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Enabling Building Decarbonization Through Sustainable Finance

Introduction



Image: Pexels, Johannes Plenio

In Europe, the building sector contributes to approximately **36% of the greenhouse (GHG) emissions**.

Additionally, nearly the entire building stock is considered energy inefficient, with an average building renovation rate of less than 1% each year across the European Union).¹

Significant actions and investments are required to mobilize the European building sector towards net zero. Building renovation is one of the sectors with the most significant investment gap in the EU. It has been estimated that 275 billion euros of additional investment in building renovation is needed each year to achieve the 55% GHG reduction target of the EU Renovation Wave² by compared to 1990 levels. To finance this transformation, the financial industry requires clear guidance on **decarbonizing their mortgage and commercial real estate (CRE) portfolios rapidly**.

Financial Institutions (FIs) can influence the decarbonization of building stock in their portfolios. By implementing suitable and effective interventions in the form of innovative and financial products that will help achieve a net-zero emission building stock at least cost and without detours. To propel this, it is relevant to understand which (financial) products can incentivize the decarbonization of buildings in the European context with the least cost and delay

Implementing suitable interventions in the form of innovative financial and non-financial products can help achieve a net-zero emission building stock at least cost and without detours.

To prompt decarbonization action, PCAF supports FIs in identifying appropriate sustainable financial products and linking them to the reduction of GHG emissions.

To enable this, PCAF organized a knowledge-sharing session with FIs and other market participants to gather sufficient input. The focus of the session was to link the financial products with the decarbonization of the building portfolios. The session featured a subject matter expert who shared how public-private finance could support building decarbonization.

Prior to this, PCAF conducted preparatory research on financial products, including interviews with FIs from various European countries to understand and validate the chosen sustainable finance products.

In the following sections, methods and approaches used to gather input are discussed, followed by key findings. These findings are summarized as recommendations for the European financial sector.

This paper is developed in the scope of the PCAF project Financing towards net-zero buildings, funded by the Laudes Foundation.

¹ The Renovation Wave aims to at least double the annual energy renovation rate by 2030 and in addition to reducing emissions and creating green jobs in the construction sector which is dominated by local businesses, it will improve overall living standards for Europeans.

² Buildings Performance Institute Europe (BPIE) (2017); European Commission (EC) (2020a)

2. Methods and Approach

To gain a better understanding of the landscape of sustainable finance products and how these can effectively support the decarbonization of European buildings, the following approach was undertaken:

PREPARATORY RESEARCH

The first step involved preparatory research on both financial and innovative non-financial products that can incentivize building emissions reduction.

First, financial and non-financial products were identified. Secondly, an analysis of how these products can be interlinked was performed.

After the analysis, the selection of products was narrowed down based on relevance. Relevance was determined by effectiveness, maturity, accessibility (which covered complexity, related costs, effort involved) and the extent of market use.

Ultimately, idealized pathways linking financial and non-financial products to building decarbonization were created. This research consisted of a comprehensive literature review, analysis of industry reports and case studies, as well as consultation with internal and external (see interviews with FIs) subject matter experts.

INTERVIEWS WITH FIs

The preparatory research was complemented by interviews with FIs across European countries. Discussions involved the selection of products (i.e. completeness, correctness), (the effectiveness of) their interlinkage, and other topics such as current and expected challenges concerning the implementation of these products and requisite market maturity.

KNOWLEDGE SHARING SESSION

A knowledge-sharing session was conducted for a group of participants including European FIs and leading organizations with a focus on decarbonizing the built environment. During this session, key findings from the preparatory research were shared. An open discussion followed, leading to a comprehensive understanding of the effectiveness of the idealized pathways, and the implementation challenges to be expected.

EXPERT KNOWLEDGE INPUT

The knowledge-sharing session included a presentation given by a subject matter expert who illustrated how public-private finance can support building decarbonization. On behalf of Global Building performance Network (GBPN) and in collaboration with the Indonesian Ministry of Finance, Poppy Ismalina had conducted extensive research³ on fiscal and financial options to incentivize sustainable buildings in Indonesia. The outcomes of the research apply to the European context and prompted an exchange of views that fed into our findings.

³ Setiawan S, et al., (2021) - Green Finance in Indonesia's Low Carbon Sustainable Development

3. Financial products considered

3.1. RESEARCH FINDINGS

The identification of the landscape of both financial and non-financial products has led to a selection deemed most relevant for incentivizing building emissions reduction for FIs. These findings were validated by expert and stakeholder input. This section provides a brief description of these products as well as their interlinkage.

The following financial products were identified:

PROPERTY-LINKED FINANCE	<ul style="list-style-type: none">• This is a loan linked to the property - rather than to the property owner. It results in repayment obligations transferring to the new owner when a property is sold.• Property owners only pay for energy efficiency measures until they sell their property, while new buyers benefit from a more energy efficient, potentially more valuable property, in return for continuing to make regular payments• It supports homeowners by funding up to 100% of the upfront costs of energy efficiency improvements.
GREEN MORTGAGES	<ul style="list-style-type: none">• A mortgage specifically targeted at green buildings.• A bank or mortgage lender offers a house buyer a preferential term if they can demonstrate that the property for which they are borrowing meets certain environmental standards.• Green mortgages aim to incentivize homeowners to invest in improving energy efficiency by providing for instance lower interest rates, additional borrowing capacity, cashback and/or refunds as well as non-financial benefits (e.g. free EPC assessments, advisory services). Eligible green activities concern the improvement of energy efficiency in existing homes and the purchase of highly efficient homes.
SUSTAINABILITY-LINKED LOANS/ BONDS	<ul style="list-style-type: none">• A sustainability-linked bond (SLB) is a financial product where financial terms are linked to the achievement of predetermined sustainability performance targets (i.e. sustainability or ESG metrics within a given timeframe).• These metrics are formulated as Key Performance Indicators (KPIs) or Sustainability Performance Targets (SPTs) and interest rates and potential penalties in case targets are not met are contingent on the achievement of these indicators. In this case, KPIs can include building GHG emission reduction targets to incentivize decarbonization.• Sustainability-linked loans (SLL) work according to the same principles.• For SLLs, the interest rate of the loan may increase if the borrower fails to achieve the agreed-upon sustainability performance target, and vice versa.

4. Non-financial products considered

The following non-financial products were identified:

BUILDING ENERGY MODELLING AND DIGITAL TWINS

- Building Energy Modelling (BEM) is a **software tool that simulates building energy use**. A BEM program takes as input a description of a building including geometry, construction materials, heating and lighting, occupancy patterns, building orientation and more. Similarly, **Digital twins is a computational technique that creates a representation of buildings to simulate and analyze their energy performance**. Both BEM and Digital twins can be used to monitor performance, predict maintenance needs, and optimize operation of solar PV installations or other energy efficiency measures.
- Both tools can also be used to assess the energy efficiency performance of a building and therefore can be used as input for developing financial incentives.

DIGITAL PLATFORMS

- **Digital platforms are software solutions designed to optimize building energy performance** by providing data-driven insights and energy management services. Selected – based on maturity and popularity - digital platforms include Eliq, Kamma and Deepki.
- Eliq allows users to track their energy consumption in real-time via an application. The platform analyzes energy usage data to provide insights into consumption patterns and potential areas for optimization.
- Kamma: monitors energy data and optimize energy consumption, provides retrofitting advice and shows compliance with building regulations.
- Deepki collects and analyzes commercial real estate energy usage data

ESCOs

- An energy service company (ESCO) is a **business that provides a range of energy-related services** to commercial, industrial, and residential customers. These services typically include energy audits, energy-efficient upgrades, and energy management systems. ESCOs typically work on a project-by-project basis, where they identify potential energy-saving opportunities, provide financing options, and then implement and monitor the energy-saving measures.

ANALYTIC PLATFORMS

- Analytics platforms include Skenariolab: **an AI-driven platform that offers analysis of real estate market value, rental prices, energy performance, CO₂ emissions, and cost structure**. It analyzes how changing real estate conditions impact valuation.

The next section illustrates how linking these financial and non-financial products can result in different benefits. The uptake of the non-financial products can be incentivized by the financial products (and vice versa). The aim of this paper is to gain better understanding of how linking these non-financial to financial products could potentially result in various benefits such as improved product efficiency, the achievement of KPIs/SPTs, reduced risk related to meeting financial product requirements, and more.

5. Proposed interlinkage between digital platforms and sustainability-linked bonds



Idealized pathways interlinking the financial and non-financial products were proposed and discussed with participants during the knowledge-sharing session and through expert interviews. It is to be noted that these linkages represent hypothetical situations and are not based on real examples.

Digital platforms linked to support the realization of key performance indicators (KPIs) of sustainability-linked bonds

Example linkage 1: The FI issues an SLL/SLB with building emissions-related KPIs to clients and provides a 'partnership package' including the SLL/SLB and a digital platform membership.

- The digital platform is designed to **monitor and optimize building energy performance** and to do so, it gathers and provides real-time energy usage, visible to both clients and FIs.
- The platform **analyzes the data** and with the help of its **benchmarking** capabilities, allows for a **comparison of energy performance** against industry standards or similar buildings.
- Subsequently, it **identifies opportunities** for improvement and provides energy efficiency recommendation.
- Ultimately, these activities **support the achievement of the KPIs/SPTs related to building GHG reduction**.



6. Proposed interlinkage between ESCOs and property-linked finance

Energy Service Companies (ESCOs) increase a borrower’s eligibility for a green mortgage and reduce the risk of property-linked finance by supporting the implementation of energy-efficiency measures.

Example linkage 2: The FI provides financing to the client, while partnering with an ESCO to implement energy-efficiency measures.

- The ESCO **analyzes energy usage** of concerned buildings to understand the baseline, which will inform decisions on energy efficiency improvements
- It provides **technical expertise and support in evaluating energy efficiency measures** and its impact on property value. It supports in **identifying areas of inefficiency** and **potential opportunities** for energy savings. Once the most relevant energy-efficient measures are identified, the ESCO can support in **implementing and monitoring** those.
- The ESCO **provides energy usage data** and reports to demonstrate the property’s improved energy performance to the financial institution (lender). By doing so, it supports the borrower’s application for a (green) mortgage. More attractive green mortgage options will thus become available to the borrower.



Image: Unsplash, Leonard Neiderwimmer

- Finally, the ESCO can provide **maintenance** services to ensure that energy efficiency improvements continue to deliver the expected benefits over time.
- Ultimately, by collaborating with ESCOs, FIs **reduce the risk of property-linked finance loans not meeting requirements**. Furthermore, an ESCO supports the FI’s need in collecting reported data required to measure its Scope 3, category 15 financed emissions.



7. Challenges related to the implementation of non-financial products

The following challenges were identified through research, expert interviews and the knowledge-sharing session. FIs should consider appropriate responses to these challenges should they decide to implement the pathways illustrated in the previous section.



INCREASED RETURN ON INVESTMENT (ROI) REQUIREMENT

The adoption of innovative products such as digital platforms brings **additional expenses**, such as subscription and partnership costs, but also costs related to the technical integration of energy-saving measures. This **necessitates a sufficient RoI**, which might be a challenge depending on the effectiveness of the interlinked products – a pre-requisite for several digital platforms to perform effectively.



COMPLEXITY THROUGH INTERMEDIARIES

Intermediary parties (such as a broker) between a loan originator and a loan taker can **introduce complexities** in implementing innovative products as they add an **additional 'link' in the data collecting and systems processes**. Having an intermediary party involved implies that they should be willing and able to collect energy usage data and subsequently relay it to the financial institution (loan originator).



LIMITATIONS OF EPC-BASED PRODUCTS

Some innovative products are built on EPC-label data. For instance, Eliq and Deepki use EPC labels in their data collection. However, **EPC-related data need not always the optimum data for modelling the energy usage of buildings**. EPC labels are a theoretical estimate of building performance and do not show the *actual energy usage* of a building. Therefore, it is not always an accurate depiction of building energy usage.

EPC-related data might be limited or difficult to obtain in certain countries due to specific national regulations. This complicates the collection and analysis of energy usage data.

7. Challenges related to the implementation of non-financial products (cont.)



THIRD-PARTY DATA INTEGRATION

Compatibility between third-party and the internal data management systems of FIs is crucial to efficiently process any information.

Incompatibilities can result in data processing issues (e.g. manual interventions that lead to delays). It might also be challenging (e.g. high costs, effort) to implement an appropriate data processing system.



COMPLICATED END-USER JOURNEY

To incentivize building owners to decarbonize their buildings, a clear user journey is crucial. **The process of integrating financial and non-financial products should be straightforward to end users.** However, user journeys could be complex due to country-specific legislations (e.g. on subsidies), numerous stakeholders fulfilling different roles in the process, lack of transparency at certain steps, technical integration difficulties and so on. This can deter end-users from entering the process. FIs provide financing to end-users and therefore bear part of the responsibility to bring clarity to this process.



PRIVACY- AND CONSENT-RELATED ISSUES

Tenants can be reluctant to share energy usage data with FIs and intermediaries (e.g. data platforms, brokers) due to security or privacy concerns.

For instance, Spain has experienced an increase in the number of illegally occupied private properties partly as a result of energy usage data being misappropriated.³ Properties' energy usage was analyzed and properties with very low energy usage were targeted to be illegally occupied.

In addition, to implement energy-saving measures or data-collecting systems in tenanted properties, tenant's consent is required. Attaining this can be an additional hurdle for FIs and data collectors.



LIMITED MARKET MATURITY

The European (energy-efficient) building market is less mature compared to US and Australia markets. This is particularly the case for energy-related data collection and the integration of digital products incentivizing emissions reduction.

PRIVATE FINANCING

The arrival of innovative public/private funds might indicate that the European market is growing. Examples include the European Energy Efficiency Fund (EEEF) and Property Assessed Clean Energy (PACE) financing.⁴ EEEF is a private capital fund for climate-related investments to support the climate goals of the European Union to promote a sustainable energy market. PACE financing enables property owners to make their homes more efficient and resilient by contributing 100% of the hard and soft costs of completing an energy efficiency, renewable energy or resilience project.

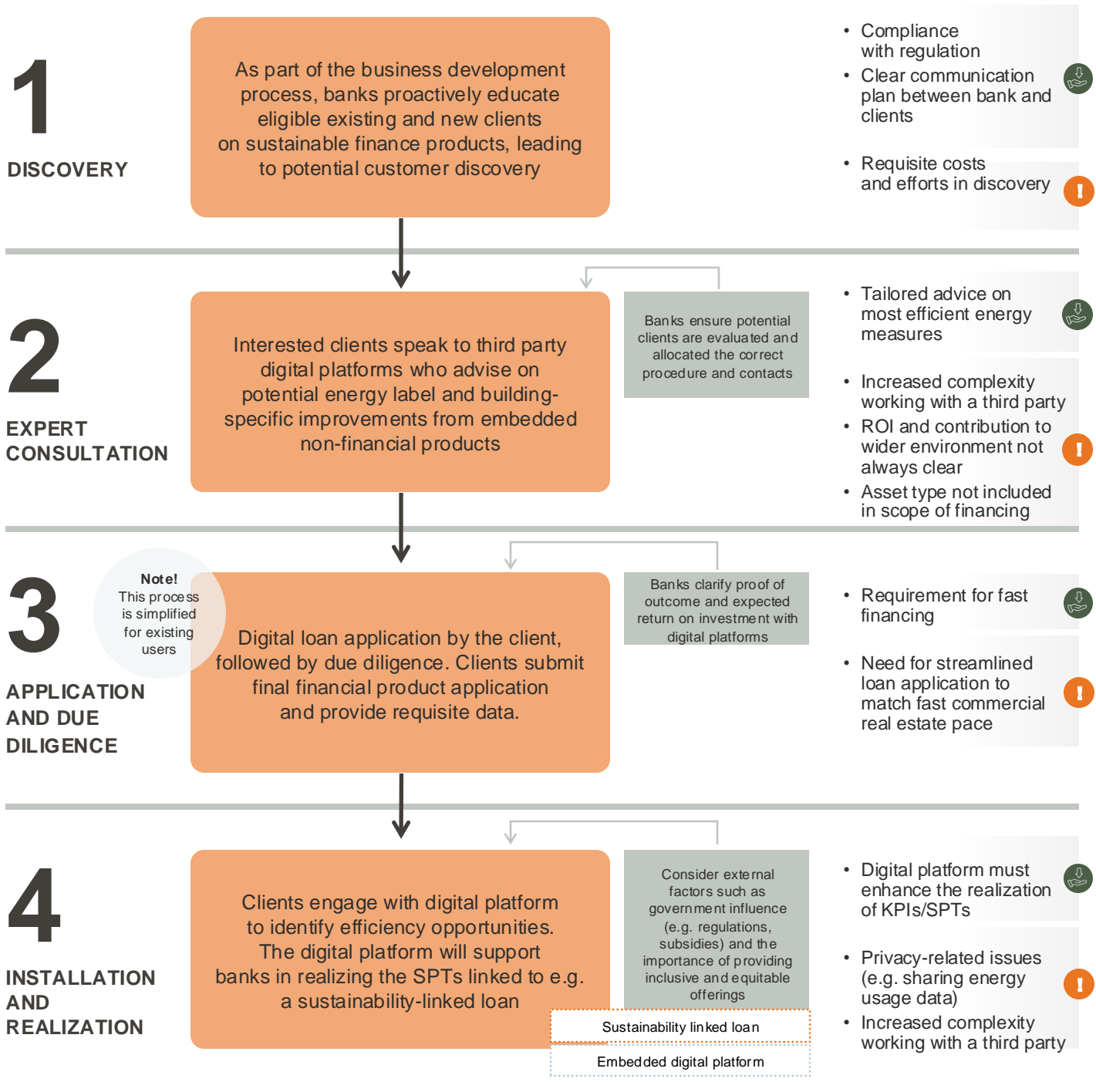
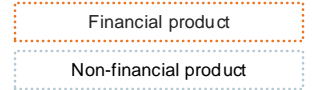
³ European Parliament (2024)

⁴ European Energy Efficiency Fund (EEEF) (2024)

8. User journey integrating financial and non-financial products

A potential user journey that demonstrates the embedding of a non-financial product with a sustainable finance product.

Needs Challenges



9. Next Steps

PCAF's aim with this paper is to support FIs by demonstrating the benefits of the interlinkages between sustainable finance and non-financial products, with the potential to reduce GHG emissions.

Based on the insights generated from this report, we recognize that the proposed embedding of non-financial products with financial products is very much an idealized concept. The challenges identified will need to be mitigated to a certain degree to enable this idealized version to be successfully commercialized.

As next steps, we recommend FIs to explore avenues to resolve the identified challenges, while engaging more with the digital platform ecosystem.

Overcoming challenges

Measures to overcome these challenges include gaining a deeper understanding of country-specific

privacy legislation (to enable collection and processing of energy usage data), understanding the financial impact of embedded products to better calculate and communicate the return on investment and implementing measures to simplify and increase transparency on the user journey.

Digital platform ecosystem

Digital platform providers and FIs could collaborate more to create synergies in providing tailored energy efficiency measures. Engaging with key players in this field will provide insights to FIs that enable an improved understanding of building energy efficiency and related changes. Eventually, this will support the move toward an embedded financial/non-financial product that can be offered to customers.



Image: Unsplash, Michael Beemer



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