



Fannie Mae Single-Family Green Bond Second Opinion

7 September 2023

Executive Summary

The Federal National Mortgage Association (Fannie Mae) is the largest US government-sponsored enterprise. Its mission is to support liquidity and stability in the secondary US residential mortgage market, which it does by purchasing qualifying mortgages from lenders that it bundles into Mortgage-Backed Securities (MBS) and sells to investors with guarantees.

Green proceeds are used to finance the purchase of mortgages backed by 1) new Single-Family properties (1-4 residential units) that have green building certifications (GBCs) or 2) new and existing properties with solar photovoltaic (PV) systems. Two groups of GBCs are eligible: those that reduce home energy use by at least 10% (Main Group) and 50% (Towards Zero Group) over the requirements of the state code in which the properties are located. Homes with solar PV systems are required to show a 20% reduction in electricity use from their installation. In the near term, Fannie Mae expects to allocate the largest proportion of proceeds to mortgages backed by GBCs in the Main Group. Investments in mortgages backed by properties with Towards Zero Group certifications and solar PV systems are expected to initially be small. The list of GBCs has been updated from those previously eligible under Fannie Mae's 2020 framework, while the solar PV category is a new addition.

We rate the framework Light Green and give it a governance

score of Good. The Light Green shading primarily reflects the modest energy use reduction benefits expected from most loans purchased under the framework and its lack of criteria around embodied emissions and climate resilience. While we view investments in solar PV systems alone as Dark Green, the issuer will use green proceeds to finance the full value of the eligible loans. While this project category uses similar or more ambitious criteria than in comparable green finance frameworks we have assessed to date, the shading reflects an update to our methodology that prevents the shading from being applied only to an asset improvement while the entire value of the asset is eligible for green financing. The framework however benefits from the issuer's requirement for the underlying properties to have insurance against flooding and fire, among other climate hazards.

Strengths

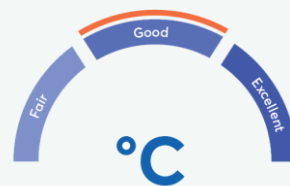
The framework's inclusion of only loans backed by properties demonstrating energy use reductions beyond state code requirements represents an improved level of ambition from the 2020 version of the framework. Given the issuer's national reach and influence, this should contribute to raising the bar overall for building energy efficiency levels in the US. This is especially true of certifications in the Towards Zero Group, which the issuer expects to increase due to incentives for home energy programmes under the US government's Inflation Reduction Act.

SHADES OF GREEN



CICERO
Light Green

GOVERNANCE ASSESSMENT



GREEN BOND PRINCIPLES

Based on this review, this framework is found aligned with the principles.



The issuer will require all borrowers to undertake Home Energy Score (HES) assessments in order for loans to be eligible under the solar PV project category, which has the ancillary benefit of encouraging future energy efficiency retrofits and supporting data collection. Besides rating a home's overall energy usage, the HES assessment recommends priority energy improvements and estimates the resultant annual energy savings. The extent to which borrowers actually implement these improvements is unclear, but we view the HES assessment as having the potential to drive additional energy efficiency improvements and playing an important role in raising homeowner awareness around the importance of energy efficiency retrofits. The issuer also shared that it aims to utilize the data collected to review and strengthen this project category's criteria as well as to eventually support the extension of its Green MBS programme to incentivize energy efficiency retrofits.

Weaknesses

The eligibility of loans backed by newly constructed homes with fossil fuel boilers may curtail the potential emissions savings from the energy use reduction criteria in both project categories. Although we note the predominance of natural gas heating systems in the US, the long useful life of these properties nevertheless locks in GHG emissions from such boilers, which may be significant especially when accumulated across the issuer's large and far-reaching Green MBS programme. The quantity of emissions locked-in is mitigated somewhat by energy efficiency requirements under eligible GBCs such as ENERGY STAR that apply to fossil fuel boilers.

Pitfalls

The overall energy use reduction delivered by the framework's requirement for solar PV systems to reduce electricity use by 20% is uncertain and would be around 9% for the average US home, although the issuer expects this to be higher in practice. In 2021, electricity accounted for 43% of residential final energy consumption, while natural gas accounted for 42%.¹ The actual reductions in energy use delivered will vary from home to home depending on how important electricity is to its energy footprint, which may be larger in warmer regions that use less heating (generally natural gas in the US context) and more air conditioning. In this respect, it is favourable that rough data collected by the issuer on solar loans it has purchased so far indicate their greater popularity in states with abundant sunshine that are also warmer, e.g. Arizona, California, Florida, and Texas. Further, the extent to which this project category's investments translate into emissions reductions depends on the emissions-intensity of the grid in the backing property's geography.

Mortgages backed by homes with solar PV systems are eligible under the framework regardless of the homes' overall level of energy efficiency. As such, loans backed by very energy inefficient homes, i.e. those with high climate impacts, are eligible under the framework. According to the issuer, it has not implemented a minimum energy efficiency requirement due to the importance of reducing energy consumption in all homes.

The majority of mortgages financed under the framework will be backed by newly constructed homes, which have substantial climate and environmental impacts that the framework does not address. In particular, the production of construction materials like concrete and steel can be very emissions-intensive, while timber may also be linked with deforestation. Although some of the eligible GBCs may have requirements to address these issues, the framework does not specifically aim to do so.

The energy use reduction criteria in both of the framework's project categories are based on modelled values, and actual performance may vary substantially. According to the issuer, the use of modelled values is necessary due to borrowers' privacy concerns around collecting actual values. Even if homes are designed to very high energy efficiency standards, occupant behaviour can lead to increased energy use. This may be exacerbated by both rebound and licensing effects, under which occupants increase energy use as a response to improved energy efficiency in their homes, either through economic or psychological motivations.²

¹ <https://www.eia.gov/energyexplained/use-of-energy/homes.php>

² <https://www.frontiersin.org/articles/10.3389/fenrg.2018.00038/full>



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1 Fannie Mae Single-Family's environmental management and green bond framework

Company description

The Federal National Mortgage Association (Fannie Mae) is the largest US government-sponsored enterprise (GSE), chartered in 1938 by the United States Congress. Fannie Mae's mission is to support liquidity and stability in the secondary U.S. residential mortgage market, and to help underserved markets, such as affordable housing for low- and moderate-income home buyers. It does not originate loans or lend money directly to borrowers in the primary mortgage market. Instead, Fannie Mae purchases qualifying mortgages from lenders, which it bundles into securitized bonds – or Mortgage-Backed Securities (MBS) – and sells to investors with guarantees.

Fannie Mae serves the housing market through the Single-Family (1-4 residential units) and the Multifamily (MF) Mortgage Businesses. Through these two business segments, Fannie Mae provided over \$684 billion in liquidity to the mortgage market in 2022, which enabled the financing of approximately 2.6 million home purchases, refinancing or rental units. The Single-Family business segment supports liquidity in the mortgage market by acquiring and securitizing single family loans into Fannie Mae MBS, as well as by issuing structured Fannie Mae MBS backed by Single-Family mortgage assets, and buying and selling Single-Family agency MBS.

The current framework is an update of Fannie Mae Single-Family's June 2020 green bond framework, which specified the GBCs properties must meet in order for the loans they back to qualify for inclusion in its Green MBS. The updated framework has a revised list of GBCs and introduces a new eligibility category—loans backed by properties with solar photovoltaic (PV) systems.

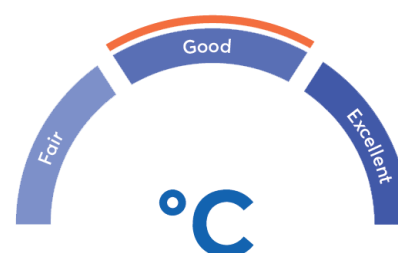
Governance assessment

Fannie Mae has further developed its climate strategy since its last framework, with improvements including the issuance of an annual sustainability report. Although the report follows the TCFD Recommendations, the issuer has not yet published the emissions associated with its entire loan portfolio nor set targets governing the emissions associated with its financing activities. It is positive that Fannie Mae is now conducting climate scenario analysis for physical and transition risks, although it has not publicly disclosed details of the parameters and findings.

Fannie Mae Single-Family's framework has clearly defined selection criteria developed by a team with clear environmental expertise. The criteria factor in some considerations for physical climate risks by virtue of Fannie Mae's general requirements for properties to have insurance against climate hazards and lenders to continually monitor changes that may impact properties' requirements to have flood insurance. However, the issuer does not include considerations for supply chain factors or life-cycle impacts in the selection process.

The framework commits Fannie Mae Single-Family to a robust level of reporting, backed by the issuer's track record of reporting on Green MBS issuances since its last framework. However, a commitment to obtain external verification of its allocation and impact reporting would strengthen the framework.

The overall assessment of Fannie Mae Single-Family's governance structure and processes gives it a rating of **Good**.





Sector risk exposure

Physical climate risks. Unabated climate change will accelerate physical climate impacts, including more extreme storms, accelerated sea level rise, droughts, wildfires and flooding. Research on physical climate risks to the US mortgage market suggests that extreme weather events, can increase delinquency, forbearance and prepayment rates, as well as increase the number of risky mortgages being sold into the secondary market. A lack of information about property exposure to such risks is a contributing factor to their likely mispricing.

Transition risks. Due to the profound changes needed to limit global warming to well below 2°C, transition risk affects all sectors. Higher costs of carbon that result from changing regulations and other aspects of climate transition may adversely impact livelihoods and the ability of mortgage borrowers to make repayments. Regulatory requirements related to energy efficiency, building materials, or other aspects of housing's climate impacts may also impact the cost of housing. Depending on the characteristics of housing stock and the preferences of home buyers, demand for property purchases and mortgages may also be adversely impacted by the transition. Responses to physical climate risks may also impact homeowners, for instance if homeowner insurance coverage becomes more expensive or in the worst cases, unavailable.

Environmental risks. Local environmental impacts from building construction and renovations include soil, water and air pollution, e.g. from poor handling of waste streams and management of potentially hazardous substances. The supply chains for construction materials and building components may also be linked with impacts on biodiversity and ecosystems, e.g. deforestation and other destruction of habitat. Depending on geographical context, depletion of ground and surface water may also be relevant, as well as exposure to natural disasters linked with degraded ecosystems, e.g. landslides, erosion, and flooding, which exacerbate and are exacerbated by climate change.

Environmental strategies and policies

Fannie Mae's overall approach to sustainability applies to Fannie Mae Single-Family and includes 14 priority topics, with environmental topics among them including climate resilience, climate risk, and green homes. Fannie Mae reports that it integrates these 14 priorities into its overall objectives of improving access to equitable and sustainable housing and enhancing its financial and risk positions. Fannie Mae has not set any public KPIs or targets related to climate or environment.

Fannie Mae's climate strategy focuses on quantifying its exposure to climate-related risks and opportunities, developing capabilities to address risks and leverage opportunities, and communicating with its stakeholders about these issues to enable more informed decision-making. According to its reporting, some immediate priorities include enhancing property resilience and raising awareness among homeowners, renters, and property owners to improve preparedness for climate-related risks. The other aspect of Fannie Mae's climate and environmental strategy is its various loan programmes. In the Single-Family business segment, these includes loans that encourage the construction of homes with green building certifications, energy efficiency improvements, and resiliency improvements such as storm surge barriers, upgraded roofing, and wildfire home hardening.

Fannie Mae reports in line with the TCFD Recommendations and the SASB standards for mortgage finance, commercial banks, and investment banking and brokerage. This includes reporting on the climate-related risks that it has identified and the mitigating actions it takes to address them. Although it reports on impacts from its Green MBS programme, the issuer does not disclose the GHG emissions or other environmental impacts associated with



its operations or its financing activities. Fannie Mae however discloses the percentages of all single-family and multifamily loans in its portfolio with flood insurance, as well as the percentages of its REO properties³ in flood zones. As of December 31, 2022, 3.3% of single-family loans in Fannie Mae's single-family guaranty book were located in a Special Flood Hazard Area, for which Fannie Mae requires flood insurance. The issuer has not disclosed its climate risk assessment process and how it makes use of climate scenario analysis but reports that it is currently working to improve its physical and transition risk analysis.

Currently, Fannie Mae's actions to mitigate against physical climate risks include requirements for backing properties to have insurance against flooding if they are located in a FEMA⁴-designated Special Flood Hazard Area, coastal barrier resources system, or otherwise protected area. Loans purchased by Fannie Mae Single Family must also have insurance against other climate hazards, including fire, lightning, smoke, windstorms, and hail. Originators of single-family loans are required to represent and warrant that all insurance requirements are met at loan delivery, as well as to monitor FEMA maps for the life of the loans for changes in FEMA flood maps that may alter properties' flood insurance requirements. When acquiring single-family loans, the issuer also checks lenders' determinations of flood insurance requirements against FEMA-sourced data. Fannie Mae also reports that it makes use of risk sharing and credit risk transfers to reduce some of the potential losses it may incur as a result of physical climate hazards.

Fannie Mae does not maintain any other cross-cutting climate-related or other environmental policies or requirements governing the loans it purchases and their underlying properties.

Green bond framework

Based on this review, this framework is found to be in alignment with the Green Bond Principles. For details on the issuer's framework, please refer to the green bond framework dated June 2023.

Use of proceeds

For a description of the framework's use of proceeds criteria, and an assessment of the categories' environmental impacts and risks, please refer to section 2.

Selection

The Single-Family Green MBS business strategy is led by Fannie Mae Single-Family's Senior Vice-President for Capital Markets and includes a dedicated team of finance, communications and sustainability experts. The team's expertise includes energy efficiency finance, energy and water efficiency technologies, renewable energy and energy benchmarking protocols to green building certifications. The team reports on issuance and performance of the Single-Family Green MBS business to the executive leadership of the company, including the Executive Vice President of Single-Family Mortgage Business, the Senior Vice-President of Enterprise ESG and the Fannie Mae Community Responsibility & Sustainability Board Committee.

As part of the process for Fannie Mae Single-Family to buy a mortgage loan from a lender, the lender is required to represent and warrant that the loans it is selling Fannie Mae meet general criteria described in the Fannie Mae Single-Family Selling Guide. Lenders must also represent that such loans have received an eligible GBC or a 20% reduction in electricity usage offset by solar PV for loans to be eligible for pooling into a Single-Family Green MBS. In addition, once the loan is delivered and before the Green MBS is issued, Fannie Mae will independently verify:

³ REO refers to residential properties owned by Fannie Mae as a result of servicer-completed foreclosures or deeds-in-lieu of foreclosure.

⁴ Federal Emergency Management Agency



- The GBC by validating the existence of a valid certification through a proprietary database developed to capture the approval of the GBC by the rater, and/or
- A minimum of 20% reduction in electricity usage by reviewing property data to analyze the percentage of electricity usage offset by solar generation.

The issuer shared that the above-referenced proprietary database of certification schemes is managed by a contracted third party. The data feeding the database is updated digitally by third parties who collect the information pertaining to GBCs and solar electricity generation. According to the issuer, the 20% reduction in electricity use is verified by a third-party via a US Department of Energy (DOE) Home Energy Score (HES) assessment based on modelled values. The data collected during the assessment is sent to Fannie Mae Single-Family via the aforementioned database generally around the time when the loan is delivered.

If the issuer finds that the property backing the loan did not have a valid GBC and/or solar offset percentage, it will not allow the loan to be pooled into a Single-Family Green MBS. However, the loan would remain eligible for pooling into other single-family pools.

Management of proceeds

The management of the proceeds from the Green MBS is consistent across Fannie Mae's Single-Family securitization programs. Fannie Mae commits to acquire the mortgage loan from the lender if it conforms to all requirements stated in the Fannie Mae Single-Family Selling Guide. Once acquired, Fannie Mae securitizes the loan into a fully guaranteed MBS and sells the MBS to the general MBS investor community.

For each pool of loans to be securitized, a separate trust is created, the purchased loans are placed in this trust and a Green MBS backed by the loans in the trust is issued. The process differs from the typical use and management of proceeds associated with green bond issuances, in that Fannie Mae Single-Family has already made the eligible investments – i.e. purchased the eligible loans – prior to green bond issuance and uses green bond proceeds to recoup the funds. According to the issuer, there will be no unallocated proceeds.

The issuer clarified, that in the event the funding includes the installation of new solar equipment, that the funds slated for installation are held in escrow by lenders until the borrower provides the necessary documentation, and that the borrower has 15 months to install the PV system. During this timeframe, the issuer works closely with the lender to ensure the work is completed. If in the rare event the PV system is not installed, Fannie Mae Single Family will remove the loan from the MBS.

Reporting

Fannie Mae maintains a webpage that provides an overview of its various Green MBS programmes, including a list of Green MBS issued to date. The webpage hosts the issuer's annual impact report, which describes the Green MBS eligible assets for the preceding year alongside impact indicators for its Single-Family Green MBS, including:

- Projected annual energy saved (kBTU)
- Projected annual emissions saved (MTCO₂e)
- Projected annual utility cost savings

Fannie Mae has provided reporting on the projected impacts of its single-family green bonds each year since inception of the program in 2020.⁵ This includes an annual one-page summary and spreadsheet with data on issue

⁵ <https://fm.fanniemae.com/bondimpactreporting/index.html>



date, outstanding balance, and energy and emissions savings for each Green MBS. Fannie Mae also provides information about its single-family green bonds in its annual Corporate ESG Report.

In addition, Fannie Mae Single-Family publishes at-issuance and ongoing data for all Single-Family MBS through a web-based system called PoolTalk⁶. Through PoolTalk, investors can obtain comprehensive information about single-family securities and the underlying loans. Currently, this does not include information on the environmental characteristics of the underlying properties or impacts, but Fannie Mae Single-Family aims to disclose additional information by early 2024, including attributes in the MBS disclosure documentation identifying MBS that are fully backed by properties with qualifying GBCs or meet the minimum eligibility criteria for solar PV loans.

Moving forward, Fannie Mae Single-Family clarified that investors will be able to see the percentage of loans in each Green MBS that qualify under each eligible project category, and expects that beginning in 2024, it will be able to publish data on the proportion of loans qualifying under the ENERGY STAR certifications, DOE Net Zero Energy loans, and the National Green Building Standard (NGBS) Green Single Family Home Certification.

According to the issuer, it uses an external party to help with impact aggregation and reporting. The issuer publishes the methodologies it uses to estimate impacts from its Green MBS programme on its website and has confirmed that the same methodologies will apply to its reporting on impacts from the GBC project category moving forward. It will however publish a separate methodology for reporting on impacts from its Solar Loans project category.

The issuer clarified that it has internal processes and groups that review and check impact reporting calculations prior to publication but that no external verification of either allocation or impact reporting will be obtained.

⁶ <https://fanniemae.mbs-securities.com/fannie>



2 Assessment of Fannie Mae Single-Family’s green bond framework

The eligible projects under Fannie Mae Single-Family’s green bond framework are shaded based on their environmental impacts and risks, based on the “Shades of Green” methodology.

Shading of eligible projects under Fannie Mae Single-Family’s green bond framework

- Fannie Mae Single-Family’s previous green bond framework only had one project category—loans backed by properties with GBCs eligible under that framework—to which 100% of proceeds were allocated. 100% of those properties were certified under the ENERGY STAR scheme. Under the current framework, Fannie Mae Single-Family expects to use the majority of proceeds under the GBC project category, with proceeds going to the solar loans category expected to grow slowly over time.
- The framework does not include a limit on the age of the loans, but this is limited to six months in the great majority of cases by the issuer’s general criteria on loan purchasing.

Category	Eligible project types	Green Shading and considerations
Green Building Certification Loans	Financing loans backed by properties that have been awarded Green Building Certifications (GBC) at the time construction is completed or within the last 5 years from the date Fannie Mae purchased the loan, including certifications with the following criteria: <ol style="list-style-type: none"> 1. Main Group: ≥10% improvement in energy savings over the state energy code where the property is located 2. Towards Zero Group: >50% reduction in energy use over the state energy code where the property is located 	Light Green <ul style="list-style-type: none"> ✓ The shading reflects the project category’s ambition to support the construction of new homes with energy efficiency requirements that go beyond minimum regulatory requirements, while taking into consideration the fact that the improvements are not sufficiently ambitious to be fully consistent with a low-carbon and climate resilient future and do not address issues such as embodied emissions and climate resilience. ✓ The issuer currently expects 100% of loans to be in the Main Group but expects to see more Towards Zero Group loans over the next year due to incentives for home energy programmes under the US Inflation Reduction Act. ✓ According to the issuer, only loans backed by newly constructed homes are eligible. Given the long useful life of buildings, all new construction must be state-of-the-art and zero-





carbon-ready by 2030 in order to align with a 1.5-degree climate scenario, which entails both having on-site renewable energy systems and very high levels of energy efficiency. While it is possible that some certifications in the Towards Zero Group may deliver such levels, those in the Main Group will not.

- ✓ The Towards Zero Group certifications may not always deliver a >50% reduction in energy use over minimum energy efficiency requirements in state building codes, which vary from state to state. However, the issuer has confirmed that it will screen the certifications it accepts in each state to ensure that it will only securitize loans backed by properties with GBCs that achieve the framework's criterion of a >50% reduction in energy use over the relevant state code, if the issuer decides to create a specifically designated "Towards Zero" bond. Where loans backed by properties in both groups are co-mingled in a green MBS, we encourage the issuer to provide transparency on whether those in the Towards Zero Group meet the >50% criterion or not.
 - ✓ The issuer currently recognises 19 certifications across the Main Group and Towards Zero Group. The full list is provided in the next section (See "List of eligible certifications"). The issuer shared that to be eligible, certifications must be 1) nationally available (including state-specific versions of nationally available certifications) and 2) require third-party verification and confirmation that the standards and frameworks included in the certification have been applied. The issuer will review and revise the list annually. Where states do not have a statewide energy code, the issuer indicated that it will determine the level of GBCs' energy savings based on modelling by ENERGY STAR for those states. The issuer further noted that the thresholds are subject to review and revision going forward.
 - ✓ The potential emissions savings from energy use reductions may be curtailed by the eligibility of homes with fossil fuel boilers, which may lock in emissions over the lifetime of the home.
 - ✓ The climate and environmental impacts of new buildings is heavily influenced by construction materials, which can be emissions-intensive to produce or be linked with
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deforestation and biodiversity loss. These impacts may not necessarily be mitigated by the eligible GBCs. The GBCs may also not uniformly require measures to ensure the climate resiliency of the underlying properties or contain requirements pertaining to public transport access.

- ✓ The reliance on modelled values means that actual energy use reductions may vary depending on home occupants' behaviour. According to the issuer, the use of modelled values is necessary due to borrowers' privacy concerns around collecting actual values. Even if homes are designed to very high energy efficiency standards, occupant behaviour can lead to increased energy use. This may be exacerbated by both rebound and licensing effects, under which occupants increase energy use as a response to improved energy efficiency in their homes, either through economic or psychological motivations.⁷

Solar Loans Financing loans backed by properties which use solar **Light Green**



photovoltaic (PV) systems as a source of renewable energy generation, which produce a minimum of a 20% reduction of the home's electricity consumption on an annual basis.

Solar loans can be used by borrowers who are

1. financing a home with an existing solar PV system,
2. refinancing a home with the proceeds paying off outstanding debt used for solar PV installation, or
3. purchasing or refinancing a home with the loan proceeds being used to add solar PV to the property.

- ✓ While we view investments in solar PV systems as Dark Green due to the criticality of renewable energy in the green transition, the issuer is unable to only finance the investments in solar PV systems and will use green proceeds to finance the full value of the eligible loans. While this project category uses similar or more ambitious criteria than in comparable green finance frameworks assessed to date, the shading reflects an update to our methodology that prevents the shading from being applied only to an asset improvement while the entire value of the asset is eligible for green financing. As such, the project category receives a Light Green shading to reflect its relatively limited energy use reduction benefits in relation to the total energy use of a home. Further, the shading reflects the project category's lack of criteria governing embodied emissions and climate resilience, while taking into consideration the ancillary benefits from the issuer's requirement for all borrowers to undertake the US DOE's Home Energy Score (HES) assessments in order for the loans to be eligible under the framework.

⁷ <https://www.frontiersin.org/articles/10.3389/fenrg.2018.00038/full>



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- ✓ According to the US DOE, electricity accounted for 43% of residential final energy consumption in 2021, while natural gas accounted for 42%.⁸ As such, the 20% electricity reduction criterion would translate into a 9% reduction in overall energy use for the average US home, although the issuer expects this to be higher in practice. The actual reductions in energy use delivered will vary from home to home depending on how important electricity is to its energy footprint, which may be larger in warmer regions that use less heating (generally natural gas in the US context) and more air conditioning. In this respect, it is favourable that rough data collected by the issuer on solar loans it has purchased so far indicate their greater popularity in states with abundant sunshine that are also warmer, e.g. Arizona, California, Florida, and Texas. Further, the extent to which this translates into emissions reductions depends on the emissions-intensity of the grid in the backing property's geography.

 - ✓ We consider positively the requirement for all borrowers to undertake HES assessments in order for their loan to be eligible. Besides rating a home's overall energy usage, the HES assessment also estimates its carbon footprint and energy bill. The assessment recommends priority energy improvements that, when made together, will be paid back in ten years, alongside the annual energy savings from making these improvements. Although there are no data indicating the extent to which borrowers implement these improvements, we view the HES assessment as having the potential to drive additional energy efficiency improvements and playing an important role in raising homeowner awareness around the importance of energy efficiency retrofits.

 - ✓ The HES assessment also has the ancillary benefit of improving data collection around the current status of energy use in the US housing stock, both for the US DOE and the issuer.⁹ The issuer shared that HES data will support its future review of the 20% criterion, which it deems conservative, and also support future plans to encourage energy efficiency retrofits through its Green MBS programme.

⁸ <https://www.eia.gov/energyexplained/use-of-energy/homes.php>

⁹ According to the issuer a total of 221,167 HES assessments have been completed and submitted to the US DOE as of 6 August 2023.



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- ✓ Considerations discussed under the GBC project category pertaining to embodied emissions, physical climate risks, fossil fuel boilers and rebound and licensing effects are also applicable here.
 - ✓ Solar panels are associated with some embodied emissions and supply chain environmental impacts from extraction of raw materials. They may contain heavy metals such as silver, lead, arsenic and cadmium that may be classified as hazardous waste. Proper decommissioning is required to avoid pollution impacts at end-of-life.
 - ✓ According to the issuer, loans backed by homes of any age are eligible for inclusion in this project category, and there is also no limit on the age of the solar PV system. The issuer informed that the 20% threshold takes into consideration age and potential performance degradation of older systems.
 - ✓ The issuer clarified that the 20% reduction is based on modelled values. The baseline electricity consumption of the home is based on an HES assessment, which models energy use based on home characteristics and excludes electricity consumption from non-building uses such as electric vehicle charging, pools and spas (hot tubs). The electricity delivered by the PV system is modelled using PV Watts, a tool developed by the US National Renewable Energy Laboratory.¹⁰
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Table 1. Eligible project categories

¹⁰ The tool considers the capacity and efficiency of the solar array in addition to physical factors affecting solar generation such as shade, azimuth panel tilt, and solar energy reaching a given geographical area. According to the issuer, the tool is widely used by US solar panel installation companies.



List of eligible certifications

Towards Zero						
Certifications that require a greater than 50% reduction of energy use						
Organization	Certification	Version	Also Available for Multi-Family?	Energy Savings vs. IECC 2006 Baseline	Ventilation Requirements	Previous Group
Home Innovation Research Labs	NGBS Green+ Net Zero Energy	2020	Yes	100%	ASHRAE 62.2-2010	N/A
International Living Future Institute	CORE Green Building Certification	1	Yes	50%	ASHRAE 62.1(2)-2016	Towards Zero
International Living Future Institute	Living Building Challenge	3 / 3.1 / 4	Yes	105%	ASHRAE 62.1(2)-2016	Towards Zero
International Living Future Institute	Zero Energy	1	Yes	100%	N/A	Towards Zero
Passive House Institute (PHI)	Certified Passive House	9 / 10	Yes	73%	Custom Requirements	Towards Zero
Passive House Institute (PHI)	EnerPHIt Certified Retrofit	9 / 10	Yes	73%	Custom Requirements	Towards Zero
Passive House Institute US (PHIUS)	PHIUS Certified	2018 /2021	Yes	74%	Custom Requirements	Towards Zero
USGBC	LEED Zero	LEED Zero Energy	Yes	100%	ASHRAE 62.2-2007	Towards Zero
Build it Green	GreenPoint Rated New Home Single Family (California Only)	8 / 8.3	No	53%	ASHRAE 62.2-latest version	Towards Zero



Main Group						
ENERGY STAR v3 or equivalent						
Organization	Certification	Version	Also Available for Multi-Family?	Energy Savings vs. IECC 2006 Baseline	Ventilation Requirements	Previous Group
U.S. Environmental Protection Agency	ENERGY STAR Multifamily New Construction	1 / 1.1 / 1.2	Yes	20%	Custom Requirements	N/A
U.S. Environmental Protection Agency	ENERGY STAR Single-Family New Homes	3 / 3.1 / 3.2	No	29%	Custom Requirements	Main Group
U.S. Environmental Protection Agency	ENERGY STAR Indoor Air Plus	1	Yes	29%	ASHRAE 62.2-2010	Main Group
Enterprise Community Partners	Enterprise Green Communities Criteria	2020	Yes	29%	ASHRAE 62.1- 2010 & 62.2-2010	Main Group
Enterprise Community Partners	Enterprise Green Communities Criteria Plus	2020	Yes	40%	ASHRAE 62.1-2010 & 62.2-2010	N/A
Home Innovation Research Labs	National Green Building Standard (NGBS) Green Single Family Home Certification	2020	Yes	31%	ASHRAE 62.2-2010	Main Group
International Finance Corporation	EDGE	3	Yes	41%	N/A	Main Group
U.S. Department of Energy	Zero Energy Ready Home	1 / 2	Yes	40%	ASHRAE 62.2-2010	Main Group
USGBC	LEED BD+C Residential: Homes v4	v4	Yes	24%	ASHRAE 62.2 2010	Main Group
USGBC	LEED BD+C Residential: Homes v4.1	v4.1	Yes	24%	ASHRAE 62.2- 2016	Main Group









3 Terms and methodology

This note provides Shades of Green’s second opinion of the client’s framework dated June 2023. This second opinion remains relevant to all green bonds and/or loans issued under this framework for the duration of three years from publication of this second opinion, as long as the framework remains unchanged. Any amendments or updates to the framework require a revised second opinion. Shades of Green encourages the client to make this second opinion publicly available. If any part of the second opinion is quoted, the full report must be made available.

The second opinion is based on a review of the framework and documentation of the client’s policies and processes, as well as information gathered during meetings, teleconferences and email correspondence.

‘Shades of Green’ methodology

Shades of Green second opinions are graded dark green, medium green or light green, reflecting a broad, qualitative review of the climate and environmental risks and ambitions. The shading methodology aims to provide transparency to investors that seek to understand and act upon potential exposure to climate risks and impacts. Investments in all shades of green projects are necessary in order to successfully implement the ambition of the Paris agreement. The shades are intended to communicate the following:

Shading	Examples
 <p>Dark Green is allocated to projects and solutions that correspond to the long-term vision of a low-carbon and climate resilient future.</p>	 Solar power plants
 <p>Medium Green is allocated to projects and solutions that represent significant steps towards the long-term vision but are not quite there yet.</p>	 Energy efficient buildings
 <p>Light Green is allocated to transition activities that do not lock in emissions. These projects reduce emissions or have other environmental benefits in the near term rather than representing low carbon and climate resilient long-term solutions.</p>	 Hybrid road vehicles

The “Shades of Green” methodology considers the strengths, weaknesses and pitfalls of the project categories and their criteria. The strengths of an investment framework with respect to environmental impact are areas where it clearly supports low-carbon projects; weaknesses are typically areas that are unclear or too general. Pitfalls are also raised, including potential macro-level impacts of investment projects.

Sound governance and transparency processes facilitate delivery of the client’s climate and environmental ambitions laid out in the framework. Hence, key governance aspects that can influence the implementation of the green bond are carefully considered and reflected in the overall shading. Shades of Green considers four factors in its review of the client’s governance processes: 1) the policies and goals of relevance to the green bond framework; 2) the selection process used to identify and approve eligible projects under the framework, 3) the management of proceeds and 4) the reporting on the projects to investors. Based on these factors, we assign an overall governance grade: Fair, Good or Excellent. Please note this is not a substitute for a full evaluation of the governance of the issuing institution, and does not cover, e.g., corruption.



Assessment of alignment with Green Bond Principles

Shades of Green assesses alignment with the International Capital Markets' Association's (ICMA) Green Bond Principles. We review whether the framework is in line with the four core components of the GBP (use of proceeds, selection, management of proceeds and reporting). We assess whether project categories have clear environmental benefits with defined eligibility criteria. The Green Bonds Principles (GBP) state that the "overall environmental profile" of a project should be assessed. The selection process is a key governance factor to consider in Shades of Green's assessment. Shades of Green typically looks at how climate and environmental considerations are considered when evaluating whether projects can qualify for green finance funding. The broader the project categories, the more importance Shades of Green places on the selection process. Shades of Green assesses whether net proceeds or an equivalent amount are tracked by the issuer in an appropriate manner and provides transparency on the intended types of temporary placement for unallocated proceeds. Transparency, reporting, and verification of impacts are key to enable investors to follow the implementation of green finance programs.



Appendix 1: Referenced Documents List

Document Number	Document Name	Description
1	Fannie Mae Single-Family Green Bond Framework (June 2023)	
2	Fannie Mae ESG Report (2022)	
3	Sample US DOE Home Energy Score assessment	



Appendix 2: About Shades of Green

Shades of Green, now a part of S&P Global and formerly part of CICERO, provides independent, research-based second party opinions (SPOs) of green financing frameworks as well as climate risk and impact reporting reviews of companies. At the heart of all our SPOs is the multi-award-winning Shades of Green methodology, which assigns shadings to investments and activities to reflect the extent to which they contribute to the transition to a low carbon and climate resilient future.

Shades of Green is internationally recognized as a leading provider of independent reviews of green bonds, since the market's inception in 2008. Shades of Green is independent of the entity issuing the bond, its directors, senior management and advisers, and is remunerated in a way that prevents any conflicts of interests arising as a result of the fee structure. Shades of Green operates independently from the financial sector and other stakeholders to preserve the unbiased nature and high quality of second opinions.

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- ★ **2021 Largest External Reviewer**, Climate Bonds Initiative Awards
 - ★ **2020 External Assessment Provider Of The Year**, Environmental Finance Green Bond Awards
 - ★ **2020 Largest External Review Provider In Number Of Deals**, Climate Bonds Initiative Awards
 - ★ **2019 External Assessment Provider Of The Year**, Environmental Finance Green Bond Awards
 - ★ **2019 Largest Green Bond SPO Provider**, Climate Bonds Initiative Awards
 - ★ **2018 External Assessment Provider Of The Year**, Environmental Finance Green Bond Awards
 - ★ **2018 Largest External Reviewer**, Climate Bonds Initiative Awards
 - ★ **2017 Best External Assessment Provider**, Environmental Finance Green Bond Awards
 - ★ **2016 Most Second Opinions**, Climate Bonds Initiative Awards