



Energy
Efficient
Mortgages
Initiative

Research into market appetite for Energy Efficient Mortgages

Version: Final

Main author: A. Ranieri, C. Gianni, J. Johnson, L. Kesziszan

Dissemination level: Public

Lead contractor: CRIF

Publication date: 17.08.2022



EeMMIP project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 894117 respectively.

Table of Contents

Table of Contents.....	1
Executive Summary.....	2
1. Introduction	3
2. Energy Efficient Mortgages Today	5
2.1 Analysis of Financial Institutions by Country	6
2.2 Availability of Energy Efficient Mortgages (EEM)	8
2.3 Best Practices in Energy Efficient Mortgages (EEM) & The Value Chain	10
3. In pursuit of the ‘ecosystem’: EEM value chain analysis	12
3.1 Origination/Retail.....	13
3.2 Risk Management	16
3.3 Marketing.....	19
3.4 Partnerships	22
3.5 Funding & Investor Relations	23
3.6 IT & Data	25
3.7 Technical experts	28
4. Case Studies:	30
4.1 Consumer Behavioural Research: Assisting financial institutions in overcoming behavioural barriers when promoting energy refurbishment services and products.....	30
4.2 Data foundation for scaling up energy efficient mortgages in Norway, Sweden & Denmark....	31
4.3 The Italian Superbonus 110%	34
5. References	39
6. Annexes	42
6.1 Annex I	42
6.2 Annex II	47

Executive Summary

The overall objective of this deliverable is to provide a robust basis, rooted in market research and feedback, for the identification and testing of an optimal value chain, including innovative market actions, in market demonstrators in Italy (Trento) and the UK (Scotland), which will stimulate and accelerate the development of a market in energy efficient mortgages.

1. Introduction

At the heart of the Energy Efficient Mortgages Initiative (EEMI) is a strong business case for lending institutions in the first instance, which in turn drives a value chain in which all actors derive benefits. There are substantial asset value improvements and long-term risk reduction that can be achieved by the integration of energy efficiency considerations into lending practices. The value proposition of energy efficient mortgages has been proven through numerous research publications, practical case studies and existing market products.¹ Energy efficient buildings are more comfortable for occupants and cost less to run in terms of energy bills, leading to greater occupier satisfaction, health and wellbeing. Linking these benefits to property values and financial risk, making dwellings more energy efficient could result in lower risk of mortgage default, increased risk mitigation capacity and could help to futureproof portfolios against value decline.

Energy efficient mortgages can drive innovation in lending institutions and attract investors. Over the longer term, energy efficient mortgages will deliver benefits accruing from increased competitive advantage and regulatory future-proofing:

- new business opportunities and diversified financing options allowing for a competitive advantage;
- stronger, more resilient banking system through improved understanding and management of sustainability issues, including environmental and social liabilities;
- increased demand from ESG responsible investors;
- better ability to manage regulatory risks, lower capital requirement and improved risk profile via increased loss mitigation capacity, lower probability of default and reduced loan-to-value ratios;
- customer retention and enhanced borrower relationship;
- improved reputation and credibility.

As an extension of the business case from a lending perspective, energy efficient mortgages also constitute a new asset class, which will be – and in some cases already are being - used for the purposes of energy efficient (covered) bond issuance, responding to the ever-increasing demand for green investments and, as such, providing access to a more diversified investor base and potentially lower funding costs for issuers over time.

The starting point for the design and delivery of the ‘ecosystem’ is a robust and comprehensive understanding of the current state of play of the market in energy efficient mortgages, as well as an understanding of what is needed in order to foster and accelerate further market development. Section 1 of this Report therefore considers the status of the market today in terms of current product offerings across Europe, while section 3 reviews the perceived obstacles to market development from the perspective of market participants, as well as potential solutions to overcome these.

With regard to the latter, the Report also considers the multitude of actions both undertaken by the EEMI directly and by market participants in the EEMI network to address the market criticalities and bottlenecks in support of the EEM ‘ecosystem’. Given their importance for the overall ‘ecosystem’, a different report in this series will consider in detail emerging innovative market solutions which will almost certainly help to deliver integrated ‘digital customer journeys’, as well as more efficient and effective lending institution processes. Section 4 of this Report consequently provides a deeper dive

¹ <https://energyefficientmortgages.eu/knowledge-hub/>

into a select number of relevant initiatives or analysis which, together with the Report on innovative digital solutions, can guide the market demonstrators, be shared across other jurisdictions and support a comprehensive roadmap to long-term market development.

2. Energy Efficient Mortgages Today

In recent years, there has been an obvious acceleration in the provision by lending institutions of green or energy efficient mortgages. The reasons for this are likely three-fold:

1. Since the launch of the EEMI in 2015, lending institutions have become increasingly aware of the business case accruing from this type of lending, as described above. We strongly believe that the EEMI has been – and remains – instrumental in articulating and substantiating this business case related to energy efficient mortgages, as well as in providing a ‘tool box’ for lending institutions to ‘fast track’ their product development, through in-depth consumer research, data gathering, processing and disclosure mechanisms, property valuation guidance, economic analysis of the risk mitigating effects of energy efficient mortgages and a platform for exchange of best practice with other relevant market stakeholders and authorities, to name but a few². The present Project is complementing this ‘toolbox’ in many important ways (see section 3 for more details).
2. Increasingly, lending institutions are launching dedicated green/energy efficient mortgage products on the asset side as eligible assets for the issuance of green/energy efficient (covered) bonds on the liability side, as a response to strong and sustained investor demand for these bonds.
3. As the scale of the climate change challenge has become apparent, a comprehensive but complex regulatory and supervisory landscape has emerged in the EU around the concept of sustainable finance, which is putting pressure on banks to integrate ‘sustainability’ into their entire value chains, impacting on their business models and strategies, governance structures and disclosure. The scope of this landscape and its relevance and implications for energy efficient mortgages are described in detail in a Report published on the Nordic Energy Efficient Mortgage Hub (NEEM)³ Project.

In the first part of this Report, we look more closely at the offer of green or energy efficient mortgages for residential and non-residential buildings across the EU based with a view to better understanding the increase in such products on offer. To this end, the Consortium conducted an analysis of the product offerings of 67 financial institutions from 18 countries located in the European area, operating at national and international level, thus reaching 30 countries where their products are offered.

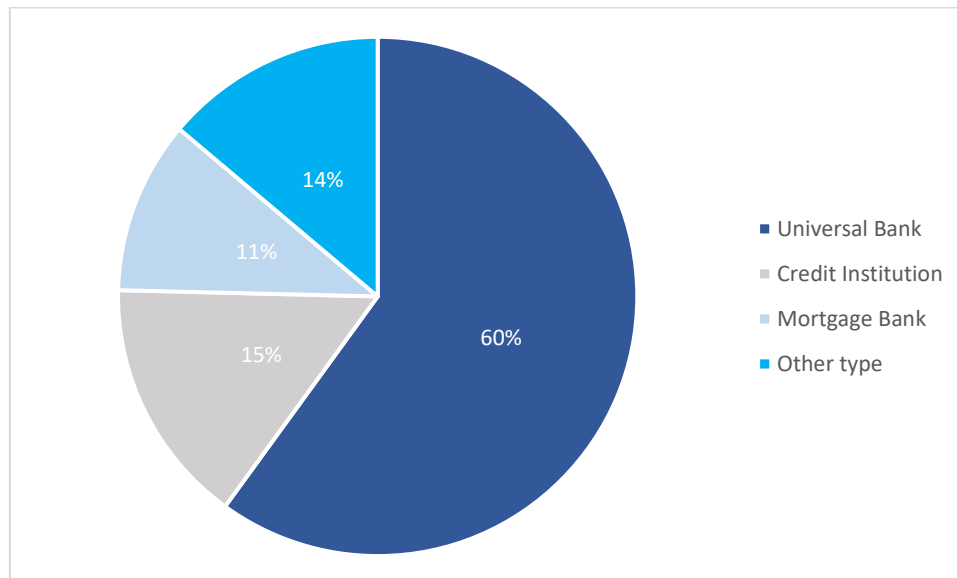
The financial institutions in our sample cover a variety of ‘models’: universal banks are commonly recognised in European countries as providing a wide and comprehensive variety of financial services, including retail, commercial and investment services. A credit institution is defined by the European Banking Authority (EBA) as an *“undertaking whose business is to receive deposits or other repayable funds from the public and to grant credits for its own account”*⁴. Similarly, a mortgage bank is characterised by the origination and servicing of mortgage loans. Finally, there are a variety of other institutions, which represent a very low proportion of our sample, but which include a building societies, foundations, insurance companies, a loans company, and a residential real estate. These are grouped under “other type”. The financial institutions analysed are illustrated in Graph 1.

² <https://energyefficientmortgages.eu/>

³ <https://neemhub.eu/>

⁴ <https://www.eba.europa.eu/regulation-and-policy/single-rulebook/interactive-single-rulebook/100433>

Graph 1. Type of Financial Institution

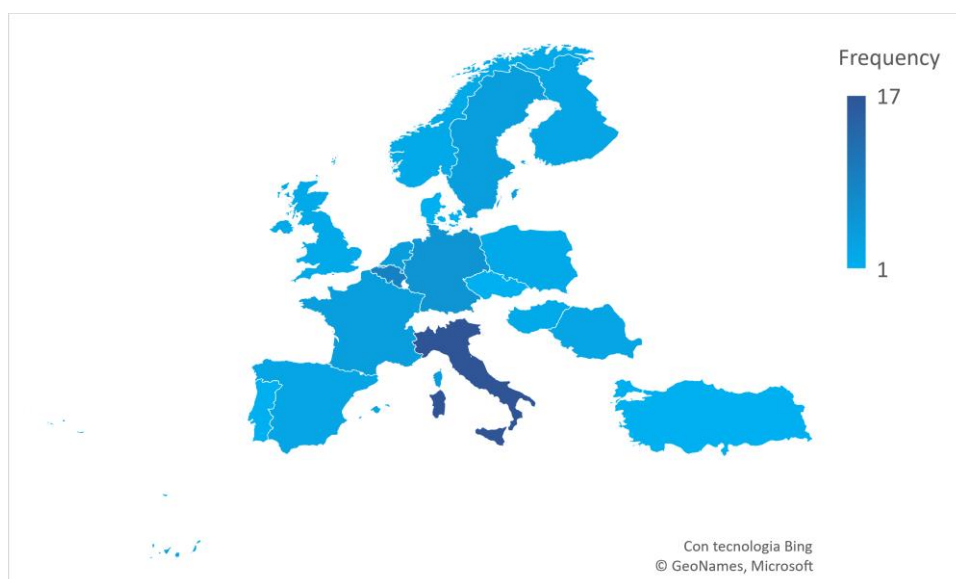


Source: Authors compilation based on data extrated in 2020 from 65 FIs presented in the Annex I

The analysis aims to determine for each Financial Institution (FI), the type of product offered, the country of origin of the product and the countries in which the FI provides the financial product.

2.1 Analysis of Financial Institutions by Country

Figure 1. Frequency of FIs by country of origin



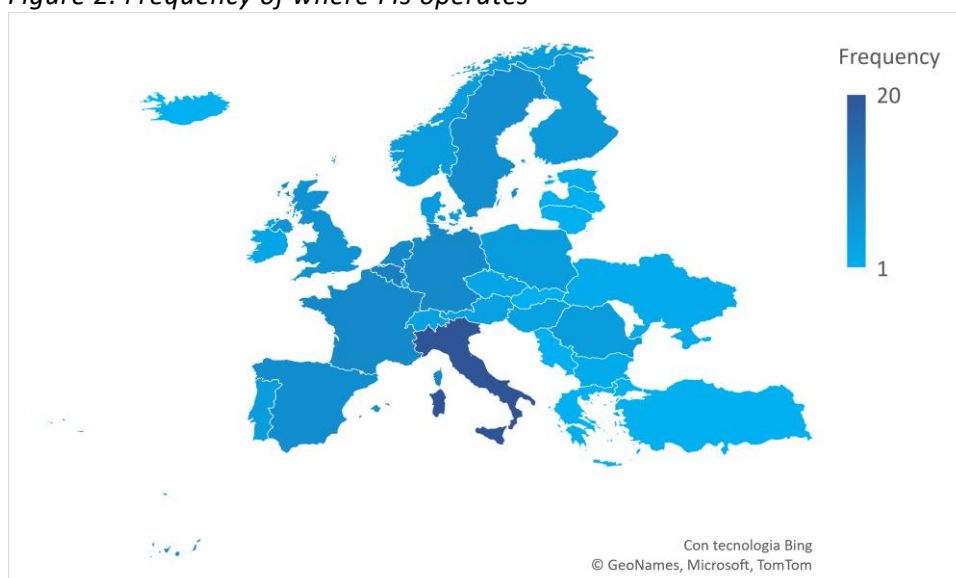
Source: Authors compilation based on data extrated in 2020 from 65 FIs presented in the Annex I

The number of financial institutions by country of origin is shown in Figure 1. The goal of this map is to display the number of financial institutions in the sample to show how the analysed sample is distributed across Europe. The country with the most financial institutions (17) in our sample is Italy, followed by Belgium (9) and Germany (6). Czech Republic, Denmark, Ireland, Portugal, and Turkey, on the other hand, have the lowest frequency of FIs, with only one per country.

Data from Figure 1 can be compared with the one in Figure 2. The latter, indicates the number of branches operating within each country to define how many financial institutions from our sample operate internationally; this information is valuable in determining the ease of distributing financial products across European countries.

The map in Figure 2 shows that Italy has the highest frequency (16) of branches in the examined area, as expected given the high frequency of FIs in the previous figure. Considering the ratio obtained by dividing the number of FIs within national borders and the number of branches operating abroad, the four French FIs in the sample operate in seven different countries. Belgium is next, with nine international branches out of six local financial institutions. Finally, the Netherlands and Spain both count 4 FIs and 3 branches respectively. These results indicate where financial products are not only offered in a financial institution's home country but also abroad, pointing to the potential of a European-wide energy efficient mortgage ecosystem.

Figure 2. Frequency of where FIs operates



. Source: Authors compilation based on data extrated in 2020 from 65 FIs presented in the Annex I

2.2 Availability of Energy Efficient Mortgages (EEM)

The overall goal of the EEMI is to provide a conceptual framework for EEM in Europe in order to support the energy improvement of the EU's building stock. The current Report also looks at how those products currently offered by the FIs in our sample which are dedicated to financing energy efficiency buildings. The main goal of this section of the Report is to paint a picture of the existing EEM market in Europe and to determine the availability of these types of products in different European countries.

The EEMI aims to actively contribute to the attainment of the Paris COP 21 agreement's climate targets, as well as to improve financial stability in general. The creation of a unique label for EEM aims to add value to consumers/borrowers, promote cross-sectoral growth and foster market innovation at the EU level. To qualify for the EEM label, the following precise criteria have been laid down in order to provide principles-based guidance that will evolve over time under the leadership of the EEM Label Committee that will provide overall EU-wide coordination with the support of the national EEM hubs⁵:

1. The implementation of EEM at national level should be based on current best market practice standards, in line with EU legislative requirements, e.g., *the Energy Performance of Buildings Directive (EPBD)*, *the Energy Efficiency Directive (EED)*, and in line with *the Mortgage Credit Directive (MCD)*. The EEM Label Committee, comprised of representatives from the major mortgage markets and other EU-level market stakeholders, ensure the continued alignment of EEM with high quality EU and national best market practice standards through the EEM Label that will be reviewed annually. Cross-sector market stakeholders are encouraged to organise into national EEM centers in order to achieve national coordination and ensure market consensus and implementation.
2. Lending institutions are encouraged to incentivise energy improvements both at the time of origination of the mortgage and in the future by linking additional favorable financing terms to evidence of further improvements in energy performance. Such a mechanism can be linked to recommendations from building renovation passports where these are available.
3. Lending institutions which originate EEM are asked to self-certify that their products meet the EEM Label Convention (box 1).
4. The EEM Label is supported by the Harmonised Disclosure Template (HDT)⁶, an excel-based form that lending institutions which have been granted the EEM Label use to disclose information on their energy efficient mortgage products, with the primary aim of facilitating and therefore improving access to relevant, consistent and comparable data on energy efficient mortgages within and between jurisdictions for investors, regulators and other market participants for due diligence purposes.
5. In addition, efforts to design and deploy cross-sectoral market solutions and partnerships in the context of an EEM could (1) increase consumer/borrower marketing and demand for EEM and thereby stimulate private investment in energy performance, and (2) make information readily available to consumers/borrowers about potential European/national/regional/local public subsidies and tax benefit schemes.

⁵ <https://energyefficientmortgages.eu/wp-content/uploads/2021/07/EEMI-Definition-14.11.18.pdf>

⁶ <https://www.energy-efficient-mortgage-label.org/hdt>

6. National market hubs are leading national stakeholders in developing national best practices for EEMs as financial products aligned with EU climate change commitments following the Paris COP 21 agreement.

Box 1: EEM Label Convention

EEM Label Convention

Energy Efficiency Mortgage (EEM) are intended to finance the purchase/construction and/or renovation of both residential (single family & multi-family) and commercial buildings where there is evidence of: (1) energy performance which meets or exceeds relevant market best practice standards in line with current EU legislative requirements; and/or (2) an improvement in energy performance of at least 30%.

This evidence should be provided by way of a recent Energy Performance Certificate (EPC) rating or score, complemented by an estimation of the value of the property according to the standards required under existing EU legislation. It should specifically detail the existing energy efficiency measures in line with the [EEMI Valuation & Energy Efficiency Checklist](#).

Lending institutions are committed to providing regular information enabling investors to analyse the Energy Efficient Mortgage products, following the Harmonised Disclosure Template.

In the context of the EEM Label the term "mortgage" refers to residential and commercial property loans which fall within the scope of the Capital Requirements Regulation ([Regulation 2013/575/EU](#)) and/or Mortgage Credit Directive ([Directive 2014/17/EU](#)) or under equivalent legislation outside of the EEA.

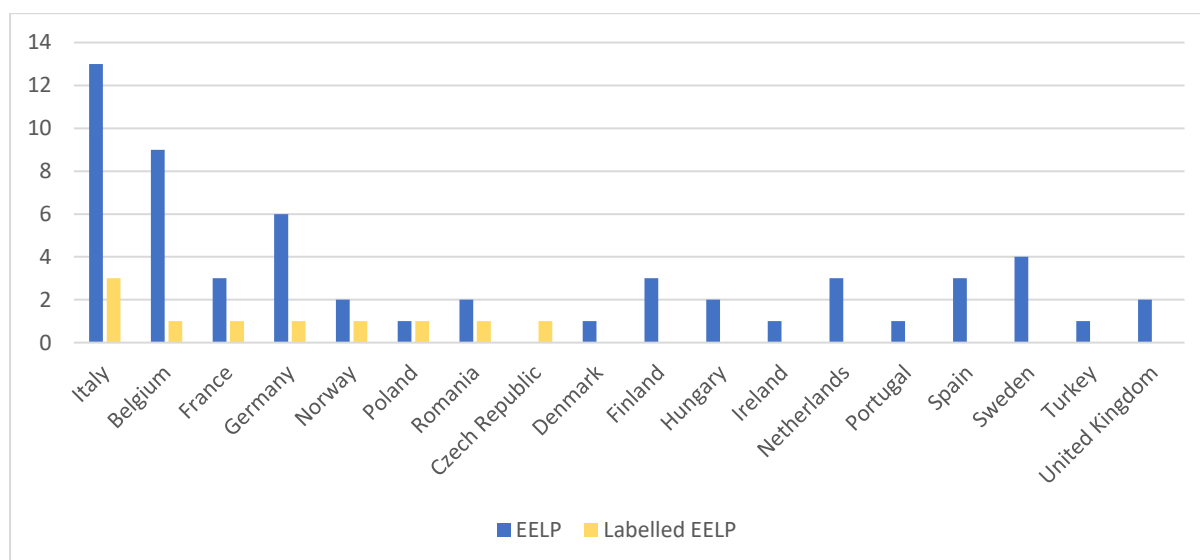
The major goal of the data collection was to provide a view of the current EEM offer in Europe and identify the availability of this type of product among European countries. The market in energy efficiency financing is currently fragmented, with a variety of different types of products available. As a result of this, the analysis covers not only EEM but also unsecured consumer loans with the primary goal of improving energy efficiency in residential and non-residential buildings. To streamline the research results, we refer to Energy Efficiency Loan Products (EELP), which cover both EEM and unsecured consumer loans with a focus on energy efficiency renovation.

The 65 financial institutions examined were selected among EEMI the EEMI lending institutions stakeholders⁷; the majority (55) offered EELP. The remaining ten financial institutions at the time of the analysis did not provide EELP, representing the small ratio of the sample. Still, few financial institutions had adopted the EEM designation when the study was accomplished (9). Furthermore, there were already 38 financial institutions in 14 countries with 52 marked products when the report was prepared, in May 2022, a number that continues to grow. Both EEM and unsecured consumer loans (which meet the EEM label convention) have received the EEM label. The full list of EEM-labeled financial institutions can be found at www.energy-efficient-mortgage-label.org/issuers/directory.

⁷ <https://energyefficientmortgages.eu/lending-institutions/>

A deeper dive into the sample allowed us to examine the nature of the offer in each country as in 2020. The results are displayed in absolute values since the sample is not homogeneous in the number of institutions present in each country. The major goal of the data collection was to provide a view of the current EEM (and other products) offer in Europe and identify their availability among European countries.

Graph 2. Offer of EELP by country



Source: Authors compilation based on data extracted in 2020 from 65 FIs presented in the Annex I

From a market development perspective in relation to the EEM Label, this information has been valuable since it provided useful indications of the further potential for the EEM Label and pointed to those institutions which the EEMI could approach in order to secure additional onboarding of financial institutions and their financial products.

2.3 Best Practices in Energy Efficient Mortgages (EEM) & The Value Chain

At the time of writing in May 2022, the market in energy efficiency financing is developing rapidly, as market and regulatory developments put pressure on financial institutions to accelerate their sustainable financing activities and increasingly integrated EE and ESG factors into their operations. The following recent best practice examples of EEM and other related products - which are labelled under the EEM Label, demonstrate the transformative nature of these products and the broader EEM value chain:

Berlin Hyp

Berlin Hyp⁸ offers a broad spectrum of green financing products including: (1) energy efficiency loans which are secured by energy-efficient and environmentally friendly buildings and contribute to the

⁸ <https://www.berlinhyp.de/en/customers/products>

Sustainable Development Goals SDG 11 (Sustainable Cities and Communities) and SDG 13 (Climate Action) and (2) taxonomy loans which are used to finance investments that are based on the eligibility criteria for environmentally sustainable economic activities outlined in the EU Taxonomy Regulation and contribute to the Sustainable Development Goals SDG 11 and SDG 13. The eligibility criteria for energy efficiency loans and taxonomy loans, which for their part aim to make a significant contribution to protecting the climate, and the corresponding DNSH criteria (“do no significant harm”) as well as the minimum social requirements (minimum safeguards), are defined in Berlin Hyp’s Sustainable Finance Framework. This framework provides an overarching approach to classifying their sustainable financing products on a holistic scale.

Banco Intesa Sanpaolo

Banco Intesa Sanpaolo in Italy offers a ‘Green-Mutuo Domus’⁹: a subsidised mortgage which makes it possible to purchase and build a residential property in Italy with a high energy class (equal to or higher than B) or to renovate a residential property in Italy improving its energy performance rating by at least one class. In 2021, approximately 14,000 green mortgages of a total value of over 2.2 billion euro were issued.

Caja Rural de Navarra

A further best practice example which also demonstrates the additional value of the EEMI in promoting an EEM value chain relates to Caja Rural de Navarra’s (CRN) green finance activities. CRN offers a green mortgage (“Hipoteca verde CRN”)¹⁰ which aims at financing both the purchase of new and existing residential units as well as their renovation. Loans included under this product line are and will be compliant with the EEM Label convention and with the EU Taxonomy, according to CRN’s sustainability framework. Significantly, in February 2022, CRN issued its inaugural green covered bond¹¹, which has been issued against its Sustainability Bond Framework which, as indicated, aligns the use of proceeds with the EU Taxonomy TSC and also the draft of the EUGBS. The proceeds of this green covered bond will be dedicated to (re)finance the construction, renovation, acquisition and ownership of energy efficient buildings, intended to be aligned with the Taxonomy’s TSC in these areas. CRN also commits to making best efforts to comply with the DNSH criteria.

⁹<https://www.intesasanpaolo.com/it/persona-e-famiglie/prodotti/mutui/mutuo-green-acquisto-riqualificazione-casa.html>

¹⁰ <https://www.energy-efficient-mortgage-label.org/product/1>

¹¹ <https://www.cajaruraldenavarra.com/sites/default/files/crn-inaugural7-y-green-covered-bond-4feb2022.pdf>

3. In pursuit of the ‘ecosystem’: EEM value chain analysis

The increase in the offer of green/energy efficient mortgages in recent years is extremely encouraging but the scale of investment needed to improve building energy performance means much greater private investment in the EU’s building stock will be required in order to meet the EU’s climate targets. Indeed, the scale of investment needed in building energy efficiency is estimated at more than €180 billion p.a. until 2030¹² and will almost certainly increase as a result of the recently adopted REPowerEU Strategy¹³.

During the course of the Energy Efficient Mortgages Initiative (EEMI), significant efforts have been devoted to developing an understanding of the obstacles to the accelerated and widespread roll-out of EEM through in-depth consultation with market stakeholders and these discussions continue, as do discussions on the ways in which to overcome these obstacles (more on this later).

In particular, research, analysis and dialogue with EEMI lending institutions and other relevant stakeholders (see Annex II provides an overview of the stakeholders) provided very useful insights across the key elements in the energy efficient mortgage value chain, namely:

- Origination/retail
- Risk management
- Marketing
- Partnerships (development of synergies with other stakeholders)
- Funding & investor relations
- IT Solutions - data
- Development of technical expertise (SMEs, Valuers, Energy Efficiency experts)

This research points to what the market considers to be the fastest and most efficient way of rolling-out EEM products across EU jurisdictions. By overlaying relevant criticalities and solutions described in this Report with the market demonstrators and sharing these with the EEMI national market hubs, it is possible to design a targeted roadmap for deployment of energy efficient mortgages in an energy efficient mortgage ‘ecosystem’, taking into account the characteristics of the market demonstrators and consumer appetite (based on existing and recent research¹⁴ conducted under the present Project).

As this section will show, there are inevitable overlaps between the 7 elements, both in terms of criticalities and their solutions. But for the sake of clarity and granularity, the individual elements are considered separately and cross-references are made, reflecting the inter-connectedness of the value chain and ‘ecosystem’.

¹² https://ec.europa.eu/clima/system/files/2018-11/initiative_7_smart_en.pdf

¹³ https://ec.europa.eu/commission/presscorner/detail/en/ip_22_3131

¹⁴ <https://energyefficientmortgages.eu/wp-content/uploads/2021/07/Consumer-Research-DE-IT-SE-UK-2018.pdf>
<https://energyefficientmortgages.eu/wp-content/uploads/2021/07/EON-Green-Mortgages-Debrief-with-appendices-051218.pdf>

3.1 Origination/Retail

Customer Journey

The ultimate success of the EEM product and market is contingent on the design and delivery of products, processes and services which meet consumer expectations and therefore generate and sustain demand. The consumer research conducted as part of the present Project points to consumers across markets being (1) readier than ever to engage in dialogue around energy efficiency against a background of growing concerns about climate change and greater awareness of the financial and environmental impacts of energy efficiency measures and (2) receptive to the green mortgage propositions tested¹⁵.

From the outset, one key aspect has been recurrent in discussions with lending institutions on 'greening' their retail activities to secure and sustain demand for EEM and that is the customer journey. Customer awareness and incentivisation are also key and will be discussed under the 'marketing' section of this Report.

A simplified customer journey can be broken down into three key stages: (1) the first contact with the bank when the customer is seeking financing for a specific project, (2) the creditworthiness assessment process and (3) the mortgage approval and validation process.

A number of obstacles or bottlenecks have typically been identified by lending institutions in relation to the potential customer journey related to EEM:

1. Customer journey process: slow and complicated
2. Administrative burden for both customers and banks in terms of energy audit and certification-costs if not externalised

Lending institutions have also identified key priorities to addressing these criticalities:

1. Firstly, the identification of a solution that includes existing products and schemes, securing flexibility within the framework.
2. Secondly and most importantly, the design of a simple, transparent and time-efficient process. This entails clearly defining and optimising, from a cost perspective, the process of capturing and integrating the Energy Performance Certificate in lending processes.

Further consultation with lending institutions pointed to the following potential solutions:

1. One-stop shops: As banks are primary point of information and decision point for the borrower, banks could play a role of information hub provided they have easy and transparent access to relevant information for EE financing in housing (i.e. complementary funding schemes, fiscal regimes in places, partnerships available, first cost/benefits analysis ...).
2. Merge energy performance and valuation expertise: In order to streamline the process, saving both time and costs, it could make sense to merge the valuation reports and building energy performance assessment. This would entail integrating building energy performance criteria into valuation reports, through instructions to valuers.

¹⁵ <https://energyefficientmortgages.eu/wp-content/uploads/2022/04/EeMMIP-2022-Complete-Report-Consumer-Insights-Green-Mortgage-Propositions-Feb-2022.pdf>

Delivering an integrated EEM ‘ecosystem’ with an optimised customer journey at its heart to boost consumer demand for building energy renovation is the primary objective of the EEMI and current efforts to design and deploy market demonstrators in Scotland and the Autonomous Province of Trento. The objective is to deliver ‘ecosystems’ which bring together relevant market players, including lenders, investors, SMEs and utilities, with aligned strategies and actions, to deliver the right products, services and data. This will ensure that consumers have access to and will be guided towards the most efficient and cost effective, integrated technical and financial products, services and advice, via a seamless journey and experience which maximises the benefits for them.

In recent months, the EEMI has been in dialogue with a variety of market participants which are combining sustainability and digitalisation to offer innovative solutions that can, among other things, support the design of digital customer journeys. These platforms will help consumers to understand which energy efficiency improvements would be relevant for their homes, how much these would cost, how much they could save, and even refer them on to accredited suppliers for the installation. Since the customer journey is at the very heart of the ‘ecosystem’, a series of relevant innovative solutions will be considered in more detail in a separate report in this series¹⁶.

Part of delivering an energy efficient mortgage ‘ecosystem’ is of course ensuring that banks are also operating optimal processes. Indeed, the robust origination of energy efficient mortgages requires the integration of new and different systems and processes which must be streamlined in order to secure efficiency and cost effectiveness.

Throughout section of this Report, we will describe the ways in which the EEMI is supporting banks in designing and deploying these processes. However, and given the fact that valuation has been pinpointed by lending institutions in relation to retail/origination consideration, it is worth pointing here to the early efforts by the Royal Institution of Chartered Surveyors (RICS) under the EEMI to design a property valuation checklist¹⁷. This was intended as a first and rapid response to the recognition of the importance of property valuation and the calls to potentially merge energy performance and valuation expertise as alluded to above. The aim of the checklist is to build awareness of the potential impact of building energy performance and value amongst lending institutions and property valuers, encourage valuers to actively take account of relevant building characteristics and provide lending institutions with a basis from which to give tailored instructions to valuers when commissioning an appraisal of a property.

The EEM Label¹⁸, including its Harmonised Disclosure Template¹⁹, together with the EEMI Master Template²⁰ are also supporting optimised banks processes in relation to the collection and processing of data for EEM origination purposes – these will be discussed in more detail in subsequent subsections.

In the meantime and once again, digitalisation is offering the potential to streamline processes and procedures, overlaying different elements of this new value chain and delivering ready made solutions for lending institutions to ‘plug in’ to their existing systems. As will be described in more detail in the separate Report in this series mentioned above, one pioneering example of such a digital solution is

¹⁶ Will be available at www.energyefficientmortgages.eu in due course.

¹⁷ <https://energyefficientmortgages.eu/wp-content/uploads/2021/07/EEM-Property-Valuation-Guidelines>

¹⁸ <https://www.energy-efficient-mortgage-label.org/>

¹⁹ <https://www.energy-efficient-mortgage-label.org/hdt>

²⁰ <https://energyefficientmortgages.eu/knowledge-hub>: See EEMI Master Template

an IT platform developed by Sociedad de Tasación in Spain and endorsed by the Spanish banking sector, in which real estate valuation data from new and existing buildings is layered with real energy performance certificates and estimated ones.

Energy Efficiency Criteria

An additional key element of a bank's retail activities in the area of green/energy efficient mortgages, which is a particularly relevant theme at the current time in the context of the implementation of the EU Taxonomy Technical Screening Criteria for Buildings²¹, is the measurement of building energy efficiency.

This has long been a central theme of discussions in the area of energy efficient mortgages. Concerns highlighted previously by lending institutions and discussions on how to address these led to the EPC being identified as the relevant measure of building energy performance. This recommendation led to the EPC being made the main measure of building energy performance in the EEM Label Convention²². In the meantime, the EPC has also been recognised as a key measure of building energy performance in the context of the EU Taxonomy.

However, it became apparent in the context of the current Project that identifying the top 15% of the existing building stock using the Primary Energy Demand (PED) can be challenging. This is the case in Italy, where a continuous function assigning a specific interval of PED to an EPC class does not exist, meaning it is not possible to identify a threshold at 15% of the distribution. The result is that the introduction of PED in the context of the EPC embeds uncertainty in the Italian market, giving rise to incoherence and rendering communication of these considerations to the market difficult.

With a view to addressing this challenge and facilitating compliance of EEM with the Taxonomy's TSC through the EEM Label, an analysis of the Italian building stock and available EPCs has been conducted through the present Project with a view to identifying, in accordance with a preliminary hypothesis and selected clusters, a threshold at 15% of the distribution to comply with the 15% best in class requirement of the EU Taxonomy. The underlying methodology will be shared across other jurisdictions with a view to offering support where similar concerns have been highlighted.

Energy Efficiency Monitoring

Linking a mortgage product to building energy performance and potentially to favourable financing conditions, e.g. a lower interest rate, requires some kind of monitoring of the energy efficiency performance of the building which represents the collateral for the mortgage. This presents a number of challenges for banks, as indicated below, starting with their actual ability to access this data because of data privacy issues (see data & IT section of this Report for more details on this criticality), to the actual practical monitoring of the data.

With regard to monitoring, digital innovation is once again offering 'light at the end of the tunnel'. Increasingly, energy solutions companies are offering metering solutions which allow for the continuous capture and report of real energy performance of buildings. Kilowatt hours (kWh) saved as a result

²¹https://eur-lex.europa.eu/resource.html?uri=cellar:d84ec73c-c773-11eb-a925-01aa75ed71a1.0021.02/DOC_2&format=PDF

²² <https://www.energy-efficient-mortgage-label.org/about-us/convention>

of a renovation can be calculated day by day and the resulting fabric improvement can be benchmarked, delivering confidence to market participants, including lending institutions. As a result of the potential applications of this metering capability in the context of the 'ecosystem', this solution will be considered in more detail, alongside the 'digital customer journey' solutions in the separate Report mentioned earlier, with a focus on the Knauf Energy Solutions smart metering technology as a case study.

Table 1: *Main criticalities and solutions of the "Customer Journey".*

Identified Criticalities	Identified Solutions
Lack of simplicity and transparency: <ul style="list-style-type: none"> - Administrative burden - Long process 	Online Guide: <ul style="list-style-type: none"> - EEM Information Platform - One-stop shop - EE Calculator
Additional transaction costs: <ul style="list-style-type: none"> - Valuation - Energy Audit - Certifications costs 	Link property value with Energy performance: <ul style="list-style-type: none"> - Merge Energy and Valuation expertise / requirements - EE criteria in Valuation reports

Table 2: *Main criticalities and solutions related to energy efficiency criteria.*

Identified Criticalities	Identified Solutions
EE criteria too ambitious to reach critical market size	Rely on EPC labels and certification
Lack of public data available (EPC data coverage and access)	Ask for a recent (2 years max) EPC
Lack of common quality standards within current EPC data	Rely on publicly available EPC databases (of which the quality and vintage is updated by public body or certified independent agency)

Table 3: *Main criticalities and solutions related to energy efficiency monitoring*

Identified Criticalities	Identified Solutions
Difficulties for banks to work with energy consumption data: <ul style="list-style-type: none"> - Data privacy issues (GDPR) - Real consumption data issues - Dynamic monitoring issues 	Work with EPC data and specific control points in time (before and after EE upgrades)

3.2 Risk Management

One of the underlying premises of the EEMI is that building energy efficiency is negatively correlated to credit risk, i.e. the more energy efficient a building is, the lower the credit risk for the bank of the underlying mortgage financing. This has been recognised as being central to the business case for

lending institutions and has the potential to drive a virtuous circle of benefits for all market participants. Research conducted under the EEMI²³ points to the reason for this being twofold: (1) the more energy efficient a building, the more disposable income available in a household as a result of lower energy bills, meaning there is a lower probability of default of the borrower and (2) the more energy efficient a building, the higher its value and the lower the potential losses for the bank in the event of default.

The potential risk mitigating effect of building energy performance is clearly relevant from a risk management perspective, as a result of its impact on probability of default and loss given default, two measures of riskiness.

Discussions with lending institutions point to four elements which are critical to the risk management associated with energy efficient mortgages, namely those which are specifically relevant to the calculation of borrower default probability and loss given default, driven by the loan-to-value (LTV) of the loan:

- Creditworthiness Assessment
- Property Valuation
- Energy Performance Risks
- Capital Requirements and impact on RWA

The particular challenges highlighted by lending institutions as associated with these elements are outlined in the tables below, but typically focus on an inability to account for energy savings in risk parameters, uncertainties around energy performance and their impact on risk parameters and lack of data.

A first response to these challenges was the development under the EEMI of a common data protocol to help lending institutions manage the additional complexity of energy efficiency mortgages and organise information flows more efficiently. The resulting “Master Template”²⁴ is an excel document which facilitates the gathering of all relevant data points related to EEM for the purposes of mortgage origination, underwriting and funding, as well for regulatory reporting processes. Beyond the ‘traditional’ data points, the Master Template also provides best practice guidance to lending institutions on what minimum additional energy efficiency and property related data should be collected in order to originate EEM, namely EPC category/score and year of construction. Essentially, the Master Template can be used as an internal checklist to support the integration of all energy efficiency related risk and value information into their lending decisions. It also has important benefits for the potential issuer of EEM covered bonds or securitisation programmes, which will be explored in more detail in the ‘funding section’ of this Report.

An important complement to the EEMI Master Template is the Harmonised Disclosure Template (HDT)²⁵ of the Energy Efficient Mortgage Label²⁶ which alongside the ‘ecosystem’ is considered to be a key driver of energy efficient mortgage market development. To recall, the EEM Label is intended as

²³ <https://energyefficientmortgages.eu/wp-content/uploads/2021/07/BE-IT-NL-UK-Correlation-Analysis.pdf>,
<https://energyefficientmortgages.eu/wp-content/uploads/2021/07/Italian-Correlation-Analysis.pdf> &
<https://energyefficientmortgages.eu/wp-content/uploads/2021/07/Extended-Dutch-Correlation-Analysis.pdf>

²⁴ <https://energyefficientmortgages.eu/knowledge-hub>: See EEMI Master Template

²⁵ <https://www.energy-efficient-mortgage-label.org/hdt>

²⁶ <https://www.energy-efficient-mortgage-label.org/>

a quality and transparency benchmark to promote trust in and secure regulatory recognition of the energy efficient mortgage asset class. The HDT is an excel-based form that lending institutions which have been granted the EEM Label use to disclose information on their energy efficient mortgage products, with the primary aim of facilitating and therefore improving access to relevant, consistent and comparable data on energy efficient mortgages within and between jurisdictions for investors, regulators and other market participants for due diligence purposes. It is anticipated that this transparency will support the ongoing substantiation of the negative correlation between building energy performance and credit risk, supporting a potential realignment of capital requirements, by allowing for enhanced evaluation and tracking of the financial performance of EEM relative to alternatives and provides greater transparency regarding climate risks and resilience.

On this subject and with a view to supporting potential future efforts to secure an appropriate capital framework for EEM, in a different Report²⁷ under this Project, Copenhagen Economics has analysed the potential impact of the risk mitigating factors of energy efficient mortgages on capital requirements. They then benchmarked the results from this exercise against what would be the current treatment of EEM under the Capital Requirements Regulation (CRR) in the EU in order to identify gaps in the regulatory capital framework to be addressed and subsequent recommendations which could be taken up in order to appropriately account for energy efficiency aspects in the existing framework.

Significantly, in recent years and months, developments in the regulatory framework mean that the possibility of the credit risk mitigation impact of energy efficiency being reflected in the capital framework has become more tangible, with supportive references in draft legislation on capital requirements²⁸ (*Article 208*) and mandates to the European supervisory authorities to explore the potential for a dedicated prudential treatment for exposures to green assets²⁹ (*Art. 501c*). This emphasises the value of lending institutions undertaking audits of their existing loan portfolios using the Master Template to identify and tag existing energy efficient mortgages and implement the necessary infrastructure, processes and procedures to originate this type of mortgages. This exercise is all the more pertinent against a background where physical and transition risks will put pressure on banks' loan books and regulators' and supervisors' attention is already focussing not only on the best performing assets from a sustainability perspective, but also those assets and the related exposures which are most at risk from climate change.

With regard to this last point, most recently, the EEMI has been in dialogue with market stakeholders which are supporting the identification of energy efficiency, climate and environmental risks in banks' lending portfolios against the background of the EU Taxonomy, the extensive EU sustainability disclosure requirements and the ECB's supervisory expectations in this area. The IT platform launched by Sociedad de Tasación in Spain and approved by the Bank of Spain is a pioneering example also here.

²⁷ https://energyefficientmortgages.eu/wp-content/uploads/2021/12/Draft-report_REV_EEMI-layout.pdf

²⁸ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021PC0664>

²⁹ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02013R0575-20210930&from=EN>

Table 4: Main criticalities and solutions related to Credit Worthiness Assessment

Criticalities	Solutions
Impacts on energy savings too small to be implemented	To develop an easy-to-use energy savings calculator at European level that can quantify the energy saved in monetary terms. By integrating the investment cost, one can also assess the cost efficiency of the renovation and assess it with the full mortgage cost. (UCI tool and e-calculator Flanders Region)
Impact on PD biased by the fact that households that do the investment have already a low risk profile (social standards bias)	

Table 5: Main criticalities and solutions related to Property Valuation

Criticalities	Solutions
Lack of uniform calculation method for LTV	Policy recommendation to include energy performance standards within the valuation methods
Lack of favourable conditions for the customer	

Table 6: Main criticalities and solutions related to Specific Energy Performance Risks

Criticalities	Solutions
Rebound effect	Policy recommendation to include energy performance standards within the valuation methods
Renovation cost efficiency monitoring	
Post Mortgage Compliance risk	

Table 7: Main criticalities and solutions related to Capital Requirements and impact on RWA

Criticalities	Solutions
Lack of historical data to produce empirical evidence	Pool data from several EU countries
Lack of energy performance representativity in some markets (not enough A labels to make robust statistical assessments)	Focus on short term (2-3 years duration) and build tangible figures for EC Action plan on sustainable Finance

3.3 Marketing

Alongside simplicity, transparency and cost effectiveness in the customer journey, which are considered as important aspects to generate and sustain demand for EEM, actually making consumers aware of the availability of these products and helping them to understand their potential is the first step to stimulating market development.

Discussions with lending institutions in this area have given rise to a large number of perceived challenges not only in relation to consumer awareness, but also in relation to targeting, product profile, communication/product awareness and banks reputation and branding. These criticalities and the potential solutions identified by lending institutions to address these are outlined in the tables below.

As a first concrete response to these challenges, the EEM Label is intended, at least in part, to raise the profile of EEM, whilst acting as a quality and transparency benchmark to build trust and confidence, which, together, will promote supply and uptake. At the time of writing, the EEM Label Committee is implementing a 'grid' of labelled products to help private and professional customers navigate to lending institutions and their EEM products across the EU. At the same time, it is anticipated that the EEM Label will support reputation building and branding for the EEM Labelled Institutions as a result of the high-profile and visibility of the EEMI and the EEM Label, the widespread authority support for it and its strong visual identity.

In parallel to these efforts, the NEEM Project is currently undertaking efforts to deliver behavioural optimised guidance to stimulate building energy performance improvements. This will provide invaluable insights for raising awareness of EEM products and for the development and deployment of the right tools/products for households and SMEs which address behavioural barriers to investment in building energy efficiency, particularly renovations. Given the potential value of this work in supporting product design, shaping the customer journey and guiding the market demonstrators and other EEMI national market hubs, the analysis is explored in greater detail in section 4 of this Report.

Table 8: *Main criticalities and solutions related to Marketing*

Criticalities	Solutions
Low level of market awareness	Conduct a national/regional survey about awareness and household behavior
Enhance awareness	Communication through national/regional states and then via professional associations and banks
Enhance the willingness of the buyers, renters, renovators (and new builders) to invest	Mandatory miles stones for each group/ Tax incentives
Keeping a smooth process	EPC valuable for all target groups without heavy extra costs (EPC cost partially subsidised)

Table 9: *Main criticalities and solutions related to Targeting*

Criticalities	Solutions
Retail Customers: home needs (buying, renovation)	Picking up mortgage applying phase to set specific interviews. Potential customers should be clearly identified by a database that might collect the relevant information.
Retail Customers: Energy Efficiency needs	Picking up invoices payment or billing management for energy providers

Building Companies of the new residential market	Mortgages with big-size restoring purposes. Financial operations for new buildings
Retail Customers restoring residential building	Special offering for building companies
Analysis of market changes regarding green mortgages	Tracking the market changes in all countries

Table 10: *Main criticalities and solutions related to Product profile*

Criticalities	Solutions
Process simplification	Fast evaluations, simple document checklist, customer support partnerships, mortgage
Price Management (Flexible Price over performance)	Unsecured offering (lighter than mortgages) to introduce and easily promoting e-finance
Lighting devices / Furniture discounts in partnership	Efficiency enhancement price sensitive (based on the energy rating improvement); Partnership with main furniture / domestic appliances dealers and energy providers

Table 11: *Main criticalities and solutions related to communication/product awareness*

Criticalities	Solutions
Enhancing Network – Dedicated Teams	Website communication, banner in ATM, Social networks, leaflet in branch offices, Newspapers' interview, Bank associations actions and protocols
Knowledge Management for branch offices	E-learning, Vademecum, Focused documents and training
Evaluation Services provided by Banks with energy efficiency-oriented product (solutions for energy saving)	Business partnership with networks / skilled professional services
Comarketing with institutions	Development relations with any Social Institution (Domestic, International, Associations, Dealers...)
Increasing public awareness	Involvement of National and European Authorities in the communication process

Table 12: *Main criticalities and solutions related to banks' reputation or branding*

Criticalities	Solutions
Ethically oriented finance	Consumer associations involvement, comarketing with environment care associations or local institutions
Enhancing environment conditions	Communications about improvement in building customers or effect of the green mortgages.

New selling proposition and advanced role in public marketing	Forcing opening of the new «green» public throughout institutional communication actions.
---------------------------------------------------------------	-------------------------------------------------------------------------------------------

3.4 Partnerships

Customer research³⁰ and dialogue with lending institutions in the context of the EEMI have pointed to the potential value in an holistic approach to EEM, according to which the lending institution, the energy company and SMEs, for example, partner up to provide an integrated product offering, which delivers a seamless and simple process for financing and carrying out building energy renovation, including necessary certifications, ensuring an optimal customer journey. This speaks directly to the objective of designing and deploying an EEM ‘ecosystem’ as described in the retail/origination section of this Report.

In this respect, ongoing efforts to deliver this integrated ‘ecosystem’ of products and services are necessarily also focussed on identifying and mobilising strategic partnerships involving a broad range of stakeholders in local markets, which will in turn deliver win-win relationships among market actors, incentivising rewarding engagement in the market. It is furthermore anticipated that the channelling of private financial resources through EEM will also trigger new investments in research & development in ancillary sectors and growth in the entire energy efficiency sector.

With this game-changing potential in mind, a variety of different partnerships have been identified by lending institutions as being supportive of market development:

- Government Partnerships
- Partnerships with utility providers
- Partnerships with energy experts

As indicated elsewhere in this Report, a variety of innovative digital solutions are emerging which integrate relevant service providers and experts into the digital customer journey, delivering the simplified and cost-efficient approach that is widely recognised as the optimal way of securing the supply and uptake of EEM and achieving the much-needed renovation of the EU’s buildings stock.

With regard to partnerships with government, it has always been the intention under the EEMI that EEM be a stand-alone, private financing mechanism, independent of public funding. However, there is significant potential to accelerate market development and reinforce the mechanism through institutional support and public policy alignments, whether this is on international, European, national, or local levels. In this respect, other Reports in this series consider the range of relevant public support mechanisms and then hone in on optimal schemes and characteristics which could be deployed in national EEM ‘ecosystems’ to complement EEM and ensure a mutual leverage effect. As a result of its scale and subsequent importance in the Italian market and therefore relevance for the Italian market demonstrator, more details on the 110% Superbonus and the interaction with the private finance sector are provided in Section 4 of this Report. A critical analysis of the Superbonus in order to extract lessons to guide optimal leverage between private and public mechanisms will be provided in a separate Report under this Project³¹.

³⁰ <https://energyefficientmortgages.eu/wp-content/uploads/2021/07/Consumer-Research-DE-IT-SE-UK-2018.pdf>

³¹ Will be available at www.energyefficientmortgages.eu in due course.

Table 13: *Main criticalities and solutions related to partnerships*

Criticalities	Solutions
Government Partnerships: Common policy and regulatory framework.	Lobbying and industry associations speaking with a single voice; EPC requirement and rewarding system.
Partnerships with Utility Providers: Smart solutions giving real time feedback for homeowners.	Dissemination of the information on best practices to improve the customer journey.
EE Advisors: Detailed advice on the best measures generating energy savings.	Case studies on best practices should be reviewed and shared with a broader audience. Only partners with expertise, scale and quality certification can be involved in the partnerships.

3.5 Funding & Investor Relations

One of the keys to the long-term success and longevity of a market in EEM is a robust value chain which drives a virtuous circle for all market participants. A key aspect of this value chain, directly associated with the origination of EEM, is the funding mechanisms behind the mortgage portfolios and the investors who invest in the debt securities e.g. covered bonds or and securitisation.

Designing an EEM product and framework requires careful consideration of the appropriateness of these for the underlying funding mechanism and very importantly the needs of investors buying the bonds. Indeed, since 2015 in particular in Europe, the issuance of green bonds has increased exponentially, and investor demand is increasingly oriented towards sustainable investments, pointing to the opportunities to further develop the market in this respect by delivering EEM assets to serve as underlying collateral for the bonds.

And it is this last point regarding EEM assets, which is typically considered by lending institutions and other stakeholders³² to be a key criticality (see table below for full set of considerations in this area) in relation to green funding activities i.e. the lack of eligible 'green' mortgage assets aligned with covered bond programmes, for example, and sustainability frameworks. Alongside this are concerns about a lack of data availability, standardisation and disclosure.

On the asset side, through its efforts to support the origination of EEM and deploy an integrated EEM ecosystem, leveraging on digital solutions, the EEMI is progressively helping to respond to the challenge of insufficient assets by actively encouraging the purchase of energy efficient properties or promoting energy efficient renovation of existing buildings.

At the same time, significant efforts have been and are being undertaken to improve the collection, processing and disclosure of standardised data on the asset side of the mortgage business through

³² <https://sustainabonds.com/gss-covered-growth-seen-easing-as-asset-constraints-bite/>

the EEM Label by way of clear definitions and standardised data collection and disclosure templates. This is matched on the liabilities side by efforts, dating back to 2018, in the context of the Covered Bond Label to make green covered bonds more visible and facilitate investor due diligence through a dedicated definition of a sustainable covered bond³³ and the possibility of tagging eligible issuances with a 'green leaf' icon.

It is anticipated that these efforts, alongside many of the relevant activities described earlier in this Report as well as advocacy activities to secure the appropriate treatment of covered bonds in the context of the EU Green Bond Standard for example³⁴, will further unlock the potential of green funding.

Table 14: *Main criticalities and solutions related to mortgage loans (assets)*

Criticalities	Solutions
New assets & existing energy-efficient assets	Energy efficient definitions
Lack of precise definitions	EPC level A and B as best practice
Too ambitious goals	Parallel alternative best 20% of the existing real estate market
Renovated assets	Renovation definitions
Lack of precise improvement definitions	Improvement of 1 to 2 levels but minimum C
	Parallel alternative minimum improvement 30% of energy consumption
Grandfathering	Timeline
Question of eligibility after several years	Grandfathering of loans which were state of the art at time of granting

Table 15: *Main criticalities and solutions related to Impact reporting*

Criticalities	Solutions
Impact of retail loans	Retail benchmark
Lack of a standardised definition	Define national benchmarks for retail mortgage loans

³³ <https://www.coveredbondlabel.com/issuers/Index/>

³⁴ <https://hypo.org/app/uploads/sites/3/2021/09/EMF-ECBC-Comments-on-the-Proposal-for-a-Regulation-on-EUGBS-14.09.21.pdf>

Impact of commercial loans	Commercial benchmark
Lack of a standardised definition	Define national benchmarks for commercial mortgage loans
Green Bond Principles	Standard
Basis for green loan definition	Should be guidance for EEMI
Harmonised framework for impact reporting	Standard
Dialogue with the initiative	Should be guidance for EEMI

Table 16: *Main criticalities and solutions related to Non-Banking issues*

Criticalities	Solutions
Avoidance of non-banking related issues	Data tracking
Tracking of annual energy performance over lifetime of a loan	Should be covered by energy providers
No set-up in place	National registers to map loans and energy consumption
No budget	
Challenging of banks	No need to challenge first movers or followers
	Issuers have gone the extra mile
	Banks have invested time and money into their internal green projects
	Sometimes reduction of interest rates

3.6 IT & Data

Within lending institutions, it was recognised early in the EEMI that data would be fundamental to the development of a robust EEM product and sustained market development. Different definitions of energy efficiency across and within EU countries, the lack of a standardised framework for data collection at mortgage origination and short sample histories when data are potentially available have all contributed to overall challenges in data availability, accessibility and usage in recent years. Lending institutions also highlight concerns about the resources required to integrate ESG considerations into their IT systems. The main criticalities identified and their potential solutions are detailed in the tables below.

In the meantime, and as described earlier in this Report, significant efforts have been made through the EEMI to respond to the challenges of a lack of consistent definitions and standardised data collection frameworks within and across EU Member States through: (1) a definition of an energy efficient mortgage³⁵ through the EEM Label, (2) a data infrastructure, with the Master Template at its heart, to

³⁵ <https://www.energy-efficient-mortgage-label.org/about-us/convention>

support the gathering, processing and disclosing of data linking financial and asset performance in a standardised manner and (3) the Harmonised Disclosure Template (HDT) of the EEM Label, currently being delivered through the present Project, focussed on the disclosure of data on EEM mortgage portfolios.

Importantly, the Master Template and the HDT are based on and aligned with existing disclosure templates in order to maximise synergies across disclosure requirements and subsequently reduce burden on banks in terms of time and cost.

As already alluded to above in relation to energy efficiency monitoring, different national interpretations of the GDPR have in some countries limited access to national EPC registers, undermining the ability of lending institutions to integrate this data into their internal processes and procedures, whether this be for reporting, risk management or funding purposes. The EMF-ECBC recently drafted an amendment to the recast of the Energy Performance of Buildings Directive (EPBD) to secure access to all energy performance data of buildings necessary to determine EU Taxonomy alignment and the permission to process that data³⁶.

Finally and largely as a response to data availability and accessibility issues, it is worth pointing here to efforts under the NEEM Project to analyse the existing data foundation relevant for EEM as well as data gaps that limit financial institutions in their ability to provide these products in the Nordic region³⁷. This will be complemented by analysis in the Region to identify cost-efficient data sources that can close existing gaps and develop roadmaps for automated harvesting of data at the asset level. This research could provide interesting insights for the market demonstrators and the EEMI national hubs in developing and testing the 'ecosystem'. For this reason, this research is considered in more detail in section 4 of this Report.

It is anticipated that these actions, together with the digital solutions highlighted throughout this section of the Report, will provide lending institutions, investors and SMEs with access to a continuous flow of material data on building energy performance (EPCs, primary energy demand), supporting EU Taxonomy alignment and ESG counterparty ratings.

Table 17: *Main criticalities and solutions related to Availability of data*

Criticalities	Solutions
EPC data	EPC data
Low percentage of buildings with EPC	Making EPC mandatory within a certain limited timeframe (e.g. 5 years)
High cost of EPC data	Validity: limit validity of EPC in time (important for new mortgages);
No encouragement measures for the property owners.	Reducing EPC costs: subsidies; Trigger: link EPC to certain fiscal advantages (will also increase the renovation rate).

³⁶ <https://hypo.org/app/uploads/sites/3/2022/03/EMF-ECBC-Proposal-for-an-Amendment-to-EPBD-recast-31.03.22.pdf>

³⁷ <https://neemhub.eu/publications/data-foundation-for-scaling-energy-efficient-mortgages-in-denmark-norway-and-sweden>

<p>Property data</p> <p>In several countries limited availability of valuation reports (only in 1/5 of the mortgages applications)</p> <p>Cost of the property valuation report (if we would need a valuation report for each mortgage).</p>	<p>Property data</p> <p>Integrating the property valuation in the EPC, so we need only 1 report which can be created by 1 expert (2 versions: basic & detailed to limit costs if needed);</p> <p>Using Fintech solutions and open data to gather the information.</p>
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Table 18: *Main criticalities and solutions related to Accessibility of data*

Criticalities	Solutions
<p>Format</p> <p>Lack of electronic data available for everyone.</p>	<p>Format</p> <p>Creating an online platform in which all data suppliers can encode data and making it accessible for legitimate stakeholders.</p> <p>All data needs to be linked to an unequivocal and official identification criteria (unique key) for each property.</p>
<p>Structure / definitions</p> <p>Some data points can be stored in different formats. (e.g. EPCs have 4 values -a letter and a number in kWh/m² per year for Energy consumption and a letter and a number in kg CO₂/m² per year for carbon emissions-)</p> <p>Definitions of data points can be different even within one country making analyses and comparisons nearly impossible. (e.g. LTV and household income are calculate in different ways by different banks).</p>	<p>Structure / definition</p> <p>Creating clear structure requirements and definitions for all data points to be able to compare the values and create usable analyses.</p>
<p>Privacy/GDPR</p>	<p>Privacy / GDPR</p> <p>Defining clear rules on who can access/use the data (e.g. banks can only access the data for their portfolio, energy suppliers can only access the real consumption data, ...).</p>

Table 19: *Main criticalities and solutions related to IT-systems*

Criticalities	Solutions
<p>Timing</p> <p>Many data providers will need time to update their IT-systems to comply with the EeMAP / EeDaPP requirements</p> <p>Regulatory updates have always priority and a lot of these are ongoing are coming in the next years.</p>	<p>Timing</p> <p>Having clear guidelines / requirements to allow efficient IT development</p> <p>Define deadlines based on impact evaluation of all impacted data providers</p>
<p>Costs</p>	<p>Costs</p> <p>Reducing data needs & reporting to the strict minimum needed</p> <p>Providing subsidies / financing within EeDaPP project</p> <p>Provide extra revenues for Energy Efficient Mortgages (e.g. lower capital requirements, reviewed RWA, ...)</p> <p>Provide easy real-time access to EeDaPP database (API) allowing the same process & commercial efficiency for EEM's compared to classical mortgages</p>

3.7 Technical experts

With the holistic 'ecosystem' approach in mind, efforts to design and deploy an EEM 'ecosystem' necessarily include a carefully selected value chain of actors. In particular, the specific nature of building energy performance and the fact that the expertise in this area is not a competence of the banking industry means that the inclusion of technical experts in the 'ecosystem' is absolutely fundamental to the design and deployment of efficient and robust products and related infrastructures.

Efforts to build the ecosystem of stakeholders and services are pinpointing the appropriate role of technical experts in the value chain and, as indicated earlier, digital customer journey solutions are showing how accredited technical experts, with the necessary skills and capabilities, can be integrated into the 'ecosystem'.

Table 20: *Main criticalities and solutions related to Technical Experts*

Criticalities	Solutions
<p>Site inspections: Cost of multiple experts; In some countries EPCs / valuations may be carried out without site-inspection.</p>	<p>Site inspections: Building renovation passports – may allow for more ‘desk-top’ due diligence to be carried out; Transaction costs should be part of the savings calculations.</p>
<p>Accreditation of installers and SMEs Reliable installers managing the renovation.</p>	<p>Accreditation of installers: Appropriate existing training packages prior to an installer being accredited; Governments develop/endorse a Quality Mark (as in UK) – funders can support anything carrying the Quality Mark with reduced due diligence requirements; A system of monitoring and evaluating of installers’ work standards.</p>

4. Case Studies:

4.1 Consumer Behavioural Research: Assisting financial institutions in overcoming behavioural barriers when promoting energy refurbishment services and products³⁸

The financial institutions (FIs) in the Nordics are at different stages of maturity in terms of fulfilling the aim of becoming a one-stop-shop for energy efficient renovations. A common factor is that they all aim to connect the client to an external partner to initiate the energy efficient renovation journey. FI do not want the task and responsibility of conducting energy renovations themselves.

Constructing optimal business model and collaborations between FI, clients, and external energy refurbishment providers, is crucial to accelerate the green transition and the main goal in the Nordic Energy Efficient Mortgage Hub project (the NEEM project).

For this to happen, the actions involving all three key stakeholders should be behaviourally optimised:

- First, the outreach strategy of the FI's should be as effective as possible. Whether the approach is digital or analogue it must be behaviourally optimised. See more below.
- Second, the behavioural barriers of homeowners should be efficiently addressed. Both FI's and external partners should integrate customised solutions to the target group, e.g. elderly couples, families, households with large equity, etc.
- Third, collaboration models between FIs and external energy partners need to strike a perfect balance between interests of the two parties. That is rarely the case, meaning that the customer loses interest in too one-sided business proposals.

At a glance: Behavioural learnings from optimising outreach strategies

When FI's promote green products and services, two main outreach channels are used: Digital and analogue. In recent FI initiatives, both have yielded impressive conversion rates: Among 100 positive reactions to digital letters or phone calls, 13.4 % and 13.7 % have completed an energy efficient renovation, respectively.

Key behavioural learnings so far regarding analogue approaches: Proper preparation and the advisor's commitment is key when calling customers. Setting limitations to create comfortability is key when having client meetings. Engaging the local community is key when hosting seminars.

Key behavioural learnings so far regarding digital approaches: Retention rather than attraction is key for online landing pages (SEO cannot do the job). Wording and timing is key for direct messaging (both online or mobile banking). Trust and transparency is key when hosting webinars.

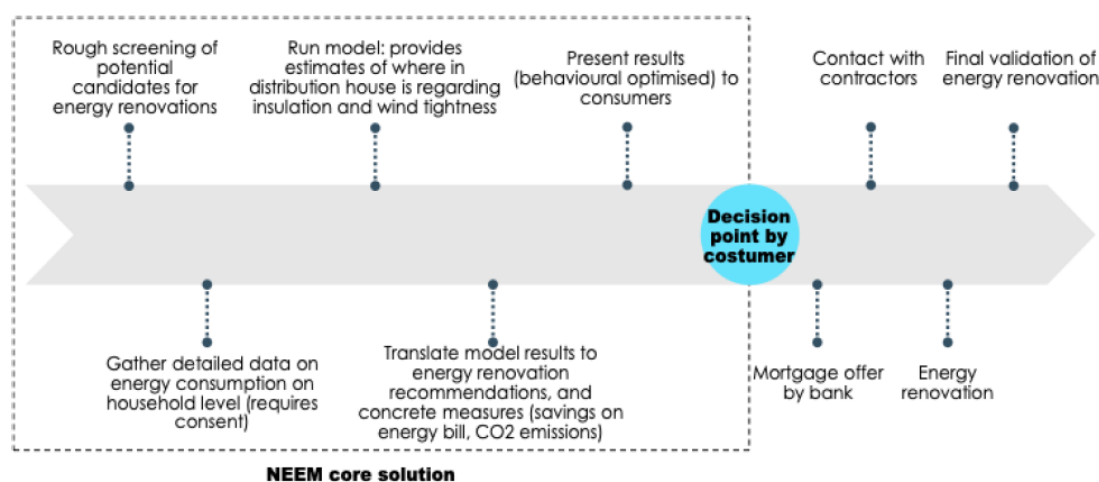
As with many complex products, 'context is king', meaning how *exactly* these key take-aways can be addressed depends on specifics for the FI.

³⁸ Provided by Jossi Steen-Knudsen, Behavioural Advisory.

4.2 Data foundation for scaling up energy efficient mortgages in Norway, Sweden & Denmark

Through the Nordic Energy Efficient Mortgage Hub (NEEM)³⁹ and with a focus on the Nordic Region, efforts are being undertaken to ensure that lending institutions have sufficient data available to them to scale-up lending for energy renovations. The Report indicates how these efforts require a value chain of inputs, starting with a foundation of energy, real estate and weather data, which can provide support banks and other financial service institutions engaged in the asset class of real-estate.

Figure 3. NEEM solution process.



Source: <https://neemhub.eu/publications/data-foundation-for-scaling-energy-efficient-mortgages-in-denmark-norway-and-sweden>, p.7

In a first step, the Green Digital Finance Alliance has focussed on 'data discovery' and gap analysis by way of a mapping exercise of the available energy data supply in each of the Nordic countries and a classification of data according to data source, data quality, frequency of updates and data granularity⁴⁰. The objective of this exercise was to assess the availability and readiness of data to be deployed by banks for two main purposes:

1. Use of data for initial screening of potential candidates in a mortgage portfolio for energy renovations
2. Remote identification of the reason for energy inefficiencies (including lack of air tightness, insulation or behaviours) which are insights to guide design of a renovation package or financing.

The data supply profile for each country was developed by describing data available to lending institutions across the four main data categories, highlighting quality issues or data gaps: (1) energy consumption data, (2) energy production or energy source data, (3) building parameter data and (4) weather data.

³⁹ The Nordic Energy Efficient Mortgage (NEEM) Hub: <https://neemhub.eu/>

⁴⁰ <https://neemhub.eu/publications/data-foundation-for-scaling-energy-efficient-mortgages-in-denmark-norway-and-sweden>

All three countries have developed or as in the case of Sweden, are in the process of development of energy data hubs. The Nordic market is defined by the different degrees of data fragmentation driven by domestic factors, therefore all countries represent a different level of readiness for the NEEM solution case (Figure 3). Each market has been screened for the following categories: consumption, real estate, methodological and EPC data. This allowed for the identification of similarities and differences across the Nordic market and to develop potential solutions that can facilitate the process of data collection.

Table 21: Data sources per country

Data sources in Denmark

	CONSUMPTION DATA	REAL ESTATE DATA	METEOROLOGICAL DATA	EPC-DATA
Description	Datahub database with hourly metering data from all households.	Real estate data from Bolig- og Bygningsregistrets open API (DAWA).	Weather data from DMI Open Data API.	Energistyrelsens complete database of EPCs. requires contact to ENS.

Data sources in Norway

	CONSUMPTION DATA	REAL ESTATE DATA	METEOROLOGICAL DATA	EPC-DATA
Description	Elhub database with hourly metering data from all households	Lantmäteriet Byggnadsdirekt API	Weather data from Open API	National EPC-database hosted by Enova at

Data sources in Sweden

	CONSUMPTION DATA	REAL ESTATE DATA	METEOROLOGICAL DATA	EPC-DATA
Description	Need agreements with the grid operator in the area of Sweden	Lantmäteriet Byggnads API	SMHI Open Data	National Board of Housing, Building and Planning's API to the EPC database (Boverket)

Source: <https://neemhub.eu/publications/data-foundation-for-scaling-energy-efficient-mortgages-in-denmark-norway-and-sweden>

The authors find the following for each country:

- Denmark: the data foundation is fairly well-developed and is ready for the two purposes described above, although there will be certain challenges, for example related to data quality in certain instances, which will need to be addressed.
- Norway: the data infrastructure is ready for the two purposes described above. Again, there will be challenges to be overcome, for example relating to data gaps and lack of access to certain datasets.
- Sweden: certain improvements will be needed to the data foundation in order to be ready for the two purposes described above, in particular related to the fragmented nature of the data foundation and lack of access to hourly energy consumption data.

The next steps in this exercise will focus on data expansion i.e. an identification of the data ecosystem available to source the identified missing EE raw data sets short and longer term in the three countries. All of these steps are being undertaken in parallel to a screening and mapping of the supply side of data software solutions available in the Nordics⁴¹ as well as deployed by lending institutions in other EU markets with a view to exploring the possibility of testing prototype algorithms for remote screening and automated retrofitting advice adapted to a flexible energy system, as well as for remote verification of savings.

The 'methodology' described above will serve as a very useful guide for other national jurisdictions to conduct similar audit and gap analysis exercises, as well as explore the potential for a similar algorithm to be applied for the purposes of remote screening and automated advice.

⁴¹https://neemhub.eu/onewebmedia/Deliverable%20D2.3%20metrics%20demand%20and%20supply_NEEM%20Hub_20220419.pdf

4.3 The Italian Superbonus 110%

In 2020 and to address the Covid-19 emergency, the Italian Government introduced a series of measures to support Italian families, starting from the 'Cure Italy Decree'. These measures were then subsequently strengthened and extended by the 'Relaunch Decree' and the 'August Decree' [...]. The Relaunch Decree introduced a 110% tax deduction for costs incurred in relation to energy performance and/or earthquake protection work, **with the possibility of transferring the relative tax credit**. This applies to expenses incurred from 1 July 2020 to 31 December 2021 for thermal insulation work and other measures to improve energy efficiency. Any work to reduce the earthquake risk is also included ('earthquake bonus') as is work to install photovoltaic systems and columns to charge electric vehicles".⁴²

The possibility of transferring the relative tax credit to banks and insurance companies makes these subjects crucial to the renovation of residential buildings. Banks can be involved only at the end of the process as a buyer of fiscal credit or, if banks finance the building improvements, the future credit is usually booked in advance. The loans are typically personal loans or credit lines for construction companies, and the credit can be sold by both the owner and the construction company (using the discount on the invoice). Potentially, low-income owners can improve their buildings with the support of a bank that finances and/or buys the credit, thereby contributing to reducing energy poverty.

This section is focused on how and when banks are involved in the Superbonus processes.

The Superbonus stakeholders

The list of actors involved in the process to obtain and then sell the fiscal credit related to Superbonus are:

- Landlords;
- Construction companies;
- Professionals (technical and fiscal);
- Valuers, audit;
- Banks (and partners).

Landlords (single proprietors or co-owners) who decide to improve the energy performance of their properties require advisory support to understand renovation options: for example, if the building is eligible and the works are sustainable and technically possible. A partnership between the landlord and other actors is essential to complete the home renovation.

Construction companies and professionals (architects, engineers, ...) are fundamental in assessing costs, timelines, and limits. They are the partners of property owners throughout the entire process, from definition to execution and certification. To access the Superbonus incentive, technical certifications are requested by the Italian fiscal agency, the national agency for energy efficiency. Banks can ask clients to provide them with documents to verify the planned Superbonus operation before buying tax credits.

⁴² Italian Government, Ministry of Finance, *The measures introduced by the Italian government to support families*: <https://www.mef.gov.it/en/covid-19/The-measures-introduced-by-the-Italian-government-to-support-families-00001/>

The process of document verification before, during, and after the improvements requires specialised knowledge. For this reason, **strategic and legal consulting companies or valuers and auditors** with fiscal or technical knowledge are an important part of the ecosystem around the Superbonus. Consulting firms support customers and banks through the process of home renovation. In short, their digital platforms help applicants to collect all the needed documents. Consulting firms can also produce certificates or second opinions on the documentation that secure the fiscal credit; these companies connect applicants and banks, helping the latter to buy and trade credits.

Banks are "facilitators" of Superbonus operations and are crucial in determining whether a home renovation can be financed and in buying the tax credits.

The role of public agencies has been limited to that of controller. The revenue income agency, the agency for energy efficiency, and other administrative departments were not able to support citizens because of the number of applications, also if FAQs were published and updated. A more active role of local administrations could improve efficiency in terms of communication and effectiveness.

Box 2. Superbonus overview

Superbonus: a short description

The Superbonus scheme supports two kinds of building renovation:

- *Energy efficiency work;*
- *Anti-seismic adaptation work.*

The Superbonus procedure is available to applications from:

- *The residential building or property owners (including beneficial owners or tenants);*
- *Housing cooperatives;*
- *Others (Public entities that manage social housing. Non-profit organizations, amateur sports associations).*

The main interventions are:

- *Thermal insulation of the building envelope;*
- *Replacement of heating or air conditioning systems in residential buildings (boilers, heat pumps, etc.);*
- *Structural improvements to prevent earthquakes damage.*

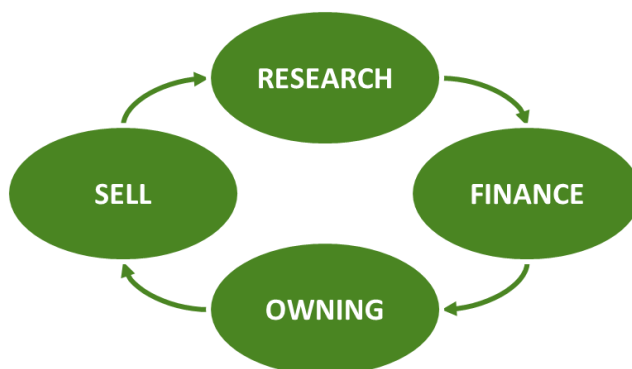
Additional interventions are:

- *IoT systems, solar shields, water heaters;*
- *Photovoltaic systems with storage systems;*
- *Electric vehicle charging infrastructure;*
- *Removal of architectural barriers.*

Home ecosystem: a customer journey

Figure 4. Customer journey summary

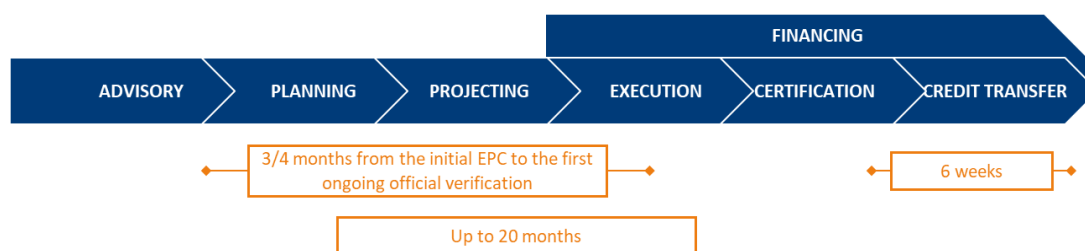
Figure 4 summarises the phases along the journey of buying, owning and selling a home. The ownership of a property involves research, purchase and sale. The Superbonus 110% is relevant in the ownership phase, and banks need tools to support clients in their energy efficiency renovation projects. Since 2020, CRIF has worked with more than 30 lending institutions to analyse their processes in order to put in place procedures to support the technical analysis and estimation of future benefits, costs, and time needed for given Projects.



Applicants should first check with their technical partner that the improvements they wish to carry out are eligible for the Superbonus 110% (advisory and planning phases). Upon confirmation, the beneficiary can engage with contractors and launch the work that requires certification in order to generate a credit (projecting, execution, and certification steps). As described above, the possibility of transferring the tax credit provides a unique opportunity for the banking sector to play a central role in the renovation process (financing and credit transfer).

This section aims to analyse the touchpoint between banks and customers, following the process designed in Figure 5.

Figure 5. Analysis of the touchpoint between banks and customers



Source: CRIF

Advisory

The advisory phase requires that applicants identify their partners (technical experts such as energy saving experts or construction companies) to plan the renovation works. Sometimes clients select a bank before other partners, as banks are crucial to respond to financial needs and it is important to ensure that a bank will buy the fiscal credit once the home renovation is complete. For this reason clients prefer to sign an agreement with a bank as soon as possible in the process.

Lending institutions play the role of information hub, providing data about both fiscal incentives and their commercial offers. The assessment of a building's energy efficiency status requires specialised knowledge but banks can support potential applicants with a first cost/benefit analysis. IT solutions

play a crucial role in the preliminary phase of the customer journey, supporting clients in defining their needs. As indicated above, digital solutions will be analysed in a separate Report in this series, but useful digital instruments related to the Superbonus are:

- Quantobonus110 is a free tool provided by ANCE (the construction companies' national association). It defines the maximum cost, laid down by law, for potential renovation work;
- GreenBees is a tool developed by CRIF that simulates the benefits and costs of an energy renovation.

Bottlenecks: Absence of green products to finance buildings' energy efficiency, lack of specialised knowledge.

Best practices: Use of digital tools to support customers, engaging them from the beginning of their journey to improve their building energy efficiency.

Planning and Projecting

Once they are aware of the opportunities provided by the Superbonus, clients start to plan their home renovation. As indicated elsewhere in this Report, banks are still in the process of designing home renovation ecosystems that can support customers in the selection of partners for the works, and the integration of new and different systems and processes must be streamlined in order to secure efficiency and cost effectiveness.

Bottleneck: Absence of ecosystem or suggested partners, procedures not focused on building features and value.

Best practices: The use of digital platforms, transparent processes, supply chain control.

Financing

Once the project has been planned by applicants' technical partners, before commencing the works, customers need to know if a bank will finance and then buy their credit. For these reasons, banks have processes in place to assess the requests. Companies with fiscal and/or technical know-how become banks' partners to support them through the process of finance and credit acquisition. Banks buy technical reports to evaluate the projects in case of bridging loans or assess the profile of the applicants to buy their future credit (for example using KYC tools).

Bottleneck: Absence of green products to finance buildings energy efficiency renovation, lack of building data in banks' systems.

Best practices: New procedures to evaluate risks and collect and store building information. For example, the establishment of new policies to only finance owners or construction companies that are able to obtain the fiscal credit.

Execution, Certification and Credit transfer

The validation process involves public and private verifiers. Banks and customers need to cooperate to collect all documents that certify the quality of the building renovation, so as to avoid future verification by national agencies. Once the documentation has been collected, banks' administrative departments execute the fiscal credit transfer and releases the stipulated amount to the customer.

Partnerships between banks and other firms are crucial because specialised knowledge is required to evaluate the paperwork before executing the credit transfer. Indeed customers have to collect cadastral, fiscal, and technical documents, invoices, and proof of payments to prove that building improvements have been carried out and the objectives reached. These partner firms analyse the paperwork and provide banks with a guarantee that the renovation process has been executed correctly and that the objectives have been achieved.

Bottleneck: Lack of specialised knowledge, lack of monitoring of building performance, management of building data.

Best practices: A transparent process helps applicants during the execution phase and after this phase to collect and produce all necessary document and certifications.

5. References

EBA Single Rulebook

<https://www.eba.europa.eu/regulation-and-policy/single-rulebook/interactive-single-rulebook/100433>

Berlin Hyp Green Loan Products

<https://www.berlinhyp.de/en/customers/products>

Banco Intesa Sanpaolo Green Mortgage Product

<https://www.intesasanpaolo.com/it/persone-e-famiglie/prodotti/mutui/mutuo-green-acquisto-riqualificazione-casa.html>

Caja Rural de Navarra (2022). Inaugural Green Covered Bond: Investor Presentation.

<https://www.cajaruraldenavarra.com/sites/default/files/crn-inaugural7-y-green-covered-bond-4feb2022.pdf>

Baccegga, T., Bedin, A., Billio, M., Hristova, I., Riedel, M. (2019). Technical Report on Econometric Assessment & Results

<https://energyefficientmortgages.eu/wp-content/uploads/2021/07/BE-IT-NL-UK-Correlation-Analysis.pdf>

Basis. (2018). Green Mortgages: Spain & Portugal

<https://energyefficientmortgages.eu/wp-content/uploads/2021/07/EON-Green-Mortgages-Debrief-with-appendices-051218.pdf>

Billio, M., Costola, M., Fumarola, S., Hristova, I., Pelizzon, L., Portioli, F., Riedel, M. & Vergari, D. (2020). Final report on correlation analysis between energy efficiency and risk.

<https://energyefficientmortgages.eu/wp-content/uploads/2021/07/Italian-Correlation-Analysis.pdf>

Billio, M., Costola, M., Pelizzon, L., & Riedel, M. (2020). Buildings' Energy Efficiency and the Probability of Mortgage Default: The Dutch Case. *University Ca'Foscari of Venice, Dept. of Economics Research Paper Series No. 6*.

<https://energyefficientmortgages.eu/wp-content/uploads/2021/07/Extended-Dutch-Correlation-Analysis.pdf>

Bogdan, L. (E.ON), Weimann, L. (E.ON), Henderson, J. (BASIS), Feldwick, H. (BASIS), Hope, C. (BASIS), Rimmer, L. (BASIS). (2021). Consumer Research Insights in for Germany, Sweden, Netherlands, Italy, Hungary, Romania.

<https://energyefficientmortgages.eu/wp-content/uploads/2022/04/EeMMIP-2022-Complete-Report-Consumer-Insights-Green-Mortgage-Propositions-Feb-2022.pdf>

Copenhagen Economics. (2021). Appropriate prudential framework for energy efficient mortgages.

https://energyefficientmortgages.eu/wp-content/uploads/2021/12/Draft-report_REV_EEMI-layout.pdf

Energy Efficient Mortgage Label Harmonised Disclosure Template (2021). <https://www.energy-efficient-mortgage-label.org/hdt>

European Commission. (2018). Smart finance for smart buildings investment facility. https://ec.europa.eu/clima/system/files/2018-11/initiative_7_smart_en.pdf

European Commission. (2021). Proposal for a regulation of the European Parliament and of the Council amending Regulation (EU) No 575/2013 as regards requirements for credit risk, credit valuation adjustment risk, operational risk, market risk and the output floor. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021PC0664>

European Commission.(2021). Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012.

<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02013R0575-20210930&from=EN>
European Commission. (2021). Annex to the Commission Delegated Regulation supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by establishing the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to climate change mitigation or climate change adaptation and for determining whether that economic activity causes no significant harm to any of the other environmental objectives. https://eur-lex.europa.eu/resource.html?uri=cellar:d84ec73c-c773-11eb-a925-01aa75ed71a1.0021.02/DOC_2&format=PDF

European Mortgage Federation-European Covered Bond Council (EMF-ECBC). (2021). EMF-ECBC Response to European Commission Consultation on the Proposal for a Regulation on European Green Bonds. <https://hypo.org/app/uploads/sites/3/2021/09/EMF-ECBC-Comments-on-the-Proposal-for-a-Regulation-on-EUGBS-14.09.21.pdf>

European Mortgage Federation-European Covered Bond Council (EMF-ECBC). (2022). Proposal for an Amendment to the Energy Performance of Buildings Directive. <https://hypo.org/app/uploads/sites/3/2022/03/EMF-ECBC-Proposal-for-an-Amendment-to-EPBD-recast-31.03.22.pdf>

Hartenberger, U., Lorenz, D., Sayce, S. (2019). EEMI Valuation Checklist Background Explanation & Guidance. <https://energyefficientmortgages.eu/wp-content/uploads/2021/07/EEM-Property-Valuation-Guidelines.pdf>

Italian Ministry of Finance. (2020). The measures introduced by the Italian government to support families. <https://www.mef.gov.it/en/covid-19/The-measures-introduced-by-the-Italian-government-to-support-families-00001/>

Marijewycz, M., Worrall, S., Weimann, L., Parkinson, C., Hope, C., Feldwick, H. (2018). Creating an Energy Efficient Mortgage for Europe Consumer Research Insights

<https://energyefficientmortgages.eu/wp-content/uploads/2021/07/Consumer-Research-DE-IT-SE-UK-2018.pdf>

Nordic Energy Efficient Mortgage Hub (2021). Data Foundation for Scaling Energy Efficient Mortgages in Denmark, Norway and Sweden.

<https://neemhub.eu/publications/data-foundation-for-scaling-energy-efficient-mortgages-in-denmark-norway-and-sweden>

Nordic Energy Efficient Mortgage Hub (2022). Prioritised list of metrics to enable an AI supervised approach.

https://neemhub.eu/onewebmedia/Deliverable%20D2.3%20metrics%20demand%20and%20supply_NEEM%20Hub_20220419.pdf

Sustainabonds. (2022). Bumper GSS covered bond growth seen easing as asset constraints bite.

<https://sustainabonds.com/gss-covered-growth-seen-easing-as-asset-constraints-bite/>

6. Annexes

6.1 Annex I

Organisation name	Country	Branches	Type
ABN AMRO	Netherlands	Netherlands,Belgium,United Kingdom	Universal Bank
AEGON	Netherlands	Netherlands	Insurance Group
Alpha Bank Romania	Romania	Romania	Universal Bank
Argenta Bank	Belgium	Belgium,Netherlands,Luxemburg	Universal Bank
AXA Bank	Belgium	Belgium	Universal Bank
Banca Monte dei Paschi di Siena, BMPS	Italy	Italy	Universal Bank
Banco BPM	Italy	Italy	Banking Group
BANCO DELLE TRE VENEZIE	Italy	Italy	Universal Bank
Belfius Bank & Verzekeringen	Belgium	Belgium	Banking Group
Berlin Hyp AG	Germany		Real estate financier
BNL Gruppo BNP Paribas	Italy	Italy	Universal Bank
BNP Paribas Fortis	Belgium	Austria,Belgium,Bulgaria,Czech Republic,Denmark,France,Finland, Germany,Hungary,Ireland,Italy,Luxembourg,Norway,Netherlands,Poland,Portugal,Romania,Russia,Serbia, Slovakia,Spain,Sweden,Switzerland, Ukraine,United Kingdom	Universal Bank
BNP Paribas UK	United Kingdom		Universal Bank
BPER Banca	Italy	Italy	Universal Bank
Caisse des Dépôts Group	France	France	Credit Institution
Caixa Geral de Depósitos, CGD	Portugal	Portugal	Universal Bank
Caja Rural de Navarra	Spain	Spain	Credit Institution
CASSA CENTRALE BANCA	Italy	Italy	Universal Bank
Cassa di Ravenna	Italy	Italy	Universal Bank
CiviBank	Italy	Italy	Universal Bank
Colibri Mortgages	Netherlands	Netherlands	Foundation
Compagnie de Financement Foncier	France	Austria,France,Switzerland,	Credit Institution
Crédit Agricole	Italy	Italy	Universal Bank
Crelan	Belgium	Belgium	Universal Bank
Deutsche Hypothekbank	Germany	Germany	Universal Bank
DNB Boligkreditt AS	Norway	Norway,Denmark,Sweden,Luxemburg	Loans company
DZ BANK	Germany	Germany	Universal Bank
Ecology Building Society	United Kingdom	United Kingdom	Building Society
Friulovest Banca	Italy	Italy	Universal Bank
Garanti Bank	Romania	Romania	Credit Institution
Groupe BPCE	France	France	Universal Bank
Helaba	Germany	Germany,Spain,France,Sweden	Universal Bank
Hello Bank	Czech Republic	Czech Republic	Universal Bank
Hemma	Sweden	Sweden	Mortgage Bank

Technical Report on Market Research

Iccrea Banca	Italy	Italy	Universal Bank
ING Belgium	Belgium	Belgium,Luxembourg	Universal Bank
Intesa Sanpaolo	Italy	Italy	Universal Bank
KBC Bank	Belgium	Ireland,France,United Kingdom,Netherlands,Germany,Italy	Banking services
Mortgage Society of Finland, Hypo	Finland	Finland	Credit Institution
Münchener Hypothekenbank eG	Germany	Germany,Spain,France	Mortgage Bank
Norddeutsche Landsbank, NORD/LB	Germany		Universal Bank
Nordea Bank	Sweden	Denmark,Finland,Norway,Sweden, Estonia,Poland,Austria,Belgium,Germany,Italy,Luxembourg,Portugal,Spain,Switzerland,United Kingdom	Universal Bank
Nordea Eiendomskreditt	Norway	Norway	Mortgage Bank
Nordea Kredit	Denmark	Denmark	Mortgage Bank
Nordea Mortgage Bank	Finland	Finland	Mortgage Bank
Onesto Groep	Belgium	Belgium	Universal Bank
OP Mortgage Bank	Finland	Finland	Credit Institution
OTPBANK	Hungary	Hungary	Universal Bank
PKO Bank Hipoteczny	Poland	Poland	Mortgage Bank
PKO Bank Polski	Poland	Poland	Universal Bank
Rabobank	Netherlands	Netherlands	Credit Institution
Raiffeisen Bank	Romania	Romania	Universal Bank
Société Générale	France	Italy,Austria,Belgium,Bulgaria,Czech Republic,Denmark,Estonia,Finland,France,Germany,Greece,Hungary,Iceland,Ireland,Latvia,Liechtenstein,Lituania,Luxemburg,Netherlands,Norway,Poland,Portugal,Romania,Russia,Spain,Sweden,Switzerland,Ukraine,United Kingdom	Universal Bank
Société Générale CIB	Italy		Credit Institution
Sparkasse	Italy	Italy	Universal Bank
Stabelo	Sweden	Sweden	Insurance Group
Swedbank	Sweden	Sweden	Universal Bank
Takarék Mortgage Bank (TBC)	Hungary	Hungary	Mortgage bank
Triodos Bank	Belgium	Netherlands,Belgium,Germany,France,United Kingdom,Spain	Universal Bank
Triodos Bank	Spain		Universal Bank
UBI Banca	Italy	Italy	Universal Bank
Unicredit	Italy	Italy	Universal Bank
Unión of Créditos Inmobiliarios, UCI	Spain	Spain,Portugal	Credit Institution
Volksbank Alto Adige	Italy	Italy	Universal Bank

ABN AMRO. Retrived from: <https://www.abnamro.com/en/home>

AEGON. Retrived from: <https://www.aegon.com/home/>

Alpha Bank Romania. Retrived from: <https://www.alphabank.ro>

Argenta Bank. Retrived from: <https://www.argenta.be>

AXA Bank. Retrived from: <https://www.axabank.be>

Banca Monte dei Paschi di Siena, BMPS. Retrived from: <https://www.mps.it>

Banco BPM. Retrived from: <https://www.bancobpm.it>

BANCO DELLE TRE VENEZIE. Retrived from: <https://www.cherrybank.it>

Belfius Bank & Verzekeringen. Retrived from: <https://www.belfius.be/retail/fr/index.aspx>

Berlin Hyp AG. Retrived from: <https://www.berlinhyp.de/en/>

BNL Gruppo BNP Paribas. Retrived from: <https://bnl.it/it>

BNP Paribas Fortis. Retrived from: <https://group.bnpparibas>

BNP Paribas. Retrived from: <https://www.bnpparibas.co.uk/en/>

BPER Banca. Retrived from: <https://www.bper.it>

Caisse des Dépôts Group. Retrived from: <https://www.caissedesdepots.fr>

Caixa Geral de Depósitos, CGD. Retrived from:
https://www.cgd.pt/English/Institutional/Pages/Institutional_v2.aspx

Caja Rural de Navarra. Retrived from: <https://www.cajaruraldenavarra.com/en/our-dna>

CASSA CENTRALE BANCA. Retrived from: <https://www.cassacentrale.it/it>

Cassa di Ravenna. Retrived from: <https://www.lacassa.com/ita/>

CiviBank. Retrived from: <https://www.bancodelletrevenezie.it/it/>

Colibri Mortgages. Retrived from: <https://www.colibrilife.com>

Compagnie de Financement Foncier. Retrived from: <https://foncier.fr/en/>

Crédit Agricole. Retrived from: <https://www.credit-agricole.it>

Crelan. Retrived from: <https://www.crelan.be/fr/particuliers>

Deutsche Hypothekenbank. Retrived from: <https://www.deutsche-hypo.de>

DNB Boligkreditt AS. Retrived from: <https://www.dnb.no/en/personal>

DZ BANK. Retrived from: <https://www.dzbank.com>

Ecology Building Society. Retrived from: <https://www.ecology.co.uk>

Friulovest Banca. Retrived from: <https://www.friulovestbanca.it/privati/>

Garanti Bank. Retrived from: <https://garantibank.eu>

Garanti BBVA Mortgage. Retrived from: <https://www.garantibbva.com.tr>

Groupe BPCE. Retrived from: <https://groupebpce.com>

Helaba. Retrived from: <https://www.helaba.com>

Hello Bank. Retrived from: <https://www.hellobank.cz>

Hemma. Retrived from: <https://www.hemma.se>

Iccrea Banca. Retrived from: <https://www.iccreabanca.it/it-IT/Pagine/default.aspx>

ING Belgium. Retrived from: <https://www.ing.be/en/retail>

Intesa Sanpaolo. Retrived from: <https://www.intesasanpaolo.com>

KBC Bank. Retrived from: <https://www.kbc.ie>

Mortgage Society of Finland, Hypo. Retrived from: <https://www.hypo.fi>

Münchener Hypothekenbank eG. Retrived from: <https://www.muenchenerhyp.de/en>

Norddeutsche Landsbank, NORD/LB. Retrived from: <https://www.nordlb.com>

Nordea Bank. Retrived from: <https://www.nordea.dk/privat/produkter/boliglaan/nordea-kredit.html>

Nordea Eiendomskreditt. Retrived from: <https://www.nordea.no/om-nordea/om-nordea/samarbeidspartnere/nordea-eiendomskreditt.html>

Nordea Kredit. Retrived from: <https://www.nordea.dk/privat/produkter/boliglaan/nordea-kredit.html>

Nordea Mortgage Bank. Retrived from: <https://www.nordea.fi/en/personal/our-services/loans/nordea-mortgage-bank-plc.html>

Onesto Groep. Retrived from: <https://www.onesto.vlaanderen/nl/home>

OP Mortgage Bank. Retrived from: <https://www.op.fi/op-financial-group>

OTPBANK. Retrived from: <https://www.otpbank.hu/portal/hu/Maganszemelyek>

PKO Bank Hipoteczny. Retrived from: <https://www.pkobp.pl/grupa-pko-banku-polskiego/spolki-w-grupie-pko/pko-bank-hipoteczny/>

PKO Bank Polski. Retrived from: <https://www.pkobp.pl>

Rabobank. Retrived from: <https://www.rabobank.com/en/home/index.html?languageDoesNotExists=it>

Raiffeisen Bank. Retrived from: <https://www.raiffeisen.ro>

Société Générale CIB. Retrived from: <https://www.societegenerale.com/en>

Société Générale. Retrived from: <https://www.societegenerale.it/it/>

Sparkasse. Retrived from: <https://www.sparkasse.it>

Stabelo. Retrived from: <https://www.stabelo.se>

Swedbank. Retrived from: <https://www.swedbank.se>

Takarék Mortgage Bank (TBC). Retrived from: <https://www.en.takarekjb.hu/maganszemelyek>

Triodos Bank (ES). Retrived from: <https://www.triodos.es/es>

Triodos Bank. Retrived from: <https://www.triodos.com>

UBI Banca. Retrived from: <https://www.intesasanpaolo.com/it/ubi-banca.html>

Unicredit. Retrived from: <https://www.unicredit.it/it/privati.html>

Unión of Créditos Inmobiliarios, UCI. Retrived from: <https://uci.com/index.aspx>

Volksbank Alto Adige. Retrived from: <https://www.volksbank.it/it/home>

6.2 Annex II

Origination/Retail

Participating banks	Observers
BPER (IT) Crédit Agricole (IT) BNPP PF (UK) Banco BPM (IT) ABN AMRO (NE) Münchener Hyp (DE) Friulovest Banca (IT) Nordea (DK) Nordea (NO) Volksbank Alto Adige (IT) Unicredit (IT)	Verband deutscher Pfandbriefbanken Febelfin UKGBC Royal Institution of Chartered Surveyors IFC

Risk Management

Participating banks	Observers
Belfius (BE) BNP Paribas (UK) Unión of Créditos Inmobiliarios, UCI (ES) Munchener Hyp (DE) UniCredit (IT)	Febelfin Verband deutscher Pfandbriefbanken Ca' Foscari Royal Institution of Chartered Surveyors CRIF UKGBC SAFE

Marketing

Participating banks	Observers
AXA Bank (BE) Banco BPM (IT) BMPS (IT) BNP Paribas (UK) BPER Banca (IT) Crédit Agricole (IT) NORD/LB (DE) UCI (ES)	Febelfin Verband deutscher Pfandbriefbanken Ca' Foscari Royal Institution of Chartered Surveyors CRIF UKGBC SAFE

Partnerships

Participating banks
BNP Paribas (UK) Credit Agricole (IT) KBC (BE) Nordea (DK) Rabobank (NL) Unicredit (IT)

Funding & Investor Relations

Participating banks	Observers
ABN Amro (NL) Banco BPM (IT) Berlin Hyp AG (DE) BNP Paribas (UK) BNP Paribas (UK) BNP Paribas (UK) Caisse des Dépôts Group (FR) Caisse des Dépôts Group (FR) Caja Rural de Navarra (ES) KBC Bank (BE) Münchener Hypothekenbank eG (DE) Norddeutsche Landesbank, NORD/LB (DE) Nordea Eiendomskreditt (NO) Nordea Kredit (DK) UniCredit (IT)	European Datawarehouse Febelfin Hypoport TXS UK Regulated Covered Bond Council Verband deutscher Pfandbriefbanken European Bank for Reconstruction & Development World Bank

IT & Data

Participating banks	Observers
ING (BE) Caja Rural de Navarra (ES) Friulovest Banca (IT) KBC Bank (BE) OP Mortgage Bank (FI)	Ca' Foscari University of Venice European Datawarehouse Hypoport Royal Institution of Chartered Surveyors TXS World Bank

Technical experts

Participating banks	Observers
Berlin Hyp AG (DE) BNP Paribas (UK) BPER Banca (IT) Friulovest Banca (IT) Nordea (DK) Rabobank (NL) Triodos Bank (BE)	CRIF European Builders Confederation Flemish Construction Confederation Febelfin Tinsa Group