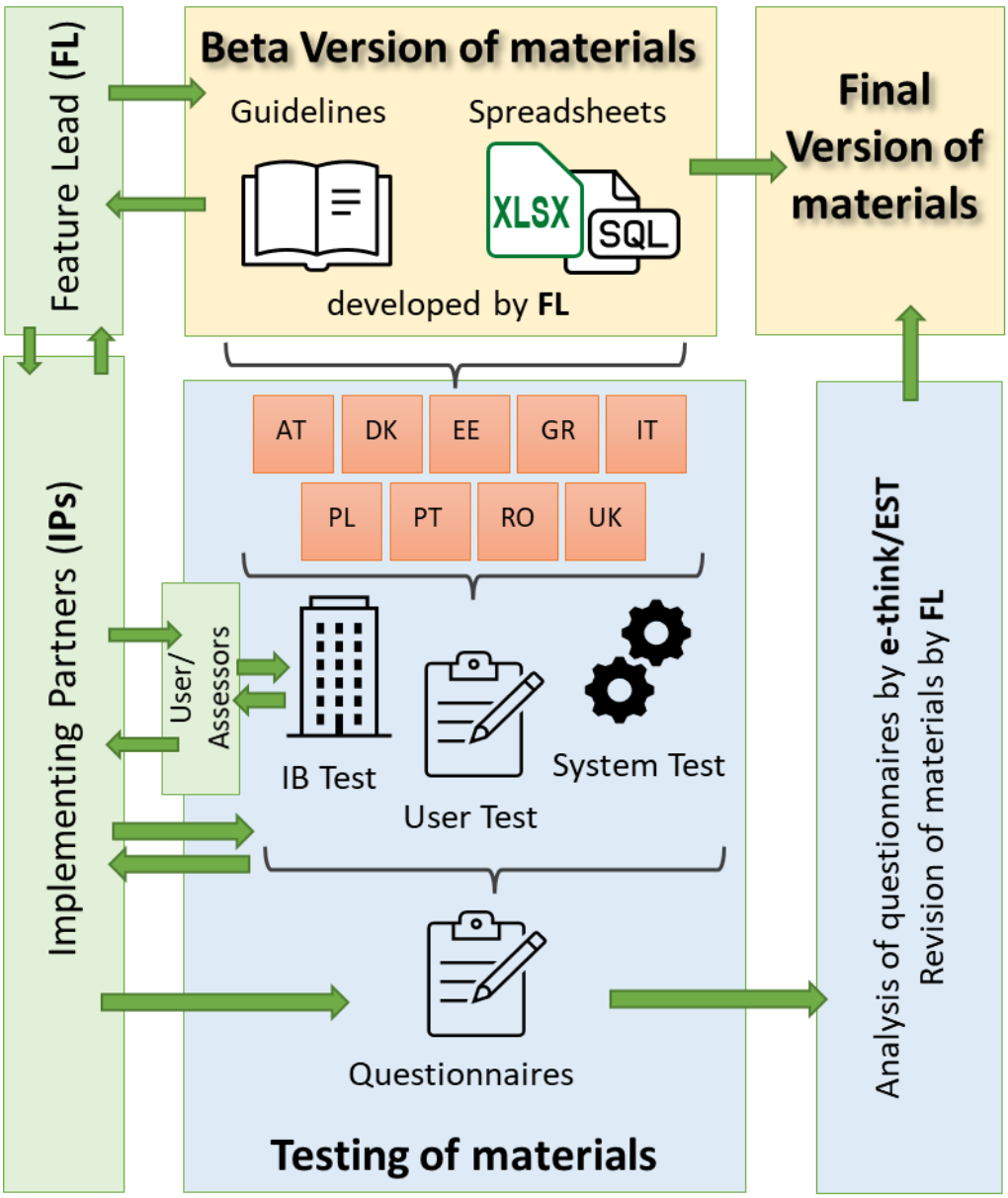

Figure 1: Approach for testing feature materials in the X-tendo project

The following Table 1 gives an overview of the types of tests that have been performed for the different features in the different implementing countries. More details of the characteristics of each test project are described in the feature chapters.

Table 1 – Overview of testing activities by feature and implementing country / partner

		1. Smart readiness	2. Comfort	3. Outdoor air pollution	4. Real energy consumption	5. District energy	6. EPC database	7. Building logbook	8. Enhanced recommendations	9. Financing options	10. One stop shops
		Feature lead partner									
Country	Implementing Partners	VITO	BPIE	NAPE	VITO	e-think	TU Wien	BPIE	TU Wien	ADENE	ADENE
AT	EASt	IB	IB		IB				Expert		
DK	DEA					Expert	S		IB	U/S	U/S*
EE	TREA	IB Expert			IB			U/S			
GR	CRES	IB Expert	IB Expert				S	U/S			
IT	ENEA				IB	IB	S				
PL	NAPE			IB U Expert		IB			IB S	Expert	
PT	ADENE		IB					U/S Expert		U/S	U/S* Expert
RO	AAECR	IB	IB		IB Expert	IB				U/S	U/S*
UK	EST				**		Expert		IB		S
	No of partners testing	4	4	1	4	3	3	3	3	3	1 stand-alone test*

*Feature 10 tests in DK/PT/RO are delivered alongside testing of feature 9 **Note UK test under feature 10 also relevant here

This report provides the summary of the outcomes of the testing activities for each of the 10 features in one or several implementing countries. This is mainly based on the analysis of the evaluation questionnaires filled out by the implementing partners, but also on the content of the testing results reports where these have already been available at the time of writing the document. The questionnaires hereby consist of general questions along the testing steps, questions on testing time and related costs, an evaluation against defined cross-cutting criteria (Quality and Reliability, User-friendliness, Economic feasibility, and Consistency with ISO/CEN standards) and final thoughts. The questionnaires slightly differ for the different types of test projects (in-building, system, user tests) and for the different features (composition of detailed questions for the cross-cutting criteria). Exemplary evaluation questionnaires for each of the three types of test projects can be found in the Annex of this report.

With this the report should provide a summary of the outcomes of the testing activities on the different features in the different countries, provide conclusions for further development of the developed ideas and materials towards the end of the project and beyond, explain the practicability and challenges in the implementation of the features in practice, and give guidance for organising similar test projects in the future.

The report first provides an introduction to the topic of the feature, the developed methodologies and materials and the performed testing activities. This is followed by the description of the testing results structured by the types of test projects. This includes a description of overall results, estimated time and costs and the different cross-cutting criteria. Finally, conclusions out of the testing activities are presented.

2 FEATURE 9: FINANCING OPTIONS

2.1 Introduction

Integrating information on financial support in the Energy Performance Certificate (EPC) and its specific recommendations can help to persuade building owners to undertake an energy renovation and steer investments towards deep renovations.

There is a need to unlock further public and private financing for energy renovations of buildings, in order to achieve the long-term climate and energy objectives of the European Union. The EPC is one of the core instruments of the Energy Performance of Buildings Directive (EPBD). It provides renovation recommendations to the end-user, making it a logical entry point to increase the awareness of various financial options, including availability of subsidies, low-interest loans, as well as innovative financial solutions (e.g. energy performance contracting, on-bill financing).

EPCs can provide a market benchmark and clear eligibility criteria for public authorities, as well as guide policymaking and the introduction of new financial support schemes. Furthermore, integrating financial support alongside with the EPC recommendations can help to persuade building users to undertake an energy renovation. This feature is exploring how the integration of financing options can boost the perceived usefulness of the EPC, increase its impact on renovation decisions, and help public authorities to develop more effective financial support schemes.

More information about the feature can be found in the introductory report or on the X-tendo website.

Feature 9 was tested in Denmark (DEA), Portugal (ADENE) and Romania (AAECR)

All partners did a user test, and Portugal did an additional system test.

Table 2 – Description of F9 tests – Financing options

Denmark (DEA)			Portugal (ADENE)			Romania (AAECR)		
User test name	**User test type**	**Description**	**User test name**	**User test type**	**Description**	**User test name**	**User test type**	**Description**
F10.UT.01.DK Interviews of house owners	Interview based on a structured approach with open questions.	A series of interviews of house owners that have performed energy renovations on their houses based on a BetterHome report. Feature 9 and Feature 10 are both covered by these interviews.	F9.UT.01 Call setup and evaluation;	Questionnaire/ Survey;	Questionnaire to stakeholders of IFFRU 2020 to evaluate the archived results and the use of the EPC and establish lessons learned for future calls;	F9.UT.01 How to link EPCs to Financing	Surveys / stakeholders meeting	Tips on the use of EPCs in financing schemes (as eligibility criteria) and on EPC upgrade to integrate and monitor financing along improvement measures recommendations.
			F9.UT.02 Financing Instruments and Technical Assistance	Stakeholders Workshop	Stakeholder involvement to discuss requirements (role of EPC), technical support (role of experts/EPC auditors) and design of future calls for financing.			
			System test name	**System test type**	**Description**			
			F9.ST.01 Interoperability between platforms	Webservice	Interoperability between SCE (EPC database) and a financing platform for data exchange.			

Context to the tests

Portugal

The climate transition is part of the Portuguese Recovery and Resilience Plan (RRP), having allocated an investment in the building's energy efficiency of 620 M€. Already in place, there are financial programs as for example "Edifícios mais Sustentáveis" (45 M€), "Vale Eficiência" (32 M€) or "IFFRU 2020" (1400 M€), some taking advantage of the EPC in their eligibility criteria (either optional or mandatory).

Furthermore, the Portuguese Buildings Long Term Renovation Strategy (LTRS) also highlights some policies and actions to support the energy renovation uptake, either through financial support (grants, subsidies and loans taking into consideration the complementarity between the private and public funding) and fiscal benefits and reinforces the role of the EPC in the access to these financial programs and benefits.

The objective for the finance functionality testing in the Portuguese context was to implement 2 new functionalities:

- Automatic improvement measures proposal
- Information on financing and incentives

The methodology involved developing an "Advice Centre" module, and, through system testing, develop the two new functionalities. Through user testing, the beneficiaries of the one-stop-shop were invited to evaluate portal casA+ before and after the new functionalities' implementation.

The information on the financing and incentives module is described as follows in the testing report from Portugal:

"Information on financing and incentives: making available a page that gathers information on the Incentives and Support Programs in force, responding to the needs of its users. The new page presents some of the available incentives to promote buildings' efficiency and the adoption of good practices that encourage a better use of resources.

Denmark

Denmark (DEA) is developing an analysis based on interviews that follow homeowners from the initial phase up to the part where recommendation gets performed. The interview will focus on homeowners, who have received a better home report. The purpose will be to discover financial barriers and opportunities in the planning process of energy renovations.

To achieve this an in-depth qualitative interview was carried out with 8 homeowners that have received the Danish OSS BetterHome report.

Romania

In Romania, currently, there is no information in the issued EPCs about financing options. However, the newly revised national energy performance assessment methodology (not yet official) includes in the EPC content description the requirement to include financing options/mechanisms without specifying in how much detail.

Owners seeking financing for renovation of their building need an energy audit, which is a continuation of the EPC calculation with in-depth analysis of recommended measures in terms of energy savings, costs, and economic indicators (e.g., payback duration, specific investment). This interoperability is mandatory for all financing mechanisms. It does not apply when financing is covered from private owner's funds.

The financing mechanisms are always related to the building performance of some type. When renovation is targeted, energy savings and emission reduction, expressed as percentages of the initial building performance as mirrored in the associated EPC, are most often the leading criteria in prioritization and/or level of facilitated funds.

2.2 Results of the testing activities

Overall results of user tests

Portugal

Methodology Stakeholders

ADENE organized a workshop entitled *"Session dedicated to financing mechanisms for energy renovation of buildings"*, on 16th June 2021, and had 56 participants from the financing sector and construction sector. The main objectives of the stakeholders' workshop were:

- Receive input from local/national stakeholders on opportunities and barriers for implementing the X-tendo feature number 9 in Portugal related with Financing Options (for building renovation);
- Receive input from local/national stakeholders on important aspects to be considered in the future financing schemes for energy renovation in Portugal;
- Engage relevant stakeholders and communicate/disseminate X-tendo's results.

The EPC is an essential tool in the process to have access to financing and incentives towards building's energy efficiency. IFFRU 2020 is a current financing programme that assessors can refer householders to. The scheme manager for IFFRU 2020 was invited to present their financing scheme mechanism as an example to promote the discussion to future design of financing mechanism, particularly linked to EPCs. The session agenda was as follows:

- Welcome
- X-tendo Project
- Long-Term Strategy for the Renovation of Buildings in Portugal - ELPRE
- Discussion and collection of contributions
- Typification of financial instruments and some recommendations
- IFRRU – Financial Instrument for urban rehabilitation and revitalization
- Discussion and collection of contributions
- Recommendations for the design of future financial mechanisms and conclusions

Besides the workshop, the functionality test involved 1 questionnaire and 1 interview with 2 target groups (qualified experts and management entity of the funding scheme, respectively) who were identified to date as parties involved in the process of accessing funding through the IFFRU 2020 program. This questionnaire/interview aims to assess the link between the energy certificate and the financing mechanisms and gather feedback from various stakeholders on lessons learned, barriers identified and next steps for the future.

Methodology Consumers

In Portugal the consumer testing approach was as follows:

1. Questionnaire to registered homeowners (Q1) and companies (Q2) on exiting OSS
2. New functionalities development
3. Questionnaire to registered homeowners on new functionalities user experience (Q3)

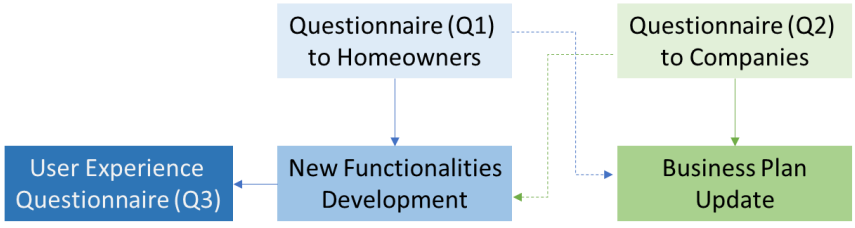

Figure 2: Testing Approach

For the homeowners' questionnaire the goal was to evaluate the following:

- Type of OSS user
- Evaluation of existing functionalities and impact on energy renovation
- OSS improvement and future functionalities

For the companies' questionnaire the goal was to evaluate the following:

- Type of company registered in OSS
- OSS Registration process and portal use
- OSS Membership and benefits achieved

Results Stakeholders

Results from 56 participants in the stakeholder's workshop on recommendations for future financing schemes were (top 3):

- Prioritising the worst performing buildings in future financing schemes is particularly important to articulate the subsidies/incentives for financing the energy renovation
- Design instruments with a special focus on families' support: the low interest rates financing mechanism have a positive impact. Draw credit lines for energy renovation with interest rates that the Portuguese families can pay and are interested in (0%?). Non-refundable support should be avoided for resource efficiency and the risk assessment analysis should be rethought because of the return on investment
- Link different entities, promoting the skills and knowledge of each one towards a common goal. Methodologies in force in the IFRRU can be replicated and transposed to normal bank financing, for example.

Results from 133 qualified experts on recommendations for future financing schemes were (top 3):

1. Use the EPC to evaluate the ex-ante and ex-post improvement measures implemented in a building's rehabilitation in a funding program application
2. Use the EPC as mandatory eligibility criterion to have access to financing for energy renovation
3. The information about financing programs and benefits for building's energy renovation should be available in a unique platform (e.g. one-stop-shops), complementary to EPC

Results from stakeholder discussions with the IFFRU 2020 financing managing entity in terms of recommendations for future financing schemes were (top 3):

1. The EPC is an essential tool in the process to have access to financing and incentives towards building's energy efficiency in a clear, simple and standardized way, both in terms of calculation and presentation, allowing the ex-ante and ex-post benchmark, using the same rules and indicators, in an objective manner, in all country.

2. The EPC should be adjusted to also considered the needs of the financing schemes, namely when there are mandatory requirements for the funding operation eligibility. However, it should not impact the energy certification scheme nor should be tailored to each funding program.
3. The interoperability between the EPC database and the financing platforms, as well as the advisory support are critical for the success of the financing mechanisms, since is allows the automatic gathering of EPC information, aggregates it in general indicators for buildings, and significantly facilitates the reading of information by the involved entities in the funding mechanism, both during the time of application and after the completion of work.

Results consumer testing (integrated with F10)

- Based on the current casA+ functionality, 53% considered that they will "maybe" use casA+ for home improvements while 32% consider that they will certainly use casA+ to implement improvement measures. 14% answered "No" due to financial availability, bureaucracy, waste of time and lack of transparency. This result highlights a problem with the OSS communication strategy since people are getting confused with the Environmental Fund application (which is independent from the OSS).

Results from 463 registered homeowners in casA+ show they have a high interest in having functionalities available such as (top 3):

1. Automatic proposals for improvement measures (developed under F10 testing)
2. Financial incentives information (developed under F10 testing)
3. House characterization (developed under F7 – Building Logbook testing)"

Results from 15 homeowners after evaluating the financial incentives information functionality indicated:

1. Homeowners consider using some incentives or support programs presented in this feature if they want to take some improvement measures in their homes
2. With this functionality homeowners are more aware of the incentives and support programs that exist for the energy rehabilitation of buildings
3. This functionality to be very useful in the context of a one-stop-shop and building's energy renovation
4. This functionality meets the homeowners' expectation for something like this
5. Respondents identified that the functionality was not so easy to find, being necessary to improve this aspect of the user experience in the OSS.

Conclusions

Recommendations how to link EPC schemes with financial instruments:

- Enhance the EPC role in access to financing, namely by establishing the EPC as mandatory eligibility criterion in the ex-ante and ex-post evaluation

- Simplify and reduce bureaucracy in the financing programs applications, namely by using the EPCs (the certification scheme should be a trustable tool bringing confidence to the process and allowing for benchmark)
- Replicate success models linking different entities and promoting their skills towards the common goal of the building energy renovation, namely taking advantage of the link to EPCs and the technical advisory that can come from it and the interoperability between the EPC database and the financing platforms
- Have a clear communication strategy for the energy renovation financing initiatives and interconnect and communicate the existing benefits available al national and regional level (e.g. unique platform), namely through digital platforms linked to EPCs (e.g. one-stop-shops)

Romania

Methodology

Three types of tools have been used in the testing approach:

1. Surveys to selected stakeholder groups: Surveys as questionnaires have been designed specifically for consumers, public authorities, energy auditors (EPC assessors) and banks, as main targeted groups from the stakeholders
2. Analysis of current EPC methodology, based on assessor experience The current official methodology used to assess energy performance of buildings was studied in detail to conclude if it offers the necessary information needed for eligibility requirements in the running financing mechanisms.
3. Recommendations on the use of EPCs and data in financing schemes From the surveys, identify recommendations on the use of EPCs and data in financing schemes (eligibility criteria and how to present financial options and indicators).

All stakeholder questions had 5 possible answers: 0 (do not agree) through 1 (somewhat disagree) to 5 (fully agree).

Testing was successfully delivered, though only 3 survey responses were received from banks.

Results

Financing options in the EPCs were found helpful by 76% of consumers and 97% of them want to know about eligibility criteria to access funds. 80% of local authorities find that renovation of buildings is most suitable for financing mechanisms. 79% of energy auditors consider necessary to amend the current legislation on energy renovation financing so as to motivate a significantly higher number of building owners.

Results from 29 **homeowners** indicated that consumers have a high interest in being informed about:

1. updated financing options, available eventually through a web-portal or a one-stop-shop.
2. eligibility criteria to access funds
3. contact information from financing institutions to learn about more details

Results from 15 respondents from **local authorities** indicated that the local authorities have the highest interest in:

1. offering financing of materials and works (money) for building renovation
2. having a platform for advisory services for financial instruments and a knowledge hub for financial instruments
3. amending the current legislation on energy renovation financing to motivate a significantly higher number of building owners that have access to funds

Results from 37 **energy auditors** indicated that the EPC assessors are highly interested in:

1. the amendment of the current legislation on the financing of energy renovation works to motivate a significantly higher number of building owners able to access funds
2. accessing a dedicated site with available financing options for renovation in order to provide this information to the beneficiaries
3. providing data on financing options to beneficiaries in the energy consultancy services aiming to increase energy performance during renovation of assessed building

Results from 3 respondents from **commercial banks** only indicated the highest interest in providing the state authorities with financing solutions and guidance for access to finance in the context of increasing the energy efficiency of buildings, while the lowest interest was in offering zero-interest for loans dedicated to energy renovation of buildings.

The current methodology used to assess energy performance of buildings was analysed and it was easily concluded that it is suitable to offer the necessary information commonly required for eligibility in the running financing mechanisms:

1. The EPCs indicate primary energy consumption, both non-renewable and renewable.
2. The EPCs indicate the level of CO_2 emission resulted from the energy used in the building
3. The energy audits, which are more detailed studies on building energy renovation indicate energy savings and emission reductions resulted from each package of works recommended in the EPCs

Conclusions

Financing options fit naturally as an extra service of the **assessor** to the beneficiary and should be well received on the market. In addition, the financing institutions, private or state-owned, are in great need for good and replicable projects to make the associated mechanisms trustworthy and efficient.

The **consumers** may find if they are eligible for more favourable financing mechanisms and learn how to apply for funds. The **authorities** disseminate more easily the financing

programs and get better projects in the applications. The banks are more likely contacted for special loans. Energy auditors are more helpful to beneficiaries lacking proper funds for improvements and more likely asked to provide their services.

Recommendations on the use of EPCs and data in financing schemes, as eligibility criteria and how to present financial options and indicators, are presented as follows:

1. Present public financing schemes (e.g., national programs) first and then private financing schemes.
2. Detail eligibility criteria for each financing mechanism.
3. Make clear the connection between the level of energy performance improvement, including emission reduction, and the promised financing amount.
4. State what work costs may be reimbursed and what work cost should be covered from own funds.

Denmark

Methodology

The testing was done in two parts: 1) deep-dive qualitative interviews with householders (this was the major part of the user testing – this also covered F10 testing) and 2) a market screening exercise to identify options for financing renovation (other than personal savings) from private banks, and a review of public (including Supplier Obligation based) subsidy options.

Interviews

The user testing was done through persons interviews. From 2016 – 2019 the DEA collected 405 Better Home plans from which 24 was selected as meeting the criteria set for the study. The criteria for selecting suitable candidates for interview is the following:

- BetterHome plan issued from 2016-2019
- Building erected before 1980
- Building must have application code 120 or 130 from the Danish building code corresponding to a small family house or a terraced house
- Building must have heated area of at least 100 m^2
- BetterHome plan must contain suggestion of replacement of windows or panes
- BetterHome plan must contain at least one re-insulation proposals
- Building without district heating or heat pump must contain suggestions for heat conversion
- Total budget for energy renovation must be larger than € 13.500 (≈DKK 100.000)

From this sample size 10 persons agreed to participate in the interviews, resulting in 8 homeowners actually participating. The participants in the 8 interviews are all a part of a

family with children, in two cases adult children. Household income is between DKK 0.8 and 1.8 million. DKK. per year. Both short and long educations are represented.

All the interviewees express that they have insight into construction and energy renovation without in any way being professionals.

The interview contains questions regarding the entire process around the BetterHome report. This includes the following phases:

- Planning by the homeowner
- Performance of the report
- Evaluation of the received recommendations

If a renovation has been performed:

- Financial solution
- Planning of the renovation
- Results and performance of implemented recommendations

The only challenge found in delivery of the test was that some participants withdrew their willingness to participate in the interview after consent had been obtained.

The interviews resulted in a report that summarizes the findings, and draw conclusions based on the answers from the participants.

Market Screening

The following financial institutes were included in the analysis:

- Realkredit Danmark
- Nykredit
- Totalkredit
- Jyske Bank
- Nordea
- Arbejdernes Landsbank
- Coop Bank (Totalkredit)
- Sydbank (Totalkredit)
- Ringkjøbing Landbobank (Totalkredit)

Results

Market Screening – Private Sector

The screening showed that all the banks have some kind of mortgage for energy renovations under different names and varying terms and conditions. Most of the products from the banks provide a discount on the loan fee or a lower interest rate. However, it is often that the loan also will be shorter, have a lower loan amount and it is necessary to document that

the loan has been used for energy renovations. The requirements does not often include public tools as BetterHome report or the EPC, but the banks uses a private tool instead.

Market screening in the public sector

When performing one of the green services (insulation) it was possible to achieve a tax deduction up to 12.000 DKK/year per person (app. 1600 EUR). The tax deduction is only available on the salary for the craftsmen.

Public subsidy: The subsidy program is targeted residential buildings including conversion to heat pumps, extra insulation of the exterior envelope, new energy windows etc. As documentation for the application an EPC is required.

Pre-2020 grant programmes included a supplier obligation programme whereby homeowners could report their saving to an energy company who would then pay the homeowner an amount of money for the right to report the energy saving to the Danish Energy Agency.

Figure 3 shows the amount of participants from the interviews, who engaged with subsidy programs and how they financed their energy renovations.

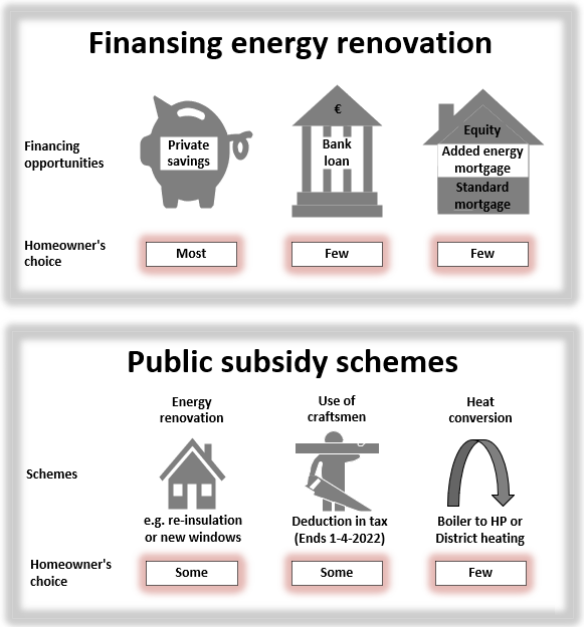

Figure 3: Amount of participants from the interviews engaging with different subsidy programs and financing options

"Of the eight households, except in one case, all energy renovations are paid for by the homeowners' own cash holdings. In other words, neither bank loans nor mortgages have been taken out to finance the implemented improvements. A single homeowner has obtained a small grant while others did not think it was worth the hassle or came up with it too late."

"In summary, the results of the eight interviews are in line with the results of the survey that Niras conducted in 2016. Here, it was found that the BetterHome consultancy had had an impact on the homeowners in a number of areas and that the BetterHome consultancy had helped to qualify the homeowners' knowledge about renovation and energy consumption. In addition, it was concluded that the BetterHome consultancy had only had a minor impact on the renovation process (financial management, budget, and time schedule), and that very few of the homeowners had used the consultant to manage the renovation they had completed.

"Not least the latter is more than confirmed by the current interviews, where no one has used the BetterHome consultant for anything after the preparation of the BetterHome plan."

Conclusions

Based on the interviews and the corresponding analysis, 12 recommendations for improvements have been developed – see F10 results for the full list. These include:

- "Financing offers must be able to be entered in the BetterHome plan: The BetterHome does include cost and savings, and encourages the homeowner to begin the dialogue with a financial institute. The loan offers and consequences should be further integrated in the BetterHome solution. It should be possible to update the rate of interest and payback. This suggestion is more or less dependent on suggestion 1 (for a digitized BetterHomes plan).

Also relevant to financing are recommendations:

- Discount on new Energy Label: When performing energy renovations described in the OSS/EPC, it should be possible to update the EPC at a reduced cost.
- Direct discount on the OSS: The willingness to pay for the solution was not very high based on the interviews. Existing subsidies on the market was not sufficient as well. It is then recommended that the subsidies are focused on reducing the cost connected to achieving an OSS report.

Cross cutting criteria

Quality Aspects

Partners did not supply data on quality aspects. However, see discussion under Economic Feasibility below of the costs and challenges of providing up-to-date and accurate financing information.

User Friendliness

Experience in Portugal showed that **complexity of data requirements** could act as a barrier (see Economic Feasibility below). See also discussion of **digitalisation** under Economic Feasibility below.

The Portugal financing test advice module provides an effective design of how a web-based advice service can be integrated into EPC-linked OSS service, and survey results suggest that consumers find the design helpful (See further info under F10 below).

The research provides useful indicators on how financing information should be presented. This information from Romania is worth repeating as a very clear statement of best practice:

"Recommendations on the use of EPCs and data in financing schemes, as eligibility criteria and how to present financial options and indicators, are presented as follows:

1. Present public financing schemes (e.g., national programs) first and then private financing schemes.
2. Detail eligibility criteria for each financing mechanism.
3. Make clear the connection between the level of energy performance improvement, including emission reduction, and the promised financing amount.
4. State what work costs may be reimbursed and what work cost should be covered from own funds"

See further discussion of user friendliness under F10 below.

Economic Feasibility

Costs of providing financing information

In Denmark and Romania, the analysis did not significantly consider the **costs and challenges** of providing financing information.

Provision of financial advice to consumers is heavily regulated in most countries – regulatory compliance will add substantially to costs of delivering this information. Similarly information about both public and private financing can rapidly become out-of-date: maintaining financing information up to date in a centralised way would require dedicated staff. On the other hand the costs of not having such a centralised facility are likely to be high for the consumer: In Romania it was noted that "If there is no public integrated platform on financing options, the assessor needs more than 1 hour to search for the financing mechanisms for which the beneficiary is eligible."

Financing support provided by EPC assessors would also require additional **training** for assessors (adding to system costs): in Portugal, where testing included reviewing an existing financing programme provided by assessors, such training on the financing had been provided to the assessors.

Digitalisation

Alongside changing financing scheme rules, changing interest rates and energy prices will affect accurate provision of financing information. The Danish analysis is certainly correct that being able to address this depends on **digitalisation**: "It [would be desirable to] update the rate of interest and payback [on reports]. This suggestion is more or less dependent on

suggestion 1 (for a digitized BetterHomes plan)." Interoperability between finance and EPC platforms was also identified as key in Portugal (see below).

Use of EPC data and information within financing programmes

Portugal was the only one of the three test cases to significantly consider the role of EPCs and EPC data in supporting provision of financing (as opposed to financing information supporting the provision of advice/recommendations alongside EPCs). The Portuguese research found that, "the interoperability between the EPC database and the financing platforms, as well as the advisory support are critical for the success of the financing mechanisms"

Data gathering requirements

In Portugal some data was provided on EPC assessors' experience of promoting a finance scheme to their customers. Some experts reported increase on costs when implementing the financing scheme rules to link to EPC. The financing scheme concerned had fairly complex data collection requirements: the EPC was used as eligibility criteria as it was necessary to link the commercial banks' platform to the funding scheme platform to the EPC database, being necessary to add data to these platforms that was not available in the EPC. The scheme also adds to costs because an additional EPC assessment is required following installation of measures as a condition of the financing.

2.3 Conclusions and discussion

The results of the tests in Denmark and Portugal show that enabling and supporting householders to not just receive advice but take action, remains a key challenge for advice providers and one-stop-shops (see further discussion on this point under "F10 Conclusions and Discussion" below).

The results of the studies carried out under F9 are clear and consistent across the three countries: both consumers themselves, and stakeholders speaking on behalf of consumers, believe that financing information is highly valued information that can be provided alongside EPCs. In particular the results suggest financial information is a key component in ensuring that reports, and advice through one stops shops, drive action on measures. Thus, for example in Portugal: "The majority of experts considers very important to have information about financing programs and benefits available in EPCs (86%) and/or in a unique platform (90%)"

Data reported in F9 testing was principally consumers' and stakeholders' views. It's rather unsurprising that consumers (and businesses speaking on their behalf) say one of the things consumers care about most about is money and that this is a key determinant of their retrofit decision making. This belief about consumers may or may not be entirely true.

Suggesting that this may not be the whole picture is the data from Portugal: 50% of the qualified experts that did the training on the financing programme, did not submit any

application to the IFFRU financing program. From those who did submit to the programme, 60% considered they needed to make adjustments in their working model, namely more working hours and increase of costs (for the auditor and for the client).

This clearly indicates that providing financing is not enough: it has to be the right kind of financing provided in the right way for it to be used by assessors and consumers.

3 ANNEX

3.1 Questionnaires

Table 3: Exemplary questionnaire for in-building tests

General questions and testing steps		
	Provide a short summary of the test you are carrying out. Please describe in your words.	
	Overall, how easy or difficult was the feature to implement? Please select an option.	
	How easy or difficult was it to explain the feature to the assessor and/or other stakeholders involved in delivering the test? Please select an option.	
	List all of the planned steps for implementing the feature. Please list performed tasks in each step	
	Were you able to perform each step? Please select an option for each step	
	[Only answer this question for options you selected "No" or "In part" in previous question] Why were you not able to perform or complete these steps? Please describe in your words.	
	[Only answer this question if you were able to perform the step and you faced any challenges] Did you face any challenges in steps that you were able to complete (for those you answered "Yes")? Please describe in your words.	
	Overall, how feasible is it to include the feature as part of a standard EPC assessment? Please select an option.	
	Explain your answer to the above question. Please describe in your words.	
Testing time & costs		
	How much time (in minutes) did it take to perform each step	
	What are the approximate costs incurred in each step? Please specify the positions as well as an approximate estimate. (Costs per EPC)	
Cross Cutting Criteria		
	Quality and Reliability	
		Are the calculation methods clearly described?
		Is the required input data clearly asked?
		Is the user provided fundamental technical knowledge needed to understand the details of the feature?
		Is training of experts/assessors needed for the feature?
		Are the results shown transparently?
		Does the user have access to formulas/application interface?
		Does the user have access to weightages for the calculation of results?
		Are measures foreseen to ensure that data collected is verified (e.g. completeness, accuracy timelines etc.)?
		Is training of experts/assessors needed for the feature?
	User-friendliness	
		Are the technical terms used provided in a glossary?
		Are the references to documents provided?
		Is the stepwise description for feature assessment provided?
		Are the results presented in graphical way?
		Did you consider the impact of graphical results on the user?

		Does the evaluation of the feature consider flexibility to adapt the methodology to different building types?
		Are the multiple-benefits (health, energy, cost saving etc.) of the feature studied?
	Economic feasibility	
		Does this feature increase EPC costs?
		Does the methodology require additional data to the one already included in current EPC derivation?
		If additional data is required, does it take longer than 1 hour to gather them?
		Is an additional on-site visit or measurement needed?
	Consistency with ISO/CEN standards	
		Have any national regulations been used in the methodology of this feature? If yes, which one?
		Is the data used for the feature already covered by the current EPC?
Final thoughts		
	Do you have any suggestions for improving this feature? For example, the description, recommendations, modules, or calculation methodology. Please describe in your words. Do you have any other comments? Please describe in your words.	

Table 4: Exemplary questionnaire for system test

Questions	
	Provide a short summary of the test you are carrying out. Please describe in your words.
	Overall, how easy or difficult was the feature to implement? Please select an option.
	List all of the key changes you planned to make to the existing 'back-end' EPC systems to enable the feature. Include all changes, whether they were successfully implemented or not. Please put a small description (5 words or less) for each change in a cell.
	Were you able to perform each planned change? Please select an option for each change.
	[Only answer this question for options you selected "No" or "In part" in previous question] Why were you not able to perform or complete these steps? Please describe in your words.
	What are the major challenges in implementing the new feature? Please describe in your words.
	What are the main advantages of the feature? Please describe in your words.
	Explain the major areas of monetary cost in implementing the new feature. Please describe in your words.
	What can be done to minimise the monetary cost in each area? Please describe in your words.
Cross Cutting Criteria	
	Quality and Reliability
	Are the calculation methods clearly described?
	Is the required input data clearly asked?
	Are the results shown transparently?
	Does the user have access to formulas/application interface?
	Does the user have access to weightages for the calculation of final results?
	Are the specific requirements to carry out the assessment outlined for assessors?
	Is training of experts/assessors needed for the feature?
	Are the qualification requirements clearly outlined for experts/assessors?
	User-friendliness
	Is the stepwise description for feature assessment provided?
	Are reporting templates used?
	Is the calculation/process description provided in guidelines?
	Does the tool have stepwise description of the assessment?
	Economic feasibility
	Does the implementing need additional infrastructure in the form of servers, programs, ...? If so, are these costs higher than €1000 to purchase, according to a rough estimation?
	Are there high skills (for example: IT and programming knowledge) required to implement and handle the feature?
	Consistency with ISO/CEN standards
	Have any national regulations been used in the methodology of this feature? If yes, which one?
	Is the data used for the feature already covered by the current EPC?
Final thoughts	
	Do you have any suggestions for improving this feature? For example, the description, recommendations, modules, or calculation methodology. Please describe in your words.
	Do you have any other comments? Please describe in your words.

Table 5: Exemplary questionnaire for user tests

Questions	
	Provide a short summary of the test you are carrying out. Please describe in your words.
	List all of the planned steps for delivering the test. Please put a small description (5 words or less) for each step in a cell.
	Were you able to perform each planned step? Please select an option for each step.
	[Only answer this question for options you selected "No" or "In part" in previous question] Why were you not able to perform or complete these steps? Please describe in your words.
	[Only answer this question if you were able to perform the step and you faced any challenges] Did you face any challenges in steps that you were able to complete (for those you answered "Yes")? Please describe in your words.
	How well did the users understand the feature? Please select an option. (Only answer if a question regarding perception was in the questionnaire)
	What did the test tell you about how much users find the feature useful? Please select an option.
	What did the test tell you about how much users liked or disliked the feature? Please select an option.
	What did the test tell you about how users would use the information provided in the new feature? Please describe in your words.
	List the headline quantified results from your test, for example, the percentage of users who found the feature useful. Please describe in your words. (Please provide at least the top 3 findings)
	Did users make any suggestions for changing the feature? Please describe in your words.
New questions	
	Please describe the participation in the survey (number of participants, potentially split to different target groups; share of returned questionnaires)
	Please describe the objective of the survey
	Please describe the main questions asked
	Please describe the main findings of the survey
	Please provide us with quantitative results in the form of additional xls file as much as possible (e.g. anonymised filled questions or aggregated results of the survey questionnaires)
Testing time	
	How much time (in minutes) did it take to perform each step
Final thoughts	
	Do you have any suggestions for improving this feature? For example, the description, recommendations, modules, or calculation methodology. Please describe in your words.
	Do you have any other comments? Please describe in your words.

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