Will Banks Start Putting Their Money Where Their Properties Are?

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ABSTRACT

The banking industry, including mortgage finance institutions, largely has been absent from financing single-family residential energy efficiency improvements and decarbonization, leaving the market to unsecured credit card debt and other specialty financing programs (such as PACE financing, local green banks, and utility or contractor financing) with limited national coverage and often high interest rates. Residential green mortgages – which either allow borrowers to increase the size of a purchase or refinance loan to fund efficiency, renewable, or resilience measures or reward pre-existing improvements –are used only to a very limited degree.

Given that mortgage financing has the potential to be the largest source of funding for residential building decarbonization, it is imperative we rethink ways to unleash this capital. To that end, this paper considers why green mortgage financing has failed to gain traction in the U.S.; examines what has led to green financing uptake in Europe; highlights significant new opportunities and pressures for change (e.g., California's SB253 disclosure requirements, federal incentives, analytic tools); and provides a "market actor lens" for assessing the likely viability of transformative solutions. Recommended measures include discounted mortgage rates and incentive stacking to facilitate and incentivize the purchase and retrofit of efficient and resilient homes, the collection of reliable and cost-effective home energy information and a focus by lenders on broadening the issuance of mortgage backed securities to include Sustainability MBS. Lenders should be incentivized to participate in the green mortgage market with credit enhancement and risk-reduction support by third-parties such as Greenhouse Gas Reduction Fund recipients.

Introduction

Buildings in the U.S. account for about 33% of total annual carbon dioxide emissions; made up of approximately equal parts emissions generated by the residential and commercial buildings (EIA 2023). While banks are not legally responsible for the carbon emissions of their investments, growing ethical questions and pressures from investors and policymakers have forced financial institutions to consider the externalities associated with their capital. The Partnership for Carbon Accounting Financials (PCAF), an industry-led partnership, provides methodologies for financial institutions to measure and report the financed emissions of their lending activities (PCAF 2023). The PCAF guidelines assign to the lender responsibility for the emissions associated with the portion of the loans not yet paid off. For example, if a residential mortgage is half paid off, half of the emissions are the homeowner's responsibility and half should be included in the lender's Scope 3 disclosure report. Table 1 is an approximation for the residential and commercial emissions that can be attributed to the financial community. At a very high level, financial institutions are "responsible" for 471 million metric tons (mmt), nearly half a billion metric tons (mt) of emissions from the built environment in 2022. Of these emissions,

about half (248 mmt) are from residential mortgages and 223 mmt are from commercial lending. Of that, the Government Sponsored Enterprises (GSEs)–Fannie Mae and Freddie Mac–hold the largest fraction, approximately 38% of the total. By quantifying the carbon footprint of their loan portfolios, the lending industry can better understand the source of these emissions and develop financial products that reduce contributing emissions, build resilience and efficiency, and expand access to affordable and sustainable new development.

Table 1. Debt outstanding, value of real-estate, and sector/lender carbon dioxide (CO2) emissions breakdown

Sector and Lender Categories	**Outstanding mortgage debt (million $)**	**Market value (million $)**	**CO2 emissions (2022 mmt)**	
			Sector	**Lender**
Building Sectors				
1-4 family residential	14,027,211	52,000,000	248	
Multifamily residences	2,213,705	20,700,000	223	
Nonfarm, non-residential	3,683,487			
Lenders				
U.S Chartered Depository Institutions	5,854,806			139
Government Sponsored Enterprises	7,400,770			178
Mortgage pools or trusts	3,711,605			89
Other	2,716,438			65
Total			**471**	**471**

Source: Federal Reserve Bank of St. Louis, EIA 2023, Zillow 2023, Nareit 2021.

At the same time, many lenders have their own environmental, social, and governance (ESG) commitments and net-zero targets, in no small part because of investor and public pressure. Many are part of the Net-Zero Banking Alliance or other international climate action groups, which commits them to financing climate action and to net-zero goals by 2050 (United Nations Environment Programme, 2023). On a global basis, large banks are also committing to investing their capital into the climate and energy transition, with JP Morgan Chase (JP Morgan, 2023) committing $2.5 trillion over 10 years, Citi $1 trillion over the same time period (Citi, 2021), and Barclays (Barclays, 2022) and HSBC (HSBC, 2024) $1 trillion by 2030. These funds are generally directed at renewable energy and clean technology investments. Barclay’s

announcement is notable in naming green mortgages[1] as a specific area of focus for their sustainable finance investments (Barclays, 2022).

Decarbonizing the built environment is going to require significant financial resources and innovation. For example, a 2021 report from the ACEEE assessed that deep retrofits on single-family housing can cut a home's energy use by 58% to 79% and its emissions by 32% to 56%, depending on the home's age and regional climate. A shift to electric heating and cooling via heat pumps, provides long-term carbon reductions. In addition to utility savings these types of retrofits improve indoor air quality, temperature control, and reduce noise, but come at a cost of $42,600 to $56,750 (at the time of the 2021 study), more than most homeowners can afford. (ACEEE, 2021). Findings from the Lawrence Berkeley National Laboratories in a 2022 study (Walker, et al) found similar costs.

While incentives and tax rebates such as those from the Inflation Reduction Act (IRA) will contribute to offsetting costs, these alone will not be nearly enough, likely only affecting a very small percentage of our residential building stock. For most property owners, decarbonization will only be possible with attractive financing. Specialized "green finance" solutions exist, but their reach and scope is often limited and credit card debt is often expensive. Banks and mortgage lenders with reach have an opportunity to become leaders and innovators by leveraging the mortgage financing framework to develop a robust green mortgage industry but have thus far largely stayed away from residential climate lending.

With a focus on single-family lending, this paper first reviews recent policy developments that potentially hold promise for driving change in lending policies; and, then tackles residential lending – outlining the state of green finance, the shortcoming of green mortgages in the U.S., and what has allowed them to work in Europe and other limited instances. With this context in mind, the paper concludes by providing a "market actor lens" for developing and assessing the viability of new approaches; and offers some strategies for spurring large scale investment in residential efficiency and decarbonization.

Policy Developments

Recent years have brought several new policy developments, which when combined, will help make the case for developing stronger green building finance solutions that banks can offer. These include both sticks and carrots via mandatory disclosures and federal financial incentives.

Mandatory Greenhouse Gas Disclosure

Emerging regulatory requirements are mandating the disclosure of financed emissions. In the US, the Securities and Exchange Commission (SEC) passed ambitious rules to require registrants to report their greenhouse gas emissions in the form of Scope 1, 2 disclosures.[2] Scope 3 disclosure requirements, which would have included financed emissions, were eliminated in the face of intense opposition.

[1] Although Barclay's does not specify the geographic focus of their green mortgage investment plans, we are assuming that the focus is Europe and/or the UK.

[2] Per the SEC, "a registrant would be required to disclose GHG emissions from upstream and downstream activities in its value chain (Scope 3), if material or if the registrant has set a GHG emissions target or goal that includes Scope 3 emissions" (SEC 2023).

But California, which is the fifth largest economy in the world, enacted and signed into law on October 7, 2023, the Climate Corporate Data Accountability Act. This is the most sweeping disclosure rule in the nation, requiring both public and private companies, including lenders, that do business in California and have revenue of $1 billion or more to disclose Scope 1 and 2 emissions starting in 2026. Mandatory Scope 3 emissions reporting will begin in 2027, with every company required to comply, regardless of whether it is headquartered in the state. The new reporting rules will apply to most large US companies, as long as they operate in the California market. Disclosure will apply to an institution's nationwide/worldwide portfolio, and is not limited to its California portfolio, thereby effectively forcing most large US lenders to disclose the greenhouse gas (GHG) associated with their entire portfolio of loans. The Climate Corporate Accountability Act, introduced in January 2023 in the State of New York has similar requirements (State of New York 2023).

At this stage, the writing is on the wall: banks, local credit unions, GSEs and portfolio managers will have to evaluate and publicly disclose their mortgage portfolio emissions, including those attributed to commercial and residential loans. Whether disclosure is sufficient to drive change in the near term is unclear. Approaches and policies that bridge the gap between mere accounting/disclosure and investment in decarbonization are essential.

Building Data Disclosure

Understanding a building's standard or performance through ratings or data disclosure can help existing and prospective owners identify the efficiency upgrades and decarbonization measures needed to improve the property's efficiency and/or resiliency.

Commercial and multi-family buildings in the United States are increasingly subject to mandatory benchmarking[3], a requirement to disclose their consumption and emissions on an annual basis. Almost all this disclosure data is fed into the U.S. Environmental Protection Agency's (EPA) ENERGY STAR® Portfolio Manager platform, allowing it to provide increasingly useful statistics on regional building consumption by building type. This data transparency allows any operator or lender to evaluate a building's performance relative to its peers and help identify efficiency upgrades and decarbonization measures, creating a useful lever for improvement. For example, the NYU Stern Center for Sustainable Business created the Decarbonization Compass[4] to assist property owners and mortgage lenders in identifying efficiency upgrades and decarbonization measures. This tool tracks building emissions relative to the targets set under New York City's Local Law 97 building performance standard and identifies the lenders holding the mortgages on these buildings, thereby gaining insights for where to prioritize decarbonization.

Data transparency for single-family residential homes, however, is limited. Energy labeling programs for homes sold or listed for sale exist in Oregon, Vermont, Minnesota, Austin (TX), Ann Arbor (MI), and Berkeley (CA) but have, to date, not been scaled. These programs also use different approaches, some relying on modeled estimates such as the U.S. Department of Energy's Home Energy Score, some on utility data and others on home surveys; as a result, national stakeholders such as the GSEs cannot easily compare what is being disclosed.

[3] At time of writing, 8 states, the District of Columbia and close to 50 cities and counties had benchmarking requirements for large buildings: https://imt.org/public-policy/maps-and-comparisons/

[4] https://sites.google.com/stern.nyu.edu/decarbonizationcompass/home#h.42cb869ecae7f678_84

Selected lenders large and small are beginning to assess their own portfolio emissions. This can be facilitated with Automated Energy Models, such as that offered by ClearlyEnergy, which leverage a combination of public tax assessor data and home inspection information to estimate home consumption and emissions for large portfolios of holdings (Hopkins, 2018). This approach, which models emissions instead of calculating them from reported consumption information, is how European, and increasingly U.S., lenders are approaching their Scope 3 reporting requirements.

Incentives

Federal support for energy efficiency and decarbonization initiatives increased with the passage of the landmark IRA climate legislation. The IRA includes nearly $9 billion in total for home energy rebate programs for energy efficiency retrofits and electrification, with between $4,000 to $14,000 or more directly for a household. Additionally, some two dozen of its tax provisions apply to single-family homes making energy efficiency and renewable energy upgrades. These programs also present an opportunity to improve data transparency by requiring many home improvements to be paired with a home audit, a building energy model and/or home consumption information to unlock incentive payments; and to improve data standardization with reporting requirements.

Another significant allocation of the IRA is the $27 billion for the Greenhouse Gas Reduction Fund (GGRF), a clean energy technology accelerator administered by the EPA. Competitive funding awards, announced in April 2024, were made to coalitions and organizations for deploying (or helping to provide) clean energy technology, including home installments such as rooftop solar panels, in low-income and disadvantaged communities. One of the objectives of the GGRF is to mobilize financing and private capital to stimulate additional deployment of these types of projects. Some awardees from the GGRF National Clean Investment Fund (NCIF) program plan to leverage the GSEs' platforms and mortgage products as a vehicle for financing deep green capital improvements. For example, they propose to use NCIF funds to incent lenders to originate GSE-eligible mortgages that finance green improvements at a lower cost than usual by providing credit enhancements, such as loss guarantees, and by covering any additional origination costs. NCIF initiatives also include the development of new decarbonization loans that will be structured to be eligible for sale to the GSEs.

Green Mortgage Markets

The Current Landscape

Energy efficiency and renewable energy can reduce operating costs, cut greenhouse gas emissions, and improve the resiliency of buildings. But upfront costs are significant and a major barrier to getting these projects done, particularly for individual households. The landscape of financing options is vast and includes traditional structures like loans and leases as well as a variety of specialized products and programs[5].

[5] The U.S. Department of Energy's Financing Navigator as well as the EPA's Clean Energy Financing Toolkit for Decisionmakers are resources that summarize and help navigate the wide array.

This discussion will focus on financing for single-family residential properties as that is where lenders have the most exposure from financed emissions (see Table 1) and where the challenges can be greatest for individual property owners to find cost-effective financing. Existing residential energy efficiency financing product options include PACE, on-bill financing (e.g., from utilities), and unsecured solar or energy efficiency loans, which typically have a tenure of five to fifteen years. In a 2020 report, ACEEE estimated the combined size of residential PACE, on-bill financing and state energy office financing to be less than $1bn in 2018-19 (Henner, 2020), not accounting for private-market solar and efficiency loans.

The use of mortgages, at time of purchase or refinance, represents a huge but basically untapped opportunity to finance residential upgrades or to incentivize the purchase of new or pre-existing green homes. The largest players in the mortgage market, Fannie Mae and Freddie Mac (the GSEs), offer lenders guidelines for originating mortgages that finance energy efficiency upgrades but there is limited data available on how many such loans are made in the U.S., and evidence indicates there are very few[6]. Before exploring some of the reasons why, a brief overview of the mortgage capital markets can help provide context.

Overview: Mortgage-Backed Securities Market

Often the ultimate owner of a mortgage is not the same institution that originated it. While banks and thrifts may hold in portfolio the loans they make, investors play a critical role in the liquidity of the mortgage market as their purchases enable an ongoing flow of capital to create new loans. After making a loan, a bank or non-bank lender may sell it into the secondary mortgage market to an aggregator. For residential mortgages that meet certain requirements, this is likely Fannie Mae or Freddie Mac (along with Ginnie Mae, collectively referred to as the "Agencies"). The aggregator then bundles and "securitizes" the loans into mortgage-backed securities (MBS), which are then sold to investors, usually in shares. With single-family home mortgages, a standard MBS might include over a thousand mortgages, thereby diversifying risks. MBS usually carry some form of credit enhancement to mitigate default risk and guarantee investors timely payments and return of principal. Because of consistent origination guidelines, the Agency MBS market is very liquid and the efficiencies for lenders are passed on to borrowers in the form of lower rates[7]. The MBS market is relevant to green investments because greater demand for specific MBS translates into securities trading at a premium, and ultimately passing along a portion of this value to borrowers in the form of lower interest rates.

The GSEs have developed green and social bonds to meet the demand of investors interested in making progress toward their ESG goals. Green bonds are MBS pools where the underlying collateral finances positive impacts to housing infrastructure or the environment. The GSEs have been issuing multifamily green MBS for over a decade and began offering single-family green securities in 2020 (Fannie Mae) and 2021 (Freddie Mac).[8] The vast majority of mortgages in Fannie Mae's single-family green MBS fall outside the parameters of its own energy efficient mortgage product described below, instead consisting of conventional mortgages

[6] Based on a review of available reporting on single-family green bonds issued since inception of those offerings, it appears since 2020 when Fannie Mae began offering these bonds, and through 2023 fewer than 20,000 green mortgages combined for both GSEs have been originated. In contrast, in 2023 alone, the GSEs purchased over 1.5 million single-family loans (Fannie Mae; Freddie Mac).

[7] For more information on the MBS market in general, see Basics of Single-Family MBS (fanniemae.com)

[8] To date, these single-family green MBS pools are relatively small in size, with up to a few hundred loans in each versus the much larger size of standard MBS.

on newly constructed ENERGY STAR certified homes. In addition GSEs issue social bonds consisting of mortgages on single-family and multifamily housing in underserved communities and to underrepresented groups. Social bond issuances are now equal or greater in volume to green securities and play a growing role in the GSEs' impact strategies (Fannie Mae, 2024). However, whether green and social MBS trade at a premium is debated and the premia over vanilla MBS are generally small.

Green Mortgage Product Features

In a "green" or "Energy Efficient Mortgage" (EEM), the efficiency project costs, or other allowable green measures, are rolled into the mortgage at time of purchase or refinance. For borrowers, this can mean a higher monthly mortgage payment as it includes financing the project costs but allows the financing to be spread out over the term of the mortgage, typically 30 years, at a relatively low cost of capital. It also allows for deeper retrofits to be completed at once rather than spreading out projects over time, thus delaying benefits. Homeowners will generally experience lower utility bills, increased comfort, and improved indoor air quality. The alternative financing models generally have shorter terms, leading to higher monthly payments, and higher rates because they are not secured by the home and backed by quasi-governmental entities. Besides green mortgages offered by GSE, the Federal Housing Administration (FHA) and the U.S. Department of Veterans Affairs (VA) insure certain energy efficient mortgages[9]. Some smaller banks, thrifts, and credit unions offer green mortgages and often provide more flexibility in interest rates or other underwriting criteria than other conventional loans.

Fannie Mae's HomeStyle® Energy mortgage and Freddie Mac's GreenCHOICE® mortgage[10] allow borrowers to use mortgage proceeds to finance the cost of green single-family home improvements when purchasing or refinancing a home, up to 15% of its "as-completed" value. Eligible improvements within their "green" scope include energy efficiency measures , water efficiency measures, electrification, and renewable energy as well as some resilience improvements. For many measures, the GSEs require evidence of cost-effectiveness through an energy report such as that from the U.S. Department of Energy's Home Energy Score. Homeowners can also finance certain pre-existing debt related to green improvements (e.g., from residential PACE, utility efficiency programs, consumer loans), rolling those pre-spent dollars into the new mortgage. This takeout mechanism enables the GSEs to play a role in providing liquidity for other green home financing providers as it can free up capital for those actors to redeploy while affording borrowers the lower interest rates of a mortgage product. The GSEs only offer single-family green mortgages for improvements on existing homes; FHA offers EEMs for both improvements and the purchase of new energy efficient homes.

Green Mortgage Offerings and Barriers to Uptake

The GSEs allow all of their lender customers to originate their published green mortgage products; they don't require special lender approvals as they do for renovation financing. In addition, lenders receive a financial incentive for each green mortgage delivered. In spite of this and the fact that most banks and mortgage lenders voice their commitment to ESG, green mortgage products represent a fraction of a percent of the trillion dollar mortgage market.

[9] FHA and VA loans are pooled into MBS that are guaranteed by Ginnie Mae and sold to investors.

[10] These products were introduced in 2016 (Fannie Mae) and 2018 (Freddie Mac), after years of inactivity of older energy lending products, which were discontinued after the GSEs entered conservatorship.

Figure 1 summarizes the types of products that top single-family mortgage originator consumer-facing websites, including banks and non-banks, offer homeowners to undertake green measures. The market review focused on mortgages, as these are typically the lowest cost of capital for borrowers. It also shows the mention of green mortgages, if any, in the most recent ESG or impact reports. While it cannot be confirmed whether these lenders offer GSE-backed mortgages, it is assumed they do sell to one or both given the dominance of the GSEs in purchasing mortgages.

Rank		Offer Green Mortgage Loans		ESG/Impact/TCFD Report
Rank[1]	Lender	Offer[2]	Other Green Loan[3]	Mention GreenMtg
1	Rocket Mortgage	Solar only[i]	Solar only[i]	No/Solar only
2	United Wholesale	No	Personal loans for ee	No
3	Loan Depot	No	Solar/HELOC	N/A[ii]
4	Wells Fargo	No	EVs	No
5	Fairway Independent	No[iii]		N/A[ii]
6	Bank of America	No	EVs	No
7	US Bank	No		No
8	JP Morgan Chase	Yes[iv]	Refinance for ee	No
9	PNC	No		No
10	Citizens	No	HELOC	No

1--Largest Mortgage Lenders in the U.S. by Volume, 2022, HMDA Data--source: Forbes
2--Indicates website specifically offers an energy efficient or green mortgage
3--Indicates website offers other type of energy efficiency (ee) or green loan--typically a home equity line of credit (HELOC) or personal loan
(i) borrowers can consolidate other solar panel loans into a mortgage | (ii) no report available
(iii) mentions VA loans offer use for energy efficiency upgrades | (iv) only mentions FHA EEM about which borrower can contact their loan officer

Figure 1. Overview of lender green mortgage offerings *Source*: Authors' review; websites accessed March 5-6, 2024

This analysis makes it clear, there is little evidence that banks are putting green money where their properties are! With interest rates relatively high today, homeowners are reluctant to refinance for the purpose of renovation and efficiency upgrade projects; however, consistent with recent conversations with industry stakeholders, a 2021 report from RMI highlighted other likely reasons for the very low volumes of green mortgages (Ballesteros et al, 2021).

- **Lack of consumer awareness.** In addition to lenders not promoting green mortgages, home energy information is generally absent from the sale process, except in a small handful of jurisdictions. Without data about the existing energy performance, or resiliency, of the home and evaluation of recommended upgrades, borrowers will not realize they could benefit from a green mortgage that allows them simultaneously to finance needed improvements. Awareness and data transparency also help recognize the value of homes with efficient or resilient features.
- **Transaction costs and additional time and requirements for homeowner and lender.** Although the GSEs' green mortgages can be processed through automated underwriting systems, they typically take more time and resources to gather information for origination and lenders and borrowers typically want to move the home purchase process quickly. An energy audit is often required and there must be an as-completed appraisal conducted. Lenders must verify the eligibility of the proposed efficiency measures, a process for which they are rarely qualified.

- **Appraisal requirements and lack of appraisers with green expertise.** The GSEs' current green mortgage products require appraisers to determine the home's as-completed value (i.e., after the improvements are made) for every project before the financing has been approved. While it is critical that homes be properly valued to protect consumers from taking on more debt than their property is worth, these appraisals can add time and cost to the process and presents a challenge for appraisers to attest to market reaction to green features that have not yet been installed. Today, only a small subset of appraisers are trained to perform green appraisals, and these appraisers do not have access to widespread comparables for green features.

The European Success Story

Unlike the US, one out of every six mortgages issued in the United Kingdom (UK) is now a green mortgage that incentivizes investment in retrofits or rewards pre-existing efficiency with lower rates or cash incentives (Carter, 2022). Across Europe, 11% of household real-estate lending is now categorized as green[11] by the European Banking Authority (EBA) (EBA, 2023) – a particularly impressive market share since these products only became available in the past few years. According to EBA, three quarters of financial institutions require the Energy Performance Certificate (EPC)[12] at mortgage origination, providing them with valuable, standardized information on the efficiency of the building stock in their portfolio. Barclays kickstarted the UK Green Mortgage market in 2018 by providing discounted rates on mortgages to buyers of new homes that had an EPC rating of A or B. In a survey of 83 lending institutions across Europe (EBA, 2023), 42 followed the Barclay's model and offered green mortgage products for the purchase of efficient homes, 24 offered products for energy efficient retrofits, typically requiring a 20%-30% improvement in greenhouse gas emissions, and 13 offered a bundled retrofit and mortgage product.

As an incentive to buy a green building or to renovate an existing one to make it greener, the lenders offer a lower interest rate, give cash back, allow increased loan amounts, or combine these incentives. These green mortgages are then bundled and issued as green bonds, with major issuances by Barclays (Climate Bonds Initiative 2023) and NatWest Group (Basar 2022).

In February 2021, the EU launched the Energy Efficient Mortgages Initiative (EEMI) to stimulate the mortgage industry to fund more green buildings and renovation and create a standard reporting template for the sector (Energy Efficient Mortgages Initiative 2018). It was established to help achieve the goals set out under the COP 21 Paris Agreement by improving the energy performance of Europe's building stock and to provide financial stability by reducing credit risk for banks and financial institutions.

U.S. Studies and Pilot Projects

On a much smaller scale, the Vermont State Employees Credit Union (VSECU), now the New England Federal Credit Union (NEFCU), successfully piloted a green mortgage called the

[11] The categorization relies on internal lender standards and the European Union green taxonomy (EBA, 2023)..

[12] All homes sold or rented out in Europe must have an Energy Performance Certificate (EPC) which grades homes' efficiency on a scale of A (highly efficient) to G (inefficient) (European Union, 2023); this requirement stems from a 2002 EU-wide directive (European Union, 2002)

"Clean Energy Mortgage" (CEM) on a dozen homes, with the support of a grant from the U.S. Department of Energy. The mortgage wrapped home energy improvements into the mortgage refinance process, proved to be a win-win for lenders and borrowers. Screening tools were developed to support the customer facing staff and gauge the interest and eligibility of the homeowners. With the support of an energy coach and by offering an interest rate discounted by 50bps (0.5%) in exchange for adding energy improvements, customers were willing to borrow significantly more and undertake deeper retrofits. The energy projects ended up adding 25% to the amount refinanced and were three times larger and more comprehensive than the typical Vermont energy projects. The average Home Energy Score increased by 3 points (on a 1 to10 scale), saving more than $1,000 in annual energy costs (Faesy et al. 2022). The CEM pilot program in Vermont demonstrated that the tradeoff between a lower interest rate and larger mortgage size can be a win-win for lenders and borrowers: the lender was willing to offer a lower interest rate in exchange for a larger mortgage size to incorporate energy improvement measures and the borrowers were willing to increase the size of their mortgage in exchange for a lower interest rate, smaller utility bills, and increased home comfort. Because of the lower energy burden of the home, neither party is taking on substantially more costs or risks in the transaction.

Studies have shown that having an efficient home has a positive impact on the value of the underlying collateral (the home) itself. A recent Freddie Mac analysis compared the property sale price and loan default rates between homes that carried an energy efficiency rating and those that were unrated, as well as better-rated and lessor-rated homes. They found rated homes are sold for, on average, 2.7% more than comparable unrated homes and that better-rated homes are sold for 3-5% more than lesser-rated homes. While the default risk of rated homes is not, on average, different from unrated homes, loans on rated homes to borrowers with high debt-to-income ratios (45% and above) appear to have a lower delinquency rate than those of unrated homes (Freddie Mac, 2019). Additional studies on the risks of stretching borrowing for efficiency are likely needed to provide data-driven evidence that can influence willingness to change underwriting standards.

Recommendations For Unlocking Green Building Investment

Table 2 lists primary interests for the key actors who can play a role in advancing residential efficiency, electrification and decarbonization with green finance.

Table 2. Interests of Key Residential Financing Market Actors

Market Actor	Interests & Motivations
GSEs	♦ MBS value and demand ♦ Meeting regulatory goals (e.g., affordable housing lending targets) ♦ Balance sheets (e.g., sufficient reserves) ♦ Managed risks
Banks	♦ Profit ♦ Risk mitigation (e.g., balanced loan portfolios, climate impact) ♦ Ability to sell loans (e.g., value, low risks) ♦ Reputation
Underwriters	♦ Loan size ♦ Loan volume ♦ Certainty and speed of closure

Borrowers	♦ Mortgage cost ♦ Downpayment requirements ♦ Favorable lending criteria (e.g., credit score, debt to income ratio) ♦ Long-term costs
Investors	♦ Rate of return ♦ Investment requirements (e.g., ESG)
Regulators & Policymakers	♦ Safety and soundness ♦ Risk management ♦ Well functioning markets ♦ Climate goals ♦ Equity goals

Creating a link between these actors' motivations and energy efficiency or climate is not simple. And, while important, financial interests are not likely sufficient to drive wholesale change. So, what types of strategies might be effective? The following ideas for driving residential green investment address these interests and are informed by the aforementioned market developments.

1. **High-impact mortgages & MBSs**

To broaden the set of investors who value positive social impact, the GSEs should accelerate a focus on **Sustainability MBS** for the single-family market. These securities support financing properties that combine the features of affordable housing, affordable and clean energy, and the fostering of economic opportunities for residents in their communities. Before even developing a formal single-family sustainable bonds framework (ICMA, 2024), the GSEs can highlight where their social bonds also bundle energy efficient properties.

Sustainability mortgages underlying these MBS can emphasize a property's lower GHG emissions as well as resiliency features. By financing improvements or providing preferred financing for highly efficient or resilient homes, these mortgages could mitigate lender and GSE risks, reduce reportable Scope 3 emissions, and lower insurance costs for borrowers. A sustainability mortgage should explicitly allow not only efficiency investments, but upgrades that increase resilience as well. Essential to success would be reliable metrics and methods for measuring a property's resilience to climate-related threats.

To be successful, these high-impact mortgages must not just be GSE compliant, but GSE backed and GSE driven. The GSEs set market standards and by setting clear guidelines for originating and selling these mortgages, the GSEs help the private mortgage markets follow suit, propelling wide adoption. On a parallel path, GGRF recipients can work with CDFIs and other non-GSE lenders to demonstrate the viability of high-impact mortgage products.

Eventually, *all* mortgages should be sustainable and climate-friendly and every borrower should be offered the opportunity to make efficient and resilient improvements at the time of purchase or refinance. The GSEs' origination guidelines should be updated to reflect this as a standard offering and part of the origination process.

2. **Favorable financing for borrowers**

The prevalence of discounted rates in European green mortgages is indicative of the importance of kickstarting new mortgage products with financial incentives. Lenders of GSE products are not required to offer **reduced interest rates** on green mortgages today. While lenders may balk at such a requirement, losses they may incur by offering a lower interest rate can be offset in a variety of ways.

- As learned from the Vermont pilot, what the lender loses with a lower interest rate, they frequently regain with a higher loan amount (Faesy, 2022),.
- Green banks and GGRF awardees can buy down interest rates.
- The GSEs can also require and offer a reduced rate through a loan level pricing adjustment. This can be justified by the GSEs ability to pool high-impact mortgages, and sell those MBS to investors demanding securities with specific characteristics.

3. Reliable, accessible, understandable, and easily applicable information

The viability of high-impact mortgages depends in part on ensuring that these mortgages are based on **reliable information** and deliver what they promise to investors, lenders, and the GSEs. For example, green mortgage MBSs that do not deliver greater affordability or sustainable MBSs that do not increase home resilience or do not deliver long-term GHG reductions will lose investor confidence and support.

While reliable information is essential, the cost of getting that information cannot exceed the value it provides to the transaction. Without national labeling mandates like the one in Europe, market actors must reap benefits beyond the cost of getting the information. The sweet spot is providing "reliable enough" data at a reasonable cost. Some options for lowering the cost of collecting information on home energy, emissions and resilience features include simplified home energy auditing; using a broader set of well-trained but lower-skilled contractors to collect required information; using automated energy estimators; and, greater access and use of a national homes registry, such as the Green Building Registry[13].

Lender and/or GSE policies also need to ensure that reliable metrics are applied consistently and routinely. To the greatest extent possible, procedures should make it easy for different actors to integrate this information as needed (e.g., appraisals, MLS listings, automated underwriting).

Information is only useful if understandable and obvious. For borrowers, the benefits of improved resiliency or a lower energy costs need to be communicated upfront and in an understandable way. Benefits include improved livability, lower operating costs, lower insurance rates, environmental stewardship, and/or mortgage product incentives. These benefits need to be explicit for all borrowers – not just for those already eager to seek out green products. Online screening tools that gauge both the home and homeowner's eligibility and interest are one option for communicating potential benefits to borrowers. For investors, the attributes of "high-impact" mortgages and MBSs must be transparent in order to be valued in the market.

Finally, the GSEs and investors must articulate what **standard metrics,** information and analyses they need to take action. For example, it is critical for federal agencies to commit to collecting standardized data from IRA-funded energy efficiency and electrification upgrades in residences across the nation and territories. This includes data on housing characteristics, specific upgrades, and energy usage pre and post upgrade.

4. Expedited, incentivized, and more flexible processing of "high impact" mortgages

Absent mandated levels of "high-impact" mortgages, GSEs and lenders need to do more to help underwriters and borrowers want to use these new mortgage products. For example, banks may offer to **prequalify** borrowers for higher loan amounts to pay for efficiency upgrades or purchase properties that meet "high-impact" criteria. Banks can also offer **incentives to**

[13] https://www.earthadvantage.org/green-data-solutions/the-green-building-registry.html

underwriters. However, the financial reward must be sufficiently attractive for them to try a new product and deal with potential delays or other headaches: the $500 incentive for some green mortgage products does not appear to have driven uptake. Other sources of capital (e.g., green banks) may be needed to sufficiently incentivize underwriters at the onset.

5. **Leveraged capital**

While lower interest rates and fees would certainly drive investment in residential energy upgrades, the available capital may not be sufficient to decarbonize the residential building stock and most borrowers will still face a gap if making significant upgrades. One way to fill this gap is to find other sources of available funds amongst federal, state and local incentives. Lenders should facilitate integrating and stacking available incentives to make investments attractive or increase the improvements a homeowner can make.

Green bank funds can be used to add **credit enhancements** and **de-risk lender capital**. Some GGRF recipients plan to leverage the funds to offer a guarantee on green mortgages, particularly for credit unions and CDFIs serving homeowners who might not otherwise be able to get a mortgage loan, thereby reducing risks and enabling a lender to increase underwriting flexibility and/or offer lower rates.

6. **New and existing policy drivers**

GHG Reporting: While the disclosure requirements in California's SB253 have the potential to drive investment in decarbonization, such action is certainly not guaranteed. Publicizing information on the emissions and climate risk in individual lenders and the GSEs portfolios may help increase investor pressure on them.

Labeling Requirements: A few jurisdictions require residential labeling at point of listing or sale. More wide scale adoption of common labeling standards would make it significantly easier for energy information to be included in appraisal and underwriting; and would educate buyers on how to take into account energy performance when looking for a home.

Building Performance Standards: A number of jurisdictions have passed building performance standards (BPS) for commercial buildings. Establishing a building performance standard for homes is not practicable unless homeowners and/or buyers can access extremely favorable financing. GGRF recipients working with GSEs could test a residential BPS pilot.

Codes: All new housing units with mortgages backed by the U.S. Department of Housing and Urban Development (HUD) and the U.S. Department of Agriculture (USDA) must adopt the most recent energy code, even if the jurisdiction where the building is located follows much less stringent codes. Support is growing to urge the Federal Housing Finance Agency (FHFA), which oversees Freddie Mac and Fannie Mae, to follow suit and require all new homes with Agency backed mortgages to meet updated building energy code requirements. Code requirements on new homes may open the door for creating similar, albeit less stringent requirements for mortgages on existing homes.

Table 3 summarizes the key recommendations for each category of residential market actors.

Table 3. Recommendations by Market Actors

Market Actor	Recommendations

GSEs	♦ Issue Sustainable MBS ♦ Discounted rates ♦ Reliable, low-cost information and labeling ♦ Mandatory reporting including Scope 3
Banks	♦ Discounted rates ♦ Reliable, low-cost information and labeling
Underwriters	♦ Reliable, low-cost information ♦ Monetary incentives
Borrowers	♦ Discounted rates ♦ Low-cost information and labeling ♦ Incentive stacking
Investors	♦ Invest in Sustainable MBS ♦ Low-cost information and labeling
Regulators & Policymakers	♦ Reliable, low-cost information ♦ Credit enhancement and risk reduction tools ♦ Mandatory reporting including Scope 3

Conclusion

The coming years will likely see dropping interest rates and a refinancing boom, offering an ideal opportunity for homeowners who have built up equity in their homes to undertake efficiency and resilience measures when they refinance. New strategies, policies, and approaches that consider how to address the interests of different market actors are needed and summarized in Table 3. Sustainable mortgages need to be offered by the major mortgage originators as part of their standard customer-facing process. This is also the opportunity for banks to put their money where their buildings are, build new lines of business and, in the process, reduce their Scope 3 carbon footprint and climate risks, which they will be increasingly compelled to disclose. The coming wave of refinance combined with IRA incentives, the GGRF and other funds to help bring down rates for sustainable mortgages, and commitments by large lenders to invest in decarbonization and affordable housing offers a unique opportunity to create demand for new high-impact mortgage products that can enhance affordability, improve occupant health and increase the resilience of U.S. single-family homes.

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