



Energy
Efficient
Mortgages
Initiative

Exploring Global Best Practices in Energy Efficient Mortgages

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Executive Summary

The UN 2030 agenda and sustainable development goals and the Paris Climate Agreement have bound all nations across the globe to undertake ambitious efforts to combat climate change and adapt to its consequences. In this context, buildings are critical to the climate transition as they are responsible globally for 40% of energy consumption and 33% of global greenhouse gas emissions.

Massive efforts and significant investment will be required to ensure the built environment is sustainable and energy efficient. Private finance, as a complement to public money, has a key role to play in delivering on global climate and sustainability objectives by channelling private investment towards sustainable projects in support of the transition. Against this backdrop, the importance of green or sustainable finance and the potential for green or energy efficient mortgages to support the improvement of the built environment is increasingly recognised around the globe.

As global jurisdictions undertake efforts to respond to these challenges through private finance initiatives and legislative and supervisory actions, there is significant potential in exchanging information between these jurisdictions with a view to leveraging on best practice examples in the pursuit of building energy renovation and green/energy efficient mortgage market development. To this end, this Report is the result of a case study analysis in the following global jurisdictions: EU, Kenya, Malaysia and Japan. With a view to facilitating comparison and therefore the identification of best practice, we structure each case study broadly around: (1) the key pillars for accelerated market development in relation to energy efficient mortgages as identified under the Energy Efficient Mortgages Initiative (EEMI), (2) the regulatory framework for Sustainable Finance and building energy performance in each of the jurisdictions and (3) the different public support actions in place in each of the jurisdictions.

Inevitably, the starting point for each jurisdiction is different, determined by their stage of economic development, energy priorities and challenges, their climatic conditions and the nature of their building stocks and so on. However, what emerges very clearly is that the energy transition and 'green' finance are key priorities in all jurisdictions and the subject of serious and increasingly comprehensive actions, both public and private. Significantly, there are broad similarities across many of the areas of analysis mentioned above from which it is possible to derive valuable best practice indications:

Pillars of EEM Market Development

- *Consumer awareness/demand:* Consumer awareness of and demand for energy efficiency and energy efficient mortgages or green finance has typically been low across all jurisdictions studied, although interest is growing in all. Consumer research across jurisdictions typically points to the importance of understanding the drivers of consumer demand e.g. lower energy bills, protection against natural disasters, social pressure, environmental concerns. Common findings include the importance of awareness raising campaigns and the potential role of government subsidies in stimulating demand. Research from the EU with respect to EEM products specifically points to flexibility, transparency and simplicity as being key in securing demand, possibly combined with lower interest rates. The potential for differentiated products according to age and income is also highlighted in Japan.
- *Access to data:* All countries have building energy performance measurement systems in place, which will be crucial in providing data to support green/energy efficient mortgages. Best practice would appear to point towards mandatory certification of new and existing buildings, where practicable, and the availability of a publicly accessible database to record this data. Market-led templates specifically focussed on green/energy efficient mortgages, such as those developed under the EEMI, can help lending institutions manage the additional complexity of collecting and

potentially disclosing data in this area. In Malaysia, the Central Bank is also undertaking efforts to close the climate data gap for financial institutions.

- *Green Bond Markets:* There is growing recognition across all jurisdictions of the importance of green bond markets in supporting the transition, and all jurisdictions have taken action in this area. Globally, green bond markets are growing rapidly but remain relatively modest compared to conventional bond markets. In the green covered bond market, experience from the EU suggests that this dynamic is due to a lack of eligible assets, as well challenges associated with data availability, lack of standardisation and disclosure. EEMI-type initiatives, which are focussed on EEM market development, as well as efforts such as those through the Covered Bond Label around data, can support an increase in eligible assets and improve data availability, standardisation and disclosure. In Japan, the JHF Green Bond which is closely associated with the JHF Flat35S scheme received the Japan Green Bond Award and is recognised by the government as best practice in the Japanese market. Malaysia's green sukuk could be considered as best practice for the Islamic finance world.
- *Optimising the value chain:* There is growing awareness across jurisdictions of the value of an 'ecosystem' approach to energy renovation and/or green/energy efficient mortgages, with examples of successful partnerships, the integration of technical experts and architects in financing schemes, plans to train architects, developers and building companies and efforts to financially support SMEs in scaling up the transition. The EEMI is actively working on the establishment of a three-pillar 'ecosystem' consisting of a consumer renovation simulator, access to financing options through the EEM Label and a 'marketplace' of accredited suppliers.

Regulatory & Supervisory Framework

- *Sustainable Finance, Supervisory Expectations & Monetary Policy:* Governments and central banks across all jurisdictions are undertaking efforts to promote sustainable finance and set supervisory expectations around managing climate risk, with a focus on 'financing green' and 'greening finance'. The direction of travel appears to be towards taxonomies of sustainable activities (which should ideally be tailored to a jurisdiction's circumstances) and mandatory ESG-related disclosures. In some jurisdictions, such as the EU, the central bank is planning to decarbonise its corporate bond holdings while others are maintaining market neutrality in relation to monetary policy.
- *Building Energy Performance Legislation:* Although legislation regarding building energy performance differs quite significantly from one jurisdiction to another in relation to its level of development (Japan's legislation in this area was first published in 1979, for example) or its binding nature, best practice would appear to point towards mandatory minimum performance requirements for new and existing residential and commercial buildings and mandatory certification schemes (as mentioned above), to name but a few. A recurring theme in this area also is the importance of building energy performance legislation which is tailored to local and climatic conditions, as highlighted in Kenya.

Public Energy Efficiency Support Schemes

All jurisdictions have introduced or are considering the introduction of grants and/or tax incentives targeted variously at individuals and companies to stimulate building energy efficiency. A best practice analysis from the EU points at targeted, goal-oriented renovation incentives, sufficient budget to meet consumer demand, ongoing assessment of efficiency of schemes and continuity in schemes as being key. Recommendations from other jurisdictions highlight the importance of well-calibrated tax incentives in securing and sustaining take-up of these mechanisms. Japan's 'eco-point' scheme has been particularly successful in scaling up investment in green housing and energy efficiency

renovations. Interestingly, plans have been announced in Kenya to establish a green investment bank to provide funding instruments and incentives to overcome barriers to sustainable investments.

Introduction

Landmark international agreements signed in 2015 and marked by the adoption of the UN 2030 agenda and sustainable development goals and the Paris Climate Agreement have bound all nations across the globe to undertake ambitious efforts to combat climate change and adapt to its consequences. The most recent Conference of the Parties of the UNFCCC (COP 27), which took place in November 2022 in Sharm El-Sheikh, Egypt, focussed on building on previous successes and moving at pace from planning to implementation of the Agreement¹.

In this context, it is widely recognised that buildings are critical to the climate transition as they are responsible globally for 40% of energy consumption and 33% of global greenhouse gas emissions.² Ensuring the built environment is sustainable and energy efficient will therefore be central to mitigating climate change. This will not only require massive efforts but also significant investment.

Against this background, private finance, as a complement to public money, has a key role to play in delivering on global climate and sustainability objectives by channelling private investment towards sustainable projects in support of the transition. As a result of the intrinsic link between mortgages and buildings, the mortgage industry for its part has a potentially game-changing role to play in this respect, because mortgage lenders can bring energy efficiency considerations into the conversation with borrowers at a crucial moment and deliver the necessary financing to support a renovation. The importance of green or sustainable finance and the potential for green or energy efficient mortgages to support the improvement of the built environment is increasingly recognised around the globe.

One of the primary objectives of this Report is to facilitate the exchange of information between global jurisdictions with a view to leveraging on best practice examples in the pursuit of building energy renovation and energy efficient mortgage or green housing finance market development. To this end, we conduct a case study analysis in the following global jurisdictions: EU, Kenya, Malaysia and Japan. The choice of jurisdiction was driven by a desire to account for different stages of economic development, different energy profiles and different climatic or environmental conditions. We are also fortunate to have members in each of these jurisdictions on whom we have been able to rely for input in the elaboration of this Report, another driver of the selection. With a view to facilitating comparison and therefore the extraction of best practice, we structure each case study broadly around the key pillars for accelerated market development in relation to energy efficient mortgages as identified under the Energy Efficient Mortgages Initiative.

A Report of this kind would not be complete without considering the regulatory framework for Sustainable Finance in each of the jurisdictions. Indeed, in the EU, this agenda is at the heart of efforts to deliver on its climate change commitments and is inevitably influencing financial institutions' and therefore mortgage lenders' activities in this market. This Report will therefore offer the possibility to understand the legislative developments in selected parts of the globe and consider the extent to which these can inform and guide further development across global jurisdictions.

Finally, we also consider the different public support actions in place across jurisdictions and, where possible, include lessons learned in deploying relevant subsidies and grants, for example, which could once again serve as guidance for other jurisdictions.

¹ <https://cop27.eg/#/>

² <https://www.weforum.org/agenda/2021/02/why-the-buildings-of-the-future-are-key-to-an-efficient-energy-ecosystem/>

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European Union

The European Union (EU) has set itself ambitious climate change targets as a response to the commitments it and its Member States made on signing the Paris Agreement in 2015. Under the European climate law, EU Member States are required to reduce greenhouse gas emissions by at least 55% by 2030 and make the EU climate neutral by 2050.

Collectively, the EU27 Member States are the third largest producers of greenhouse gas (GHG) emissions globally, after China and the US.³ The production and use of energy account for in excess of 75% of the EU's GHG emissions, making energy efficiency a key priority in meeting the EU's 2030 and 2050 targets⁴. As the Council of the European Union reports⁵, in 2020, most of the EU's energy was imported (58%). Over 40% of the energy produced in the EU came from renewable sources, while approximately one-third came from nuclear power. Russia is the EU's main supplier of fossil fuels, meaning meeting energy savings targets is not only crucial to mitigate climate change but also to guarantee the EU's energy security.

The scale of investment needed to meet the energy savings targets alone is estimated at more than €260 billion p.a.⁶. Significantly, three quarters of this investment is accounted for by energy efficiency in buildings⁷. Against a background of very low annual rates of renovation of the building stock across Member States, decarbonising the EU's building stock through renovation is at the heart of the EU Green Deal⁸, intended to deliver on the clean energy transition.

It was in this context that in 2015 the EMF-ECBC launched the Energy Efficient Mortgages Initiative⁹ (EEMI) with the objective of mobilising the mortgage industry to not only 'finance green' through energy efficient mortgages in support of the climate transition, but also to 'green finance' by helping banks to recognise and manage climate and environmental risk on their balance sheets, securing the overall resilience of the financial system. See box below 1 for more details on the EU's mortgage and housing markets.

³<https://www.c2es.org/content/international-emissions/#~:text=China%2C%20the%20United%20States%2C%20and,the%20United%20States%20and%20Russia>

⁴ https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3544

⁵ <https://www.consilium.europa.eu/en/infographics/where-does-the-eu-s-energy-come-from/>

⁶ https://ec.europa.eu/commission/presscorner/detail/en/ip_20_17

⁷ https://ec.europa.eu/clima/system/files/2018-11/initiative_7_smart_en.pdf

⁸ https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en

⁹ <https://energyefficientmortgages.eu/>

Box 1 EU's Mortgage Market

Mortgage and housing markets in Europe remain one of the largest in the world. The total residential mortgage stock in the EU27 amounted to more than EUR 6.5 tn in 2021 according to the EMF Hypostat 2022 report¹⁰. With the UK, the largest mortgage market in Europe, Norway and Iceland, combined European outstanding mortgages reached EUR 8.7 tn, a new record for the broader region. The EU mortgage stock, moreover, increased by more than 5% relative to 2020, the largest increase since 2010. EU27 Gross residential lending, in the meantime, expanded by around 12% in 2021, as the region recorded an all-time high volume of EUR 1.2 tn in new mortgage loans.

The interest rate environment in Europe also contributed to 2021's mortgage lending scenario. Indeed, the average European interest rate on residential mortgages (i.e., considering EEA and UK) further decreased this year to a historically low 2.07% average rate (about 5 bps lower than in 2020). Overall, rates remained comparatively low across most jurisdictions comprised in the EMF report in 2021, in line with the overarching interest rate trend. However, data suggests that a number of individual jurisdictions, such as Luxembourg, Poland, Italy or Denmark, to name a few, reported yearly interest rate increases, though to varying degrees.

Homeownership in Europe is also quite diverse. Overall, according to the latest Eurostat and EMF statistics, the share of European households owning a residential proper was 70% in 2020 (71% in 2019). The share of households with a mortgage loan, in the meantime, stood at 29.4%, up by 6%. The narrative at national level can nevertheless diverge from the general European picture. For instance, as the EMF Hypostat shows, homeownership levels tend to be comparatively higher in Central and Eastern Europe, whereas in the Nordics or Germany, the share stands below 60%.

In terms of housing supply, the general European trend in 2021 indicates that construction investment increased, in line with the improving economic outlook and prospects, with building permit issuance and building transactions expanding as well. In the context of recovering housing and construction sector, house prices, as a measurement of the House Price Index (HPI), expanded in the EU27 area by 11.3% year on year in 2021, in a further acceleration from 2020's 4.8% growth rate. All EMF jurisdictions reported yearly house price increases in 2021, yet, as with other indicators, the pace of growth varied from country to country.

Despite the consistent growth of the European mortgage stock and the apparent recovery of the housing supply markers, Europe faces crucial challenges. Perhaps one of the most relevant ones is the age structure of the European dwelling stock. The bulk of European dwellings were built in the 1946-1981 period, considering the European Union Housing Census Hub, yet the average age of residential dwellings in Europe differs greatly between countries, since construction investment and production has historically followed different patterns in each jurisdiction. Moreover, climate change is also affecting weather conditions, leading to a substantial change in cooling and heating demands from households. In this context, total new building permit issuance, which would shed light on the prospective expansion of the current building stock, represented but 0.86% of the combined EU27 and UK building in 2021, up from 0.74% in 2020. This ratio seems to have increased in almost every jurisdiction, as the EMF explains, yet the efforts to ensure a thorough renovation of the European housing supply seem otherwise lacking, considering the sheer scale of the aggregated housing stock. Lastly, as a final challenge to consider, in view of the progressive increase of house prices and the current inflationary cycle in Europe, marked by rapidly increasing consumer and energy prices, house affordability, especially for first-time buyers, is fast becoming a hurdle for mortgage lenders, builders and society as a whole, as new generations endeavour to find accessible and sustainable housing options.

The result of the EEMI to date has been a comprehensive suite of solutions to unlock potential and achieve these outcomes across the relevant elements of the EEM value chain. These solutions, which have been developed in consultation with a broad network of experts and market participants, have the potential to providing useful insights for other global jurisdictions.

Pillars of EEM Market Development: Key Insights from the EEMI

Over the last seven years, significant efforts have been devoted under the EEMI to developing an understanding of the obstacles to the accelerated and widespread roll-out of energy efficient mortgages through in-depth consultation with market participants. The key focus has been on unlocking the huge potential that there is in the industry to ‘finance green’ as well as undertaking the necessary steps to ‘green finance’, and this across the whole value chain from retail/marketing considerations and the customer journey to risk management, IT & data-related issues, partnerships with other stakeholders and the involvement of technical experts, funding considerations and investor relations. Extensive research and stakeholder consultation resulted in the identification of a series of solutions which have the potential to accelerate the development of the energy efficient mortgage market across Europe. More detailed results are available in a separate Report¹¹ in this series. For the purposes of this Report, we have selected certain challenges and related solutions which it is widely in the EU held should be addressed as a priority in order to achieve this market development, and therefore could provide useful insights for a global audience.

Consumer awareness/demand

The ultimate success of the energy efficient mortgage 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. Traditionally, consumer awareness regarding home energy performance has been low, which has subsequently constrained interest in and demand for energy efficient mortgages. Against a background of rising energy prices, however, we are likely to see a growing interest in home renovation measures and associated financing that can help consumers to manage their energy bills.

Whatever the context, the first step towards raising awareness and designing a marketable financial product has been identified in the EU as understanding the key drivers of consumer demand, alongside a deep appreciation of what consumers perceive as valuable. In 2018, the EEMI conducted comprehensive consumer research to this end across 4 European markets: Germany, Italy, Sweden and the UK. The research conducted indicated that the appeal, relevance and understandability of EEM are generally strong across 3 (Italy, Sweden and UK) of the 4 markets surveyed (reception in Germany was less strong because of a competing government-backed scheme). This research was later extended to include Spain and Portugal¹² and encouragingly indicated that there is also sizeable appeal for EEM across both of these markets. This consumer research generated key insights that can form the basis of EEM market development, as detailed in Figure 4.

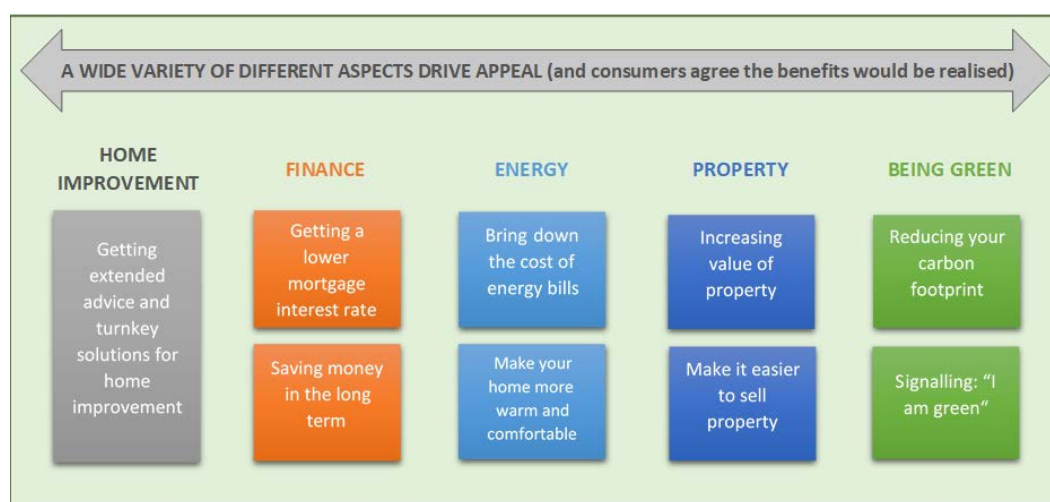
¹⁰ <https://hypo.org/app/uploads/sites/3/2022/11/HYPOSTAT-2022-FOR-DISTRIBUTION.pdf>

¹¹ <https://energyefficientmortgages.eu/wp-content/uploads/2023/01/Research-into-market-appetite-for-Energy-Efficient-Mortgages.pdf>

¹² <https://energyefficientmortgages.eu/wp-content/uploads/2021/07/EON-Green-Mortgages-Debrief-with-appendices-051218.pdf>

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Figure 1 - Key insights for EEM market development



Source: Creating an Energy Efficient Mortgage for Europe: Consumer Research Insights ([link](#))

Most recently, the existing research has been extended from a quantitative perspective in the markets already surveyed and three additional markets have been added, namely Hungary, the Netherlands and Romania¹³. In these three markets, specific qualitative research was also conducted, extending that previously carried out in the other markets.

The extended research which was conducted with a total of 4000 consumers in the 8 markets mentioned points to consumers across markets being (1) readier than ever for energy efficiency renovations against a background of mounting 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 tested¹⁴. A number of more detailed insights, which reflect to the heterogeneity of European markets, provide additional food for thought, potentially also for a global audience:

*Energy efficiency*¹⁵

- Across markets consumers are more ready than ever for energy efficiency conversations, climate change is becoming a mounting concern and there is a sense of urgency. Benefits of energy efficiency measures are also becoming clearer in terms of financial and environmental impact.
- Most consumers have encountered an EPC (energy performance certificate) since it is increasingly mandated for home purchases or rental agreements, yet there is poor understanding on what makes a house "A" rated. Greater education is needed to bring consumers up to speed.
- Intent/desire to make energy efficiency improvements is widespread, but willingness to act or compromise is low. There are high barriers since energy efficiency improvements are perceived as expensive.
- While sustainability is not a core consideration when choosing a mortgage provider, there is strong consideration for energy efficiency improvements across markets with >50% of respondents considering them. Consumers are willing to finance energy improvements with a loan and even more likely to add additional borrowing for energy efficiency improvements to their new/existing mortgage.

¹³<https://energyefficientmortgages.eu/wp-content/uploads/2022/04/EeMMIP-2022-Complete-Report-Consumer-Insights-Green-Mortgage-Propositions-Feb-2022.pdf>

¹⁴See footnote 5.

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

Energy efficient mortgages¹⁶

- Across European markets, there is a need for flexibility and transparency in the development of EEM. There are significant differences between markets in terms of context and outlook, and within markets households are at different stages in their journey, pointing to the importance of a highly flexible proposition which responds to the diverse needs.
- Simplicity is also a key requirement. Especially in eastern Europe, where there can be greater cynicism around the type of bureaucracy implied by things like EPC certification. The easier the process, and the more control the consumer can have, the greater the reassurance.
- Markets with higher mortgage costs may expect larger discounts – such that the discount represents a meaningful proportion of the total interest burden. Against a 5% interest rate, a 0.3% discount feels underwhelming; but something closer to 0.7-1.0% becomes quite meaningful.
- There is also scope for government/EU initiatives to aid in take up of green mortgage products – the impact of a clearly communicated initiative can be seen in Italy with the Superbonus scheme¹⁷, which combines with the benefits of the EEM to give consumers a wide-ranging, appealing proposition.
- Lastly, the proposition has the greatest breadth and the greatest potential impact if it incentivises consumers not only to choose more efficient homes, but also to make their own home more efficient – leveraging the financial benefits of the product alongside environmental benefits is likely to have greatest impact on take-up.

Beyond the EEMI consumer research detailed above, specific consumer behavioural research is being conducted in the Nordic Region of the EU to deliver optimised guidance to address behavioural barriers to investment in building energy efficiency, particularly renovations, and stimulate the much-needed improvements. Research is ongoing at the time of writing but is already delivering some interesting learning in relation to outreach strategies which can help lending institutions to improve communication towards their customers to improve awareness and actually secure renovation actions.

As described in other Chapters in this Report, interesting findings have emerged in other jurisdictions from consumer research, namely the dynamics around an aging population, as discussed in Japan, and the fact that ‘green’ products are typically most attractive to a younger population. Findings such as this could be included in future research in the EU in this area in order to ensure the most effective targeting of energy efficient mortgage products.

In recent months, the EEMI has focussed its attention on designing and delivering an EEM ‘ecosystem’¹⁸, which combines all the know-how described here, leverages on digital innovation and brings together all relevant stakeholders i.e. lenders, investors, SMEs, building experts, utilities, to deliver a seamless customer journey as a way to stimulate and sustain consumer demand for energy renovation and unlock energy efficient mortgage market potential. The EEM ecosystem subsequently consists of three pillars, a simulator for consumers to understand their renovation needs, access to financing options through the EEM label website and finally a marketplace to facilitate consumer access to SMEs (more on the latter below).

The extensive research conducted through the EEMI and ongoing in the Nordics presents a number of key takeaways which can guide efforts around consumer awareness raising and demand:

¹⁶<https://energyefficientmortgages.eu/wp-content/uploads/2022/04/EeMMIP-2022-Appendix-Summary-Insights-per-country-Green-Mortgage-Propositions-Feb-2022.pdf>

¹⁷ <https://www.governo.it/it/superbonus>

¹⁸ <https://energyefficientmortgages.eu/home-ecosystem/>

1. *Consumer awareness of and demand for energy renovation and energy efficient mortgages is key to the overall success of the energy efficient mortgage product and to long-term and sustained market development.*
2. *Consumer awareness and demand in these areas has typically been low, although rising energy prices and rising costs of living are likely to drive interest.*
3. *There is value in obtaining an understanding of the key drivers of consumer demand, alongside a deep appreciation of what consumers perceive as valuable. This research can be combined with targeted behavioural research to overcome behavioural barriers.*
4. *Overall, consumer research of this kind is valuable because it can: (1) support lenders in ensuring that their consumers are better informed and access the right information through the appropriate channels, and (2) inform the formulation of targeted EEM value propositions delivered to different market segments and adapted for different mortgage markets.*
5. *Consumer research in the EU related to EEM points to flexibility, transparency and simplicity as being key in securing demand, combined with appropriate interest rate discounts and underpinned by government subsidies.*
6. *Findings from research in other global jurisdictions could guide future analysis in the EU in this area, for example, around the impact of age on attractiveness of 'green' products.*

Data availability & access

Data has long been identified as being critical to the development of a robust energy efficient mortgage product and sustained market development. Lenders need access to building energy performance data in order to be able to integrate this information into creditworthiness assessments and potentially disclose the energy performance of their mortgage portfolios from a risk management perspective. Considering the broader value chain, access to this data will also be important in the context of the valuation of the underlying collateral. Indeed, very early in its analysis and research, the EEMI realised that climate-related and environmental risks may affect the value of collateral and therefore LTVs and, by extension, LGD. In the specific context of energy efficient mortgages, there is compelling evidence¹⁹ to suggest that an energy efficient building is likely to present a lower risk in terms of value, meaning that building energy efficiency is therefore a risk factor from the perspective of banks' lending activities.

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 variously contributed to overall challenges in data availability, accessibility and usage in recent years.

Building energy performance data: availability & accessibility

In the EU, the Energy Performance Certificate (EPC) is the official measure of the energy performance of buildings and is required by law when a property is put up for sale or rent. All EU Member States have implemented EPC regimes at national level in accordance with the Energy Performance of Buildings Directive (EPBD)²⁰.

There have been concerns relating to the consistency and reliability of EPCs as a result of different national implementation approaches, as well as challenges regarding availability and accessibility, linked to low EPC coverage and a lack of publicly accessible databases. However, a current recast of

¹⁹<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>

²⁰https://eur-lex.europa.eu/resource.html?uri=cellar:c51fe6d1-5da2-11ec-9c6c-01aa75ed71a1.0001.02/DOC_1&format=PDF

the EPBD is seeking to address these challenges through a series of targeted improvements. These include efforts to make EPCs much clearer, and more reliable and visible, with easy to understand information on energy performance and other key characteristics to benefit building owners, financial institutions and public authorities.

The EPBD further includes a template for EPCs with a minimum number of common indicators on energy and GHG emissions, complemented with a number of voluntary ones, such as on charging points, indoor air quality and Global Warming Potential based on the building's life-cycle carbon emissions (see figure 1). The A rating should correspond to zero-emission buildings while the G rating corresponds to the 15% worst performing buildings in each country, with the remaining buildings in the country distributed proportionately among the classes in between. Finally, the revision also includes common requirements for databases and the provision of public access to databases on the energy performance of buildings so as to improve the quality of the information available and facilitate the work of public authorities and financial institutions.

Figure 2 - Proposed Template For Energy Performance Certificates

1. On its front page, the energy performance certificate shall display at least the following elements:

- (a) the energy performance class;*
- (b) the calculated annual primary energy use in kWh/(m² year);*
- (c) the calculated annual primary energy consumption in kWh or MWh;*
- (d) the calculated annual final energy use in kWh/(m² year);*
- (e) the calculated annual final energy consumption in kWh or MWh;*
- (f) renewable energy production in kWh or MWh;*
- (g) renewable energy in % of energy use;*
- (h) operational greenhouse gas emissions (kg CO₂/(m² year));*
- (i) the greenhouse gas emission class (if applicable).*

2. In addition, the energy performance certificate may include the following indicators:

- (a) energy use, peak load, size of generator or system, main energy carrier and main type of element for each of the uses: heating, cooling, domestic hot water, ventilation and in-built lighting;*
- (b) renewable energy produced on site, main energy carrier and type of renewable energy source;*
- (c) a yes/no indication whether a calculation of the Global Warming Potential has been carried out for the building;*
- (d) the value of the life-cycle Global Warming Potential (if available);*
- (e) information on carbon removals associated to the temporary storage of carbon in or on buildings;*
- (e) a yes/no indication whether a renovation passport is available for the building;*
- (f) the average U-value for the opaque elements of the building envelope;*
- (g) the average U-value for the transparent elements of the building envelope;*
- (h) type of most common transparent element (e.g. double glazed window);*
- (i) results of the analysis on overheating risk (if available);*
- (j) the presence of fixed sensors that monitor the levels of indoor air quality;*
- (k) the presence of fixed controls that respond to the levels of indoor air quality;*
- (l) number and type of charging points for electric vehicles;*
- (m) presence, type and size of energy storage systems;*
- (n) feasibility of adapting the heating system to operate at more efficient temperature settings;*
- (o) feasibility of adapting the air-conditioning system to operate at more efficient temperature settings;*
- p) metered energy consumption;*
- q) operational fine particulate matter (PM_{2.5}) emissions.*

The energy performance certificate may include the following links with other initiatives if these apply in the relevant Member State:

- (a) a yes/no indication whether a smart readiness assessment has been carried out for the building;
- (b) the value of the smart readiness assessment (if available);
- (c) a yes/no indication whether a Digital Building Logbook is available for the building. Persons with disabilities shall have equal access to the information in energy performance certificates.

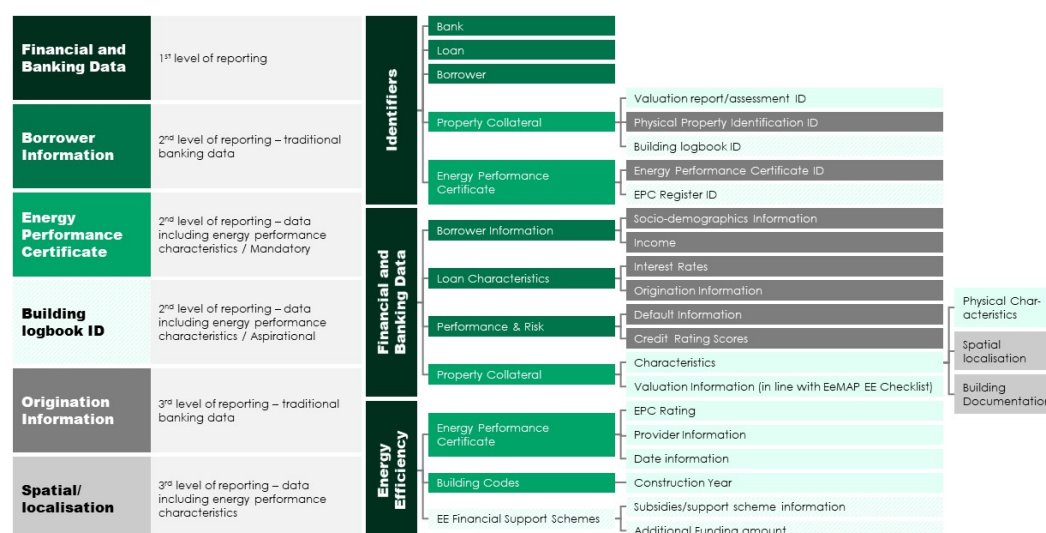
Source: Energy Performance of Buildings Directive recast ([link](#))

System integration: Data collection, disclosure & collateral valuation

In parallel to these legislative developments, the EEMI has sought to respond to data-associated challenges with the design of a common data protocol to help lending institutions manage the additional complexity of energy efficiency mortgages from a data perspective and organise information flows more efficiently. Indeed, one of the key tenets of EEM is the importance of understanding and harnessing the links between the energy performance and value of the asset, credit risk assessments and the determination of financing/loan conditions. As indicated above, the physical characteristics and energy performance information of buildings can be used to generate decision-relevant inputs for lending institutions.

The resulting “EEMI Master Template”²¹ is an excel document that allows for the gathering of all data points related to energy efficient mortgages during the lifetime of the loan for the purpose of mortgage origination, underwriting and funding, as well to comply with regulatory reporting requirements. Beyond the ‘traditional’ data points, the Master Template also serves as best practice guidance on what minimum additional energy efficiency and property related data should be collected in order to implement energy efficient mortgages, namely EPC category or score and year of construction (see Figure 1). In essence, the Master Template constitutes an internal checklist which can help banks to integrate all energy efficiency related risk and value information, alongside the more conventional information, into their lending decisions.

Figure 3 - Core data of Master Template & Legend

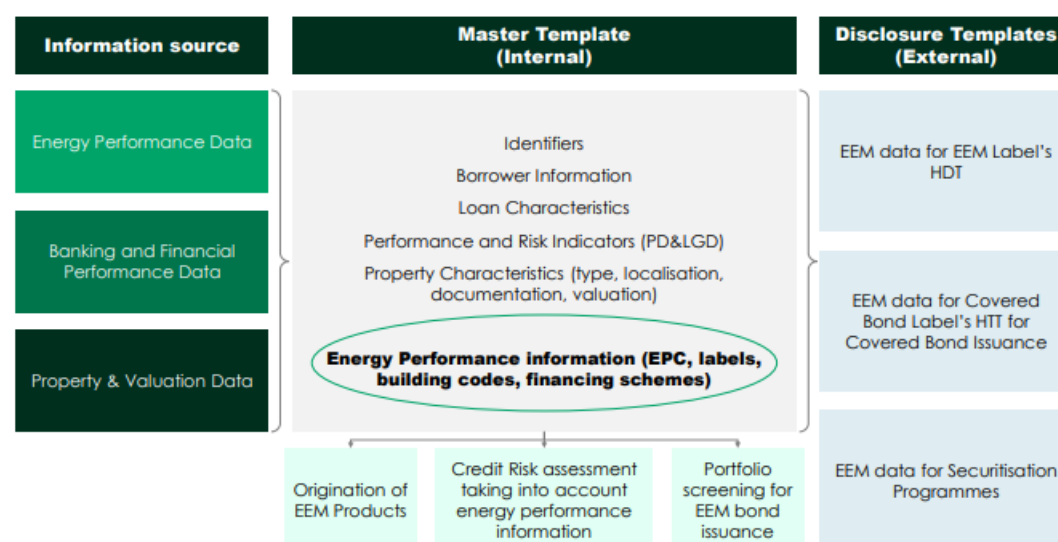


Source: EEMI Master Template Explanatory Guidance ([link](#))

²¹ <https://energyefficientmortgages.eu/knowledge-hub>: See EEMI Master Template

There are particular business development and risk management uses of the Master Template, in particular: (1) as a robust tool to support lending institutions in ‘tagging’ existing EEM which comply with the EEM Label Convention (see box 3) in their loan books and (2) supporting the origination of new EEM and the progressive ‘greening’ of banks’ loan books and therefore balance sheets - which will be explored in more detail in subsequent sections and (3) as a support for issuers of EEM covered bonds or securitisation programmes, which will also be explored in more detail in the ‘funding section’. The figure below sketches the Master Template and its functions within the EEM lifecycle:

Figure 4 - Functions of EEMI Master Template in EEM Lifecycle



Source: EEMI

As a complement to the EEMI Master Template, the EEMI developed a Harmonised Disclosure Template (HDT)²² as a key element of the Energy Efficient Mortgage Label²³. The EEM Label is intended as 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.

An important consideration with regard to the collection, processing and disclosure of energy efficiency data is the extent to which this complies with relevant data protection legislation. In the EU, data protection is governed by the General Data Protection Legislation (GDPR). In order to provide legal certainty to lending institutions in the completion and disclosure of the HDT and guidance with regard to the mitigation of liability risks, the EEMI commissioned three legal opinions²⁴ which are intended for use by lending institutions to stress test their own arrangements internally to ensure GDPR compliance and make any necessary adjustments.

Finally, and responding to the important role of collateral valuation in the EEM value chain, the EEMI developed a Checklist and Guidance²⁵ for property valuers, under the direction of the Royal Institution

²² <https://www.energy-efficient-mortgage-label.org/hdt>

²³ <https://www.energy-efficient-mortgage-label.org/>

²⁴ <https://energyefficientmortgages.eu/wp-content/uploads/2022/04/EEM-Label-GDPR-Compliance-Considerations.pdf>

²⁵ <https://energyefficientmortgages.eu/wp-content/uploads/2021/07/EEM-Property-Valuation-Guidelines.pdf>

of Chartered Surveyors (RICS), to complement existing valuation practices with a specific and more detailed focus on building energy performance and its impact on property values. The purpose of the checklist is to:

- provide a potential extension for instructions for secured lending
- enable valuers to reflect upon the building characteristics that impact on energy efficiency and form a judgement as to whether such characteristics present a risk reduction or increase to the security of the asset for the loan moving forward; and, by implication
- engender greater awareness of energy matters by valuers and encourage participation in upskilling
- build awareness of energy efficiency and risk among the banks' risk assessment departments, improve their skills of how to interpret valuation and Energy Performance Certificate (EPC) reports as well as learn how to challenge valuers in case of incomplete valuation reports.

The identification of data-related challenges and the subsequent efforts, both legislative and market-led, presents a series of findings in this specific area which can guide lending institutions across the EU and beyond:

1. *The official measure of building energy performance in the EU is the mandatory Energy Performance Certificate (EPC).*
2. *Historically, there have been concerns relating to the consistency and reliability of EPCs, as well as challenges regarding availability and accessibility. The current EPBD recast is seeking to address these concerns.*
3. *A building energy performance measurement and certification system is a prerequisite for energy efficient mortgage market development.*
4. *The existence of and appropriate access to databases linked to these certifications is also necessary in order to facilitate the integration of building energy performance data into banks' processes.*
5. *A data collection template, such as the EEMI Master Template, can support banks in managing the additional complexity of handling data linked to energy efficient mortgages.*
6. *A data disclosure template, such as the EEM Label HDT, can support banks in reporting data to regulatory authorities and investors.*
7. *An analysis of compliance of data collection, processing and disclosure with data privacy legislation will help banks to manage compliance risk and reduce liability.*

Green Bond Markets

Research and consultation with market participants under the EEMI have also pointed to the funding mechanisms behind the mortgage portfolio and the investors who invest in these debt securities as being key to the long-term success of a market in EEM. As a result of the interconnectedness in the value chain, the origination of energy efficient/green mortgages will also deliver a stream of eligible assets to support green bond issuance, creating a virtuous circle.

Since 2015, the issuance of green bonds globally has expanded significantly, with a five-fold increase during the period. The EU is a global leader in this market, with 51% of global issuance in 2020 from EU companies and EU public bodies²⁶. Given the intrinsic link between covered bonds and mortgages, the market in sustainable covered bonds in Europe presents an interesting case study. The first sustainable covered bond was issued by Münchener Hypothekbank in 2014. This was followed by an inaugural green euro benchmark covered bond in 2015 from Berlin Hyp. Since this time, the market in sustainable covered bonds has continued to expand, with issuance gaining momentum in particular since 2018, when more than 6bn EUR of sustainable covered bonds were issued²⁷. Beaumont, Schuller

²⁶ https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3406

²⁷ <https://hypo.org/app/uploads/sites/3/2021/09/ECBC-Fact-Book-2021-FINAL.pdf>

& Farina (2022) indicate that almost 70% of sustainable covered bonds are green covered bonds linked to energy-efficiency as well as affordable housing²⁸.

Despite these encouraging figures and the strength of investor demand, current green bond issuance in the EU is still niche, representing 2.6% of total EU bond issuance, according to the European Commission²⁹. Beaumont, Schuller & Farina (2022) note that, according to the July 2022 composition of the iBoxx EUR benchmark covered bond index, sustainable covered bonds in the index amounted to EUR 48.5bn, representing 6% of the total euro benchmark covered bonds in the index. Of these, EUR 32bn or 4% were green covered bonds³⁰.

It is widely held that a lack of appropriate assets in line with covered bond programmes and sustainability frameworks is currently limiting further and faster growth in the market. Additional ongoing challenges relate to a lack of data availability, standardisation and disclosure. As the previous sections demonstrate however, the EEMI is seeking to address these 'bottlenecks' through an integrated EEM ecosystem which will progressively help to respond to the challenge of insufficient assets by stimulating the EEM market linked to the purchase of energy efficient properties or to the energy efficient renovation of existing buildings. This point links back to the one made at the beginning of this section regarding the interconnectedness of mortgage and green (covered) bond markets and the creation of a virtuous circle. Furthermore, the EEM Label and the Covered Bond Label³¹ are laying down standardised definitions and improving the collection, processing and disclosure of standardised data in a harmonised manner.

The European Commission has naturally also recognised that green bonds markets will represent a source of significant green investment and has also embarked on legislative efforts in this area focussed on stimulating the market via an EU Green Bond Standard, for example³². This voluntary standard is intended to boost issuance and help companies and public authorities to use green bonds to raise funds on European capital markets. This is in turn intended to boost the EU Capital Markets Union and the EU's financial markets as a hub for sustainable finance.

All in all, research conducted in this area, allow us to draw the following high-level conclusions:

1. *The funding mechanisms behind the mortgage portfolio and the investors who invest in these debt securities will be key to the long-term success of a market in EEM. Equally, as a result of their interconnectedness, EEM market development will provide a flow of eligible assets for green bonds.*
2. *Issuance of green bonds globally has expanded significantly since 2015 but remains relatively niche compared to overall bond issuance.*
3. *Efforts to increase the flow of eligible assets and improve data availability, standardisation and disclosure, such as those being conducted under the EEMI and via the Covered Bond Label, will help to grow the market.*

Optimising the supply chain

Improving the energy efficiency of building stocks will depend on a robust and skilled supply chain to identify, install and assure the quality of energy efficiency measures. In Europe, it is anticipated that

²⁸ <https://hypo.org/app/uploads/sites/3/2022/08/ECBC-Fact-Book-2022.pdf>

²⁹ https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3406

³⁰ <https://hypo.org/app/uploads/sites/3/2022/08/ECBC-Fact-Book-2022.pdf>

³¹ <https://www.coveredbondlabel.com/>

³² https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/european-green-bond-standard_en

efforts to improve energy efficiency in buildings and reduce the amount of fossil fuel they consume could create more than 160,000 jobs in the energy and heating sector by 2030³³.

However, there are concerns that labour and skills shortages in Europe's construction sector, driven by an ageing workforce and unattractive employment conditions, will mean there are not enough suppliers available to deliver the kind of sustainable building renovation and modernisation needed to meet climate targets. Until these kinds of supply chain issues are addressed, lenders could be constrained in their efforts in this area.

Clearly these are barriers which are exogenous to the mortgage industry itself and will require interventions which are beyond the remit of individual lenders. However, as the EEMI and efforts to deliver an EEMI 'ecosystem' are showing, there is value in dialogue with SMEs and technical experts (alongside other stakeholders) with a view to identifying and developing their role in the value chain and integrating them into the 'ecosystem'. In this respect, accreditation of these companies and technical experts is considered as being an important prerequisite in order to ensure that sustainable building renovations are carried out as efficiently as possible to deliver the anticipated savings, securing both consumer trust and lender confidence.

1. *A skilled labour force is fundamental to the climate transition.*
2. *Challenges in this area are beyond the direct control of the mortgage industry, however, there is value in a dialogue with companies and technical experts in order to integrate them into an 'ecosystem'.*
3. *Efforts are underway under the EEMI to create an EEMI Renovation Ecosystem.*
4. *Accreditation of suppliers is a key in ensuring quality in delivery of renovations, which will secure consumer trust and lender confidence.*

Regulatory & Supervisory Landscape

Market driven initiatives, such as the EEMI, have demonstrable value in guiding and shaping industry actions, in this case energy efficient mortgage market development. Inevitably, however, regulation and supervisory expectations are also fundamental in shaping the role and activities of market actors and the regulatory and supervisory landscape around sustainable finance and its impact on the banking industry is no exception. What follows is an overview of the core features of the EU's regulatory and supervisory landscape, which is shaping the "financing of green" and the "greening of finance", including mortgage finance.

Sustainable Finance Agenda

As indicated in the introduction to this Report, since 2018, the EU, under the direction of the European Commission, has been developing a comprehensive policy agenda on sustainable finance, which aims to both harness the potential of and prepare financial institutions and investors for the climate transition through a broad range of reporting and disclosure requirements in particular. As an aside and of relevance to a global audience in the present context is the fact that the EU is also seeking to coordinate international efforts in the area of Sustainable Finance through the International Sustainable Finance Platform³⁴. The overall goal of the Platform is to support the channelling of private capital to environmentally sustainable investments. To this end, the Platform seeks to strengthen international cooperation and, where appropriate, coordinate approaches and initiatives in relation to capital markets, including taxonomies, disclosures, standards and labels.

³³https://eur-lex.europa.eu/resource.html?uri=cellar:0638aa1d-0f02-11eb-bc07-01aa75ed71a1.0003.02/DOC_1&format=PDF

³⁴ https://finance.ec.europa.eu/sustainable-finance/international-platform-sustainable-finance_en

At the heart of the EU's entity level reporting and disclosure requirements is the EU Taxonomy which establishes a common language for sustainable finance based on a standardised classification and well-aligned benchmarks for what assets can be considered as significantly contributing to environmental goals.

There are six key objectives in the "EU Taxonomy Regulation"³⁵ (see Box 1). The first two are climate change mitigation and climate change adaptation, reflecting the urgency of the climate change challenge.

Box 2 Taxonomy Regulation Objectives

The Six Environmental Objectives of the Taxonomy Regulation

1. Climate change mitigation
2. Climate change adaptation
3. Sustainable use and protection of water and marine resources
4. Transition to a circular economy
5. Pollution prevention and control
6. Protection and restoration of biodiversity and ecosystems

The Taxonomy Regulation entered into force in July 2020, specifying alignment with the EU Taxonomy for financial institutions that offer financial products on the European market and non-financial companies that already have to submit a non-financial statement under the Corporate Sustainability Reporting Directive (CSRD) (see below for more details). In June 2021, the European Commission provided more detailed specifications for the reporting of EU Taxonomy alignment. These specifications detail the information companies have to disclose on how, and to what extent, their activities align with the EU Taxonomy. For an economic activity to align with the Taxonomy Regulation, a company must indicate how:

- (1) the activity substantially contributes to one or more of the six environmental objectives,
- (2) does no significant harm to the other objectives, and
- (3) meets minimum social safeguard standards.

The significance of the technical screening criteria for energy efficient mortgages is that they will determine Taxonomy alignment, or not, of the underlying mortgage loan, and in turn, the covered bond or securitisation funding the mortgage. Discussions around the 'usability' of the Taxonomy for underlying financial products are still ongoing to a large extent and are extremely important. Indeed, the extent to which an underlying mortgage is or is not Taxonomy eligible or is potentially only partially eligible will have the potential to either greatly stimulate and propel market development in energy efficient mortgages or limit the incentive for banks to grant these mortgages.

It is also worth noting here that the EU Taxonomy has significant implications for a variety of other pieces of legislation, including the recently adopted CSRD³⁶ which requires large and listed companies to disclose information on the social and environmental risks they face, and on how their activities

³⁵ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020R0852&from=EN>

³⁶ https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en

impact people and the environment, and the Sustainable Finance Disclosure Regulation³⁷ (SFDR) which imposes mandatory ESG disclosure obligations for asset managers and other financial markets participants.

It is worth highlighting here that there has been a lot of controversy in the EU with regard to the inclusion of gas and nuclear activities in the EU Taxonomy. Indeed, certain fossil gas and nuclear activities have been classified as transitional activities contributing to climate change mitigation. The inclusion of these activities is time-limited and dependent on specific conditions and transparency requirements. In September 2022, environmental groups launched legal action against the European Commission in relation to the inclusion of fossil gas, which they argue “*threatens European energy security and has led to sky-high energy prices across Europe*”.³⁸

Other groups have expressed concerns about the lack of scientific basis of the EU Taxonomy and have established “*a 'science based taxonomy' to rate the criteria of the official one (with a green/ amber/ red color code) and to provide, where possible, alternative criteria*”.³⁹

Recent months and years have also seen the emergence of a multitude of other climate and ESG risk disclosure requirements, including on Pillar 3 disclosures on ESG risks⁴⁰ as a direct response to the requirements laid down in the EU’s Capital Requirements Regulation (CRR) which implements the Basel III Accords. At the heart of these requirements is a Green Asset Ratio (GAR), according to the which banks subject to the CSRD must disclose their assets financing taxonomy-aligned activities as a share of their total assets. A separate “banking book taxonomy alignment ratio” (BTAR) covers all of a lending institution’s lending portfolio. This will capture exposures to companies which are not subject to CSRD reporting obligations (SMEs and other non-CSRD corporates) and are therefore excluded from the calculation of the GAR, allowing lending institutions to capture more exposures and show a potentially more complete picture of the Taxonomy alignment of their balance sheets.

Finally, the EU policy agenda is also putting emphasis, through the Renewed Sustainable Finance Strategy⁴¹ published in July 2021, on developing an inclusive sustainable finance framework in which SMEs and citizens can access sustainable finance opportunities and support the climate transition. Relevant in the present context are the EU’s plans to define green retail loans and green mortgages, review relevant consumer protection-focussed legislation, in particular the EU Mortgage Credit Directive (MCD), with a view to supporting the uptake of energy efficient mortgages, and launch an EU-wide information campaign addressed to businesses and households highlighting the features and benefits of such loans.

In a nutshell, the following are the key takeaways from the EU Sustainable Finance agenda:

1. *The EU Taxonomy for Sustainable Activities is central to the EU’s efforts to harness the potential of financial institutions in support of the climate transition and prepare them for associated physical and transition risks.*
2. *There has been controversy in the EU about the inclusion of gas and nuclear activities in the EU Taxonomy, as well as criticism of what some perceive as the non-scientific nature of the Taxonomy.*
3. *Linked to the Taxonomy are a series of mandatory entity-level sustainability-linked disclosure and reporting requirements.*

³⁷https://finance.ec.europa.eu/sustainable-finance/disclosures/sustainability-related-disclosure-financial-services-sector_en

³⁸<https://www.clientearth.org/latest/press-office/press/eu-taxonomy-environmental-groups-start-legal-action-against-sustainable-gas-classification/>

³⁹ <https://www.greenwashed.net/>

⁴⁰https://www.eba.europa.eu/sites/default/documents/files/document_library/Publications/Draft%20Technical%20Standards/2022/1026171/EBA%20draft%20ITS%20on%20Pillar%203%20disclosures%20on%20ESG%20risks.pdf

⁴¹https://eur-lex.europa.eu/resource.html?uri=cellar:9f5e7e95-df06-11eb-895a-01aa75ed71a1.0001.02/DOC_1&format=PDF

4. *More recently, the EU has turned its attention to ensuring an inclusive sustainable finance framework for SMEs and citizens and will among other actions seek to define green retail loans and green mortgages.*
5. *The EU is seeking to coordinate international efforts in the area of Sustainable Finance through the International Sustainable Finance Platform.*

Supervisory Expectations & Monetary Policy

In line with the growing importance of climate change for the economy and increasing evidence of its financial impact on banks, the European Central Bank for its part is also more and more sensitive to the prudent and safe management of climate-related and environmental risks in the financial sector. In November 2020, the ECB published a Guide⁴² in this area, which describes how the ECB expects institutions to consider climate-related and environmental risks – as drivers of established categories of prudential risks – in the context of their business strategy and governance and risk management frameworks. It further explains how the ECB expects institutions to increase their transparency by enhancing their climate-related and environmental disclosures.

Particularly relevant for energy efficient mortgages are supervisory expectations 7 and 8 in the ECB's recently published Guide on Climate-related and Environmental Risks, which require that, in their credit risk management, institutions consider climate-related and environmental risks at all relevant stages of the credit-granting process and monitor the risks in their portfolios. Although the guide is not binding, it will serve as a basis for supervisory dialogue, during which the ECB will discuss its expectations set out in this guide in terms of any possible divergences in institutions' practices.

More recently, in January 2023, the ECB published a first set of climate-related statistical indicators⁴³ with a view to narrowing the climate data gap and in this way better assessing the impact of climate-related risks on the financial sector. The indicators cover three main areas:

- Experimental indicators on sustainable finance provide an overview of debt instruments labelled as “green”, “social”, “sustainability” or “sustainability-linked” by the issuer that are issued or held in the euro area.
- Analytical indicators on carbon emissions financed by financial institutions provide information on the carbon intensity of the securities and loan portfolios of financial institutions, and on the financial sector's exposure to counterparties with carbon-intensive business models.
- Analytical indicators on climate-related physical risks analyse the impact of natural hazards, such as floods, wildfires or storms, on the performance of loans, bonds and equities portfolios.

As indicated in the bullet points above, currently, the indicators are either experimental or analytical and are therefore remain a work in progress. The ECB and national central banks will work together to improve the underlying methodology and identify additional data sources.

Interestingly and as indicated in a later Chapter in this Report, the Malaysian Joint Climate Change Committee (JC3) is also undertaking significant efforts in the area of climate data. Significantly, however, the focus of these efforts is on specifically closing climate and environmental data gaps for the financial sector across various operations, including lending, to support their efforts to manage climate risks and the climate transition. These efforts in Malaysia could provide inspiration for the ECB in any future development of their activities in this area.

⁴²<https://www.bankingsupervision.europa.eu/ecb/pub/pdf/ssm.202011finalguideonclimate-relatedandenvironmentalrisks~58213f6564.en.pdf>

⁴³ https://www.ecb.europa.eu/pub/pdf/other/ecb.climate_change_indicators202301~47c4bbbc92.en.pdf

Finally, the ECB has itself committed to including climate change considerations in its monetary policy strategy, in line with EU policies and initiatives in the field, as announced in an action plan and roadmap published on 8 July 2021. This comes against a background where the ECB recognises that *“climate change and the transition towards a more sustainable economy affect the outlook for price stability through their impact on macroeconomic indicators such as inflation, output, employment, interest rates, investment and productivity; financial stability; and the transmission of monetary policy”*⁴⁴. Among the ECB’s climate-change related activities are efforts to integrate climate change considerations into monetary policy operations, specifically in relation to the collateral framework and corporate sector asset purchases.⁴⁵ Specifically, the ECB has decided to gradually decarbonise the corporate bond holdings in the Eurosystem’s monetary policy portfolios and its collateral framework. It will also consider climate change risks when reviewing haircuts applied to corporate bonds used as collateral in Eurosystem credit operations. Furthermore, the ECB has decided to introduce climate-related disclosure requirements for collateral and will only accept as collateral marketable assets and credit claims from companies and debtors that comply with the CSRD. Finally, the ECB is working on enhancing its risk assessment and management with a focus in the first instance on enhanced transparency of rating agencies.

In summarising this section, the following takeaways are worth highlighting:

1. *In 2020, the European Central Bank (ECB) issued supervisory expectations and non-binding guidance around the prudent and safe management of climate-related and environmental risks in the financial sector which will support supervisory dialogue.*
2. *Since 2021, the ECB has been working towards incorporating climate change in its corporate bond purchases, collateral framework, disclosure requirements and risk management, in line with its climate action plan.*
3. *Most recently in January 2023, the ECB published a first set of climate-related statistical indicators to narrow the climate data gap and better assess climate-related risks in the financial sector.*
4. *There could be merit in orienting such efforts towards supporting the closing data gaps for the financial sector to support its climate financing activities, as is the case in Malaysia.*

Building Energy Performance Legislation

In December 2021, the EU launched a process of review of a piece of legislation which is at the heart of its efforts to improve the overall efficiency of the EU’s building stock, the Energy Performance of Buildings Directive (EPBD)⁴⁶. This is a key follow-up action to the EU’s ‘Renovation Wave’ strategy which is intended to boost energy renovation of buildings in the EU.

The Directive focuses on achieving a zero-emission and fully decarbonised building stock by 2050, increasing the rate of renovation to this end and mobilising financing to support these efforts. More specifically, the main proposed measures of the recast EPBD are:

- the gradual introduction of minimum energy performance standards to trigger renovation of the worst performing buildings;
- a new standard for new buildings and a more ambitious vision for buildings to be zero-emission
- enhanced long-term renovation strategies, to be renamed national Building Renovation Plans
- increased reliability, quality and digitalisation of Energy Performance Certificates (EPC) as indicated earlier; with energy performance classes to be based on common criteria
- a definition of deep renovation and the introduction of building renovation passports

⁴⁴ https://www.ecb.europa.eu/press/pr/date/2021/html/ecb.pr210708_1~f104919225.en.html

⁴⁵ <https://www.ecb.europa.eu/press/pr/date/2022/html/ecb.pr220704~4f48a72462.en.html>

⁴⁶ https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/energy-performance-buildings-directive_en

- modernisation of buildings and their systems, and better energy system integration (for heating, cooling, ventilation, charging of electric vehicles, renewable energy)

Worth highlighting here given the focus of this Report is the fact that the revised directive aims to facilitate more targeted financing to investments in the building sector, complementing other EU instruments supporting vulnerable consumers and fighting energy poverty.

In addition to the EPBD requirements, under the Energy Efficiency Directive⁴⁷, EU countries ensure that at least 3% of the total floor area of buildings owned and occupied by central governments are renovated to make these buildings more energy efficient. National governments are furthermore encouraged to only purchase buildings that are highly energy efficient.

The following key takeaways from the EU's building energy performance legislative efforts are:

1. *The 2010 Energy Performance of Buildings Directive is at the heart of efforts to improve the energy efficiency of the EU's building stock.*
2. *The 2021 Recast of the Directive will see the introduction of national building renovation plans, mandatory minimum energy performance standards for all buildings and improved EPCs based on common criteria.*
3. *The EPBD is also focussed on supporting vulnerable consumers and fighting energy poverty.*
4. *The Energy Efficiency Directive lays down minimum renovation requirements for central government buildings.*

Public EE Support Actions

In a set of reports⁴⁸ conducted under the EEMI, energy efficiency ('EE') support actions across EU Member States were catalogued and analysed in an effort to identify best practices in their design and ultimate execution, as the focus of the third⁴⁹ of three Reports. The latter Report also considered apparent shortcomings of the chosen actions, given their inherent value as "learning experiences", which can facilitate the establishment of more robust, consistent, efficient and impactful EE policies moving forward. The analysis takes into account a sample of five (5) active or already concluded national EE public support programmes, taken from a database of more than 280 EE support schemes across 17 EU countries built by Ca Foscari University Venice:

- KFW Energy Efficiency Scheme (Germany)
- KREDEX (Estonia)
- Superbonus 110% Fiscal Scheme (Italy)
- PAREER II (Spain)
- UK Green Deal

These programmes, as explained in the report, provide an up-to-date perspective as to current EE renovation trends in Europe, shedding light on the specific practices and goals that both credit institutions and public authorities can potentially emulate in their markets and/or jurisdictions. Furthermore, most of these programmes have a proven track record, with a clear impact on mortgage and housing markets, and, where relevant, provide clear indications about the constraints and

⁴⁷https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficiency-targets-directive-and-rules/energy-efficiency-directive_en

⁴⁸<https://energyefficientmortgages.eu/wp-content/uploads/2022/10/Technical-Report-on-relevant-public-support-actions-in-relation-to-EEM.pdf>, <https://energyefficientmortgages.eu/wp-content/uploads/2023/01/Support-Actions-and-Regulatory-Instruments-an-overview-among-selected-European-Countries.pdf>, <https://energyefficientmortgages.eu/wp-content/uploads/2023/01/Best-Practice-in-European-Public-Support-Schemes-for-Energy-Efficiency.pdf>

⁴⁹<https://energyefficientmortgages.eu/wp-content/uploads/2023/01/Best-Practice-in-European-Public-Support-Schemes-for-Energy-Efficiency.pdf>

drawbacks linked to their design and implementation. Finally, they have been carefully examined and reviewed by the European Commission, by way of the European Construction Sector Observatory (ECSO).

In terms of the specific findings of the report, we can ascertain firstly that, in view of the development and outcomes of these schemes, a more targeted approach is generally more effective. Indeed, when it comes to supporting energy efficient renovations, a goal-oriented approach can prove more effective than catch-all, largescale renovation schemes. This is further underpinned by the fact that, in a majority of cases, funding is typically scarce, so there is a need to ensure that the limited resources that are readily available bear a real impact. Moreover, as regards budget, our analysis indicates that resources allocated to these schemes often do not cover the overall demand for EE renovations or improvements. This shows that there is a clear interest among borrowers and homeowners for EE-related renovations, making a potential enlargement of funds a reasonable option for policymakers. However, as the report suggests, public support should be linked to objective and measurable, encouraging specific types of renovations and bearing in mind the goals each scheme has to actively strive to achieve.

In addition to budgetary matters, our analysis also shows that private funding can be a key to ensure the success of a scheme, in that credit institutions can enable new funding opportunities for both the responsible body behind the programme and costumers. They can also expand the reach of the programme, allowing potential partners to assess the suitability of applicants and ultimately allocate funds to interventions that are technically more meaningful to support. All in all, partnership of this nature would simplify the scheme and facilitate a timely delivery of results.

Lastly, the report finds that, for EE support schemes to have a lasting impact, progress should be measured and there should be a degree of continuity. Regarding the first point, in addition to examining the individual outcomes of each intervention, it seems reasonable to consider intermediate assessments, in order to determine is being implemented properly or identify problems related to customer access or reach. This would allow for mid-term adjustments and could help policymakers tackle major issues that could otherwise hinder the effectiveness of the programmes. Regarding the issue of continuity, as described in our report, many of the programmes do not necessarily receive a follow-up scheme that builds on the outcomes of the original scheme. Thus, to ensure that there is a consistent, long-term impact on the energy performance of residential dwellings, it would be reasonable to consider longer initiatives, with a clear roadmap for the building stock, that effectively align with the EU's climate goals.

In summary, the research conducted pointed to the following best practice at EU level in this area:

- 1. A more targeted, goal-oriented approach to energy efficiency renovations is generally more effective in achieving EE goals than larger, catch-all renovation schemes.*
- 2. Sufficient resources should be allocated to meet borrowers' and homeowners' demand for EE-related renovations.*
- 3. Private funding could be instrumental in expanding funding options.*
- 4. Intermediate assessments could help identify problems related to customer access or reach, enabling useful mid-term adjustments.*
- 5. Continuity in schemes is important, with original programmes being matched by follow-programmes to build on outcomes to ensure the long-term impact of renovations and align the national schemes with the EU's climate goals.*

Kenya

Context

Kenya is the 7th largest economy in Africa⁵⁰ and the largest economy in the East African Region⁵¹. According to UNEP Copenhagen Climate Centre (UNEPCCC), as a result of “a young and rapidly growing population, a dynamic economy and the country’s strong commitment to increasing electricity access”⁵², Kenya’s building energy consumption is increasing rapidly. UNEPCCC also refers to evidence from the Institute of Economic Affairs from 2015 suggesting that demand for electricity in Kenya is far from being satisfied either now or in the future. A further interesting and relevant observation UNEPCCC makes is that there are however significant opportunities to make Kenya’s industries and buildings more energy efficient by “improving demand-side practices and reducing system losses”.

In its Report, UNEPCCC points to data from Navigant indicating that in 2018, the Kenyan building stock was estimated at approximately 37 million m², 80% of which was represented by residential dwellings, while the overall building stock, as reported by the IFC in 2017, is forecast to grow to approximately 47 million m² by 2025, driven primarily by the hotel and institutional subsectors. Having said this however, other evidence highlighted points to a housing deficit of over 2 million units and two-thirds of urban households living in slums. As a result of demand and supply-side constraints, the housing deficit continues to increase and is exacerbated by rural-urban migration which sees half a million new arrivals in cities across the country each year.

According to the same UNEPCCC Report, in 2015, overall energy consumption of the Kenyan building stock (residential, commercial and public services) accounted for as much as 73% of total final energy consumption. Much of Kenya’s energy consumption results from the use of traditional biomass energy for cooking in the residential context. Heat and electricity consumption in buildings accounts for as little as 9% of energy use in the country, with buildings using 47% of the available electricity generation capacity (residential buildings 32% and commercial/public service buildings 15%).

UNEPCCC concludes that a combination of continued economic growth, supply constraints resulting from efforts to increase energy access and the impact of buildings in terms of overall energy consumption is making building energy efficiency absolutely fundamental to overall energy security and economic productivity objectives in Kenya, as well as to addressing climate change obligations.

As far as financing is concerned, it is often suggested that in many respects Kenya is leading the way on green finance in Africa. Indeed, as South Pole, the Swiss carbon finance consultancy, points out⁵³ and as we will also show in more detail later in this section, over the last five years, there have been impressive developments including the creation of a green bond programme and the subsequent issuance of a first green bond, the Green Climate Fund (GFC) accreditation of KCB Bank Kenya⁵⁴ and its participation in the PCAF Global GHG Accounting and Reporting Standard⁵⁵, and the launch of a local sustainable finance initiative by the Kenya Bankers Association introducing a set of principles to underpin sustainability in banks’ daily operations and decision-making.⁵⁶

⁵⁰<https://www.imf.org/en/Publications/WEO/weo-database/2022/October/weo-report?c=612,614,638,616,748,618,624,622,626,628,632,636,634,662,611,469,642,643,734,644,646,648,652,656,654,664,666,668,672,674,676,678,682,684,686,688,728,692,694,714,716,722,718,724,726,199,733,732,738,742,744,746,754,698,&s=NGDPD,NGDPDPC,LP,&sy=2022&ey=2022&ssm=0&scsm=1&ssc=0&ssd=1&ssc=0&sic=0&sort=country&ds=-.&br=1>

⁵¹ <https://globaledege.msu.edu/countries/kenya/economy>

⁵² <https://unepccc.org/wp-content/uploads/sites/3/2018/11/2018-10-ee-in-buildings-kenya-web.pdf>

⁵³ <https://www.southpole.com/blog/how-can-kenya-continue-to-lead-the-way-on-green-finance-in-africa>

⁵⁴ <https://www.greenclimate.fund/content/kcb-bank-kenya-limited>

⁵⁵ <https://carbonaccountingfinancials.com/financial-institutions-taking-action#overview-of-financial-institutions>

⁵⁶ <https://sfi.kba.co.ke/uploads/sfi-booklet.pdf>

However, it is also recognised that there is still a lack of private finance to support energy efficiency in buildings in Kenya. Indeed, as the Global Innovation Lab for Climate Finance explains in its Green Affordable Housing Finance – Instrument Analysis from September 2022, *“a lack of access to finance constrains both the supply of green homes from developers and demand from households, particularly those with low or informal incomes”*⁵⁷ (p.3). In this respect, it is worth pointing to Reall’s Green Affordable Housing Finance mechanism⁵⁸, which is a mortgage instrument providing data-driven alternative credit assessments for International Finance Corporation’s Environmental Design for Greater Efficiencies (IFC EDGE) certified green homes to support the provision of financing by local lenders to borrowers with low and informal incomes, which, Reall notes, represent the bottom 40% of income earners. The model is being piloted in Kenya and will be later rolled out in other markets such as Uganda, Nigeria, Ghana, India and Pakistan.

UNEPCCC reports other early-stage programs to provide financing for building energy efficiency, such as CFC Stanbic and Cooperative Bank providing \$33 million in green credit lines for energy- and resource-efficiency projects, while residential lender, HF Group, started offering a ‘green mortgage’ credit facility with the support of the IFC in 2018⁵⁹.

However, the fact still remains that there is huge potential in the Kenyan private finance sector which needs to be unlocked in this area and leading market commentators are also pointing here to the potential of green or energy efficient mortgages *“to fill the sustainable innovation gap in Kenya’s property and finance sectors through private financing for green buildings, and in this way position Kenya as a regional leader in climate resilience and energy efficiency”*.⁶⁰ See box 3 below for more details on Kenya’s mortgage market.

⁵⁷ <https://cpilabs.wpenginepowered.com/wp-content/uploads/2022/09/GAHF-report.pdf>

⁵⁸ <https://reall.net/blog/reall-wins-prestigious-global-climate-award-programme/>

⁵⁹ <https://unepccc.org/wp-content/uploads/sites/3/2018/11/2018-10-ee-in-buildings-kenya-web.pdf>

⁶⁰ <https://www.linkedin.com/pulse/green-mortgages-climate-resilient-future-kenyan-cities-edward-mungai/>

Box 3 Kenya's Mortgage Market

Kenya is home to an emerging mortgage market and, in recent years, has taken important steps to allow lower income households to access residential mortgage financing. According to [Kenya's Central Bank 2021 Annual Report](#), the value of outstanding mortgages by end 2021 amounted to Ksh (Kenyan Shilling) 245.1 bn (approximately EUR 1.9 bn, taking into account the end of year exchange rate), signalling a 5% increase relative to 2020's mortgage stock volumes (Ksh 232.7 bn or about EUR 1.7 bn). A total of 26,723 new mortgage loans were issued in December 2021. About 84% of mortgage lending is covered by a total of 8 credit institutions.

In terms of the interest rate environment, the average bank lending rate in 2021 was 12.1% %, according to World Bank Data⁶¹. About 88% of mortgage loans were on variable interest rates in 2021, as compared to 80.2% in 2020. The increase in variable interest rates was consistent with the increase in the value of outstanding mortgage facilities in the year.

Demand for mortgages appears to have increased, as primary mortgage lenders have seen a rise in the number of applications by new potential borrowers. However, there is a clear liquidity mismatch that these institutions cannot fully address. In this context, refinance institutions, such as the Kenya Mortgage Refinance Company (KMRC), are helping to reshape the country's mortgage lending landscape, expanding the demographic scope of mortgage lending and serving income groups that would otherwise be excluded from the market⁶².

The central bank has moreover indicated that, in order to further support the residential mortgage market in Kenya, specific measures would be needed. For instance, alternative long-term fixed rate mortgage options could be considered, such improving the KMRC's funding, in an effort to spur demand for mortgages, or review the latter institutions' lending terms, by way of real-estate support schemes intended for the expansion of building activity.

Lastly, in the aftermath of the pandemic, the Kenyan mortgage market will likely be supported by a series of underlying market and policy processes, particularly the implementation of the affordable housing programme (AHP), aimed at fostering home ownership, the development of residential infrastructures or the consolidation of the Kenyan Mortgage Refinancing Company (KMRC) as a mortgage lending catalyst.

In September 2022, the Kenya Mortgage Refinance Company (KMRC), together with the World Bank Group (WBG) and the Kenya Green Building Society (KGBS) organised a Green Affordable Housing Workshop to discuss how to integrate sustainability into affordable housing. A key takeaway from the event, as reported by the KMRC in a blog post⁶³, was the important role of green finance "*with its duality effect of financing green and greening finance*", a dual role which is keenly recognised in other jurisdictions also. In the same post, the KMRC points to green finance products, including green mortgages, as "*being a very viable area that financial institutions can explore*" and highlights the benefits for financial institutions of doing so: "*Hence expanding their client base and diversifying their product offering, building a higher-value and lower risk portfolio, and providing incentives to green mortgage takers*". The KMRC also underlines the potential role of development financial institutions in assisting private mortgage lenders to scale up green finance. Indeed, development institutions can support in capacity building through awareness-raising campaigns, training and via the provision of technical advice.

⁶¹ <https://data.worldbank.org/indicator/FR.INR.LEND?locations=KE>

⁶² <https://www.worldbank.org/en/news/feature/2021/12/10/how-kenya-is-making-home-ownership-possible-for-low-income-households>

⁶³ <https://www.kmrc.co.ke/blog/the-future-of-affordable-housing-is-green-popularity-in-kenya-takes-shape/>

December 2022 saw the publication of the draft National Green Fiscal Incentives Policy Framework.⁶⁴ Alongside considering a range of green fiscal reforms and regulatory instruments, the draft Policy Framework also announces plans to develop a green investment bank which could help overcome perceived barriers to sustainable investment through a combination of financing instruments and support and expertise to the recipients of these from the private and public sectors. More on the draft Framework below.

As experience in Europe and other jurisdictions shows, a variety of actions and tools can potentially help to unlock the potential of private mortgage finance in a structured and sustained manner. We take the liberty below of overlaying elements identified in Europe in this respect with the status quo and current developments in Kenya with a view to facilitating the sharing of best practice examples:

Pillars of EEM market development

Consumer awareness/demand

Based on the responses to its 2021 Global Buyer Survey, Knight Frank notes that 71% of African respondents consider energy efficiency to be very important to them compared to 42% globally, while 29% of home buyers in Africa prefer green homes and are willing to take on the extra costs⁶⁵.

Research conducted by the Heinrich Böll Stiftung in 2019⁶⁶ provides some interesting insights into consumer awareness around energy efficiency in Kenya specifically. Generally speaking, the research suggests that, as in Europe, there is still a lack of awareness amongst consumers despite the existence of a wide variety of energy efficiency measures and initiatives in the country. Encouragingly, the majority of respondents agree on the importance of energy efficiency, however most are either neutral or are resistant to the prospect of spending money to achieve it, despite the benefits of energy efficiency being made clear to them. Having said this, some respondents indicated that they would be motivated to reduce their energy consumption and one of the key drivers identified in this respect was lower energy bills. As the research suggests, this provides valuable insights for stakeholders seeking to encourage energy efficiency and points to the potential value of subsidies and incentives in this respect. It also points to the usefulness of emphasising cost savings in communication to consumers in Kenya around energy efficiency. This last point appears particularly salient against the current global backdrop of rising energy prices.

As far as consumer awareness of and demand for energy efficiency financing, including mortgages, is concerned, it is likely that there is a ‘chicken-and-egg scenario’ at play here, as has been and perhaps still is the case in many other parts of the globe, whereby a lack of private finance is constraining demand and a lack of demand linked to low awareness of energy efficiency measures is constraining supply. These dynamics point to the importance of a combination of awareness-raising campaigns around the practice and benefits of energy efficiency, the policies and initiatives in place in the country, as well as around energy efficiency financing mechanisms, could help, combined with supply-side actions, the focus of this Report. With regard to the demand side and with a view to stimulating interest, KMRC points to the role of financial institutions in educating potential borrowers about how *“long-term benefits of green homeownership outweigh the marginal incremental cost of green houses”*.⁶⁷ Worth highlighting here also is the Kenyan Treasury’s National Green Fiscal Policy Framework which could help incentivise consumer behaviour towards energy efficiency investments

⁶⁴<https://www.treasury.go.ke/wp-content/uploads/2023/01/Draft-Green-Fiscal-Incentives-Policy-Framework.pdf>

⁶⁵<https://www.knightfrank.com/research/article/2021-12-06-african-home-buyers-now-more-inclined-to-greener-homes>

⁶⁶https://www.researchgate.net/publication/349716727_ENERGY_EFFICIENCY_IN_KENYA_PUBLIC_AWARENESS_STRATEGIES_CHALLENGES_AND_OPPORTUNITIES

⁶⁷ <https://www.kmrc.co.ke/blog/the-future-of-affordable-housing-is-green-popularity-in-kenya-takes-shape/>

and unlock private sector supply as well by enhancing private sector financing of climate actions. More on this later.

In the meantime, it is worth highlighting the following key takeaways from this section:

- 1. There is growing awareness of and interest in energy efficiency in Africa more broadly and Kenya more specifically, but a majority of consumers is still resistant to the prospect of spending money to achieve it.*
- 2. Lower energy bills could be a major driver of energy efficiency renovations in Kenya. This points to the potential value of subsidies and incentives to stimulate demand and the usefulness of emphasising cost savings in communication to consumers.*
- 3. A combination of awareness-raising campaigns around the practice and benefits of energy efficiency, the policies and initiatives in place in the country, and energy efficiency financing mechanisms could help increase demand for energy efficiency financing.*

Data availability & access

In a context where there is a growing recognition across global jurisdictions of the importance of building energy performance certification, not only to promote energy efficient buildings but also to support the ‘financing of green’ and the ‘greening of finance’, in 2020, the Kenyan Ministry of Energy also recognised the importance of building energy performance certification in its National Energy Efficiency and Conservation Strategy (NEECS) first and foremost as a way to enhance the energy performance of new buildings in Kenya.⁶⁸ The Strategy proposes actions relating to minimum energy performance standards for buildings and the adoption of regulation on building energy performance certification for new buildings (see figure 5 below for more details).

For a number of years, Kenya has been using foreign rating tools to measure building sustainability. These include the South African Green Star Africa Rating System and the IFC’s EDGE mentioned above. The American Leadership in Energy and Environmental Design (LEED) tool is also present in the market. Market participants have however indicated that the IFC’s EDGE is increasingly the tool of choice and since July 2020, the Kenyan government has been favouring the use of EDGE for all green affordable housing projects.⁶⁹ Although these tools were all developed outside of Kenya, we understand from exchanges with market participants that they have all been contextualised by recognising and referencing Kenya’s varied climatic conditions, laws, policies and regulations as well as the availability of local materials. This contextualisation has enabled them to be applied in Kenya as a minimum baseline for green building standards. In the absence of certain standards locally, they reference international standards e.g the use of FSC certified timber for wood products and reference of WHO for health-related standards. The EDGE standard, for instance, encourages the use of materials with the lowest embodied carbon.

Given the impact of existing buildings in terms of energy consumption and CO2 production, experience from other jurisdictions, as described in this Report, suggests that there would be merit in considering an extension of any future regulations in the area of certification and minimum performance standards to cover existing buildings as well, potentially starting with public buildings. In addition to this and mindful of the importance of building energy performance data for the development of green finance, there could potentially also be merit in any future regulation in considering the establishment over time of databases or registers to record this data which could in turn be accessed by financial institutions.

⁶⁸ <https://unepccc.org/wp-content/uploads/2020/09/kenya-national-energy-efficiency-and-conservation-strategy-2020-1.pdf>

⁶⁹ <https://edgebuildings.com/edge-standard-provides-key-benefit-for-kenyas-affordable-housing-developers/>

The following key takeaways in relation to data availability & access are worth highlighting:

1. *Building energy performance certification is recognised in Kenya as key to driving energy renovation.*
2. *The IFC's EDGE certification appears to largely and increasingly be the tool of choice in this area in Kenya.*
3. *In its NEECS, the Kenyan government highlights the adoption of regulation on building energy performance certification for new buildings as a priority.*
4. *Experience from other jurisdictions suggests that there would be merit in considering similar regulation for existing buildings, potentially starting with public buildings, as well as the development overtime of publicly available databases or registers to record performance data.*

Green Bond Markets

As indicated above, in 2017 the Kenya Bankers Association (KBA), Nairobi Securities Exchange (NSE), Climate Bonds Initiative (CBI), Financial Sector Deepening (FSD) Africa and FMO - Dutch Development Bank launched the Green Bond Programme Kenya (GBP-K) to promote financial sector and green investment by developing a domestic green bond market.

Since its establishment, the GBP-K has been researching the potential of green bond issuance in Kenya. Other key objectives include the development of a pipeline of green investments and engagement with local and international investors, support to the demonstration of green bond issuance from leading banks and corporates, the promotion of green Islamic finance, the development of a pool of Kenya-based licensed verifiers, the development of a cooperative fixed income fundraising facility that would allow smaller banks and corporates to also take advantage of wholesale debt capital markets and leveraging of the Kenya experience to catalyse similar programs across East Africa Community⁷⁰.

Significantly, in 2019, Kenya became the first country in East and Central Africa to see the successful issuance of a green bond. The bond was issued by Acorn Holding Africa, a real estate company, and as of October 2019 had raised Kshs. 4.3 billion (approx. 35 million EUR). The proceeds from the issuance were channelled to the construction of 5,000 sustainable and affordable student housing units in Nairobi and its surrounding area.⁷¹ Investors in the transaction were mainly local banks, development finance institutions and local pension funds.

The significance of this successful inaugural green bond issuance is that it points to the potential for Kenyan financial institutions to access capital markets, something which has typically been very challenging, via green bonds and in this way mobilise low-cost and long-term private capital to finance sustainability in the Kenyan building stock, among other projects, through energy efficient and green mortgages. Encouragingly, it has been reported that in recent years investor interest in green bonds has grown exponentially in Africa as evidenced by oversubscriptions of recent issuances⁷² underlining the potential in this area to create the virtuous circle of green bond funding and green mortgage origination which is likely to be a key element of scaling up the financing of the climate transition.

As a key stakeholder in the affordable housing sector, KMRC has already announced its plans to issue green bonds to finance sustainable and affordable housing projects⁷³.

⁷⁰ https://docs.wixstatic.com/ugd/38b0af_ce1e7d9d411d4b0485d70f4e35474924.pdf

⁷¹ <https://www.climatebonds.net/2019/10/first-green-bond-kenya-acorn-usd40m-climate-bonds-certified-financing-green-buildings>

⁷² <https://www.businessdailyafrica.com/bd/opinion-analysis/columnists/how-green-bonds-can-bridge-financing-gap-3931634>

⁷³ <https://www.kmrc.co.ke/blog/the-future-of-affordable-housing-is-green-popularity-in-kenya-takes-shape/>

As mentioned above and described in more detail below, plans to develop a green investment bank under the draft National Green Fiscal Incentives Policy Framework could further boost private sector issuance of green bonds.

To conclude this section, our research points to some key takeaways:

1. *In 2019, Kenya became the first country in the East and Central African region to see the successful issuance of a green bond.*
2. *In recent years, investor interest in green bonds has grown exponentially in Africa as evidenced by oversubscriptions of recent issuances.*
3. *This points to the potential for future issuances to help financial institutions access capital which can in turn be mobilised at low-cost and long-terms to finance sustainability in the Kenyan building stock.*
4. *KMRC has announced plans to issue green bonds to finance sustainable and affordable housing projects.*

Optimising the value chain

As in Europe, there has been a growing recognition in Kenya of the importance of identifying, aligning the interests of and coordinating different stakeholders in the value chain to deliver sustainability in buildings. Reporting on its Green Affordable Housing Workshop in its blog post as mentioned earlier, the KMRC confirmed the agreement amongst participants of the importance of collaboration between all players in the entire value chain.

Particular attention has been paid in Kenya to the role of developers with a view to building homes and other buildings which are as green as possible. Indeed, the point is made by the KMRC that the right construction methods together with appropriate materials can reduce developers' costs and potentially enable them to pass on these savings in the form of more affordable buildings. In recent years, as the sustainability agenda has taken hold globally, comparatively high construction costs linked to lack of government support and the non-uniformed application of building standards have been highlighted as undermining appetite in the construction industry for building 'green' or producing unsatisfactory outcomes⁷⁴. In respect of the building standards point, one concern highlighted is that in the past many developers applied green building standards from Europe to Kenya, despite the differences in climate between sub-Saharan Africa and Europe, resulting in the construction of Western style buildings which are not suitable for the sub-Saharan climatic conditions. See the point on building energy performance legislation below for more considerations on this point.

Proposals highlighted during the KMRC Workshop with a view to supporting developers included capacity building of contractors and construction workers on green construction, the inclusion and mainstreaming of green housing construction courses by institutions of higher education, focussing on the green renovation of existing buildings, strategic partnerships to make the sector as robust as possible and a simplification of green certification which is also tailored to the local climatic and environmental conditions. Participants also pointed to the importance of the local and national governments taking a leading role in the green agenda. This last point chimes with the efforts under the Energy Efficient Mortgages Initiative (EEMI) to foster close dialogue with European and national authorities to ensure maximum coordination between the public and private sectors.

As will be detailed in the next section, a number of planned Kenyan government actions are focussed on addressing some of these challenges, including training programmes for architects and other

⁷⁴ <https://kimisituinvestment.co.ke/to-go-green-we-need-to-understand-the-merits/>

building professionals at national and county level on building energy efficiency and green building design to ensure local capacity for compliance⁷⁵.

With the idea of partnerships and collaboration between stakeholders in mind, one last interesting development to highlight is the Building Efficiency Accelerator (BEA) program⁷⁶. This is a public–private sector collaboration to accelerate local implementation of building efficiency policies., leveraging on global best practice. This program has been adopted by Nairobi, Nakuru, Kisii and Homabay Counties. Taking progress in Nairobi as an example, Nairobi worked with the Kenya Green Building Society through a BEA Leadership Grant on the development of local Green Building Guidelines (GBG). The GBG were completed in 2020 with a pilot application process proposed. This involves developers submitting plans for approval meeting at least 50% compliance with the guidance. The GBG are fostered by baseline data studies for water and energy.

In summary, the following points are worth highlighting:

1. *KMRC is actively promoting collaboration between all players in the value chain to deliver sustainability in buildings.*
2. *A particular focus is on capacity building and training of developers and contractors in the area of green buildings, which can help to secure the use of appropriate construction methods and materials, reducing costs and increasing affordability.*
3. *By way of a BEA Leadership Grant, the Kenya Green Building Society developed a set of local Green Building Guidelines (GBG) in 2020.*
4. *A recurring theme is the importance of building codes which are tailored to the local and climatic conditions.*

Regulatory & Supervisory Framework

Sustainable Finance

From the perspective of the broader East African region, Kenya’s Capital Markets Authority has taken a leading role in relation to reporting requirements, for example through its Stewardship Code for institutional investors⁷⁷ launched in 2017. The Code encourages asset owners and asset managers to serve as responsible stewards for those on whose behalf they are investing money and to promote good corporate governance by monitoring the companies held in investment portfolios, ensuring active and informed voting practices, focussing on sustainability issues and committing to public disclosure and client, among others.

In a legislative vein, the 2015 Companies Act⁷⁸ requires listed firms to report on matters related to ESG considerations in their annual reports, while the Capital Markets Act⁷⁹ (last revised in 2019) requires reporting on non-compliance with the Corporate Governance Code. Affected entities must either “comply or explain” i.e. apply the principles or disclose why they do not. Taken together these legislative initiatives effectively lay down mandatory entity level reporting requirements for all ESG dimensions.

In November 2021, the Nairobi Securities Exchange issued a set of guidelines⁸⁰ with double materiality perspective aimed at improving and standardising the ESG information reported by listed companies

⁷⁵ <https://unepccc.org/wp-content/uploads/2020/09/kenya-national-energy-efficiency-and-conservation-strategy-2020-1.pdf>

⁷⁶ <https://buildingefficiencyaccelerator.org>

⁷⁷ <https://www.ecgi.global/code/stewardship-code-institutional-investors-2017>

⁷⁸ <https://eregulations.invest.go.ke/media/Companies-Regulations.pdf>

⁷⁹ <https://www.cma.or.ke/index.php/regulatory-frame-work/acts>

⁸⁰ <https://sseinitiative.org/wp-content/uploads/2021/12/NSE-ESG-Disclosures-Guidance.pdf>

in Kenya. The guidelines introduce a granular approach to ESG reporting that is aligned with international standards on ESG reporting. The guidelines include further indications on how listed companies can integrate ESG factors into their organisations, taking advantage of the associated opportunities, whilst managing business risks.

At the time of writing, Kenya does not have a green taxonomy, although this is one aspect of the 'sustainable finance' agenda which is highlighted in Business Daily as being critical to secure Central Bank of Kenya support for green funding and lending programmes, as well as to the fiscal policy interventions under development by the government⁸¹. The same article also highlights the value of a green taxonomy in ensuring that capital goes to green investments and in supporting financial institutions in communicating on their green activities to investors.

To summarise, the following takeaways are worth highlighting:

- 1. From the perspective of the broader East African Region, Kenya's Capital Markets Authority has taken a leading role in relation to ESG reporting requirements through its 2017 Stewardship Code.*
- 2. Additional, mandatory entity-level ESG reporting requirements are laid down in the Companies Act and the Capital Markets Act.*
- 3. In 2021, the Nairobi Securities Exchange issued a set of guidelines with double materiality perspective to improve and standardise ESG information reported by listed companies.*
- 4. Kenya currently does not have a green taxonomy, although commentators in the country are pointing to the importance of such an initiative in scaling up green finance.*

Supervisory Expectations & Monetary Policy

As in other parts of the world, the Central Bank of Kenya (CBK) is also turning its attention to the potential systemic implications of climate change for financial institutions, financial markets and overall financial stability.

Most recently, in 2021, the CBK issued guidance⁸² on climate related risk management aimed at guiding commercial banks and mortgage finance companies in the management of their climate related risks by integrating climate related management into their business decisions and activities. The entities in question were required to provide an implementation plan to the CBK by the 30th of June 2022.

Prior to this, in 2019, the CBK issued the Kenya Banking Sector Charter⁸³ which aims to promote a responsible and disciplined banking sector that works for and with the Kenyan people. The Charter consists of four pillars focussing on: a customer centric business model, risk-based credit pricing, transparency and disclosure and ethical banking. The ethical banking pillar requires banks to entrench a culture of 'doing the right thing' in the offering of products and services, which includes integrating principles of sustainable finance across their business activities.

In summary, the following takeaways can be highlighted:

- 1. The Central Bank of Kenya is also turning its attention to the impact of climate change on the financial sector.*
- 2. In 2021, the CBK issued guidance to commercial banks and mortgage finance companies on climate related risk management.*

⁸¹ <https://www.businessdailyafrica.com/bd/opinion-analysis/columnists/kenya-needs-green-finance-guidelines-3812250>

⁸² <https://www.centralbank.go.ke/wp-content/uploads/2021/10/Guidance-on-Climate-Related-Risk-Management.pdf>

⁸³ <https://www.centralbank.go.ke/wp-content/uploads/2020/03/Kenya-Banking-Sector-Charter-2019.pdf>

3. *This followed the publication of the CBK's Kenya Banking Sector Charter in 2019, which seeks to promote a responsible and disciplined banking sector, including the integration of sustainability across business activities.*

Building Energy Performance Legislation

Energy efficiency has been topping the Kenyan Ministry of Energy's agenda since the early 2000s and 2006 saw the establishment of Kenya's energy policy, including its institutions and framework, through the Energy Act which focussed on establishing energy conservation measures for factories and buildings. However, gains since this time have reportedly been *"suboptimal because of limited information, motivation, expertise and finances required to adopt emerging energy efficiency and conservation technologies and innovations"*⁸⁴. This resulted in the development and launch in 2020 of the Kenya National Energy Efficiency and Conservation Strategy (NEECS), intended as a robust roadmap towards optimising energy efficiency and achieving conservation gains in the country, delivering overall positive impacts for the Kenyan economy.

The NEECS provides a roadmap in relation to five priority sectors – households, buildings, industry and agriculture, transport and power utilities – as a core element of efforts under the Green Economy Strategy and Implementation Plan 2016-2030, to transform to Kenya into an industrialised, middle-income nation, whilst supporting the achievement of the Kenya's climate commitments under the Paris Agreement.

On buildings specifically, the NEECS sets a number of objectives by 2025 and highlights the measurement indicators:

- Develop Minimum Energy Performance Standards for Buildings:
 - Minimum Energy Performance Standard developed and gazetted
 - Establish Baseline Energy Use Index for Buildings in Kenya
- Improve the energy performance of new buildings in Kenya:
 - Share of newly built floor area compliant with energy efficiency requirements in the total building stock
 - Adopt American Society of Heating, Refrigerating and Air-Conditioning Engineers buildings energy conservation standards or equivalent for public and commercial buildings
- Improve the energy efficiency of lighting in existing public buildings
 - Lighting load in public buildings
 - Promotion of new green public buildings
 - Design and construction of energy efficient/green public buildings
 - Ensure 25% of buildings under affordable housing are green buildings

To this end, the NEECS proposes a series of actions for new and existing buildings as outlined in the figure below:

⁸⁴<https://unepccc.org/wp-content/uploads/2020/09/kenya-national-energy-efficiency-and-conservation-strategy-2020-1.pdf>

Figure 5 - NEECS Proposed Actions in the Building Sector

Objective	Actions
Enhance the energy performance of new buildings in Kenya	<p>• Minimum building energy performance standards for new buildings</p> <p><i>Description:</i> Develop minimum energy performance standards for new buildings. These requirements will be included in the amendments to the Building Codes, which should be updated regularly (e.g. every five years). Building energy performance certification to indicate whether they meet the MEPS. The national and county governments will develop implementation strategies at the county level and offer training to building professionals to build local capacity for compliance. Adopt ASHRAE building energy conservation standards or equivalent for public and commercial buildings.</p> <p><i>Key implementation partners:</i> Ministry of Energy, State Department for Public Works, CG (County Governments), EPRA, KEBS, NEMA, NCA, Ministry of Health, Council of Governors (CoG).</p> <p><i>Outputs:</i></p> <ul style="list-style-type: none"> - MEPS for buildings, - Energy Use Index, - Amendments to the Building Codes/legislation on the technical building standards, which will include requirements for building energy performance, - Established baselines for green buildings, - Adoption of regulations on building energy performance certification, - Implementation strategy for minimum building energy performance requirements and certification at the county level, - Training programmes for architects and other building professionals on building energy efficiency and green building design.
Improve the energy performance of existing buildings in Kenya through retrofits	<p>• Programme for energy-efficient upgrade and renovation of existing buildings</p> <p><i>Description:</i> Adopt a nationwide programme for the energy-efficient upgrade and renovation of existing buildings. Old government and public buildings should be retrofitted with efficient appliances, including lighting, power factor correction, efficient motors and passive energy (e.g. natural light and ventilation). Sound implementation strategies at the national and county level will be critical. Training of building professionals will be key to improve compliance with the adopted requirements. Certification of retrofits. Enhance the capacity of EPRA to enforce the EMR 2012. Promotion of ESCOs to enhance implementation of EE recommendations. Develop an incentive and recognition scheme for facilities that transition to energy efficiency in buildings.</p> <p><i>Key implementation partners:</i> Ministry of Energy, State Department for Public Works, Ministry of Transport, Infrastructure, Housing and Urban Development, county governments, KAM.</p> <p><i>Outputs:</i></p> <ul style="list-style-type: none"> - Governmental Decree on the adoption of the programme for the energy-efficient upgrade and renovation of existing buildings and respective technical documentation, - Increased compliance with Energy Management Regulations 2012, which cover all designated facilities including buildings, - ESCO implementation strategies of the programme for energy-efficient upgrade and renovation of existing public buildings, - Training programmes for building professionals on how to perform energy-efficient building renovation.

Source: National Energy Efficiency and Conservation Strategy (NEECS) ([link](#))

What is interesting and relevant for the present Report, as mentioned above, is that these planned actions reflect a number of priorities highlighted by stakeholders in Kenya as well as those highlighted and pursued by market participants and authorities in other jurisdictions, including training programmes for building professionals, baselines and minimum requirements for green buildings and certification to measure compliance.

We mentioned building codes earlier in this chapter and the concerns raised about the difficulties associated with the use by developers of European green building standards which are not necessarily suited to sub-Saharan climatic conditions. Indeed, in the absence of a building code that has minimum green building standards the applicable rating system is purely market driven. Developers or their clients dictate the rating system to use. At the time of writing, it is our understanding from exchanges

with market participants that the analysis and development of a new building code, including minimum energy performance standards, which is consistent with modern practices and prevalent risks in the built environment is ongoing in Kenya. We understand that the Kenya Green Building Society (KBS) is taking the lead and is in the process of developing a tool that best suits Kenya's social, economic, and environmental conditions. In the meantime, and as reported in the NEECS, the Kenyan government is implementing the European Energy Performance of Buildings Directive. We understand from market participants that this will serve as a bridge towards a building code adapted to Kenya's needs until the local markets develop maturity.

The following takeaways are worth highlighting for this section:

1. *In 2020, the Kenyan Government launched the National Energy Efficiency and Conservation Strategy (NEECS) to optimise energy efficiency and achieve conservation gains in the country.*
2. *The NEECS sets a number of objectives for both new and existing buildings by 2025, including minimum energy performance standards for new buildings and a programme for renovation of existing buildings, including training of building professionals.*
3. *At the current time, we understand that the Kenyan Government is implementing the European Energy Performance of Buildings Directive as a bridge towards a building code adapted to Kenya's needs and climatic conditions in due course.*
4. *Indeed, as indicated earlier, a recurring theme is the importance of building codes which are tailored to the local and climatic conditions.*

Public EE Support Actions

In December 2022, the Kenyan Treasury published its draft National Green Fiscal Incentives Policy Framework⁸⁵ *"to identify and prioritize the implementation of a coherent suite of green fiscal reforms that will allow the country to exploit the opportunities of continuing a low emission development path while enhancing climate resilience and environmental sustainability".*⁸⁶ This followed a report published by the UN in 2014 which highlighted that *"Kenya's transition to a green economy through fiscal investment of 2% of GDP could produce substantial benefits: by 2030, a green economy could outperform business as usual by 12% or KES 3.6 trillion (equivalent to US\$ 45 billion). Per capita national income would also nearly double from KES 39,897 (US\$ 498.70) to KES 69,702 (US\$ 871.30)".*⁸⁷

The draft Policy Framework considers a variety of green fiscal reforms as mechanisms in this area, ranging from tax policies, subsidies and expenditure programs, and regulatory instruments with fiscal components all of which have revenue implications. The draft Policy Framework points in particular to the potential for government taxes to stimulate a shift in production, consumption and investment towards low-carbon, climate-resilient and environmentally sustainable practices, and how concessional loans, guarantees and interest rate subsidies can be effective tools in overcoming investment barriers and leveraging private sector green investments. Reference is also made to the fact that government spending can directly target the delivery of environmental outcomes which might otherwise be ignored by the private sector.

With regard to buildings specifically, the draft Policy Framework recognises that in the absence of harmonised guidelines regulating the development and maintenance of green buildings and currently of regulations or legislation prescribing minimum energy performance requirements for new buildings, construction in Kenya takes little or no account of green building practices at the current

⁸⁵ <https://www.treasury.go.ke/wp-content/uploads/2023/01/Draft-Green-Fiscal-Incentives-Policy-Framework.pdf>

⁸⁶ <https://kbc.co.ke/local-business/article/35216/treasury-proposes-to-set-up-special-bank-for-green-projects>

⁸⁷ https://greenfiscalspolicy.org/policy_briefs/kenya-country-profile/

time. The considerable progress made under the BEA program mentioned earlier is however highlighted as accelerating the implementation of building energy efficiency policies at local level.

Drawing on international experience of measures to increase building sustainability, the draft Policy Framework points to fiscal policies, such as subsidies linked to the costs of energy efficient building technologies, either via direct subsidies or tax exemptions, as a common approach applied to the construction of new green buildings and the renovation of existing buildings. The use of sovereign green bonds as an effective way to finance these energy activities is also highlighted, with reference to the case of Lithuania, which earmarked the first tranche (€20 million) of its sovereign green bond program to provide energy efficiency upgrades to approximately 160 apartment buildings.

Interestingly, the draft also announces plans to develop a green investment bank *“that will provide a range of funding instruments and associated incentives to support the public and private sector in overcoming barriers to making green investments at scale”*.⁸⁸ (p.51) According to the draft Policy Framework, the bank would make available a wide range of financial instruments, potentially including credit guarantees, risk-reduction facilities, debt and equity. The bank could also offer support and expertise to the recipients of financing, as well as provide incentives to support the development of innovative financial instruments such as green bonds, blue bonds, resilience bonds and transactions using carbon credits.

The Draft Green Fiscal Incentives Policy Framework is currently undergoing stakeholder/public participation with public/stakeholders expected to submit comments to the National Treasury of Kenya by 2nd March 2023 to enable further revisions.

1. *The Kenyan Treasury published its draft Green Fiscal Incentives Policy Framework with a view to identifying and prioritising a range of green fiscal reforms to support the country’s climate transition.*
2. *On buildings specifically, the draft Framework highlights that, in the absence of legislation for green buildings, new construction currently does not take account of green building practices, although it points to the considerable progress made under the BEA program.*
3. *With a view to incentivising green building construction and the energy efficient renovation of existing buildings, the draft Framework considers international experience of direct subsidies and tax exemption in this area.*
4. *The draft Framework also considers that sovereign green bonds can be an effective way of financing these activities.*
5. *The draft Framework furthermore announces plans to develop a green investment bank to provide a range of funding instruments and incentives to overcome barriers to sustainable investment.*

⁸⁸ <https://www.treasury.go.ke/wp-content/uploads/2023/01/Draft-Green-Fiscal-Incentives-Policy-Framework.pdf>

Malaysia

Context

The IMF's World Economic Outlook Database⁸⁹ identifies Malaysia as an emerging and developing economy. The newly industrialised country is the third largest in Southeast Asia and the 34th largest in the world in terms of GDP, resulting from a mixture of a growing population and expanding economic activities, especially in the manufacturing sector, enabling particularly high labour productivity⁹⁰.

The energy sector is estimated to account for 80% of Malaysia's greenhouse gas emissions⁹¹ and energy demand has been growing steadily since 2000, at an average rate of 4% between 2000 and 2018 and of 6% between 2010 and 2018⁹². This growth in demand, especially for electricity, has been accelerated by the process of industrialisation in the country in the past two decades and is expected to continue into the future, potentially outstripping supply⁹³. Fossil fuels, primarily coal and natural gas, remain the primary source of electricity generation.⁹⁴

With this context in mind as well as the economic, social and environmental benefits of building an energy resilient country, in September 2022, the Malaysian Government launched the National Energy Policy 2022-2040 (NEP)⁹⁵ with the aim of: (1) enhancing macroeconomic resilience and energy security (2) achieving social equitability and affordability and (3) ensuring environmental sustainability.

As in other parts of the globe, Malaysia's commercial and residential buildings have historically been responsible for a significant proportion of final energy consumption and, in particular, final electricity consumption, accounting for 48% of the total⁹⁶, as well as greenhouse gas emissions⁹⁷. As a result of this, there has also been a growing focus on the importance of building energy efficiency in the country.

In 2015, the Malaysian Government presented the National Energy Efficiency Action Plan for 2015-2025⁹⁸ to deliver well-coordinated and cost-effective implementation of energy efficiency measures in the industrial, commercial and residential sectors with a view to reducing energy consumption and delivering economic savings for the consumers and the country as a whole. It is worth noting that the National Energy Efficiency Action Plan is focussed on electricity usage only; it does not cover other areas of the energy sector. As far as buildings are concerned, Key Initiative Number 5 of the Plan focuses on energy efficient building design and aims at promoting energy efficiency in new commercial buildings. (More on this later the Building Energy Efficiency Legislation section of this Chapter).

As in many global jurisdictions, a key challenge in implementing energy efficiency in Malaysia is the availability of financing. Malaysia has reportedly implemented a number of successful innovative financing schemes in support of energy efficiency more generally, however, despite these it is suggested that Malaysia still faces challenges in upscaling developments, linked to a lack of comprehensive regulation, limited awareness of energy efficiency initiatives and limited information on existing financing mechanisms.⁹⁹

⁸⁹ <https://www.imf.org/external/pubs/ft/weo/2022/01/weodata/groups.htm>

⁹⁰ https://asean.org/wp-content/uploads/Regional-Study-on-Labor-Productivity-in-ASEAN_R05_Kirimok.pdf

⁹¹ https://www.bnm.gov.my/documents/20124/3770663/jc3_can_cgm_report_2022.pdf

⁹² https://www.epu.gov.my/sites/default/files/2022-09/National%20Energy%20Policy_2022_2040.pdf

⁹³ <https://thekootneeti.in/2022/10/04/analysing-the-prospects-and-challenges-in-building-energy-resilient-malaysia/>

⁹⁴ <https://www.mdpi.com/1996-1073/14/8/2200>

⁹⁵ https://www.epu.gov.my/sites/default/files/2022-09/National%20Energy%20Policy_2022_2040.pdf

⁹⁶ <https://agep.aseanenergy.org/wp-content/uploads/2019/10/EEF-Guideline-in-Malaysia.pdf>

⁹⁷ https://www.researchgate.net/publication/259827725_Building_Energy_Efficiency_for_Sustainable_Development_in_Malaysia

⁹⁸ <https://www.pmo.gov.my/wp-content/uploads/2019/07/National-Energy-Efficiency-Action-Plan.pdf>

⁹⁹ <https://agep.aseanenergy.org/wp-content/uploads/2019/10/EEF-Guideline-in-Malaysia.pdf>

Regarding the financing of building energy efficiency specifically, a number of major banks in Malaysia have started offering targeted financing solutions for green residential homes which are said to be helping to enhance awareness about sustainability when consumers purchase homes and potentially consider renovating them in the future.¹⁰⁰ However, in her opening address at the September 2022 Cagamas Berhad (National Mortgage Corporation of Malaysia) Developing and Financing Green Housing in Asia Conference in Kuala Lumpur, Jessica Chew Cheng Lian, Deputy Governor of the Central Bank of Malaysia suggests that, drawing on experience from other jurisdictions, *“there is much more that financial institutions in Malaysia can do to unlock the potential to scale up green housing finance”*. Significantly, she also points to the importance of ensuring that the transition to green housing also takes account of existing challenges of housing affordability which is challenging the ability of many Malaysians to access homeownership, as well as the current high levels of household debt. She places emphasis on the importance of *“a just and orderly transition”*.¹⁰¹

Notable in this respect are efforts from Cagamas Berhad to deliver financing solutions for affordable green housing which is accessible to lower income home buyers and helps reduce the overall environmental impact of the housing sector¹⁰². Cagamas Berhad’s efforts are discussed in more detail later in this Chapter. See also box 4 for more details on Malaysia’s mortgage market.

Box 4 Malaysia’s Mortgage Market

The Malaysian mortgage market, along with other regional markets, is undergoing deep transformations both from an institutional and economic standpoint. The latest Bank Negara Malaysia (BNM), the country's central bank, monthly statistical report from November 2022 indicates that outstanding residential mortgage values – for both commercial and Islamic banks - by the end of the abovementioned month was MYR (Malaysian Ringgit) 683.9 bn (approximately EUR 147 bn). Compared to November 2021’s mortgage stock, volumes increased by 7%.

The interest rate environment in Malaysia has also tended to favour lending. Since 2008-2009, according to World Bank (WB) data¹⁰³, the country’s bank lending interest rate has consistently decreased every year. By end 2021, the rate stood at 3.4%, the lowest reading in the WB series for this jurisdiction.

The Malaysian property market also expanded in the 2021-2022 period according to the National Property Information Centre. Residential building transactions represented about 62% of the total volume of RE transactions in Malaysia in the first half of 2022, or 54.1% of the total aggregated value (in local currency), making this specific sub-sector the key component of the local RE market.

Affordability remains one of the main challenges for credit institutions and the BNM. In this vein, the BNM launched an affordable homes scheme in late 2018¹⁰⁴, which was updated and enhanced one year later.¹⁰⁵ This scheme, which had an initial endowment of MYR 1 bn (about EUR 26 mn), to support lower-income first time buyers across the country, in cooperation with participating credit institutions. Besides housing affordability, sustainability is fast becoming a core topic for the national banking industry. In its [2021 Annual Report](#) (March 2022), the BNM outlined its plan to gauge and address climate-risks, in order to ensure that economic activities contribute to climate change mitigation and adaptation. More on this later in the Chapter.

¹⁰⁰ <https://www.bis.org/review/r220921e.htm>

¹⁰¹ <https://www.bis.org/review/r220921e.htm>

¹⁰² <https://cagamas.com.my/press-release/cagamas-expands-its-affordable-housing-mandate-to-cover-green-housing-female-headed>

¹⁰³ <https://data.worldbank.org/indicator/FR.INR.LEND?locations=MY>

¹⁰⁴ <https://www.bnm.gov.my/-/bank-negara-malaysia-s-special-measures-for-affordable-homes>

¹⁰⁵ <https://www.bnm.gov.my/-/enhancements-to-bank-negara-malaysia-s-rm1-billion-fund-for-affordable-homes>

In the meantime, the present Report, in its efforts to identify and share global experience and best practice, can offer insights which can support national efforts to scale-up financing of this kind. To this end and as for the previous Chapter on Kenya, we also take the liberty here of overlaying elements identified in Europe as being central to scaling-up energy efficient mortgages with the status quo and current developments in Malaysia:

Pillars of EEM Market Development

Consumer demand/awareness

Various research has been conducted into consumer demand for green buildings in Malaysia. Surveys from 2010 and 2011 both indicated that consumers were willing to pay more to live in a green building or sustainable neighbourhood, with the premium ranging from 5% to 18% depending on the type of housing.¹⁰⁶

In 2013, a team of researchers from the School of Housing, Building and Planning, University Sains Malaysia (USM) also conducted a study on the appetite of home buyers for green housing.¹⁰⁷ By way of a questionnaire, the researchers sought to understand home buyers' awareness of green homes, determine the extra price that home buyers were willing to pay for green homes and identify the green features which home buyers were willing to pay extra for. The study found that that public awareness about the benefits of green homes was average, and that the majority of potential home buyers were willing to more for a green home, although only up to 5% more. The study furthermore found that the most sought-after green features, for which potential home buyers would be willing to pay more, were indoor environment quality, energy efficiency and greenery.

Based on the research conducted, the study provides some interesting recommendations which resonate with research and findings from other jurisdictions and could guide policymakers and other market participants in the promotion of green buildings:

- The government should stimulate social concern on green home benefits through national plans by supporting NGO activities and promoting green building voluntary rating systems.
- The government should support green home purchases by offering financial incentives. Some of the incentives, which can be applied by the government, are as follows: tax reductions, grants, rebates and special mortgage rates for green home purchases.
- To make green homes more affordable for home buyers, the government should provide a lower interest fund for green home developers. Developers can then decrease the retail prices of green homes.
- Green home developers and designers should use integrated design approaches and cost-effective strategies to keep final prices at an affordable range for potential purchasers.
- To achieve sustainable green home development, construction firms should build green homes which meet home buyers' preferred green features.

More recent research conducted in 2022 entitled *Consumer Acceptance of Renewable Energy in Peninsular Malaysia*¹⁰⁸ provides some interesting insights into consumer awareness of and willingness to pay for renewable energy specifically. As above, these insights could guide policymakers and other

¹⁰⁶ <https://www.constructionplusasia.com/sg/homebuyers-willingness-to-pay-for-green-attributes-evidence-from-asian-cities/>

¹⁰⁷ https://www.researchgate.net/publication/276949436_Strategic_Approach_to_Green_Home_Development_in_Malaysia-the_Perspective_of_Potential_Green_Home_Buyers

¹⁰⁸ https://www.researchgate.net/publication/365240170_Consumer_Acceptance_of_Renewable_Energy_in_Peninsular_Malaysia

market participants in promoting the use of renewable energy specifically and energy efficiency in buildings more generally in the future.

The research highlights how *“there is broad consumer concern and awareness about the environment”* (p.8) in Malaysia but how marketing efforts for renewable energy have so far proven unsuccessful. The research notes that *“the concept of “green” is still relatively novel in Malaysia”* (p.8), despite a number of green programs. The paper highlights a lack of understanding of Peninsular Malaysian households’ use of renewable energies, their adaptability to change and their energy consumption patterns and points to the need for more research in these areas.

The study considers, using a theoretical approach, how environmental uncertainties, knowledge of renewable energy and consumer attitudes influence their willingness to pay a premium for renewable energy. By way of a deeper dive into consumers’ concerns, knowledge, beliefs and willingness to pay, the paper provides a number of interesting insights from which we can derive certain indications which could serve in a broader building energy efficiency context:

- Consumers who are concerned for the environment are willing to pay a premium for renewable energy.
- Similarly, consumers who have knowledge of renewable energy or who believe in the positive consequences of renewable energy are willing to pay more. This points to potential to increase the appeal of renewable energy by making consumers more aware of the impacts of climate change and the benefits of renewable energy in this context. As the paper suggests, *“consumers may be more likely to act in ways that align with their beliefs or knowledge”* (p. 14).
- Consumers may be aware of energy efficiency but lack knowledge about it, in other words, and as the paper suggests, they may lack specific information on: *“what to do next, what to look for at the store and how to compare products, whom to contact for advice, where in their buildings to look for signs of cost-effective efficiency improvements, and what ancillary benefits to water consumption, productivity, etc., may be possible”* (p.9). The paper points to the potential of information dissemination via the media to reach target audiences.
- Consumers’ energy consumption patterns influence their willingness to pay more for renewable energy. In other words, the higher a consumer’s energy consumption, the more willing they are to pay a premium for renewable energy. This chimes with the paper’s suggestion that *“the usage of energy is one of the leading causes of consumer concern”* (p.7) and, as is the case in many global jurisdictions, is a particularly relevant consideration in Malaysia against a background of increasing energy demand. The concern is also pertinent in a context of rising energy prices.

As far as consumer awareness of and demand for energy efficiency financing is concerned and as indicated above, in September 2022, Cagamas Berhad concluded a technical assistance agreement with the Asian Development Bank (ADB) focused on the identification of the challenges and constraints in Malaysia for the uptake of green residential mortgages. In particular, the results of the study, expected to be concluded towards the end of 2023, should help to identify the best measures to develop the green housing market in the country and facilitate financing access to affordable green housing, with a focus on low-income classes and female-headed households.¹⁰⁹

The different pieces of consumer research provide the following insights:

1. *Over the last decade, it appears that consumer awareness of environmental issues in Malaysia has increased, although the concept of “green” remains a novel one at the current time.*
2. *Consumers are willing to pay more for renewable energy and green housing.*

¹⁰⁹<https://cagamas.com.my/press-release/cagamas-expands-its-affordable-housing-mandate-to-cover-green-housing-female-headed>

3. *This willingness to pay a premium can be driven by consumer concerns about the environment, knowledge of renewable energy and energy consumption patterns.*
4. *Awareness-raising and information dissemination campaigns are highlighted as potentially increasing the appeal and knowledge of renewable energy.*
5. *The Government could additionally stimulate demand for green buildings by promoting building rating systems and through financial incentives.*
6. *The Government could furthermore secure green housing affordability by supporting developers through financial support packages.*
7. *Developers should use integrated design approaches and cost-effective strategies to ensure affordability and should furthermore focus on building homes that meet buyers' preferred features.*
8. *A recently signed technical assistance agreement between the Asian Development Bank and Cagamas Berhad is intended to help identify the best measures to expand Malaysia's green housing market and facilitate financing access to affordable green housing, with a focus on low-income classes and female-headed households.*

Data availability and access

In recent months, the Joint Climate Change Committee (JC3), which was established in 2019 as an industry-regulator platform to enhance climate resilience of the financial sector, has launched actions by way of the Climate Data Catalogue¹¹⁰ to close climate and environmental data gaps for the financial sector. In the first instance, the focus is addressing data gaps in relation to the following priority data groups comprising: (1) greenhouse gas (GHG) emissions and forward-looking targets, (2) green/sustainable lending/financing, (3) non-renewable and renewable energy, (4) exposure to physical risks, (5) asset value-at-risk (VaR) arising from natural catastrophes, (6) Environmental, Social and Governance (ESG) score/rating, (7) water consumption and waste management, and (8) biodiversity and forestry indicators. Of particular relevance in the present context are the focuses across these data groups on facilitating lending/investment decisions by financial institutions, among other uses.

In more general terms, the Data Catalogue is intended as a source of reference on climate and environmental data for the financial sector and provides an overview of the data that are available, partially available, and unavailable, as well as information on data gaps. The Data Catalogue is accompanied by a Report which summarises potential solutions and recommendations to address the data gaps. These efforts are furthermore intended to encourage stakeholders to work together to improve the availability and accessibility of climate data. The Data Catalogue will be updated by the Sub-Committee on an annual basis to ensure that it remains relevant based on the latest data requirements, standards and data sources.

Regarding building energy performance certification, which is widely held in other jurisdictions as being central to stimulating building energy performance improvements and supporting green or energy efficient financing, there are a number of building-relevant rating systems present in the market, which, depending on the system, are more high-level or general in the sense that they apply to a wide range of products and services, e.g. the MyHijau Mark¹¹¹, the official green labelling scheme endorsed by the government which applies to buildings, energy, transport and water & waste, or are specific to building performance. The latter includes the US Leadership in Energy and Environmental Design (LEED) Certification which has been deployed for the rating of residential and commercial buildings, as well as rating systems developed specifically for Malaysia, including but not limited to

¹¹⁰ <https://www.bnm.gov.my/climatechange>

¹¹¹ <https://www.myhijau.my/>

the profession-driven Malaysian Green Building Index¹¹² (GBI) (2009) and GreenRE¹¹³ (2013) and the government-driven PH JKR (2012) and GreenPASS¹¹⁴ (2012). All four 'local' rating systems are voluntary and not statutory requirements, unless this is specifically stipulated by individual local authorities. Significantly all are designed specifically to respond to the characteristics of the tropical Malaysian climate (hot and humid), as well as the country's current social, infrastructure and economic development. An interesting and relevant feature of GBI and GreenRE is the public accessibility of a register of certified buildings via their respective websites. The ratings systems variously apply to non-residential buildings (new & existing), residential buildings (new), industrial buildings (new & existing), healthcare facilities and townships.

Worth highlighting in addition to the above is MyCREST¹¹⁵ launched in 2015 by the Construction Industry Development Board (CIDB) and the Public Works Department (PWD) as an additional rating scheme aimed at reducing the built environment's carbon emissions and environmental impact. CIDB has indicated that since the launch of MyCREST, PWD had made it mandatory for all new public building projects worth RM50 million and above to use MyCREST¹¹⁶. In a similar vein, in 2020, under the Energy Efficiency & Conservation Act (EECA), the government introduced mandatory national building energy intensity labelling for government buildings, including offices, hospitals, universities and schools¹¹⁷. Interestingly, in the NEP 2022-2040, the Government also highlights harmonisation *"of various Green Building Indices on energy efficiency"* (p. 58) as an initiative to enhance demand-side management in the residential and commercial sector as part of its Action Plan.¹¹⁸

These more recent developments are significant as they align with the direction of travel in other jurisdictions towards mandatory building certification for new and existing buildings of all types, as part of building performance legislation. These evolutions could serve as valuable precedents for future developments across all property types in this area in the Malaysian market, which would presumably also include the extension of the registers of certified buildings that are a feature of the GBI and GreenRE.

In summary, the following takeaways which have emerged from our research are worthy of note:

1. *In recognition of the importance of data for financial institutions in relation to the climate transition, the Joint Climate Change Committee (JC3) has launched actions to identify and close climate and environmental data gaps.*
2. *In the first instance, priority will be given to addressing gaps in 8 data areas with a view to supporting lending/investment decisions among other financial activities.*
3. *Since 2009, efforts have also been dedicated to developing building rating systems, which are widely seen in other jurisdictions as being an important source of data for financial institutions.*
4. *Significantly, there are a number of 'local' voluntary rating systems which have been developed specifically for Malaysia's climatic conditions and social, infrastructure and economic development.*
5. *Recently, building energy certification has been made mandatory for public buildings.*
6. *This move could serve as a valuable precedent for mandatory certification across all building types.*

¹¹² <https://www.greenbuildingindex.org/>

¹¹³ <https://www.greenre.org/>

¹¹⁴ <https://www.seda.gov.my/energy-demand-management-edm/sustainable-low-carbon-building-assessment/>

¹¹⁵ <https://www.cidb.gov.my/eng/mycrest/>

¹¹⁶ <https://www.nst.com.my/business/2018/01/320769/mycrest-help-increase-number-green-buildings>

¹¹⁷ <https://seforallateccj.org/wpdata/wp-content/uploads/ecap17-malaysia.pdf>

¹¹⁸ https://www.epu.gov.my/sites/default/files/2022-09/National%20Energy%20Policy_2022_2040.pdf

Green Bond Markets

Kuala Lumpur, one of the main financial centres of the globe, is also the beating heart of Islamic finance, with 16 Islamic banks including five foreign ones, with total Islamic bank assets of 254 billion as at December 2019¹¹⁹, accounting for 38% of the Malaysia's total banking assets¹²⁰ and over 10% of the world's total Islamic banking assets¹²¹. As a natural consequence, Malaysia is one of the main sukuk markets in the world¹²² and in July 2017 it became the first green sukuk issuer¹²³.

The emergence of green sukuk is consistent with Malaysia's strategy to expand the Islamic financial market and to be at the frontier of Islamic financial innovations. By way of background, at the heart of Islamic finance is the overall objective of enhancing general welfare and justice in society¹²⁴ and for this reason, some financial practices such as the charging of interest are prohibited, as are certain industries¹²⁵. As a result of this, a number of Islamic scholars, financial practitioners and environmental think tanks believe that Islamic finance is intrinsically well-aligned with the objectives of sustainable finance, as they both channel investment to the benefit of the environment¹²⁶.

As a catalyst for Islamic finance due to Malaysia's innovative approaches and instruments adopted in the field, the development of green features for this specific financial model is consistent with the national strategy to expand the Islamic financial market and to make Kuala Lumpur a trendsetter for green sukuk issuance. In this context, in 2014 the Securities Commission Malaysia (SCM) introduced the Sustainable and Responsible Investment (SRI) Sukuk Framework¹²⁷, which, in line with the UN Sustainable Development Goals, pointed to the smooth creation of an ecosystem fostering sustainable and responsible investment initiatives, and marked the start of Malaysia's journey into sustainable finance.

A milestone for this green Islamic product came in 2017 with the establishment of an ad hoc partnership with the World Bank, the involvement of which has played a key role in the promotion of green sukuk. The World Bank aligned the SRI Framework with the ICMA Green Bond Principles (GBP)¹²⁸, marking an important juncture in terms of standard setting, as this move allowed for the issuance of green sukuk despite the lack of national green bond guidelines and secured investment from international investors. Below is a comparison of the SRI sukuk framework with the ICMA GBP (Liu and Lai, 2021) which shows the alignment of the two, with the only difference being the inclusion of eligible social projects that included Islamic charitable projects¹²⁹.

¹¹⁹ Bank Negara Malaysia, Financial Stability Review – Second Half 2019, Annual Report 2020

¹²⁰ Ibid

¹²¹ <https://theconversation.com/malaysia-plans-to-be-the-first-islamic-financial-superpower-19922>

¹²² <https://www.statista.com/statistics/649298/distribution-of-sovereign-sukuk-issuance-by-country/>

¹²³ <https://www.sc.com.my/resources/media/media-release/malaysias-first-green-sukuk-under-scs-sustainable-responsible-investment-sukuk-framework>

¹²⁴ <https://doi.org/10.1177/0308518X211038349>

¹²⁵ <https://doi.org/10.1177/0308518X211038349>

¹²⁶ <https://doi.org/10.1177/0308518X211038349>

¹²⁷ <https://www.sc.com.my/api/documentms/download.ashx?id=84491531-2b7e-4362-bafb-83bb33b07416>

¹²⁸ <https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/green-bond-principles-gbp/>

¹²⁹ <https://doi.org/10.1177/0308518X211038349>

Figure 6 - Comparison SRI Framework and GBP

	SRI sukuk framework	Green bond principles
Core components	<ul style="list-style-type: none"> • Utilisation of proceeds • Process for project evaluation and selection • Management of proceeds • Reporting 	<ul style="list-style-type: none"> • Use of proceeds • Process for project evaluation and selection • Management of proceeds • Reporting
Indicative categories of eligible use of proceeds	<ul style="list-style-type: none"> • Renewable energy • Energy efficiency • Pollution prevention • Management of living natural resources and land use • Eco-efficient/circular economy adapted products • Clean transportation • Sustainable water and wastewater management • Terrestrial/aquatic conservation • Climate change adaptation • Green building • Affordable housing • Employment generation • Access to essential service • Socioeconomic advancement and empowerment • Affordable basic infrastructure • Food security • Development of waqf properties or assets (towards a Muslim religious, educational or charitable use) 	<ul style="list-style-type: none"> • Renewable energy • Energy efficiency • Pollution prevention and control • Environmentally sustainable management of living natural resources and land use • Terrestrial and aquatic biodiversity conservation • Clean transportation • Sustainable water and wastewater management • Climate change adaptation • Eco-efficient and/or circular economy adapted products • Production technologies and processes • Green buildings
External review	Optional	Optional

Source: Liu and Lai 2021 ([link](#))

As of December 2021, 10 green sukuk have been issued under the SRI sukuk framework in Malaysia, accounting for US\$1.4 billion, with a substantial contribution to the country's profile in terms of sustainable finance innovation.

Of particular relevance in the context of the present Report is role that Cagamas Berhad is playing in shaping the green sukuk market. As part of its efforts in the context of its collaboration with the Asian Development Bank (ADB) as described above, Cagamas Berhad intends to issue green bond/sukuk to support the development of green residential housing finance¹³⁰. Considering the popularity of green sukuk, which are attracting investors not only from traditionally Islamic countries but also from all over the world thanks to their GBP-compliance, Cagamas Berhad's green sukuk could substantially underpin efforts to develop the green residential mortgage market in Malaysia.

To conclude this section, our research points to the following key takeaways:

1. *Kuala Lumpur is one of the main centres of Islamic finance and accounts for 38% of the Malaysia's total banking assets.*
2. *Islamic finance is a sector which is continuously developing and innovating and is well-aligned with the objectives of Sustainable Finance.*
3. *The first green sukuk (Islamic bond) was issued in Malaysia in 2017, following on from the Securities Commission Malaysia's implementation of the Sustainable and Responsible Investment (SRI) Sukuk Framework in 2014.*
4. *As a result of collaboration with the World Bank, the SRI Framework is aligned with the ICMA Green Bond Principles, which has helped stimulate larger scale interest in the green sukuk market.*

¹³⁰ <https://cagamas.com.my/press-release/cagamas-expands-its-affordable-housing-mandate-to-cover-green-housing-female-headed>

5. In September 2022, Cagamas Berhad announced plans to issue green bond/sukuk to support green residential housing finance.

Optimising the Value Chain

As in other global jurisdictions, there is a growing awareness in Malaysia for the need to have a coordinated and integrated approach to developing and financing affordable green residential buildings. Indeed, on the occasion of the signing of the Asian Development Bank's partnership with Cagamas Berhad in September 2022, ADB Private Sector Financial Institutions Division Director Christine Engstrom referred specifically to the plans to explore *"opportunities to create a sustainable and green housing finance ecosystem in Malaysia"* and highlighted how *"supporting green residential housing supply through sustainable construction methods to ensuring proper standards and quality control, as well as ensuring adequate financing, are all of utmost importance in contributing to this outcome"*¹³¹.

These plans chime with points made by Jessica Chew Cheng Lian, Deputy Governor of the Central Bank Negara of Malaysia, in September 2022 regarding the importance of extending current green financing activities beyond the end consumer to cover also other sectors in the value chain, notably developers, engineers and raw material suppliers¹³². The Deputy Governor suggests that this *"can help offset or spread over time the generally high upfront costs associated with green buildings"*. Interestingly, she also points to the potential to develop other financial products, including green housing insurance which could include a requirement for buildings which are not certified as green to be rebuilt as green building in the event of damage.

Given the crucial role of SMEs in the value chain or 'ecosystem', it is worth highlighting efforts from the Central Bank of Malaysia to support SMEs in implementing sustainable low carbon practices. In January 2022, the Bank introduced the Low Carbon Transition Facility (LCTF)¹³³ targeted at SMEs in all sectors, with a facility amount of RM1.0 billion. The LCTF can be used to finance capital expenditure or working capital to initiate or facilitate the transition to low carbon and sustainable operations. These include, but are not limited to, the following activities:

- obtaining sustainability certification;
- increasing the use of sustainable materials for production;
- improving energy efficiency of buildings and appliances; and
- installing on-site generation equipment of renewable energy.

The LCTF cannot be used to refinance existing credit/financing facilities.

Finally, it is worth highlighting the increasing number of partnerships between property developers and utility companies. In April 2022, national utility Tenaga Nasional Berhad (TNB) partnered with property developer SP Setia to [provide smart energy and renewable energy solutions](#) for SP Setia's future property developments.¹³⁴ In addition to optimising the costs related to development, this partnership is expected to deliver sustainable energy solutions for future residents as well as significant energy savings.

Another recent partnership, this time between property developer Sime Darby and solar panel provider GSPARX, has delivered homes in the Ilham Residence in the City of Elmina, Shah Alam

¹³¹ <https://bruneiibec.com/cagamas-adb-to-develop-green-affordable-housing-finance-for-malaysia/>

¹³² <https://www.bis.org/review/r220921e.htm>

¹³³ https://www.bnm.gov.my/documents/20124/2294076/lctf2022_en_faq.pdf

¹³⁴ <https://www.nst.com.my/business/2022/04/788035/tnb-sp-setia-offer-smart-energy-re-solutions-latters-future-projects>

equipped with solar panels, smart meters and home energy management systems. Residents are able to manage their energy consumption and exporting excess solar energy generated back to the provider, TNB, under the Net Metering Scheme (NEM).¹³⁵

1. *As in other jurisdictions, the concept of an 'ecosystem' to support green housing finance is gaining traction in Malaysia.*
2. *Indeed, plans to explore such an 'ecosystem' are at the heart of the partnership between the ADB and Cagamas Berhad signed in September 2022.*
3. *In a similar vein, the Malaysian Central Bank is focused on efforts to promote a 'value chain' approach to green finance, including developers, engineers and raw material suppliers.*
4. *The Malaysian Central Bank has also introduced a Low Carbon Transition Facility to support SMEs in implementing sustainable low carbon practices.*
5. *Examples of successful partnerships in Malaysia between property developers, utilities and companies specialised in renewable energy are emerging.*

Regulatory & Supervisory Framework

Sustainable Finance, Supervisory Expectations & Monetary Policy

In line with its mandates to safeguard monetary and financial stability, the Central Bank of Malaysia is undertaking a series of phased actions to ensure the sustainability and climate resilience of the Malaysian financial system with a focus on:

- Putting in place appropriate regulation and supervision to ensure that financial institutions are adequately measuring, mitigating and buffered against climate risks.
- Increasing the capacity of financial institutions to be the catalyst in the transition to a low-carbon economy. This includes increasing their offering of green financial solutions that can help their customers to transition to greener practices and to better cope with climate-related events.¹³⁶

Since 2021, the Bank has started integrating climate-related risk considerations into its regulatory and supervisory expectations, as well as its macroeconomic and financial stability assessments:

A core element of these efforts is the Climate Change and Principle-Based Taxonomy (CCPT)¹³⁷ which was launched in April 2021 as a way of delivering a strong foundation for risk assessment and disclosure, as well as channelling the flow of capital to transition activities, supporting ratings decisions and guiding the design and structuring of green finance products and services. This marked a significant milestone in the South-East Asian country's efforts in the sustainable finance framework. Interestingly the publication of the Taxonomy came just one month after finance ministers and central bank governors from members of the Association of Southeast Asian Nations (ASEAN), including Malaysia, announced their support for a regional ASEAN Taxonomy of Sustainable Finance¹³⁸.

Since July 2022, banks in the country have therefore started reporting their climate related risk exposures according to five Guiding Principles (GP) which are intended to support financial institutions in understanding the extent to which their economic activities meet climate objectives and support the climate transition: GP1 Climate Change Mitigation, GP2 Climate Change Adaptation, GP3 No Significant Harm to the Environment, GP4 Remedial Measures to Transition and GP5 Prohibited Activities. Significantly and in order to minimise macroeconomic and social disruption in the short

¹³⁵ <https://www.energywatch.com.my/blog/2022/03/04/green-living-in-malaysia-for-an-energy-conscious-future/>

¹³⁶ <https://www.bnm.gov.my/climatechange>

¹³⁷ <https://www.bnm.gov.my/documents/20124/938039/Climate+Change+and+Principle-based+Taxonomy.pdf>

¹³⁸ <https://www.eyonesg.com/2021/04/asean-to-develop-sustainable-finance-taxonomy-for-southeast-asia/>

term¹³⁹, the Taxonomy is not binary with regard to green and brown activities but also recognises transition activities.

In November 2022, the Central Bank of Malaysia also issued a policy document which lays down the principles and requirements for the management of climate-related risks by financial institutions with a view to enhancing the sector's climate resilience. The principles focus on: governance, strategy, risk appetite, risk management, scenario analysis and disclosure. At the heart of these requirements is an expectation that financial institutions have an effective risk management framework in place which integrates all material risks, including climate-related risks and addresses the way in which climate-related risks interact with other types of risk.

As already mentioned above, the Joint Committee on Climate Change (JC3) was established in 2019 to facilitate collaboration between financial industry players and regulators in support of the building of climate resilience within the industry. JC3 comprises the Central Bank of Malaysia, Securities Commission, Bursa Malaysia and 21 industry players, and is co-chaired by the Bank and the Securities Commission. The JC3 is mandated to:

- Build capacity through sharing of knowledge, expertise and best practices in assessing and managing climate-related risks;
- Identify issues, challenges and priorities facing the financial sector in managing the transition towards a low carbon economy;
- Facilitate collaboration between stakeholders in advancing coordinated solutions to address arising challenges and issues; and
- Support the financial sector's integration of identified solutions to address climate change or climate-related risks in their business operations.¹⁴⁰

In addition to its work on the Climate Data Catalogue described earlier in this Chapter, JC3 is currently exploring via pilot projects new green solutions and instruments that can support in the development of a broader 'ecosystem' for green finance with a view to scaling up transition finance. These solutions and instruments include carbon accounting and measurement frameworks, climate data aggregators, or green credentialing standards.¹⁴¹

Finally and by 2024, the Central Bank of Malaysia is requiring that all financial institutions disclose climate-related risks in line with the recommendations of the Task Force on Climate-related Disclosures (TCFD). This follows the publication of an Application Guide for Malaysian Financial Institutions by JC3 in June 2022 which provides key recommendations to facilitate the adoption of TCFD Recommendations by Malaysian financial institutions.¹⁴²

In summary, the key takeaways for this section are:

1. *The Central Bank of Malaysia has undertaken a broad and comprehensive range of actions to ensure the sustainability and climate resilience of the Malaysian financial system.*
2. *A core element of these efforts is the Climate Change and Principle-Based Taxonomy which was launched in April 2021.*
3. *In 2021, the Central Bank of Malaysia also issued a policy document laying down the principles and requirements for the management of climate-related risks by financial institutions.*

¹³⁹ <https://www.bis.org/review/r220921e.htm>

¹⁴⁰ <https://www.bnm.gov.my/climatechange#milestones>

¹⁴¹ <https://www.bis.org/review/r220921e.htm>

¹⁴² <https://www.bnm.gov.my/-/jc3-issues-tcf-d-application-guide>

4. *In 2019, the JC3 was established to facilitate collaboration between financial industry players and regulators. Key outputs have been the Climate Data Catalogue and pilot projects for new green solutions and instruments that can support in the development of a broader 'ecosystem' for green finance.*
5. *The Central Bank of Malaysia is requiring that all financial institutions disclose climate-related risks in line with the recommendations of the TCFD by 2024.*

Building Energy Performance Legislation

Building energy efficiency standards for non-residential buildings in Malaysia were first introduced in 2001 by way of Malaysian Standard Code of Practice MS1525.¹⁴³ MS1525 has since been updated three times, with the most recent revision in 2019, the key features of which include the following:

- a) improvement to description on passive design strategies especially daylighting, facade design and renewable energy;
- b) new figures for horizontal and vertical projection of shading coefficients;
- c) replacement of figure for egg crate shading coefficient with tables;
- d) ACMV outdoor design wet bulb temperature is revised; and
- e) introduction of Building Energy Intensity (BEI) Benchmark in Clause 10.

Standards for energy efficiency and use of renewable energy for residential buildings are laid down in Code of Practice MS2680:2017¹⁴⁴. The Code of Practice provides guidance on the design, selection of materials and electrical appliances and efficient use of energy including the application of renewable energy in new and existing residential buildings. The Code promotes a passive design strategy focussed on site planning and orientation, daylighting, roof, façade, natural ventilation, strategic landscaping and alternative/renewable energy.

These building standards are voluntary, however there have been efforts to enforce building energy efficiency standards through the incorporation at a federal level of certain building requirements from MS1525 into the Uniform Building By-Laws 1984 (UBBL), which lay down minimum requirements for buildings relating to ventilation, structural and constructional specifications and fire safety.

Specifically, in 2012 the UBBL was amended to include the following MS1525 guidance in a new UBBL Clause 38A¹⁴⁵:

1. New or renovated non-residential buildings with air-conditioned space exceeding 4,000 square metres shall be:
 - a) designed to meet the requirements of MS 1525 with regards to the Overall Thermal Transfer Value (OTTV) and the Roof Thermal Transfer Value (RTTV); and
 - b) provided with an Energy Management System
2. The roof for all buildings (residential and non-residential) shall not have a thermal transmittance (Uvalue) greater than:
 - a) 0.4 W/m²K for Light (under 50 kg/m²) weight roof;
 - b) 0.6 W/m²K for Heavy (above 50 kg/m²) weight roof, unless provided with other shading or cooling means.

¹⁴³<https://mysol.jsm.gov.my/getPdfFile/eyJpdil6ImJwYjNXell0eFF4ckMxanNQNHhic0E9PSIsInZhbHVlIjoia1VtVVMzZGROa1NmZTFCMUJuZFpwdz09liwibWFjIjo1Y2YzNmQ1OTNIYzZIN2RiOGESNjkyYTQzOTk5OTU1YTA0M2ZiOWY3NWUxN2Q4YzQzNDM4NWUwYzYzMGQ1NmJiZiJ9>

¹⁴⁴<https://policy.asiapacificenergy.org/sites/default/files/Code%20of%20Practice%20on%20Energy%20Efficiency%20and%20Use%20of%20Renewable%20Energy%20for%20Residential%20Buildings.pdf>

¹⁴⁵ http://architecturemalaysia.com/Files/Pool/81_170214_0739543954_pam_north_11jan2017_vonkl.pdf

It is our understanding that, at the current time, the latest revisions to MS1525 in 2014 and 2019 and MS2680:2017 remain voluntary and have not been implemented in the UBBL. Strategies and actions from other jurisdictions could provide useful insights in developing, enforcing and implementing building energy efficiency legislation, as well as minimum energy performance standards for buildings, which are widely considered across other global jurisdictions as being important in overall actions to reduce energy consumption and total GHG emissions in the building sector.

In summarising this section, the following points are worth highlighting:

1. *Malaysian Standard Code of Practice MS1525 introduced building energy efficiency standards for non-residential buildings in 2001, the most recent revision of which was in 2019.*
2. *Standards for energy efficiency and use of renewable energy for residential buildings are laid down in Code of Practice MS2680:2017.*
3. *These building standards are voluntary, although there have been enforcement efforts through the incorporation at a federal level of certain building requirements from MS1525:2012 into the Uniform Building By-Laws 1984 (UBBL).*
4. *It is our understanding that the latest revisions to MS1525 in 2014 and 2019 and MS2680:2017 remain voluntary and have not been implemented in the UBBL.*
5. *Actions in other jurisdictions around mandatory building energy performance requirements and minimum energy performance standards could provide insights for future developments in this area in Malaysia.*

Public EE Support Actions

Public actions to support energy efficiency have typically been focused on tax exemptions and financial incentives from the Ministry of Energy Green Technology and Water in relation to energy efficiency, production and consumption of renewable resources, and green buildings.

Worth highlighting in the present context are the Green Building Index tax exemptions which were introduced by the Malaysian Government in 2009¹⁴⁶. Firstly, the scheme provided a 100% tax relief incentive to companies and individuals on additional capital expenditure required in order to obtain the first Green Building Index certificate for the building. This amount was subsequently off set against 100% of the income earned from that building. Secondly, buyers of GBI certified buildings from developers were also eligible for exemptions from the stamp duty related to the transfer of ownership of the buildings. The stamp duty exemption applied to the additional cost incurred to obtain the GBI certificate and was provided only once to the first owner of the building. The scheme ran from October 2009 until December 2014.

In their paper entitled “*Analysis and recommendations for building energy efficiency financing in Malaysia*” (2018), K. Hor & M. K. Rahmat suggest that “*the scheme was successful in addressing the high upfront cost and immature markets for energy-efficient building materials and technologies*”¹⁴⁷ (p. 88) although by October 2014, the authors note that only six projects had secured GBI tax exemptions. This is largely attributed by the authors to cumbersome processes which can discourage developers from engaging in green projects. It is also worth noting that the stamp duty exemption did not have the intended impact as a result of pricing strategies put in place by developers which resulted in their covering of the stamp duty being passed on to the buyer in the form of higher sales price. With these considerations in mind, the authors put forward a series of recommendations which could provide useful insights into future incentive schemes of this kind both in Malaysia and beyond: (1) inclusion of ‘soft costs’ e.g. consulting costs, energy modelling services and GBI facilitation in the costs

¹⁴⁶ <https://link.springer.com/article/10.1007/s12053-017-9551-2>

¹⁴⁷ <https://link.springer.com/article/10.1007/s12053-017-9551-2>

which are eligible for the tax exemption, to increase the attractiveness of the scheme, (2) expansion of the tax exemption limits to all profit earned by the developer not just that from the actual building once finalised, to address any misalignments between the lifetime of the project development and the lifetime of the scheme, and (3) the provision of stamp duty exemptions for all residential buildings priced below a certain threshold, in this case RM 300,000 (US\$75,000), to counteract developers' pricing strategies.

In 2020, the Government announced the introduction of a Green Investment Tax Allowance for the purchase of green technology assets and Green Income Tax Exemption (ITE) linked to the use of green technology services and systems, including solar leasing activity¹⁴⁸. These schemes are of course not focussed on green buildings specifically but target the use of renewable energy.

- 1. Public actions in Malaysia to support energy efficiency have typically been focused on tax exemptions and financial incentives.*
- 2. The Green Building Index tax exemptions were introduced by the Malaysian Government in 2009 and included a 100% tax relief incentive for developers and stamp duty exemptions for buyers of GBI certified buildings.*
- 3. Although considered to be successful in addressing some of the barriers to energy efficient building construction, only a small number of projects benefitted from the exemptions, reportedly largely as a result of cumbersome processes.*
- 4. Recommendations put forward to improve the programme include: (1) inclusion of 'soft costs' in the costs which are eligible for the tax exemption, (2) expansion of the tax exemption limits and (3) increased stamp duty exemption limits.*

¹⁴⁸ <https://www.mida.gov.my/wp-content/uploads/2021/12/Guideline-Green-Technology-Incentive-as-at-02122021.pdf>

Japan

Context

Japan is the world's third largest economy¹⁴⁹, with some of the most significant financial institutions based in the country and within its capital¹⁵⁰, Tokyo, one of the world's main financial centres¹⁵¹. Japan's financial and economic strength makes the country indisputably one of the most prosperous in the world.

From an energy perspective Japan faces particular challenges. Japan is in fact dependent on imports for 88.8% of its energy supply¹⁵². A key turning point for the country's energy policies came in the wake of the two oil crises of the 1970s, which led Japan to introduce alternatives to petroleum, namely nuclear power, natural gas and coal and secure a steady supply of oil through stockpiling and other measures, which translated into a significant reduction in the country's dependence on petroleum (75.5% in 1973 to 40.3% in 2010).¹⁵³ The Great East Japan Earthquake of 2011 and its economic and social repercussions represented a further challenge from an energy perspective, forcing the Government to rethink its policies in this area. Since the Earthquake, the percentage of fossil fuels for power generation has been increasing, as a substitute for nuclear power. As of 2020, approximately 30% of Japan's electricity generation was coal-powered.¹⁵⁴

Against this backdrop, as of 2021, Japan was the 5th largest producer of carbon emissions¹⁵⁵ globally and according to research published by Rhodium Group in 2019, Japan's greenhouse gas (GHG) emissions represented over 2% of the annual global total.¹⁵⁶ In 2020, former prime minister Suga Yoshihide signalled Japan's intention to achieve zero GHG emissions by 2050¹⁵⁷, and announced plans to restructure the energy sector and secure an energy mix comprised of renewable energy (50-60 %), hydrogen and ammonia (10%), and energy generated by nuclear and thermal power plants (30-40%) to this end.¹⁵⁸ In October 2021, the Japanese Government announced the Sixth Strategic Energy Plan to: (1) achieve carbon neutrality by 2050 and meet the greenhouse gas emission reduction target and (2) ensure stable energy supply and reduce its costs while taking action against climate change.¹⁵⁹

Turning to buildings and as in other jurisdictions, a significant proportion of the country's GHG emissions also comes from the residential and non-residential building stock, as well as its construction. Indeed, figures from 2020¹⁶⁰ suggest that Japan's direct building emissions, arising from heating and cooling, make up almost 10% of total carbon emissions, while its electricity-related emissions in the building sector amount to 23%. An interesting point worth highlighting here is that the lifespan of buildings in Japan is particularly short with respect to other large economies, i.e. around the 30/40 years on average, despite a slight increase starting from the 1990s.¹⁶¹ This results in high levels of waste production and related-consumption. Indeed, in Japan, construction and demolition

¹⁴⁹<https://www.imf.org/en/Publications/WEO/weo-database/2022/October&https://databankfiles.worldbank.org/data/download/GDP.pdf>

¹⁵⁰ <https://www.oecd.org/japan/>

¹⁵¹ <https://www.oecd.org/japan/>

¹⁵² <https://www.stat.go.jp/english/data/handbook/c0117.html>

¹⁵³ <https://www.stat.go.jp/english/data/handbook/c0117.html>

¹⁵⁴ <https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/electric-power/040921-japans-coal-power-share-to-drop-to-26-by-2030-31-on-regulatory-push-meti>

¹⁵⁵ <https://ourworldindata.org/grapher/annual-co2-emissions-per-country?country=USA~GBR~IND~CHN~FRA~DEU~BRA~JPN~RUS>

¹⁵⁶ <https://www.bbc.com/news/world-asia-57018837>

¹⁵⁷ https://www.meti.go.jp/english/policy/energy_environment/global_warming/roadmap/

¹⁵⁸ [https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/698023/EPRS_BRI\(2021\)698023_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/698023/EPRS_BRI(2021)698023_EN.pdf)

¹⁵⁹ https://www.enecho.meti.go.jp/en/category/others/basic_plan/pdf/6th_outline.pdf

¹⁶⁰ <https://www.climate-transparency.org/wp-content/uploads/2020/11/Japan-CT-2020-Web.pdf>

¹⁶¹ Kayo, Chihiro & Tonosaki, Mario. (2021). Lifetimes of Buildings in Japan. 10.21203/rs.3.rs-968275/v1.

waste (C&DW) accounted for about 19% of total waste generated in 2000¹⁶², a number which has increased since then¹⁶³.

Ensuring the energy efficiency of buildings is therefore crucial and, for many years, has been a key focus of the country's energy policies. In this respect, it is worth highlighting that energy use per m2 of residential buildings in Japan is in the lower range of the G20 countries and in the middle range for commercial and public buildings¹⁶⁴, perhaps reflecting the fact that building energy performance has been the focus of government policies since the late 1970s (more on this later). Nevertheless, building energy performance remains a priority in Japan and, in terms of the most recent developments, in the Sixth Strategic Energy Plan of 2021, demand-side policies towards 2030 include the following: *"In the commercial and residential sectors, mandating to meet and enhancing the energy efficiency standards based on the Act on the Improvement of Energy Consumption Performance of Buildings, and strengthening the Top Runner equipment/building material standards will be addressed, in order to enable new housings and buildings built from 2030 to meet ZEH/ZEB efficiency standards."*¹⁶⁵ (p.6) (more on the Act below).

As in other global jurisdictions, these efforts will inevitably require significant levels of private investment. As far as the green or energy efficient housing finance market in Japan is concerned, the Japan Housing Finance Agency (JHF), a government-funded mortgage institution, is at the forefront of market efforts when it comes to developing financing solutions to support the uptake of energy efficient buildings. In 2005, the JHF launched Flat 35S Programme, which is a fully fixed interest rate housing loan with a term of 35 years offered in collaboration with Japan's private financial institutions. The programme provides preferential interest rates for newly built and existing housing, including single-family houses, flats and condominiums, that must meet a set of technical specific housing features identified by JHF such as, energy efficiency, earthquake resistance, accessibility and inclusive mobility (barrier-free house), as well as durability and flexibility. In this way, the properties eligible for the Flat35S programme is intended to not only be attractive to consumers, but also in line with the global carbon reduction's standards. In addition to the Flat 35S scheme, JHF is expected to issue also Green Renovation Loans¹⁶⁶, aimed at retrofitting existing properties to meet higher energy efficiency standards.

As will be explained in more detail below, JHF also became the first green bond issuer in Japan in Financial Year (FY) 2018 to issue a bond specifically targeted at supporting the financing of green housing. For more information on Japan's mortgage industry and covered bond markets more broadly, see box 5.

¹⁶² <https://www.oecd.org/japan/35896769.pdf>

¹⁶³ *Idem*

¹⁶⁴ <https://www.climate-transparency.org/wp-content/uploads/2020/11/Japan-CT-2020-Web.pdf>

¹⁶⁵ https://www.enecho.meti.go.jp/en/category/others/basic_plan/pdf/6th_outline.pdf

¹⁶⁶ <https://www.cagamas.com.my/highlights/developing-and-financing-green-housing-in-asia-conference-2022>

Box 5 Japan's Mortgage Market

According to the EMF-ECBC's Hypostat 2022¹⁶⁷ and the Japan Housing Finance Agency, the Japanese residential mortgage stock amounted to JPY 213 tn in FY2020 (roughly EUR 1.69 tn), the latest period for which there is data. Since the Global Financial Crisis (2008-2009), outstanding mortgage volumes have grown consistently over a period of ten years, with the pace of growth increasing steadily until 2020, in the context of the pandemic. Then outstanding mortgages grew by 2.51% on a yearly basis (i.e., compared to 2019's stock), following a 3% yearly increase in 2019. Gross lending in FY2020 was JPY 20 tn (EUR 172 bn).

In terms of the interest rate environment, Japan, much like the United States and the Euro area, has broadly gone through a long period of falling rates on new residential mortgages. Between 2008 and 2016, the average rate on new residential mortgages in the context of the Flat35 programme decreased consistently, falling from 2.89% at the start of this period to 1.06% in 2016, one of the lowest among the most advanced economies worldwide. However, this trend shifted soon after, before several other jurisdictions, as the average rate increased twice in 2017 and 2018 and later, though slightly, in 2020 and 2021. By end 2021, the average rate on new residential loans, based on monthly rates, in Japan was 1.33% (compared to an average rate 2.07% in the EU, and 2.96% in the US). 70% of new residential lending has a variable rate fixation, which makes borrowing more sensitive to changes in the interest rate scenario.

Mortgage funding is also quite diverse and dynamic in Japan. In this regard, covered bonds (CB) have become a commonly used instrument to finance mortgage lending activities since 2018, when the first bond was issued. As of 2021, according to the 2022 ECBC Fact Book¹⁶⁸, the Japanese CB stock amounted to EUR 6 bn (EUR 5.3 bn in 2020, up by 16%), backed mainly by mortgages.

In addition to mortgage lending, Japanese housing indicators show that housing starts expanded in 2021 (6.6% compared to 2020), following a 4-year period of negative or flat growth. The country's housing stock is, as per the latest data (2018), 62 mn units (compared to 181 mn units in the EU and 138 mn units in the US in the same period). Lastly, house prices increased, on average, by 5.2% in 2021, after four years of heterogeneous growth developments, as Hypostat data suggest. House price in cities, particularly Tokyo, have mimicked this overarching trend, although price tended to expand above the country's average (which relates resonates with market developments that have taken place in Europe or North America).

It is also worth mentioning here that in 2019, the JHF and the World Bank signed a Memorandum of Understanding (MoU) aimed at promoting cooperation on green housing finance in Asian countries.¹⁶⁹ It is anticipated that the combined knowledge and expertise of the JHF and the World Bank in the area of green housing finance can deliver technical assistance and practical solutions to many countries in Asia and beyond.

As in other jurisdictions, there is growing recognition in Japan of the need for the financial industry to expand sustainable finance and ESG policy integration, to not only support the climate transition but ensure its own resilience to climate and environmental risks¹⁷⁰. Against this background and as in the previous Chapters of this Report, there is therefore merit in considering the status quo in Japan, developments in this area so far and next steps, by overlaying a number of key themes with market dynamics and developments, with a view to facilitating the exchange of best practice across the globe:

¹⁶⁷ <https://hypo.org/app/uploads/sites/3/2022/11/HYPOSTAT-2022-FOR-DISTRIBUTION.pdf>

¹⁶⁸ <https://hypo.org/app/uploads/sites/3/2022/08/ECBC-Fact-Book-2022.pdf>

¹⁶⁹ <https://www.worldbank.org/en/news/press-release/2019/06/17/wbg-and-jhfa-announce-mou-to-explore-joint-opportunities-for-green-housing-finance>

¹⁷⁰ <https://www.adb.org/sites/default/files/publication/571621/adbi-wp1083.pdf>

Pillars of EEM Market development

Consumer Demand/Awareness

Promoting energy efficient homes is amongst the lynchpins of Japan's Long-term Energy Supply and Demand Outlook, the country's main strategic plan regulating the energy sector. In fact, as a result of the Great Earthquake of 2011 the Japanese population's attention towards environmental preservation and adaptation to protect against climate-related calamities and natural disasters, as well as towards energy savings measures (one of the main consequences of the earthquake and tsunami was a series of energy shortages along the country), considerably increased.

Nevertheless, according to the results of a joint study conducted by the Faculty of Social Sciences of Waseda University and The Japan Institute for Labour Policy and Training in 2018¹⁷¹, for most of the interviewees, energy efficiency is not a primary motivating factor when purchasing a home and energy efficiency features of the house alone are not sufficient to ensure satisfaction with a property. As a result, they stressed that in order to promote policies oriented towards the uptake of energy efficient buildings for residential purposes, it is of the outmost importance to identify all of the dynamics influencing peoples' needs and choices connected to their home and build social awareness around the importance of energy efficiency.

A study published in 2016 by Eri Nakamura from the Kobe University on the electricity saving behaviour of households and their efforts to this end, such as through renovations and the replacement of appliances¹⁷², provides additional relevant insights. From the analysis conducted on 518 Japanese households, it emerged that:

- the main motivating factor behind renovations and/or the replacement of appliances is durability, rather than electricity-saving and service-providing capabilities.
- such-measures are fostered more as a result of a certain consciousness of the importance of energy savings actions, rather than by the willingness to save energy, which means that Japanese households' behaviour is influenced by social pressure.
- when it comes to home renovation, the Japanese are willing to pay a higher cost for greater saving capability.

In considering consumer demand for energy efficiency and green finance, it is worth considering the broader context with regard to consumer sentiment which could be relevant in guiding future developments in this area. Indeed, since the collapse of the property bubble in the early 1990s, there has been a loss in confidence in the housing market among the Japanese people as a result of the subsequent negative impact on the real economy. These concerns were exacerbated by deflation and specific demographic factors, namely a decreasing population and an aging society.¹⁷³ The last point regarding demographic tendencies is a relevant one in the context of this Report as recent research¹⁷⁴ shows that, generally, age is a significant component, alongside income, when it comes to the purchase of eco-friendly products. This finding potentially provides useful insights to lending

¹⁷¹ <https://www.sciencedirect.com/science/article/pii/S0301479718308454>

¹⁷² <https://onlinelibrary.wiley.com/doi/epdf/10.1111/iics.12292>

¹⁷³ <https://www.adb.org/sites/default/files/publication/181404/adbi-wp558.pdf>

¹⁷⁴ Uddin, Ikram & Shah, Sara & Hanceraj, Sania & Lohana, Sonia & Memon, Rutba. (2019). The Influence of Age on Purchase Intention of Eco-Friendly Products: Evidence from Hyderabad, Sindh. *International Journal of Entrepreneurial Research*. 2. 1-3. 10.31580/ijer.v2i3.887; Alessandro M. Peluso, Marco Pichierri, Giovanni Pino, Age-related effects on environmentally sustainable purchases at the time of COVID-19: Evidence from Italy, *Journal of Retailing and Consumer Services*, Volume 60, 2021; Ansu-Mensah, P. Green product awareness effect on green purchase intentions of university students': an emerging market's perspective. *Futur Bus J* 7, 48 (2021). <https://doi.org/10.1186/s43093-021-00094-5>

institutions in relation to their green financing products because it suggests a differentiated approach could be required in the design and marketing of green products compared to traditional products. Against a background of population aging globally, this finding is potentially a relevant one for all global jurisdictions.

All in all, these considerations provide interesting insights for definition of policies to promote building energy efficiency, as well as the design, marketing and sale of green finance products, including green mortgages and loans for energy efficient renovation and/or construction purposes.

Finally, it is worth recalling here that the joint Memorandum of Understanding (MoU) signed between by JHF and the World Bank could also provide useful insights to identify and respond to consumer needs in relation to green housing finance.

In summary, the following elements emerged from this section:

1. *The promotion of energy efficient buildings is one of the core components of Japan's Long-term Energy Supply and Demand Outlook.*
2. *Since the Great Earthquake in 2011, the Japanese people are more sensitive to measures to protect against climate-related calamities and natural disasters, as well as energy savings measures. Moreover, consumer behaviour in Japan is strongly influenced by social pressure and consciousness of the importance of energy efficient solutions.*
3. *Nevertheless, energy efficiency is not the sole factor which motivates Japanese people when purchasing their home. Good quality of the living environment and durability are also key.*
4. *Age and income are a significant component for the purchase of eco-friendly products, indicating a potentially differentiated approach to product design and marketing for such products.*

Data availability and access

Japan has various certification schemes for rating the energy performance of buildings that allows for the identification of low carbon buildings. However, the country has adopted as its main sustainable buildings assessment tool, alongside other main assessment tools such as the “Housing Performance Indication System” used by Japan Housing Finance Agency (JHF) for the Flat35S programme and its related Green Bonds, the so-called Comprehensive Assessment System for Built Environment Efficiency (CASBEE). Released in 2001 thanks to the joint efforts of the Japanese government and the Japan Sustainable Buildings Consortium (JSBC), it has been designed to perform a comprehensive, clear, simple and affordable assessment of new and existing buildings’ sustainability, as well as renovations, and with the purpose of improving people's quality of life and of reducing the life-cycle resource use and environmental loads associated with the built environment. In particular the latter aspect is of fundamental importance in Japan, which is characterised by short-life-span buildings that consequently produce two adverse effects: on the one hand, more construction waste, on the other more carbon emission linked to new construction.

More in detail, the CASBEE is based on an indicator called the Built Environmental Efficiency (BEE) to identify a building’s ranking, which relies on two main assessment categories and four assessment/target fields, illustrated in the table below (Figure 7), where it is clear that energy efficiency is a main component when assessing a building in Japan by means of this rating mechanism CASBEE.

Figure 7 - CASBEE Assessment Categories and Assessment Fields

ASSESSMENT CATEGORIES	ASSESSMENT FIELDS
<ol style="list-style-type: none"> Q (Quality): Built Environment Quality which evaluates "improvement in living amenity for the building users, within the hypothetical enclosed space (the private property)." L (Load): Built Environment Load assessing the "negative aspects of environmental impact which go beyond the hypothetical enclosed space to the outside (the public property)." 	<ol style="list-style-type: none"> Energy efficiency Resource efficiency Local environment Indoor environment

Source: CASBEE ([link](#))

It should be clarified that CASBEE is a collective name for a set of different rating systems, each tailored in accordance with the type of buildings or the purpose of assessment (i.e. construction (housing and buildings), urban (town development) and city management), all included in the CASBEE family. Against this background, it is worth mentioning:

- CASBEE for New Construction (CASBEE-NC), which is mainly used by architects and engineers to increase the building energy efficiency value of a building during the design process¹⁷⁵.
- CASBEE for Existing Buildings (CASBEE-EB), targets a number of existing buildings to assess the building's performance at the time of the evaluation, and can be used as a labelling tool to declare the environmental performance of buildings¹⁷⁶.
- CASBEE for Renovation (CASBEE-RN), which can be used to evaluate the degree of improvement of environmental performance relative to the level preceding renovation for buildings subject to renovation¹⁷⁷.
- CASBEE for New Detached Houses, to assess the environmental performance of newly built detached houses¹⁷⁸.
- CASBEE for Existing Detached Houses, for the assessment of existing detached houses¹⁷⁹.

As part of its climate neutrality agenda, the Japanese Government plays a significant role in the promotion and support of CASBEE. An example in this respect is the adoption of CASBEE by cities and local governments in the context of their Sustainable Building Reporting System (SBRS) policy, aiming at the creation of a sustainable building market, which is pursued through the requirement of the submission of building environmental plans to the local building official.¹⁸⁰

¹⁷⁵ CASBEE Tools for building scale https://www.ibec.or.jp/CASBEE/english/toolsE_building.htm

¹⁷⁶ Ibid

¹⁷⁷ Ibid

¹⁷⁸ CASBEE Tools for building scale https://www.ibec.or.jp/CASBEE/english/toolsE_housing.htm

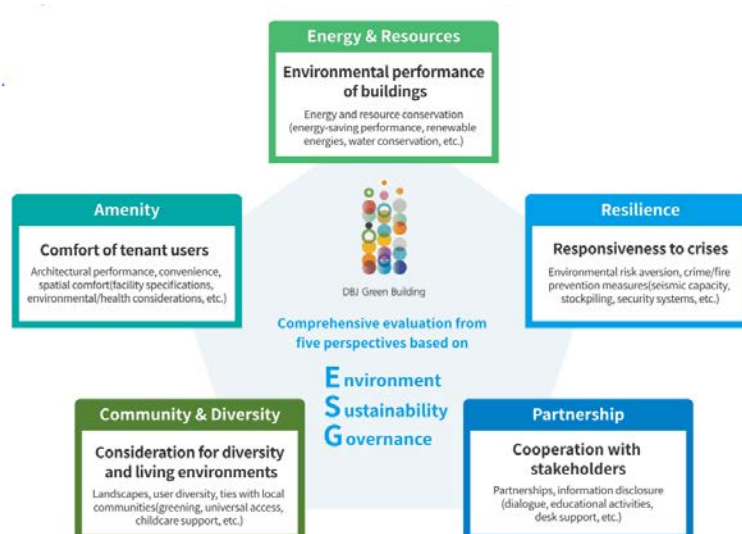
¹⁷⁹ Ibid

¹⁸⁰ Sheau-Chyng Wong, Naoya Abe, Stakeholders' perspectives of a building environmental assessment method: The case of CASBEE, Building and Environment, Volume 82, 2014, Pages 502-516, ISSN 0360-1323, <https://doi.org/10.1016/j.buildenv.2014.09.007>.

The CASBEE certification is particularly important for Japanese banks especially when it comes to the issuance of green bonds. As indicated earlier, the Japanese Green Bond Guidelines¹⁸¹ list a series of green projects as eligible from the perspective of use of proceeds, such as those linked to the financing of green buildings' construction and/or renovation. In this respect, the Green Bond Guidelines identify the reliability of said project through their compliance with environmental certification systems such as Leadership in Energy & Environmental Design (LEED), the most widely used green building rating system in the world, the CASBEE and Building-Housing Energy-efficiency Labelling System (BELS), both developed in Japan. Financial institutions can therefore issue green bonds aimed at financing low-carbon buildings where a building is CASBEE certified. Importantly, the Japan Sustainable Building Database (JSBD)¹⁸² provides access to relevant building specific data, including a building's features, its CASBEE score and additional technical details.

Largely relevant for the banking sector is also the Development Bank of Japan (DBJ) Green Building Certification, a certification system established in 2011 in an effort to support its customers in managing their real estate in an environmentally and socially conscious manner¹⁸³. In particular, the sustainability of said real estate is evaluated in accordance with five environmental, sustainability, and governance (ESG)-based perspectives, as shown in the figure below.

Figure 8 - DBJ Green Certification's Conceptual Diagram of the 5 ESG-based perspective for evaluation



Source: Development Bank of Japan (DBJ)

The Japan Real Estate Institute conducts the certification operation of this system, which proves its significance by serving also as a tool for dialogue with a wide range of stakeholders that deal in real estate, not only technical experts in architecture and design. In fact, one of the most significant aspects from a financial perspective of this certification is that it can function as an ESG investment index and can therefore be used in reporting activities directed at investors and financial markets as an example of how they are proactively tackling ESG issues and adopting Sustainable Development Goals, allowing DBJ to perform a connection role between the real estate and financial markets.

¹⁸¹ Green Bond Guidelines 2020 <https://www.env.go.jp/content/000042342.pdf>

¹⁸² <https://www.ibec.or.jp/jsbd/index.htm>

¹⁸³ https://www.dbj.jp/en/service/program/g_building/?sc=1

To conclude, this section can be summarised as follows:

1. *The CASBEE, released in 2001 by means of the joint collaboration of the Japanese Government and the Japan Sustainable Buildings Consortium (JSBC), is one of the main rating tools to measure new and existing buildings' energy efficiency and performance, as well as renovation.*
2. *Amongst other assessment tools, it is worth mentioning the "Housing Performance Indication System" used by the Japan Housing Finance Agency (JHF) for the Flat35S programme.*
3. *The CASBEE performs an important role for Green Bond issuance, as the Japanese Green Bond Guidelines identify the reliability of green buildings-related projects admissible as use of proceeds through their compliance with the CASBEE, alongside LEED and BELS.*
4. *Relevant for the banking sector is also the Development Bank of Japan (DBJ) Green Building Certification, which evaluates real estate on the basis of five ESG-based perspectives, allowing DBJ to perform a connection role between the real estate and financial markets.*

Green Bonds

As one of the main financial centres in the world, Tokyo is also a financial hub for green finance and, in line with the global financial trends, a growing share of the Japanese market is dedicated to the issuance of green bonds. In 2014, the first Japanese Green Bond was issued by the Development Bank of Japan¹⁸⁴, and since then the country's green bond market has been growing. 2016 marked the issuance of the first Japanese Green Bond compliant with ICMA's Green Bond Principles (GBP), followed in 2017 by the publication of Green Bond Guidelines, a set of standards released by the Japanese Ministry of the Environment, later updated in 2020. These guidelines outline the criteria and procedures for the issuance of green bonds, and – aligned with the ICMA GBP - it identifies four core components:

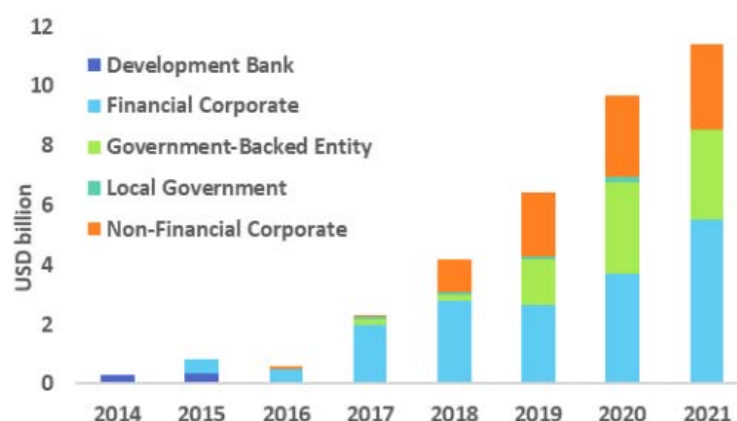
1. Use of Proceeds;
2. Process for project evaluation and selection;
3. Management of proceeds
4. Reporting

In 2021, total green bond issuance continued to increase, despite the COVID-19 pandemic, with financial corporates leading the country's issuance with 45% of the market share (USD7.1bn). Non-financial corporates and government-backed entities respectively accounted for 30% (USD4.8bn) and 22% (USD3.4bn) of the market¹⁸⁵. Despite these evolutions and as in other global jurisdictions, the green bond market in Japan remains relatively modest.

¹⁸⁴<https://greenfinanceportal.env.go.jp/en/bond/overview/history.html#:~:text=The%20first%20Green%20Bond%20was,Tokyo%20Metropolitan%20Government%20in%202017.>

¹⁸⁵ The Institute for Global Environmental Strategies (IGES) and the Climate Bonds Initiative (CBI) 'Japan Green Finance State of the Market – 2021' (December 2022) https://www.climatebonds.net/files/reports/news_report_221219_2.pdf

Figure 9 - Green Bond Market trend in Japan



Source: Climate Bond Initiative ([link](#))

As far as green bonds linked to the financing of the construction of energy efficient buildings and/or their renovation is concerned, the most relevant issuer to this end in Japan is the Development Bank of Japan, which has allocated almost USD2.2bn in the fourth quarter of 2018 by way of four green bonds to finance loans for the construction of energy efficient buildings¹⁸⁶. Other key players in the sector are:

- Mitsubishi UFJ, Sumitomo Mitsui Banking Corporation and Sumitomo Mitsui Trust Bank, which have allocated USD706m to finance low carbon and energy efficient buildings¹⁸⁷.
- Airline company Ana Holding and the Nomura Research Institute, which both raised bonds specifically to finance the construction of energy efficient buildings¹⁸⁸.
- The Tokyo Metropolitan Government, which allocated proceeds to finance climate adaptation projects (i.e. constructions for tsunami prevention) smart energy, urban development and improvement of the living environment¹⁸⁹.

As indicated earlier, in 2019 JHF issued the first green bond developed to finance the purchase of green housing in Japan¹⁹⁰, which is strictly connected to JHF's own Flat 35S programme, described in the previous section of this chapter. The assets eligible for JHF Green Bonds are only mortgages on residential buildings constructed by means of the Flat 35S housing scheme which are verified by JHF-certified inspection agents, making the buildings financed through these bonds among the most energy efficient in Japan.

Due to its key features, the JHF Green Bond scheme:

- Was selected as a pilot case by the Japanese Ministry of the Environment for its "FY2018 business model of Green Bond issuance", an initiative which ensures the conformity with the 2017 Green Bond Guideline.
- Was granted with the Japan Green Bond Award under the Japan Green Innovation Category from MOE in March 2019.

In conclusion, it is worth highlighting the following takeaways:

¹⁸⁶ Source: Climate Bond Initiative https://greenfinanceportal.env.go.jp/pdf/CBI_%20LowCarbonBuilding_final.pdf

¹⁸⁷ Ibid

¹⁸⁸ Ibid

¹⁸⁹ Ibid

¹⁹⁰ JFC https://energyefficientmortgages.eu/wp-content/uploads/2021/10/2.-2019-09-27-P_JHF_presentation_final.pdf

1. *The first Japanese Green Bond was issued in 2014 by the Development Bank of Japan, which remains the leader in the Japanese green bond market.*
2. *Other key players in the sector are Mitsubishi UFJ, Sumitomo Mitsui Banking Corporation and Sumitomo Mitsui Trust Bank, Ana Holding, the Nomura Research Institute and Tokyo Metropolitan Government.*
3. *The first Green Bond developed for financing energy efficient housing purchase was issued in 2019 by JHF, in connection with its Flat 35S programme.*
4. *By granting the JHF Green Bond with the Japan Green Bond Award, the Japanese Ministry of Environment recognised this product as best practice for the Japanese green bond market.*
5. *As in other jurisdictions, the green bond market in Japan remains relatively modest at the current time.*

Optimising the value chain

As reported in the other Chapters in this Report, an important direction of travel for other jurisdictions is towards the design of integrated value chains or ‘ecosystems’ linked to building energy renovation and the financing behind it, including the right stakeholders, products and processes.

One example of efforts to coordinate and optimise energy efficiency interventions is the Memorandum of Understanding signed between the JHF and the World Bank in 2019 which focuses on the design of a ‘financial ecosystem’. Under this partnership, particular attention is being paid to ensuring an alignment between fintech, risk management, policy design and legal and regulatory frameworks across Asian countries, with a view to ensuring that efforts to green the housing infrastructure are not undermined or progress not challenged by a misalignment across these areas. Indeed, the World Bank has suggested that *“For many countries across the world, the development of financial ecosystems to support increasing energy efficiency is critical to achieving progress on the climate change front and realizing their commitment to the SDGs”*¹⁹¹

Interestingly, the JHF Flat 35S Programme involves inspection companies to perform technical and on-site property inspections to identify eligible construction projects for the Programme. JHF has inspectors from 130 companies all over Japan¹⁹². It is also to be noted that JHF employs approximately 100 in-house architects to enhance collaboration with such inspection companies as well as home builders, among others. Many of them have first degree certificates as architects and work with the Ministry of Land, Infrastructure, Transport, and Tourism (MLIT) which supervises the housing industry in Japan.

To summarise the findings in this area:

1. *The Memorandum of Understanding signed between the JHF and the World Bank in 2019 is one example of efforts in Japan to deploy financial ecosystems in support of energy efficiency.*
2. *The JHF Flat 35S Programme involves inspection companies to perform technical and on-site property inspections to identify eligible construction projects for the Programme.*
3. *JHF also employs approximately 100 in-house architects to enhance collaboration with such inspection companies as well as home builders, among others.*

¹⁹¹<https://www.worldbank.org/en/news/press-release/2019/06/17/wbg-and-jhfa-announce-mou-to-explore-joint-opportunities-for-green-housing-finance>

¹⁹² <https://www.cagamas.com.my/blog/green-housing-finance-and-issuances-in-japan>

Regulatory and Supervisory Framework

Sustainable Finance, Supervisory Expectations and Monetary Policy in Japan

As the third largest economy in the world in terms of GDP and one of the most important financial centres, Japan has the potential to play a crucial role in tackling climate change through its financial sector by fostering low-carbon green infrastructure investments and promoting measures to support the 2030 Agenda and the Sustainable Development Goals (SDGs)¹⁹³.

In line with the worldwide attention to climate change and environmental considerations in finance, there have been a series of developments relating to sustainable finance in Japan at multiple levels, including the growing importance of ESG criteria in financial decision-making, the setting up of more rigid reporting and disclosure standards, the development of a green bond market and the growing importance of sustainable investments¹⁹⁴.

To this end, it is worth mentioning the following mainly government-driven actions:

- Japanese investment in sustainable assets saw an increase of 307% between 2016-2018 surpassing other countries and Europe¹⁹⁵. In particular, the Government Pension Investment Fund (GPIF), the world's largest pension fund, has played a crucial role by promoting ESG in Japan, with the adoption in 2017 of an ESG investment strategy and selected ESG indices, and by expressly supporting the Task Force for Climate-related Financial Disclosures (TCFD) recommendations in 2018¹⁹⁶.
- The Japan Task Force for Climate-related Financial Disclosures (TCFD) Consortium is the largest consortium of the world, with its 741 organisations as of January 2023¹⁹⁷. An important role in the promotion of the TCFD has been played by the Ministry of Economy, Trade and Industry (METI), which openly declared its support for the TCFD Recommendations and released its TCFD Guidance in 2018¹⁹⁸.
- With the aspiration to promote the green bond market in the country, the Ministry of the Environment of Japan (MOEJ) launched Japan's Green Bond Guidelines in 2017, largely based on the ICMA Green Bond Principles.
- Finally, as of April 2020, 84 Japanese organisations adopted the Principles for Responsible Investment (PRI)¹⁹⁹.

As described in earlier chapters of this Report, a green taxonomy is increasingly seen as a cornerstone of Sustainable Finance policy as a result of its role in promoting sustainable-oriented investment and greening the financial system. At the time of writing, Japan does not currently have its own green taxonomy. Rather, Japan has formulated guidelines on transition finance and developing associated technology-based roadmaps for target sectors such as steel, cement, electricity, and oil and gas²⁰⁰, although these guidelines do not allow investors to discern the greenness of financed activities.²⁰¹ Leading market figures have pointed to the potential for Japan to lead global trends in the sustainable finance field, as the country *“has enormous opportunity because it is so advanced in*

¹⁹³ Schumacher, K., H. Chenet, and U. Volz. 2020. Sustainable Finance in Japan. ADBI Working Paper 1083. Tokyo: Asian Development Bank Institute. Available: <https://www.adb.org/publications/sustainable-finance-japan>

¹⁹⁴ Schumacher, K., H. Chenet, and U. Volz. 2020. Sustainable Finance in Japan. ADBI Working Paper 1083. Tokyo: Asian Development Bank Institute. Available: <https://www.adb.org/publications/sustainable-finance-japan>

¹⁹⁵ <https://www.oecd-ilibrary.org/sites/f88d7688-en/index.html?itemId=/content/component/f88d7688-en>

¹⁹⁶ Ibid.

¹⁹⁷ TCFD (2020), https://tcfd-consortium.jp/en/member_list.

¹⁹⁸ <https://www.oecd-ilibrary.org/sites/f88d7688-en/index.html?itemId=/content/component/f88d7688-en>

¹⁹⁹ Ibid.

²⁰⁰ https://www.meti.go.jp/english/press/2021/0604_003.html

²⁰¹ <https://greencentralbanking.com/2022/08/02/japan-green-lending-scheme-sayuri-shirai/>

many of the environmental technologies” and have therefore called on Japan to “*work on creating a taxonomy of its own*”.²⁰² Interestingly, these market figures have pointed to the value of a taxonomy which is tailored to the needs and circumstances of a country and highlighted agriculture as an area where Japan might have specific needs. The importance of a tailored green taxonomy is a valuable consideration for those global jurisdictions which have not yet taken steps in this direction.

As far as the supervisory perspective is concerned, the Bank of Japan (BoJ), which is also a member of the Central Bank Network for Greening the Financial System (NGFS), released a comprehensive strategy in 2021 to tackle climate change related risk under the leadership of its governor Haruhiko Kuroda²⁰³. The strategy comprises actions to integrate climate considerations into monetary policy, financial stability and research functions. In particular, the BoJ has committed to implementing the following actions:

1. In 2021, the BoJ introduced a climate change-related lending programme, according to which banks can access zero interest funding based on their efforts to address climate change through their investment or lending activity. In order to access the programme, financial institutions must comply with climate-related disclosure requirements as prescribed by the BoJ²⁰⁴. Through the first operation in December 2021, the Bank provided funds amounting to approximately 2 trillion yen to 43 eligible counterparties. It plans to offer loans biannually in principle while accepting additional counterparties for the operations.
2. In order to foster the greening of the Japanese financial system, the bank is committed to encouraging financial institutions to enhance their disclosures, both qualitatively and quantitatively, based on the Task Force on Climate-related Financial Disclosures (TCFD) framework.
3. The BoJ will intensify its research activity on how climate change could affect the Japanese macroeconomic outlook, by taking into account economic activity and prices, financial markets, and the financial system, as well as by seeking to collect climate-related data and by improving its analytical tools in order to better conduct surveillance and identify risks.
4. In cooperation with other central banks, the BoJ will strengthen its efforts to promote investment in climate-related financial products, such as green bonds, with the aim of fostering the development of financial markets.
5. In its business operations the BoJ will pay due consideration to climate change. At the same time, the Bank will make disclosures, taking into account the TCFD recommendations, and enhance its communication with the public on climate related conducts in general.

Furthermore, the BoJ released in August 2022 a pilot climate scenario analysis exercise for the country’s largest financial institutions²⁰⁵.

Worth noting here is the fact that the BoJ has not yet made climate risk disclosures by companies mandatory. As a caveat here, access to the climate change-related lending programme mentioned above does require disclosure, however this disclosure is limited to financial institutions listed on the Japanese prime market and does not cover financial institutions listed on the standard and growth markets or on other Japanese stock exchanges²⁰⁶. There have been calls on the BoJ to consider making disclosure requirements mandatory for all financial institutions and companies over time, including unlisted companies.²⁰⁷ Additional calls have been made on the BoJ to exclude fossil fuels from its asset purchases, including its corporate bond purchase programme, to discourage fossil fuel finance

²⁰² <https://www.japantimes.co.jp/esg-consortium/2019/07/28/esg-consortium/japan-advised-set-green-taxonomy/>

²⁰³ https://www.boj.or.jp/en/about/release_2021/rel210716b.pdf

²⁰⁴ https://www.boj.or.jp/en/mopo/measures/mkt_ope/ope_x/index.htm

²⁰⁵ <https://www.fsa.go.jp/en/news/2022/20220826.html>

²⁰⁶ <https://greencentralbanking.com/2022/08/02/japan-green-lending-scheme-sayuri-shirai/>

²⁰⁷ <https://greencentralbanking.com/2022/08/02/japan-green-lending-scheme-sayuri-shirai/>

through reserves requirements and/or collateral frameworks and to require firms to publish plans outlining how they will align their businesses with Japan's climate goals, including its target of reaching net zero by 2050.²⁰⁸ In 2021, the BoJ announced its intention to maintain market neutrality in respect of monetary policy, deeming it appropriate to avoid direct involvement in micro-level resource allocation as much as possible.²⁰⁹ Market commentators have noted that this approach differs from that of the European Central Bank which has announced plans to decarbonise its corporate bond holdings.²¹⁰

The main takeaways of this section are:

1. *Sustainable Finance-related practices are emerging in Japan at multiple levels. Examples are the role of ESG criteria in financial decision-making, stricter reporting and disclosure standards, the development of a green bond market and the growing importance of sustainable investments.*
2. *Japan does not currently have its own green taxonomy, however leading market figures are encouraging the introduction of a tailor-made taxonomy which could help Japan to lead global trends.*
3. *The BoJ released a comprehensive climate strategy in 2021, comprising actions to integrate climate considerations into monetary policy, financial stability and research functions.*
4. *Climate risk disclosures by companies are required to access the climate change-related lending programme but are currently not mandatory in all circumstances.*
5. *The BoJ has announced its intention to largely maintain market neutrality in respect of monetary policy.*

Building energy efficiency legislation

Japan is particularly advanced when it comes to building energy efficiency legislation. Indeed, the country has been regulating building energy performance since 1979, when considerations of this kind were included in the Energy Conservation Law.²¹¹ Japan also provides a wide set of mechanisms to measure the energy performance of housing, including the Housing Performance Indication System (HPIS), the long-life quality housing (LQH) certification, and the Comprehensive Assessment System for Built Environment Efficiency (CASBEE).

With regard to the Energy Conservation Law, this piece of legislation was initially conceived to respond to the need for a more energy efficient industrial sector as a result of the strong repercussions on the Japanese economy connected to the 1973 oil crisis, and then served as the basis upon which the country founded its energy efficiency policies. Since 1979, the law has undergone several reviews and with respect to buildings, said updates have introduced a series of obligations pertaining to energy efficiency, including:

- A set of building energy standards for commercial and residential buildings, respectively:
 - The Criteria for Clients on the Rationalization of Energy Use for Buildings (1999), or CCREUB, a mixture of performance and prescriptive energy codes for commercial buildings;
 - The Design and Construction Guidelines on the Rationalization of Energy Use for Houses (1999), or DCGREUH.
 - The Criteria for Clients on the Rationalization of Energy Use for Houses (1999), or CCREUH, as its peer for commercial buildings, it is a combination of performance and prescriptive energy codes for residential buildings.

²⁰⁸ <https://greencentralbanking.com/central-banks/bank-of-japan/>

²⁰⁹ https://www.boj.or.jp/en/about/release_2021/rel210716b.pdf

²¹⁰ <https://greencentralbanking.com/2022/08/02/japan-green-lending-scheme-sayuri-shirai/>

²¹¹ https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-17849.pdf

- The duty for property owners to implement measures to improve the energy efficiency of their buildings (i.e. preventing heat loss)
- Government commitment to establish and publicize regulations for property owners aimed at providing guidance and advice on energy efficiency to property owners of regulated (so called “specified”) buildings.

Importantly, the Japanese Government’s legislative efforts with respect to regulating energy efficiency of buildings have been increasing over time, with the Energy Conservation Law serving as a starting point for future legislation. The table below (Figure 10) shows the main policies adopted in Japan on Building Energy Savings succeeding the Energy Conservation Law:

Figure 10 - Main BES policy instruments in Japan

Control and regulatory instruments	Energy conservation Law (1979, revised several times later) The criteria for clients on the Rationalization of energy use for buildings (1979, revised several times later) Housing Qualification Assurance Law (2000) Basic program for housing (2006)
Economic and market-based instruments	Energy Performance Contracting (EPC, since 1996) Cap and Trade in Tokyo (2010) ^a
Fiscal instruments	Tax for promoting the development of electric power facilities (1997) Capital subsidies, grants, loans
Support, information and voluntary action	Environmentally Symbiotic Housing Model Projects (1993) ^b Top Runner (1998) ^b CASBEE stands (2001)

Source: Huang, Beijia & Mauerhofer, Volker & Geng, Yong. (2015). Analysis of Existing Building Energy Saving Policies in Japan and China

The most recent and comprehensive piece of legislation in the area is the Act on the Improvement of Energy Consumption Performance of Buildings or Building Energy Efficiency Act, which was published in 2015 and has been entering into force in stages since April 2016²¹². In fact, as a result of the growing public interest in energy savings measures alongside protection from disasters in the aftermath of the 2011 Great Earthquake, successive Japanese Governments have adopted a series of actions to favour household energy savings. The Building Energy Efficiency Act establishes:

- 1) A set of mandatory regulatory measures on compliance with energy efficiency standards for large-scale non-residential buildings, implemented in April 2017.
- 2) A set of incentive measures (i.e. labelling system compliant with energy efficiency standards) implemented from April 1, 2016.

As indicated, the mandatory standard was initially applied to new large-scale commercial buildings, and later extended to medium-sized commercial buildings in 2021. These measures are expected to contribute to energy savings in the order of 2.8 Mtoe by 2030 (equalling 7% of the total energy savings aimed for by 2030)²¹³. A duty to report on the energy performance of residential buildings is applied to new medium-to-large sized housing. The standard is planned to be mandatory from 2025.²¹⁴ As

²¹² <https://www.mlit.go.jp/common/001134876.pdf>

²¹³ IEA – Japan 2021 Energy Policy Review (2021)

²¹⁴ IEA – Japan 2021 Energy Policy Review (2021)

mentioned in previous chapters, in some global jurisdictions mandatory standards will also apply to residential buildings, a development which could provide food for thought moving forward in Japan in measures to further improve building energy performance.

The Buildings Energy Efficiency Act also establishes that all new constructions and retrofits can be certified if they conform with certain efficiency standards. It furthermore sets out a number of advantages for certified buildings exclusively, such as eased restrictions on building size (allowing developers to construct buildings with more floor space). This measure resulted in the certification of nearly 93 000 buildings as of 2019.

Thanks to this and other energy efficiency-related measures adopted (i.e. the Top Runner Program fostering energy improvements in appliances and equipment; the 2030 targets for the installation of 100% efficient LED lights and efficient water heating systems for 90% of households) there is evidence of significant improvements in the energy efficiency of the residential and commercial sectors over the past decade²¹⁵: for example, in the residential sector, per capita energy demand declined by 8% over the period 2007-17²¹⁶, which was partly driven by efficiency improvements in heating and residential appliances. Additionally, energy use for space heating per dwelling declined by 20% from 2007 to 2017²¹⁷, while demand for water heating and residential appliances per dwelling decreased by 22% and 19%, respectively²¹⁸.

To conclude, the main takeaways from this section are:

1. *Japan is particularly advanced in building energy efficiency legislation, with the first piece of legislation in this area, the Energy Conservation Law, having been adopted in 1979.*
2. *The most recent and comprehensive piece of legislation in the area is the Building Energy Efficiency Act (2016), establishing mandatory energy efficiency standards for non-residential buildings.*
3. *Residential buildings are currently exempted from the Act, although the law establishes a duty to report on the energy performance of new medium-to-large sized residential buildings from 2025 onwards.*
4. *The Act also establishes that all new constructions and retrofits can be certified if they conform with certain efficiency standards. It furthermore sets out several advantages for certified buildings.*
5. *There is evidence of significant improvements in the energy efficiency of the Japanese residential and commercial sectors thanks to the energy efficiency-related measures adopted by the government.*

Public EE Support Actions

To promote energy efficiency of existing buildings, Japan has provided a wide range of grants and tax incentives targeted variously at individuals and companies to stimulate building energy efficiency²¹⁹, including the following:

- *Low Carbon Cities Promotion Act*²²⁰

The Act establishes a recognition system for low carbon buildings that contribute to the reduction of CO₂ in cities, and provides preferential treatment, through tax breaks for “low carbon buildings” that essentially exceed minimum energy performance standards.

²¹⁵ Ibid.

²¹⁶ Ibid.

²¹⁷ Ibid.

²¹⁸ Ibid.

²¹⁹ <https://nzeb.in/definitions-policies/international-roadmaps/japan-2/>

²²⁰ <https://www.mlit.go.jp/common/001048781.pdf>

- *Eco-point Housing Program*²²¹

In 2010, the Ministry of Economy, Trade and Industry (METI) together with the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), launched an eco-point housing program. The program provides for the distribution of “eco-points” to people who build a green home or undertake energy efficient renovations. In order to obtain the eco-points, the new eco-construction and/or eco-remodelling projects must meet specific requirements, such as insulation retrofits for windows, outer walls and floors, or barrier-free renovations. One eco-point is equivalent to 1 yen and can be exchanged for eco-friendly products or gift certificates or used for additional renovations. In its study on the Japanese housing eco-point system, UNESCAP, the United Nations’ Economic and Social Commission for Asia and the Pacific, notes that, as a result of the program, the national home renovation market grew 13% over the year to 5.9 trillion yen in 2010²²². Moreover, according to the Japanese Government’s figures, the estimated accrued economic benefits in the first phase of the programme were about 3.4 trillion yen²²³, which pushed the Government to grant further eco-points for 637,629 new houses and 582,012 refurbishments as of January 2012.²²⁴

- *Low Carbon Society Establishment Finance Initiative*²²⁵

Noteworthy is also the launch in 2013 of the Low Carbon Society Establishment Finance Initiative, an initiative of the Japanese Government with the purpose of mobilising additional private finance for domestic climate action, the components of which are:

- 1) an investment fund for promoting local low-carbon investments (JPY 4.8 billion);
- 2) an interest subsidy for expanding environmental finance (JPY 1.6 billion);
- 3) an eco-lease promotion programme (JPY 1.9 billion).²²⁶

- *Zero-Energy Housing Grant Program*²²⁷

In 2012, Japan's MLIT announced the launch of a zero-energy house program to support small- and medium-sized home builders to receive grants for construction and renovation activities. The program was intended to facilitate housing construction and renovation projects that aimed to achieve net-zero consumption, over the course of a year, of primary energy from fossil fuels by using enhanced thermal insulation, photovoltaic power generation systems, solar thermal energy systems, storage batteries, and other technologies.

Last but not least of course, it is important to recall the Flat 35S loan facility of the JHF, which as a government-financed agency, provides low interest rate loans to finance the purchase energy efficient homes.

To conclude, the following key takeaways are worth highlighting:

Japan has provided a range of grants and tax incentives targeted variously at individuals and companies to promote energy efficiency of existing buildings, including:

- *Tax breaks for low carbon buildings which reduce CO2 in cities.*
- *Low interest rate loans to individuals to finance the purchase energy efficient homes.*
- *An eco-point system according to which eco-points awarded to green housing or energy efficient renovations can be redeemed against eco-products or additional renovations. This scheme is considered to resulted in a 13% increase in the home renovation market in 2010 and the accrued benefits in the first phase of the programme were approximately 3.4 trillion yen.*

²²¹ <https://www.unescap.org/sites/default/d8files/28.%20CS-Japan-housing-eco-point-system.pdf>

²²² http://jutaku.eco-points.jp/newsrelease/111014_1.html

²²³ www.yomiuri.co.jp/dy/business/T111107004145.htm

²²⁴ <https://www.unescap.org/sites/default/d8files/28.%20CS-Japan-housing-eco-point-system.pdf>

²²⁵ https://www.env.go.jp/en/policy/economy/efp/summary_EFP.pdf

²²⁶ IEA – Japan 2021 Energy Policy Review (2021)

²²⁷ https://www.japanfs.org/en/news/archives/news_id032405.html

- *Investment funds and interest subsidies to mobilise private finance for climate action.*
- *Grants to home builders for net-zero consumption housing construction and renovation projects.*

Conclusion

As awareness grows of the importance of meeting global climate targets, safeguarding energy security and ensuring the resilience of economies and financial systems to climate change, jurisdictions across the globe are undertaking efforts to reduce carbon emissions, improve the performance of their building stocks as part of these efforts and mobilise private and public finance to these ends.

The case studies presented in this Report provide a comprehensive - although not exhaustive - overview of key pillars of and developments in relation to energy efficiency building renovation and energy efficient or green mortgages/housing finance across the EU, Kenya, Malaysia and Japan. While the starting point for each jurisdiction is different, determined by their stage of economic development, energy priorities and challenges, their climatic conditions and the nature of their building stocks, for example, our analysis identifies broad similarities across many of the areas of study of this Report from which it is possible to derive valuable best practice indications. Findings per jurisdictions are highlighted throughout the Report and overall best practice indications are identified and brought together in the executive summary, including efforts to secure consumer awareness and demand for energy efficiency and energy efficient mortgages, actions to mobilise the financial industry and the broader value chain, through green bonds, public subsidies and MoU between the public and private sectors for example, and legislative developments relative to the finance and building industries.

This Report subsequently provides a valuable basis from which to promote the exchange of information and dialogue between global jurisdictions, and identify and share emerging best practice to support ongoing initiatives and actions in this area.

Bibliography

European Union

World Economic Forum. (2021). Why buildings are the foundation of an energy-efficient future.
<https://www.weforum.org/agenda/2021/02/why-the-buildings-of-the-future-are-key-to-an-efficient-energy-ecosystem/>

European Commission. (2021). Questions and Answers - Making our energy system fit for our climate targets.
<https://www.weforum.org/agenda/2021/02/why-the-buildings-of-the-future-are-key-to-an-efficient-energy-ecosystem/>

Centre for Climate & Energy Solutions. Global Emissions.
<https://www.c2es.org/content/international-emissions/#:~:text=China%2C%20the%20United%20States%2C%20and,the%20United%20States%20and%20Russia>

European Commission. (2021). Questions and Answers - Making our energy system fit for our climate targets.
https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3544

Council of the European Union. (2020). Where does the EU's energy come from?
<https://www.consilium.europa.eu/en/infographics/where-does-the-eu-s-energy-come-from/>

European Commission. (2020). Financing the green transition: The European Green Deal Investment Plan and Just Transition Mechanism. *European Commission Press Corner 14 January 2020*
https://ec.europa.eu/commission/presscorner/detail/en/ip_20_17

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 Mortgage Federation-European Covered Bond Council (EMF-ECBC). (2022). Hypostat 2022.
<https://hypo.org/app/uploads/sites/3/2022/11/HYPOSTAT-2022-FOR-DISTRIBUTION.pdf>

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>

Basis. (2018). Green Mortgages: Spain & Portugal
<https://energyefficientmortgages.eu/wp-content/uploads/2021/07/EON-Green-Mortgages-Debrief-with-appendices-051218.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>

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>

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>

European Commission. (2021). Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the energy performance of buildings (recast) COM/2021/802 final
https://eur-lex.europa.eu/resource.html?uri=cellar:c51fe6d1-5da2-11ec-9c6c-01aa75ed71a1.0001.02/DOC_1&format=PDF

EEMI Master Template (2019)
<https://energyefficientmortgages.eu/knowledge-hub>

Leboulenger, D., Toth, Z., Johnson, J., Bertalot, L. (2019). EEMI Master Template Explanatory Document.
<https://energyefficientmortgages.eu/wp-content/uploads/2021/07/EEMI-Master-Template-Explanatory-Document.pdf>

EEM Label Harmonised Disclosure Template (2023)
<https://www.energy-efficient-mortgage-label.org/hdt>

Hoving, V. & Noorda, C. (2022). EEM Label GDPR Compliance Considerations
<https://energyefficientmortgages.eu/wp-content/uploads/2022/04/EEM-Label-GDPR-Compliance-Considerations.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>

European Commission. (2021). Questions and Answers: European Green Bonds Regulation.
https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3406

European Covered Bond Council. (2021). ECBC Covered Bond Fact Book 2021.
<https://hypo.org/app/uploads/sites/3/2021/09/ECBC-Fact-Book-2021-FINAL.pdf>

European Covered Bond Council. (2022). ECBC Covered Bond Fact Book 2022.
<https://hypo.org/app/uploads/sites/3/2022/08/ECBC-Fact-Book-2022.pdf>

European Commission. (2020). European Green Bond Standard.

https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/european-green-bond-standard_en

European Commission. (2020). A Renovation Wave for Europe - greening our buildings, creating jobs, improving lives

https://eur-lex.europa.eu/resource.html?uri=cellar:0638aa1d-0f02-11eb-bc07-01aa75ed71a1.0003.02/DOC_1&format=PDF

European Commission. International Sustainable Finance Platform.

https://finance.ec.europa.eu/sustainable-finance/international-platform-sustainable-finance_en

European Commission. (2020). REGULATION (EU) 2020/852 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088.

<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020R0852&from=EN>

European Commission. (2022). Corporate sustainability reporting

https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en

European Commission. (2018). Sustainability-related disclosure in the financial services sector

https://finance.ec.europa.eu/sustainable-finance/disclosures/sustainability-related-disclosure-financial-services-sector_en

European Banking Authority. (2022). Final draft implementing technical standards on prudential disclosures on ESG risks in accordance with Article 449a CRR

https://www.eba.europa.eu/sites/default/documents/files/document_library/Publications/Draft%20Technical%20Standards/2022/1026171/EBA%20draft%20ITS%20on%20Pillar%203%20disclosures%20on%20ESG%20risks.pdf

European Commission. (2021). Strategy for Financing the Transition to a Sustainable Economy.

https://eur-lex.europa.eu/resource.html?uri=cellar:9f5e7e95-df06-11eb-895a-01aa75ed71a1.0001.02/DOC_1&format=PDF

European Central Bank. (2020). Guide on climate-related and environmental risks Supervisory expectations relating to risk management and disclosure.

<https://www.bankingsupervision.europa.eu/ecb/pub/pdf/ssm.202011finalguideonclimate-relatedandenvironmentalrisks~58213f6564.en.pdf>

European Central Bank. (2023). Towards climate-related statistical indicators

https://www.ecb.europa.eu/pub/pdf/other/ecb.climate_change_indicators202301~47c4bbbc92.en.pdf

European Central Bank. (2021). ECB presents action plan to include climate change considerations in its monetary policy strategy. Press Corner.

https://www.ecb.europa.eu/press/pr/date/2021/html/ecb.pr210708_1~f104919225.en.html

European Central Bank. (2022). ECB takes further steps to incorporate climate change into its monetary policy operations. Press Corner.

<https://www.ecb.europa.eu/press/pr/date/2022/html/ecb.pr220704~4f48a72462.en.html>

European Commission. (2018). Energy Efficiency Directive.
https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficiency-targets-directive-and-rules/energy-efficiency-directive_en

Diaz, J., Tucker, T. (2022). Best Practice in European Public Support Schemes for Energy Efficiency.
<https://energyefficientmortgages.eu/wp-content/uploads/2022/10/Technical-Report-on-relevant-public-support-actions-in-relation-to-EEM.pdf>

Kenya

International Monetary Fund. (2022). World Economic Outlook Database.
<https://www.imf.org/en/Publications/WEO/weo-database/2022/October/weo-report?c=612,614,638,616,748,618,624,622,626,628,632,636,634,662,611,469,642,643,734,644,646,648,652,656,654,664,666,668,672,674,676,678,682,684,686,688,728,692,694,714,716,722,718,724,726,199,733,732,738,742,744,746,754,698,&s=NGDPD,NGDPDPC,LP,&sy=2022&ey=2022&ssm=0&ssm=1&ssc=0&ssd=1&ssc=0&sic=0&sort=country&ds=.&br=1>

Global Edge. (2021). Kenya: Economy. Global Insights.
<https://globaledge.msu.edu/countries/kenya/economy>

UNEP Copenhagen Climate Centre. (2018). Energy Efficiency in Buildings: Kenya.
<https://unepccc.org/wp-content/uploads/sites/3/2018/11/2018-10-ee-in-buildings-kenya-web.pdf>

Brunel Lister, C., Reymond, A. (2021). How can Kenya continue to lead the way on green finance in Africa?
<https://www.southpole.com/blog/how-can-kenya-continue-to-lead-the-way-on-green-finance-in-africa>

Kenya Bankers Association (2015). Kenya Sustainable Finance Principles & Guidelines.
<https://sfi.kba.co.ke/uploads/sfi-booklet.pdf>

Global Innovation Lab for Climate Finance. (2022). Green Affordable Housing Finance – Instrument Analysis.
<https://cpilabs.wpenginepowered.com/wp-content/uploads/2022/09/GAHF-report.pdf>

Reall. (2022). Reall wins prestigious global climate award programme. Press release.
<https://reall.net/blog/reall-wins-prestigious-global-climate-award-programme/>

Mungai, E. (2018). Green Mortgages For Climate Resilient Future Kenyan Cities
<https://www.linkedin.com/pulse/green-mortgages-climate-resilient-future-kenyan-cities-edward-mungai/>

The World Bank. (2021). How Kenya is Making Home Ownership Possible for Low-Income Households
<https://www.worldbank.org/en/news/feature/2021/12/10/how-kenya-is-making-home-ownership-possible-for-low-income-households>

Kenya Mortgage Refinance Company. (2022). The Future of Affordable Housing is Green; Popularity in Kenya takes Shape.
<https://www.kmrc.co.ke/blog/the-future-of-affordable-housing-is-green-popularity-in-kenya-takes-shape/>

Kenyan Treasury. (2023). Draft Green Fiscal Incentives Policy Framework.
<https://www.treasury.go.ke/wp-content/uploads/2023/01/Draft-Green-Fiscal-Incentives-Policy-Framework.pdf>

Knight Frank. (2021). Green homes top African homebuyer wishlist.
<https://www.knightfrank.com/research/article/2021-12-06-african-home-buyers-now-more-inclined-to-greener-homes>

Munene, M., Odongo, J., Nyambane, A. (2019). Energy Efficiency In Kenya Public Awareness, Strategies, Challenges And Opportunities.
https://www.researchgate.net/publication/349716727_ENERGY_EFFICIENCY_IN_KENYA_PUBLIC_AWARENESS_STRATEGIES_CHALLENGES_AND_OPPORTUNITIES

Menes, R. (2020). EDGE Standard Provides Key Benefit for Kenya's Affordable Housing Developers.
<https://edgebuildings.com/edge-standard-provides-key-benefit-for-kenyas-affordable-housing-developers/>

Kenya Bankers Association & Climate Bonds Initiative. (2018). Green Bonds Programme Kenya.
https://docs.wixstatic.com/ugd/38b0af_ce1e7d9d411d4b0485d70f4e35474924.pdf

Climate Bonds Initiative. (2019). First Green Bond from Kenya: Acorn USD40m - Climate Bonds Certified, financing green buildings
<https://www.climatebonds.net/2019/10/first-green-bond-kenya-acorn-usd40m-climate-bonds-certified-financing-green-buildings>

Kimisitu Investment Company PLC. (2022). To Go Green We Need To Understand The Merits.
<https://kimisituinvestment.co.ke/to-go-green-we-need-to-understand-the-merits/>

Business Daily Africa. (2022). How green bonds can bridge financing gap in infrastructure projects
<https://www.businessdailyafrica.com/bd/opinion-analysis/columnists/how-green-bonds-can-bridge-financing-gap-3931634>

Building Efficiency Accelerator.
<https://buildingefficiencyaccelerator.org>

ECGI. (2017). Stewardship Code for Institutional Investors – 2017.
<https://www.ecgi.global/code/stewardship-code-institutional-investors-2017>

Kenyan Government. (2015). The Companies Act.
<https://eregulations.invest.go.ke/media/Companies-Regulations.pdf>

Kenyan Government. (2019). The Capital Markets Act.
<https://www.cma.or.ke/index.php/regulatory-frame-work/acts>

Nairobi Securities Exchange. (2021). Nairobi Securities Exchange ESG Disclosures Guidance Manual.
<https://sseinitiative.org/wp-content/uploads/2021/12/NSE-ESG-Disclosures-Guidance.pdf>

Business Daily Africa. (2022). Kenya needs green finance guidelines.
<https://www.businessdailyafrica.com/bd/opinion-analysis/columnists/kenya-needs-green-finance-guidelines-3812250>

Central Bank of Kenya. (2021). Guidance on Climate Related Risk Management.
<https://www.centralbank.go.ke/wp-content/uploads/2021/10/Guidance-on-Climate-Related-Risk-Management.pdf>

Central Bank of Kenya. (2019). Kenya Banking Sector Charter.
<https://www.centralbank.go.ke/wp-content/uploads/2020/03/Kenya-Banking-Sector-Charter-2019.pdf>

KBC. (2023). Treasury proposes to set up special bank for green projects.
<https://kbc.co.ke/local-business/article/35216/treasury-proposes-to-set-up-special-bank-for-green-projects>

Green Fiscal Policy Network. (2017). Kenya – Country Profile.
https://greenfiscalspolicy.org/policy_briefs/kenya-country-profile/

Malaysia

International Monetary Fund. (2022). Country Composition of WEO Groups.
<https://www.imf.org/external/pubs/ft/weo/2022/01/weodata/groups.htm>

The ASEAN Secretariat. (2021). Regional Study on Labour Productivity in ASEAN.
https://asean.org/wp-content/uploads/Regional-Study-on-Labor-Productivity-in-ASEAN_R05_Kirimok.pdf

Climate Governance Malaysia. (2021). Towards a Low Carbon Emissions Pathway.
https://www.bnm.gov.my/documents/20124/3770663/jc3_can_cgm_report_2022.pdf

Economic Planning Unit Malaysia. (2022). National Energy Policy Plan 2022 – 2040.
https://www.epu.gov.my/sites/default/files/2022-09/National%20Energy%20Policy_2022_2040.pdf

Choudhary, V., Khatri A. (2022). Analysing the prospects and challenges in building energy-resilient Malaysia.
<https://thekootneeti.in/2022/10/04/analysing-the-prospects-and-challenges-in-building-energy-resilient-malaysia/>

Chiong, M., Chun, Y., Ikegami, Y., Latif, S., Rajoo, S., Tahara, K., Takada, A. (2021). The Trend and Status of Energy Resources and Greenhouse Gas Emissions in the Malaysia Power Generation Mix.
<https://www.mdpi.com/1996-1073/14/8/2200>

ASEAN Centre for Energy. (2019). Energy Efficiency Financing Guideline in Malaysia.
<https://agep.aseanenergy.org/wp-content/uploads/2019/10/EEF-Guideline-in-Malaysia.pdf>

Khamidi, M., Shika, S., Umar, U. (2012). Building Energy Efficiency for Sustainable Development in Malaysia.
https://www.researchgate.net/publication/259827725_Building_Energy_Efficiency_for_Sustainable_Development_in_Malaysia

Ministry of Energy, Green Technology and Water. (2015). National Energy Efficiency Action Plan.
<https://www.pmo.gov.my/wp-content/uploads/2019/07/National-Energy-Efficiency-Action-Plan.pdf>

BIS. (2022). Deputy Governor's Opening Remarks at the Cagamas Developing and Financing Green Housing in Asia Conference.
<https://www.bis.org/review/r220921e.htm>

Cagamas. (2022). Cagamas Expands its Affordable Housing Mandate to Cover Green Housing & Female-headed Households.
<https://cagamas.com.my/press-release/cagamas-expands-its-affordable-housing-mandate-to-cover-green-housing-female-headed>

Bank Negara Malaysia. (2018). Bank Negara Malaysia's Special Measures for Affordable Homes.
<https://www.bnm.gov.my/-/bank-negara-malaysia-s-special-measures-for-affordable-homes>

Bank Negara Malaysia. (2019). Enhancements to Bank Negara Malaysia's RM1 billion Fund for Affordable Homes
<https://www.bnm.gov.my/-/enhancements-to-bank-negara-malaysia-s-rm1-billion-fund-for-affordable-homes>

Pinatih, A., (2020). Homebuyers' willingness-to-pay for green attributes: Evidence from Asian cities.
<https://www.constructionplusasia.com/sg/homebuyers-willingness-to-pay-for-green-attributes-evidence-from-asian-cities/>

Ghodrati, N., Samari, M., Shafiei, M., (2013). Strategic Approach to Green Home Development in Malaysia-the Perspective of Potential Green Home Buyers.
https://www.researchgate.net/publication/276949436_Strategic_Approach_to_Green_Home_Development_in_Malaysia-the_Perspective_of_Potential_Green_Home_Buyers

Ariffin, Z., Isa, N., Lokman, M., Ludin, N. (2022). Consumer Acceptance of Renewable Energy in Peninsular Malaysia.
https://www.researchgate.net/publication/365240170_Consumer_Acceptance_of_Renewable_Energy_in_Peninsular_Malaysia

Bank Negara Malaysia. (2022). Preparing Our Financial Sector for Risks from Climate Change.
<https://www.bnm.gov.my/climatechange>

MyHIJAU. (2022). Malaysia's Green Recognition Scheme.
<https://www.myhijau.my/>

Green Building Index. (2022). Malaysia's International Green Benchmark.
<https://www.greenbuildingindex.org/>

GreenRe. (2022). Green Building Assessment.
<https://www.greenre.org/>

Seda Malaysia. Voluntary Sustainable Energy Low Carbon Building Assessment.
<https://www.seda.gov.my/energy-demand-management-edm/sustainable-low-carbon-building-assessment/>

CIDB Malaysia. (2022). MyCREST.
<https://www.cidb.gov.my/eng/mycrest/>

Yusof, A. (2018). MyCREST to help increase number of green buildings.

<https://www.nst.com.my/business/2018/01/320769/mycrest-help-increase-number-green-buildings>

ASEAN Energy Awards. (2018). Country Report on Energy Code and ASEAN Energy Award.

<https://seforallateccj.org/wpdata/wp-content/uploads/ecap17-malaysia.pdf>

The Conversation. (2013). Malaysia plans to be the first Islamic financial superpower.

<https://theconversation.com/malaysia-plans-to-be-the-first-islamic-financial-superpower-19922>

Statista. (2022). Distribution of total sovereign sukuk issuance worldwide in 2021, by country.

<https://www.statista.com/statistics/649298/distribution-of-sovereign-sukuk-issuance-by-country/>

Suruhanjaya Sekuriti. (2017). Malaysia's First Green Sukuk under SC's Sustainable Responsible Investment Sukuk Framework.

<https://www.sc.com.my/resources/media/media-release/malaysias-first-green-sukuk-under-scs-sustainable-responsible-investment-sukuk-framework>

Lai, K., Liu, F. (2021). Ecologies of green finance: Green sukuk and development of green Islamic finance in Malaysia.

<https://doi.org/10.1177/0308518X211038349>

Suruhanjaya Sekuriti. (2019). Sustainable and responsible investment sukuk framework – an overview.

<https://www.sc.com.my/api/documentms/download.ashx?id=84491531-2b7e-4362-bafb-83bb33b07416>

International Capital Market Association. (2022). Green Bond Principles.

<https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/green-bond-principles-gbp/>

Cagamas. (2022). Cagamas Expands its Affordable Housing Mandate to Cover Green Housing & Female-headed Households.

<https://cagamas.com.my/press-release/cagamas-expands-its-affordable-housing-mandate-to-cover-green-housing-female-headed>

BEBC Brunei. (2022). Cagamas, ADB to Develop Green, Affordable Housing Finance for Malaysia.

<https://bruneibebc.com/cagamas-adb-to-develop-green-affordable-housing-finance-for-malaysia/>

Bank Negara Malaysia. (2022). BNM's Fund for SMEs Low Carbon Transition Facility Frequently Asked Questions (FAQ).

<https://www.nst.com.my/business/2022/04/788035/tnb-sp-setia-offer-smart-energy-re-solutions-latters-future-projects>

Mashuriu, E. (2022). Green Living in Malaysia for an Energy Conscious Future.

<https://www.energywatch.com.my/blog/2022/03/04/green-living-in-malaysia-for-an-energy-conscious-future/>

Bank Negara Malaysia. (2022). Preparing Our Financial Sector for Risks from Climate Change.

<https://www.bnm.gov.my/climatechange>

Bank Negara Malaysia. (2021). Climate Change and Principle-based Taxonomy.

<https://www.bnm.gov.my/documents/20124/938039/Climate+Change+and+Principle-based+Taxonomy.pdf>

T. Kumagai. (2021). Japan's coal power share to drop to 26% by 2030-31 on regulatory push: METI. SP Global

<https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/electric-power/040921-japans-coal-power-share-to-drop-to-26-by-2030-31-on-regulatory-push-meti>

Our World in Data. Annual Co² emissions per country.

<https://ourworldindata.org/>

Ministry of Economy, Trade and Industry (METI) of Japan. Japan's Roadmap to "Beyond-Zero" Carbon

https://www.meti.go.jp/english/policy/energy_environment/global_warming/roadmap/

EPRS European Parliamentary Research Service. (2021). Japan's 2050 goal: A carbon-neutral society.

[https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/698023/EPRS_BRI\(2021\)698023_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/698023/EPRS_BRI(2021)698023_EN.pdf)

Ministry of Economy, Trade and Industry (METI) of Japan. (2021). Outline of Strategic Energy Plan

https://www.enecho.meti.go.jp/en/category/others/basic_plan/pdf/6th_outline.pdf

Climate Transparency. (2020). Climate Transparency Report on Japan.

<https://www.climate-transparency.org/wp-content/uploads/2020/11/Japan-CT-2020-Web.pdf>

Kayo, Chihiro & Tonosaki, Mario. (2021). Lifetimes of Buildings in Japan.

https://www.researchgate.net/publication/355614129_Lifetimes_of_Buildings_in_Japan

Satoshi Nakano, Ayu Washizu. (2018). Acceptance of energy efficient homes in large Japanese cities: Understanding the inner process of home choice and residence satisfaction. Journal of Environmental Management, Volume 225, Pages 84-92. ISSN 0301-4797;

<https://www.sciencedirect.com/science/article/pii/S0301479718308454>

Nakamura. (2016). Electricity saving behaviour of households by making efforts, replacing appliances, and renovations: empirical analysis using a multivariate ordered probit model.

<https://onlinelibrary.wiley.com/doi/epdf/10.1111/ijcs.12292>

Masahiro Kobayashi. (2016). The Housing Market and Housing Policies in Japan. ADBI Working Paper Series.

<https://www.adb.org/sites/default/files/publication/181404/adbi-wp558.pdf>

Wuyts, Wendy & Miatto, Alessio & Sedlitzky, Raphael & Tanikawa, Hiroki. (2019). Extending or ending the life of residential buildings in Japan: A social circular economy approach to the problem of short-lived constructions. Journal of Cleaner Production. 231. 10.1016/j.jclepro.2019.05.258.

https://www.researchgate.net/publication/333398276_Extending_or_ending_the_life_of_residential_buildings_in_Japan_A_social_circular_economy_approach_to_the_problem_of_short-lived_constructions

CASBEE

<https://www.ibec.or.jp/CASBEE/english/>

Sheau-Chyng Wong, Naoya Abe. (2014) Stakeholders' perspectives of a building environmental assessment method: The case of CASBEE, Building and Environment, Volume 82, 2014, Pages 502-516, ISSN 0360-1323,

<https://www.sciencedirect.com/science/article/abs/pii/S0360132314002996>

Ministry of the Environment of Japan. (2020). Green Bond Guidelines 2020
<https://www.env.go.jp/content/000042342.pdf>

Development Bank of Japan. DBJ Green Building Certification
https://www.dbj.jp/en/service/program/g_building/?sc=1

Green Finance Portal.
<https://greenfinanceportal.env.go.jp/en/>

The Institute for Global Environmental Strategies (IGES) and the Climate Bonds Initiative (CBI). (2022). Japan Green Finance State of the Market – 2021
https://www.climatebonds.net/files/reports/news_report_221219_2.pdf

Climate Bonds Initiative. (2019). Financing low-carbon buildings and energy efficiency in the green bond market.
https://greenfinanceportal.env.go.jp/pdf/CBI_%20LowCarbonBuilding_final.pdf

Japan Housing Finance Agency
<https://www.jhf.go.jp/english/>

Cagamas, National Mortgage Association of Malaysia. Green housing finance and issuances in Japan. Conference “Developing and Financing Green Housing in Asia” 17 October 2022.
<https://www.cagamas.com.my/blog/green-housing-finance-and-issuances-in-japan>

Schumacher, K., H. Chenet, and U. Volz. (2020). Sustainable Finance in Japan. ADBI Working Paper 1083. Tokyo: Asian Development Bank Institute.
<https://www.adb.org/publications/sustainable-finance-japan>

TCFD Task Force on Climate-related Financial Disclosures Consortium.
<https://tcf-consortium.jp/about#:~:text=TCFD%E3%81%A8%E3%81%AF%E3%80%81G20%E3%81%AE,Force%20on%20Climate%2Drelated%20Financial>

Green Central Banking. (2022). Japan’s green lending scheme presents opportunities and challenges.
<https://greencentralbanking.com/2022/08/02/japan-green-lending-scheme-sayuri-shirai/>

The Japan Times. (2019). Japan advised to set own green taxonomy.
<https://www.japantimes.co.jp/esg-consortium/2019/07/28/esg-consortium/japan-advised-set-green-taxonomy/>

The Bank of Japan.
<https://www.boj.or.jp/en/>

The Bank of Japan's Strategy on Climate Change. (2021).
https://www.boj.or.jp/en/about/release_2021/rel210716b.pdf

The Financial Services Agency (FSA). (2022). Pilot Scenario Analysis Exercise on Climate-Related Risks Based on Common Scenarios
<https://www.fsa.go.jp/en/news/2022/20220826.html>

Green Central Banking.
<https://greencentralbanking.com/>

Evans, Shui, Takagi. (2009). Country Report on Building Energy Codes in Japan. US Department of Energy.
https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-17849.pdf

Huang, Beijia & Mauerhofer, Volker & Geng, Yong. (2015). Analysis of Existing Building Energy Saving Policies in Japan and China. Journal of Cleaner Production. 112. 10.1016/j.jclepro.2015.07.041.
https://www.researchgate.net/publication/282633604_Analysis_of_Existing_Building_Energy_Saving_Policies_in_Japan_and_China

IEA. (2021). Japan 2021 Energy Policy Review.
https://iea.blob.core.windows.net/assets/3470b395-cfdd-44a9-9184-0537cf069c3d/Japan2021_EnergyPolicyReview.pdf

Net-Zero Energy Buildings (NZEB). Japan NZEB Goals
<https://nzeb.in/definitions-policies/international-roadmaps/japan-2/>

Ministry of Land, Infrastructure, Transport and Tourism of Japan. (2014). Outline of Low Carbon City Development.
<https://www.mlit.go.jp/common/001048781.pdf>

UNESCAP Case Study Paying people to save energy Japan's housing eco-point system
<https://www.unescap.org/sites/default/d8files/28.%20CS-Japan-housing-eco-point-system.pdf>

Environment and Economy Division Ministry of the Environment. (2017). Summary of Environmental Finance Programmes.
https://www.env.go.jp/en/policy/economy/efp/summary_EFP.pdf

Japan for Sustainability. (2012). MLIT Selects 1,320 Zero-Energy House Projects for Grant Program
https://www.japanfs.org/en/news/archives/news_id032405.html