



Federal Housing Finance Agency
Office of the Director
400 7th Street SW, 10th Floor
Washington, D.C. 20219
Re: [FHFA RFI](#)
Via [File Upload](#)

April 19, 2021

Dear Director Calabria,

It is a pleasure to submit comments on behalf of Ceres and the Ceres Accelerator for Sustainable Capital Markets. Ceres is a nonprofit organization with a 30-year history of working on climate change. The Accelerator works to transform the practices and policies that govern capital markets in order to reduce the worst financial impacts of the climate crisis. It spurs capital market influencers to act on climate change as a systemic financial risk—driving the large-scale behavior and systems change needed to achieve a just and sustainable future and a net-zero emissions economy.

Ceres works with leading global investors and companies. Our Investor Network is almost 200 investors that collectively manages over \$30 trillion in assets under management. Ceres is a founding partner of the [Net Zero Asset Managers Initiative](#), which includes investors focused on sustainable investments within their real estate portfolios and other assets.

As our nation begins to emerge from the economic and social ravages of the pandemic, and as it grapples with addressing systemic racial and environmental injustices, the FHFA's statutory mission is more important than ever. The FHFA's role particularly in supporting homeowners and renters in underserved markets and with low- and moderate-income homebuyers and renters is critical. We integrate these concerns throughout our responses to the questions, and include additional considerations in Appendix 1.

Given its responsibility to also ensure the stability and liquidity of the housing market, FHFA must quickly rise to the challenge of climate change which threatens the housing market, and play a central role in the federal response to mitigating and reducing climate change risks.

We therefore congratulate the FHFA for its investments to date to prepare to address climate as a systemic risk. We commend the new staff positions, internal networks, research, as well as the Listening Sessions and this important Request for Information (RFI). These are worthy and worthwhile investments, and Ceres strongly supports these efforts and your commitment to expand on them. As FHFA has indicated, you are just starting your concerted efforts to understand and develop a comprehensive plan to address climate risks.

In the following, we provide responses to the RFI to support your analysis and work on climate. Our comments draw from our 2020 report “[Addressing Climate as a Systemic Risk: A call to action for U.S. financial regulators](#)”¹ and our April 2021 update “[Turning Up The Heat: The Need for Urgent Action by U.S. Financial Regulators in Addressing Climate Risk](#)”.²

Our submission also draws significantly from the seminal analysis of the Commodity Futures Trading Commission’s Subcommittee on Climate-Related Market Risk of the Market Risk Advisory Committee. The Subcommittee brought together 34 diverse financial market participants that were unanimous in voting to approve the analysis and 53 recommendations in the 2020 report, “[Managing Climate Risk In The U.S. Financial System](#).”³ Ceres’ CEO and President Mindy Lubber proudly served on the subcommittee, and we encourage the FHFA to make full use of its findings.

Our submission also draws from [Soaked: A Policy Agenda To Prepare For A Climate-triggered Housing Crash](#)⁴ and many other sources. We have also reviewed the submission of the Lincoln Institute and endorse its recommendations.

We would welcome the opportunity to discuss our analysis and recommendations with you and your colleagues. Please see a summary of our recommendations in Appendix 2.

Thank you in advance for your consideration, and for all of your investments to protect US homeowners, and especially our most vulnerable, from the looming threat of climate change.

With best regards,

Steven

Steven M. Rothstein
Managing Director, Ceres Accelerator for Sustainable Capital Markets

¹ Veena Ramani, “Addressing Climate as a Systemic Risk: A call to action for U.S. financial regulators,” Ceres, last modified June 1, 2020,

<https://www.ceres.org/resources/reports/addressing-climate-systemic-risk>

² Veena Ramani, “Turning Up the Heat: The need for urgent action by U.S. financial regulators in addressing climate risk,” Ceres, April 2021,

<https://www.ceres.org/resources/reports/turning-heat-need-urgent-action-us-financial-regulators-addressing-climate-risk>

³ “Managing Climate Risk in the U.S. Financial System,” *U.S. Commodity Futures Trading Commission*, September 2020,

<https://www.cftc.gov/sites/default/files/2020-09/9-9-20%20Report%20of%20the%20Subcommittee%20on%20Climate-Related%20Market%20Risk%20-%20Managing%20Climate%20Risk%20in%20the%20U.S.%20Financial%20System%20for%20posting.pdf>

⁴ Lindsay Owens, “Soaked: A Policy Agenda to Prepare for a Climate-Triggered Housing Crash,” *The Great Democracy Initiative*, July 2020,

<https://greatdemocracyinitiative.org/document/soaked-a-policy-agenda-to-prepare-for-a-climate-triggered-housing-crash/>

Ceres Response to FHFA Request for Input - April 2021

Throughout every recommendation in this document, there are several overarching questions we urge FHFA to consider. We believe they are important and timely to consider across all of the areas addressed in these questions. They include:

- How does climate change and natural disasters affect vulnerable populations, such as low-income families that depend on affordable subsidized and naturally occurring affordable housing?
- How can addressing climate change increase not only the supply of affordable housing, but also its quality?
- How can the GSEs increase the liquidity of their securities by offering products that meet international investors' growing demand for ESG and sustainable products?
- What are the unique impacts that will affect particular populations and housing types including, but not limited to, affordable housing, housing in rural areas, the Colonias and Appalachias and other non-urban areas?
- Are these changes being proactive to be better prepared for the future, or are we only responding to the current emergency, perpetuating these inequities into the future and leaving our country, our nation's housing stock and residents, especially brown and black residents, less equipped to address the climate transition?

I. Identifying and Assessing Climate and Natural Disaster Risk

1. How should FHFA define climate and natural disaster risk?

There is considerable consensus on the definitions and categorization of climate change risk and its systemic impact on financial markets. The following draws from that consensus, and provides sources from which FHFA can draw.

Climate change risk definitions should draw from the National Climate Assessment and the definitions and analysis of other federal financial regulators.

According to the National Climate Assessment, climate change poses multi-dimensional risks to natural and human systems: "Climate change presents uncertain—and potentially severe—consequences for natural and human systems across generations. It is characterized by multiple intersecting and uncertain future hazards and, therefore, acts as a risk multiplier that interacts with other stressors to create new risks or to alter existing ones."⁵

⁵ *The Climate Report: National Climate Assessment - Impacts, Risks, and Adaptation in the United States*, (Brooklyn: Melville House, 2019), 35, <https://nca2018.globalchange.gov/>

Physical risks from climate change arise from increasing severity and frequency of climate and weather-related events. Transition risks from climate change arise from the adjustment towards a carbon-neutral economy, which will require significant structural changes to the economy.

To understand the nuances of the definition, the following expanded definitions are provided:

A. Climate change risks are categorized into physical and transition risks

Physical risks arise from increasing severity and frequency of climate and weather-related events. These events severely damage property and other infrastructure, disrupt business supply chains, impact agricultural output and more broadly can lead to loss of life and migration. Physical risk reduces asset values, resulting in delinquency or foreclosure for individuals and families, lower profitability for companies, damages public finances, and increases the cost of settling underwriting losses for insurers. Indirect effects on the macroeconomic environment, such as reduced wealth for families, job loss, lower output, productivity, exacerbate these direct impacts.

Transition risks arise from the adjustment towards a carbon-neutral economy, which will require significant structural changes to the economy. These changes will prompt a reassessment of a wide range of asset values, a change in energy prices, and a fall in income and creditworthiness of some borrowers. In turn, this entails credit losses for lenders and market losses for investors. The transition to a carbon-neutral economy also presents some opportunities for the financial sector, for example, financing investments in building energy efficiency, renewable energy and carbon-neutral transportation.

B. Natural disaster risk, from the perspective of the FHFA, should be defined as any hazard which can cause damage to a structure, its contents, and/or the perceived or actual value of the property.

Hazards which may impact a property in this fashion include, but are not limited to, the following perils:

- Inland Flood (flooding due to precipitation)
- Nuisance Flooding (Also known as sunny day flooding which is caused by a combination of sea level rise and high tide)
- Tropical Cyclone Storm Surge
- Tropical Cyclone Wind
- Hail
- Tornado
- Straight Line Winds
- Extreme Heat/Drought
- Winter Storms (Freezing Temperatures, excessive snow, etc.)
- Wildfire
- Earthquake

All of the above natural hazards are affected by climate change with the possible exception of earthquakes for which there is not sufficient study regarding the effects of climate change.⁶

2.a What are the climate and natural disaster risks to the regulated entities, including long- and short-term risks, and how might such risks change over time?

The regulated entities have faced and are projected to face increased risk due to extreme weather events such as wildfires, hurricanes, tornados, and extreme heat.^{7 8}

A. Climate change has increased the frequency and severity of extreme weather events such as wildfires, hurricanes, and tornados (NOAA 2019).

According to the National Oceanic Atmospheric Association (NOAA), between 1980 and 2019, the average number of inflation-adjusted “billion-dollar” weather events (those causing at least a billion dollars in economic destruction) per year was 6.5. In 2019 alone, there were 14 billion-dollar weather and climate disaster events (three flooding events, eight severe storm events, two tropical cyclone events, and one wildfire event). Between 2015 and 2019, billion-dollar disasters cost the United States more than \$525 billion, a record.⁹ This increasingly costly disaster trajectory is only expected to grow in the coming years, as policymakers fail to stem global greenhouse gas emissions and warming continues.

B. FHFA’s list of long- and short-term natural disaster risks should include a specific list of known perils.¹⁰

Climate change will affect the relative power and impacts of natural disaster risks. For example:

- **Inland flooding** is expected to increase in intensity in the US due to increases in temperature and shifting weather patterns. While it is generally expected that climate change will cause more extreme precipitation events, it is not well understood if the frequency of events, which include large and small events, will increase as a whole. Overall, models suggest the annual average loss due to flood will increase non-uniformly over the entire US. Additionally, inland flooding caused by hurricane induced

⁶ Recommendation developed in collaboration with KatRisk.

⁷ Owens, “Soaked: A Policy Agenda to Prepare for a Climate-Triggered Housing Crash,” and “*Rising Seas Threaten an American Institution: The 30-Year Mortgage*” <https://www.nytimes.com/2020/06/19/climate/climate-seas-30-year-mortgage.html>

⁸ Christopher Flavelle, “Rising Seas Threaten an American Institution: The 30-Year Mortgage,” *The New York Times*, June 19, 2020, <https://www.nytimes.com/2020/06/19/climate/climate-seas-30-year-mortgage.html>

⁹ NOAA, “2010-2019: A landmark decade of U.S. billion-dollar weather and climate disasters,” Climate.gov, January 8, 2020, <https://www.climate.gov/news-features/blogs/beyond-data/2010-2019-landmark-decade-us-billion-dollar-weather-and-climate>

¹⁰ Recommendation developed in collaboration with KatRisk.

precipitation is expected to increase in intensity as storms slow down due to shifting atmospheric patterns.

- **Nuisance Flooding** is caused by oceanic water inundating populated areas during normal tidal cycles. As sea level increases due to climate change, tides are causing repetitive damage to homes and structures near the coast. As sea level rise continues to increase across the Atlantic and Pacific coasts, nuisance flooding events will increase in the affected area and magnitude.
- **Tropical Cyclone Storm Surge** events are expected to increase in frequency, affected area, and magnitude of the shifting atmospheric patterns and global sea level rise. As mean sea level increases, smaller hurricanes which may not have breached existing sea walls and other oceanic defenses will begin to do so, causing more frequent small scale surge losses. The lower frequency large events will also see an increase to total magnitude causing surge events to penetrate further inland.
- **Tropical Cyclone Wind** - Increasing temperatures are expected to lead to increasing hurricane wind magnitude.
- **Hail/Tornado/Straight Line Winds** - Changes in atmospheric patterns are expected to both shift and expand the affected area where these hazards are most prevalent. There is some scientific evidence that the frequency of severe convective storms will increase, especially during some seasons that see few storms now.
- **Extreme Heat** - Droughts and extreme heat events are expected to increase in most areas both in frequency and magnitude due to increasing temperature and shifting atmospheric patterns. These heat events may cause loss of life, strains on local power infrastructure, and decreases in agricultural yield for most crops.
- **Winter Storms** (Freezing Temperatures, excessive snow, etc.) are expected to increase in magnitude and potentially in frequency. Although increasing temperatures are generally thought to be deleterious to winter storms rates and intensity, the moisture that supplies winter storms comes from the oceans which increase their output with higher mean average sea surface temperatures. Winter storms are expected to increase in magnitude. Additionally, ice events are also expected to increase in frequency as temperature shifts will cause some areas to experience less snow and more freezing precipitation.
- **Wildfire** is expected to increase in frequency, affected area and magnitude due to increasing temperatures and shifting climate patterns. As droughts become more common over a wider area, wildfires will see significant increases.
- **Earthquakes** - There is some indication that changes in surface pressure can cause an increase in earthquake occurrence probability, however the impact of atmospheric variables on earthquakes is still an active area of study

2.b. To what extent, if any, could such risks now or in the future impede the ability of each regulated entity to operate in a safe and sound manner, fulfill its statutory mission, or foster liquid, efficient, competitive, and resilient national housing finance markets?

The risks described above have a range of crucial implications for regulated entities. In the following, we describe risks to the broader environment, and specifically to the GSEs These are described in the following:

A. Weather events can cause substantial economic losses, a large part of which stem from damage to residential real estate.

Approximately 40 percent of Americans reside in counties that lie directly on the shoreline and bear the brunt of severe storm events. On top of those at risk of coastal flooding, an additional 41 million Americans are at risk from flooding rivers. Other climate effects, such as wildfires, pose credible risks as well. Warming temperatures have lengthened the fire season and set new records. Twenty-nine million Americans live in locations at high risk of wildfires.¹¹

Each natural disaster risk can cause material physical damage and thus a dollar cost to an individual property or series of properties. In addition to the direct dollar cost for a given peril, the perception of value for a location is likely to be negatively affected in areas of high and/or increasing hazard. This decrease in perceived value may come from areas where the public generally knows hazards are increasing, from public/private maps or reports, or from the insurance industry which tracks climate risk very closely and will likely increase rates in areas of high and/or increasing hazard. It is important to also note that climate change will have growing effects in the next 5 to 10 years. However at the 20 - 30 year time horizon many perils are expected to see exponentially challenging changes unless our society makes significant and long-lasting changes. This timeframe has implications for portfolios which are held over a longer period, most notable pension/investment funds, mortgages, and other insurance linked securities.

Economic choices and technical solutions could stave off some of the worst effects of climate change. But rising sea levels and spreading flood plains nonetheless appear likely to destroy hundreds of billions of dollars in property and to displace millions of people. The economic losses and social disruption may happen gradually, but they are likely to be greater in total than those experienced in the housing crisis and Great Recession. That recent experience illustrated the difficulty of allocating losses between homeowners, lenders, servicers, insurers, investors, and taxpayers in general.

B. Physical climate risks can affect real estate prices.

Real estate values are linked to land values, so physical risks, such as hurricanes, wildfires and rising sea levels, can directly affect real estate prices. Evidence is building that exposure to these risks already affects real estate values.

Commodity Future Trading Commission's (CFTC) MRAC documented research showing that:

- Increased perceptions of physical risk in a local housing market depress the prices of homes exposed to sea level rise

¹¹ Owens, "Soaked: A Policy Agenda to Prepare for a Climate-Triggered Housing Crash."

- Perceptions of flooding-related climate risk are currently priced into some real estate markets,^{12 13} and even in high-value markets, price appreciation of properties that have a high risk of climate-attributed flooding may slow relative to lower-risk properties.¹⁴
- The price of homes drops when they are designated to be in a wildfire risk zone.^{15 16} While climate risk already appears to affect real estate values, these effects likely will increase as physical risks become more frequent and severe.

In their analysis of *Flood Risk and the Housing Market*, a Freddie Mac economist and co-authors found that “[a]n increase in the vacancy rates, neighborhood blight and lack of amenities will exacerbate the decline in property values.”¹⁷

C. Decline in real estate values can have larger implications for the U.S. economy, its most vulnerable workers and the financial sector

For most U.S. households, housing constitutes the largest share of household wealth. Declining real estate values—driven by climate-related impacts or the perception of such impacts in the future—could substantially depress economic activity. This would have an especially large impact on the needs of low and moderate income families.

Some populations and local communities within the United States may ultimately be required to relocate, with potentially significant economic losses for households and investors.¹⁸ There are some estimates that there will be tens of millions of climate migrants from the US alone in the coming decades unless we make significant changes in our economic system.¹⁹

¹² Asaf Bernstein, Matthew Gustafson and Ryan Lewis, “Disaster on the horizon: The price effect of sea level rise,” *Journal of Financial Economics* 134, no. 2 (2019): 253-272, <https://pennstate.pure.elsevier.com/en/publications/disaster-on-the-horizon-the-price-effect-of-sea-level-rise>

¹³ Markus Baldauf, Lorenzo Garlappi, and Constatine Yannelis, “Does Climate Change Affect Real Estate Prices? Only If You Believe In It,” *The Review of Financial Studies* 33, no.3 (2020): 1256-1295, <https://academic.oup.com/rfs/article/33/3/1256/5735306?login=true>

¹⁴ Jesse Keenan, Thomas Hill and Anurag Gumber, “Climate gentrification: from theory to empiricism in Miami-Dade County, Florida,” *Environmental Research Letters* 13, no.5 (2018), <https://iopscience.iop.org/article/10.1088/1748-9326/aabb32/meta>

¹⁵ Shawn McCoy and Randall Walsh, “Wildfire risk, salience & housing demand,” *Journal of Environmental Economics and Management*, 91 (2018): 203-228, <https://ideas.repec.org/a/eee/jeeman/v91y2018icp203-228.html>

¹⁶ Cloé Garnache and Todd Guilfoos, “A City on Fire? Effect of Salience on Risk Perceptions,” 2019, <https://www.readkong.com/page/a-city-on-fire-effect-of-salience-on-risk-perceptions-2584424>

¹⁷ Howard Kunreuther, Susan M. Watcher, Carolyn Kousky, and Michael LaCour-Little, “Flood Risk and the U.S. Housing Market,” (February 1, 2019), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3426638

¹⁸ Abrahm Lustgarten, “The Great Climate Migration,” *The New York Times Magazine*, July 2020, <https://www.nytimes.com/interactive/2020/07/23/magazine/climate-migration.html>

¹⁹ Mathew E. Hauer, Jason M. Evans and Deepak R. Mishra, “Millions projected to be at risk from sea-level rise in the continental United States,” *Nature Climate Change* 6, (March 14, 2016): 691-695, <http://dx.doi.org/10.1038/nclimate2961>

Commercial real estate is particularly vulnerable to the shocks and stresses of climate change that may lead to declines in local GDP, which drives demand for office, industrial, and retail space.²⁰

The Federal Reserve analyzed the climate risks to real estate-linked assets and explains the transmission pathways for economic and financial risk and how they ultimately lead to financial stability risks:

“Under many climate projections, climate change leads to a further rise in sea levels and increase in storm surge. These effects, in turn, lead to increased inundation of coastal land parcels, which could either damage existing structures on those parcels, or require investment and adaptation for their continued productive use. As this inundation occurs, the expected value of coastal real estate may decrease—which may, in turn, pose risks to real estate loans, mortgage-backed securities, the profitability of firms using the inundated property, and the finances of state and local governments facing declining property tax revenues and rising remediation costs. With perfect information and no externalities, the price of real estate-linked assets might already reflect these climate-related risks. However, given the uncertainty of climate and financial models and the potential opacity of climate-related exposures – a financial system vulnerability – investors in such real estate-linked assets may react abruptly to new information about a region's exposure to climate-related risks. A sharp repricing shock, in turn, could create risks to financial stability through losses to leveraged financial intermediaries.”²¹

D. Unmitigated climate change impacts could exacerbate existing affordable housing shortages, housing inequality, and institutional racism

Climate-related natural disasters like floods and hurricanes can significantly reduce the availability and sustainability of already limited existing affordable housing stock in risky geographies exacerbating existing challenges to affordable housing created by systemic racism.

Recent research has documented the dramatic lack of affordable housing: “No state has an adequate supply of affordable and available homes for extremely low-income renters....10.8 million renter households with extremely low incomes account for 25% of all renter households and 9% of all U.S. households. Seventy percent of those extremely low-income renters—7.6 million households—are severely housing cost-burdened, meaning they spend more than half of their incomes on rent and utilities.”²²

²⁰ “Getting Physical: Scenario Analysis for Assessing Climate Risks,” *BlackRock Investment Institute*, accessed April 2021,

<https://www.blackrock.com/us/individual/literature/whitepaper/bii-physical-climate-risks-april-2019.pdf>

²¹ Celso Brunetti, et al., “Climate Change and Financial Stability,” *Board of Governors of the Federal Reserve System*, March 19 2021, <https://doi.org/10.17016/2380-7172.2893>.

²² “The Gap: A Shortage of Affordable Homes,” *National Low Income Housing Coalition*, March 2021, <https://nlihc.org/resource/nlihc-releases-2021-edition-gap-finding-extremely-low-income-renters-face-shortage-7>

Research has also documented how Covid has exacerbated systemic, structural challenges and worsened conditions for the most vulnerable, with “patterns of housing insecurity and racial and socioeconomic inequality that existed prior to Covid-19 have been exacerbated by the pandemic and the associated economic downturn.”²³ In January 2021, the Urban Institute found that “21% of all renters were behind on rent payments, and rates were even higher for low-income renters and renters of color.”²⁴ They also found that “an economic downturn is not likely to generate lower rents for the lowest-income renters. During periods of crisis, rents in the most expensive rental homes may fall, but competition for less expensive homes can increase as higher-income renters or distressed homeowners seek cheaper alternatives.”²⁵

At the same time, there is insufficient information and incentives to protect residents living in these areas, and even to disincentive them from moving there. An August 2020 research paper on flood risk published by the San Francisco Federal Reserve found “clear evidence that low income and minority residents are more likely to move into high risk flood zones.” It warned that policy changes that do not adequately consider behavioral impacts could have the unintended consequence of “sorting” low income and minority groups into high flood risk areas – trends that would have “long lasting implications for disaster vulnerability, recovery, and fiscal policy.”²⁶

E. Climate risks to commercial and residential real estate are significant, and as a result, exposes a range of financial assets that are tied to real property to climate change impacts.

CFTC’s Climate Risk Subcommittee provides a valuable summary of the range of financial assets exposed to climate change impacts, including assets tied to real property. These include:

- Commercial mortgage-backed securities (CMBS)
- Commercial real estate (CRE) bank loans
- Government-sponsored enterprise (GSE) Credit
- Risk Transfer securities
- Real Estate Investment Trusts (REITs)
- Residential mortgage-backed securities (RMBS)
- Residential mortgages

²³ “2021 Home Attainability Index,” *Urban Land Institute*, March 2021, <https://americas.uli.org/2021-home-attainability/>

²⁴ “The Gap: A Shortage of Affordable Homes,” <https://nlihc.org/resource/nlihc-releases-2021-edition-gap-finding-extremely-low-income-renters-face-shortage-7>

²⁵ *Ibid.*

²⁶ Laura A. Bakkensen and Lala Ma, “Sorting Over Flood Risk and Implications for Policy Reform,” *Federal Reserve Bank of San Francisco*, July 2020, https://www.frbsf.org/economic-research/files/Bakkensen_Ma_2020.pdf

Since most residential real estate in the United States is purchased with a mortgage, physical risk could also affect the underlying mortgages. Early-stage research suggests that wildfires and flooding cause increased residential mortgage default rates.²⁷

[d]eclines in mortgage values could affect financial market participants, including banks that hold these mortgages on their balance sheets, investors in mortgage-backed securities, and government-sponsored enterprises (GSEs), primarily Fannie Mae and Freddie Mac, which guarantee the default risk of the mortgages they securitize.²⁸

Economists at both Fannie and Freddie have warned of the risks that climate-related increases in flooding pose to the mortgage industry. In 2016, the then-chief economist at Freddie Mac wrote that rising seas “appear likely to destroy billions of dollars in property.”²⁹

Emerging evidence suggests that lenders are passing along riskier mortgages to the GSEs, in part, to remove risk from their own books.³⁰ The federal guarantee of the GSEs suggests that U.S. taxpayers may ultimately be on the hook for prepayment and default risks associated with the impacts of physical risks on collateral values.³¹

CFTC’s MRAC found that “major flooding of residential and commercial property over a large region could result, in a short time, in rising mortgage delinquency and prepayment rates and falling values of residential mortgage-backed securities, securitized commercial real estate (CRE) loans, the bonds of affected municipalities, and the stock of insurance companies (if insurance companies must make large payouts for flooded commercial property).”³²

MRAC also found that “because climate risk is expected to increase over time, asset holders with longer asset-liability structures are more exposed to climate risk.” The Subcommittee examined commercial mortgage-backed securities (CMBS)³³ and found that “institutional investors held most of the half a trillion dollars of CMBS outstanding as of 2019, with “some of these loans, and the property that secures them...at risk from flooding, wildfires, windstorms, storm surge, and sea level rise.” A study by BlackRock found that properties in New York,

²⁷ Paulo Issler, et al., “Mortgage Markets with Climate-Change Risk: Evidence from Wildfires in California,” July 1, 2020, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3511843

²⁸ Kahn M.E., and Ouazad, A., 2019, When Climate Change Leads to Mortgage Defaults, Simple steps to make sure lenders and homebuyers — not taxpayers — bear the risk, Bloomberg Opinion. <https://www.bloomberg.com/opinion/articles/2019-10-03/when-climate-change-leads-to-mortgage-defaults?sref=hG59g5b4>

²⁹ Sean Beckett, “Life’s a Beach,” *Freddie Mac*, accessed April 2021, http://www.freddiemac.com/research/insight/20160426_lifes_a_beach.page

³⁰ Jesse Keenan and Jacob Bradt, “Underwaterwriting: from theory to empiricism in regional mortgage markets in the U.S.” *Climatic Change* 162 (2020): 2043-2067, https://link.springer.com/article/10.1007/s10584-020-02734-1?_ac_lkid=df90-2a14-b0f6-39ef172f312e0f_d&error=cookies_not_supported&code=28f31739-0e75-440d-a12d-dfba8a62ad6d

³¹ Amine Ouazad and Matthew Kahn, “Mortgage Finance in the Face of Rising Climate Risk,” *National Bureau of Economic Research* (2019), https://www.nber.org/system/files/working_papers/w26322/revisions/w26322.rev0.pdf

³² “Managing Climate Risk in the U.S. Financial System,” *CFTC*

³³ *Ibid.*

Houston, and Miami which are highly vulnerable to flooding made up one-fifth of CMBS properties by market value in the Bloomberg Barclays Aggregate Index, with the risk projected to rise. The BlackRock analysis estimated that about 6 percent of the properties in the CMBS market lie in Federal Emergency Management Agency (FEMA) flood zones, which are at elevated risk of inundation.³⁴ A 2019 Morgan Stanley study identified 2,000 CMBS loans, worth more than \$56 billion, that are exposed to climate change-exacerbated flooding along the East and West coasts.³⁵ Alarming, more than half of that exposure is estimated to lie outside FEMA flood zones. That means those properties are at higher risk of being underinsured, and therefore the loans attached to them are at higher risk of impairment, with increased risk for the value of the related CMBS.

F. Unmitigated climate change impacts could devastate local economies and the local tax base, preventing critical investments that protect and increase the value of local housing stock or investments in adaptation in climate resiliency, leaving permanent vulnerabilities to future shocks.

Disasters such as floods can have community-wide impacts, over and beyond the damage to individual structures from buildings. Communities may also suffer losses in tax revenue due to the damage to the structures as well as business interruption.³⁶

The impacts of shrinking tax bases and tightening purse strings aren't felt equally by all groups. Low-income residents and residents of color are particularly hard-hit as cities cut services, impose regressive new taxes (like sales tax increases), and privatize essential services like garbage, sewers, and parking, passing costs along to residents. Public sector furloughs also hit Black workers disproportionately, as they are 30 percent more likely to be employed by the public sector than other workers. Cities also ramp up fines and fees, including court fees, incentivizing over-criminalization that also hits Black and brown residents hardest because of racial discrimination throughout policing and law enforcement agencies. It's clear that the direct and indirect effects of a climate-induced housing crash on communities of color are substantial and outsized.³⁷

G. GSEs are significantly exposed to climate risk, and this poses a risk to their statutory mission and to the broader financial system.

CFTC's MRAC examined the GSEs and found that "As major holders of mortgages and originators of residential mortgage-backed securities, the GSEs are exposed to physical climate

³⁴ "Getting Physical: Scenario Analysis for Assessing Climate Risks," *BlackRock Investment Institute* April 2019,

<https://www.blackrock.com/us/individual/literature/whitepaper/bii-physical-climate-risks-april-2019.pdf>

³⁵ "Managing Climate Risk in the U.S. Financial System," *CFTC*,

<https://www.cftc.gov/sites/default/files/2020-09/9-9-20%20Report%20of%20the%20Subcommittee%20on%20Climate-Related%20Market%20Risk%20-%20Managing%20Climate%20Risk%20in%20the%20U.S.%20Financial%20System%20for%20posting.pdf>

³⁶ Linda Shia, Andrew M. Varuzzo, "Surging seas, rising fiscal stress: Exploring municipal fiscal vulnerability to climate change," <https://www.sciencedirect.com/science/article/pii/S0264275118314100>

³⁷ Owens, "Soaked: A Policy Agenda to Prepare for a Climate-Triggered Housing Crash."

risk affecting property, particularly flood risk. Because Fannie Mae and Freddie Mac are limited by rules governing how they underwrite mortgages, they may have limited room to screen for and manage climate risk. In addition, some of this opaque risk could be transferred to other parts of the financial system through the GSEs' sales of Credit Risk Transfer securities.”³⁸

MRAC also found that “[a]fter the 2008 financial crisis, the GSEs began transferring a meaningful portion of this credit risk to the private market via Credit Risk Transfer securities, which are purchased by hedge funds, money managers, Real Estate Investment Trusts (REITs), insurance companies and pension funds, though the **GSEs retain considerable risk on their own balance sheets.**” (emphasis added).

Fannie Mae and Freddie Mac have disclosed climate as a risk factor in their filings to the SEC for investors.

Fannie Mae:³⁹

- “There are a number of factors that could cause actual conditions, events or results to differ materially from those described in our forward-looking statements, including, among others, the following:[...] severe weather events, fires, floods or other events for which we may be uninsured or under-insured or that may affect our counterparties, and other risks resulting from climate change and efforts to address climate change.” (P. 33-34)
- Credit Risk: The occurrence of major natural or other disasters in the United States or its territories and the impact of climate change could negatively impact our credit losses and credit-related expenses. (P. 35)
- **“We may suffer losses if borrowers are unable to obtain property or flood insurance, if their claims under insurance policies are not paid, or if they suffer property damage as a result of a hazard for which we do not require insurance, such as flooding outside of certain areas.** In general, we require borrowers to obtain property insurance to cover the risk of damage to their homes resulting from hazards such as fire, wind and, for properties in a Special Flood Hazard Area as designated by FEMA, flooding. As of December 31, 2020, 3.4% of loans in our single-family guaranty book of business and 6.9% of loans in our multifamily guaranty book of business are located in a Special Flood Hazard Area. For flood insurance, single-family borrowers generally rely on the National Flood Insurance Program (“NFIP”), which was recently extended through September 2021. If Congress fails to extend or re-authorize the program upon future expirations, FEMA may not have sufficient funds to pay claims for flood damage, and borrowers may not be able to renew their flood insurance coverage or obtain new policies through the NFIP. In addition, NFIP insurance does not cover temporary living expenses, and the maximum limit of coverage available under NFIP for a single-family residential property is \$250,000, which may not be sufficient to cover all

³⁸ “Managing Climate Risk in the U.S. Financial System,” *CFTC*, 39

³⁹ “2020 Form 10-K: Risk Factors,” *Fannie Mae*, accessed February 2021, <https://fanniemae.gcs-web.com/node/30106/html>

losses. The risk of significant flooding in places outside of a Special Flood Hazard Area (that is, in places where we do not require flood insurance) is expected to increase in the coming years as a result of climate change. Increases in the intensity or frequency of floods or other weather-related disasters as a result of climate change will intensify the foregoing risks.” (P. 47)

- **The occurrence of major natural or other disasters in the United States or its territories and the impact of climate change could negatively impact our credit losses and credit-related expenses.** We conduct our business in the single-family and multifamily residential mortgage markets and own or guarantee the performance of mortgage loans throughout the United States and its territories.

Freddie Mac:

- “We are exposed to increased credit losses and credit-related expenses in the event of a major natural disaster, other catastrophic event, including a pandemic, or significant climate change effects. The occurrence, severity, and duration of a major natural or environmental disaster or other catastrophic event, including a pandemic, as well as significant climate change effects such as rising sea levels or wildfires, in an area where we own or guarantee mortgage loans or REO properties, especially in densely populated geographic areas, could increase our credit losses and credit related expenses.
- A natural disaster or catastrophic event or other significant climate change effect that either damages or destroys single-family or multifamily real estate underlying mortgage loans or REO properties we own or guarantee, or negatively affects the ability of borrowers to continue to make payments on mortgage loans we own or guarantee, could increase our serious delinquency rates and average loan loss severity in the affected areas. Such events could have a material adverse effect on our business and financial results. We may not have adequate insurance coverage for some of these natural, catastrophic, or climate change-related events.”⁴⁰

A. Unmitigated climate change could reduce borrower ability to pay back loans

Climate-related flooding and other natural disaster events can reduce or destroy the value of a borrower’s wealth, reduce their income, and ultimately reduce or eliminate a borrower’s ability to pay back loans in a variety of ways. This has been well documented by a Fannie Mae economist and co-authors in 2019 in flooded areas “may face both the inability to repay their mortgage, and the inability to recoup enough funds when selling their house to cover the unpaid mortgage principle.”⁴¹

Other impacts of climate-related natural disaster events that could reduce a borrower’s (or a community of borrowers’) ability to pay back their loans include:

⁴⁰ “Form 10-K, Year End: Risk Factors,” *Freddie Mac*, December 10, 2020, http://www.freddiemac.com/investors/financials/pdf/10k_021121.pdf

⁴¹ Kunreuther et al., “Flood Risk and the U.S. Housing Market.”

- Increase the costs of purchasing, insuring or upgrading real estate property.
- Destroy or shut down entire industries, with knock-on effects to supply chains, leading to job losses, severely impacting income flow or sustainability.
- Force communities to abandon homes and relocate.

B. Risk to GSEs solvency and liquidity could be substantial.

Fannie Mae and Freddie Mac do not currently price or decline to buy mortgages based on climate risk, aside from guidelines that prohibit them from securing loans that are located in special flood hazard zones that are not insured by the NFIP. This is creating the potential for substantial information asymmetries, as banks can sell the worst climate risk to Fannie and Freddie.⁴²

C. Work to understand and manage the climate exposure of regulated entities fits squarely into FHFA’s statutory obligation to 1) ensure the safety and soundness of the enterprises and 2) foster a liquid national housing market

Ceres believes it is time to write climate risks into the rules of the housing market. To meet its statutory obligations, FHFA must make investments to better understand their climate exposure and develop policies to better price climate risk into the mortgage market.

CFTC’s MRAC analyzed the potential of specific federal government “shock absorbers” to play their statutory role in protecting consumers and the financial markets from risk, in this case, climate risk. They found that the GSE’s ability to respond to these well-documented risks are limited. “Ensuring that the GSEs are effectively measuring, monitoring, and managing climate risk will be imperative for their continued ability to enhance the stability of the U.S. mortgage market.”

3. What methodologies, datasets, variables, assumptions, future climate scenarios, and measurement tools are used to measure and monitor climate risk to the national housing finance markets? Describe any gaps in available data that limit the ability to measure such risks. How could such data gaps be resolved?

Despite some resources available, the GSEs lack high-quality, asset-level data on the future risks posed by specific perils. For this reason, we recommend:

A. The federal government should invest in high-quality, asset-level data on all sources of climate risk, including floods, wildfires, sea-level rise, and others.

⁴² Christopher Flavelle, “Climate Risk in the Housing Market Has Echoes of Subprime Crisis, Study Finds”, *The New York Times*, September 27, 2019, <https://www.nytimes.com/2019/09/27/climate/mortgage-climate-risk.html>

Advances in climate science have begun to make this kind of data collection possible, and companies that provide this data have seen a market beginning to emerge.⁴³ Sophisticated financial institutions like hedge funds are already buying this data.⁴⁴ It is homeowners, less sophisticated banks and financial institutions, and taxpayers who are often unaware of the risks. This data should also be made available to the public, who have a right to know their climate risk, and could be housed in the National Mortgage Database.⁴⁵ FHFA should work with NOAA and FEMA to purchase this data or develop similar data in-house. More granularity in geographically specific data is necessary to properly translate climate risk to credit risk. The current public datasets provide location data that is too broad.

B. The FHFA should collect and publicly disclose portfolio level and asset level data on climate risks across all perils.

To do this, the federal government should invest in high-quality, asset-level data on all sources of climate risk, including floods, wildfires, sea-level rise, and others. Sophisticated financial institutions like hedge funds are already buying this data. It is homeowners, less sophisticated banks and financial institutions, and taxpayers who are often unaware of the risks. This data should also be made available to the public, who have a right to know their climate risk, and could be housed in the National Mortgage Database.⁴⁶

Once this data is available, it should also be used to update FEMA's flood risk maps, so that they reflect the probability of future risks, not just historical risks. This data could be housed in the National Mortgage Database, which was developed in partnership with FHFA and the Consumer Financial Protection Bureau. Good data—followed by the implementation of national standards for disclosure for all residential real estate transactions—would make coastal and inland real estate markets more transparent, and ultimately facilitate adaptation and importantly, retreat, through more accurate pricing of climate-related risks.⁴⁷

There is an urgent demand for better climate risk data and for it to be used swiftly to inform strong policies that protect taxpayers and homeowners. For example, weak and incomplete flood risk data has prevented effective policy making by the Federal Emergency Management Agency (FEMA) in its oversight of the National Flood Insurance Program. As a result the Natural Resources Defense Council (NRDC) and the Association of State Floodplain Managers (ASFPM) filed a petition for rulemaking in January 2021, calling on FEMA to “revise the

⁴³ Shieber, Jonathan, “Jupiter Raises \$23 Million to Tell Businesses and Governments How Climate Change Will Destroy Them,” TechCrunch, March 4, 2019, <https://techcrunch.com/2019/03/04/jupiter-raises-23-million-to-tell-businesses-and-governments-how-climate-change-will-destroy-them/>

⁴⁴ Tett, Gillian, “Climate Change Could Cause a New Mortgage Default Crisis,” Financial Times, September 26, 2019, <https://www.ft.com/content/7ec25f94-e04f-11e9-9743-db5a370481bc>

⁴⁵ FHFA, National Mortgage Database Program, <https://www.fhfa.gov/PolicyProgramsResearch/Programs/Pages/National-Mortgage-Database.aspx>, see also, Owens, “Soaked: A Policy Agenda to Prepare for a Climate-Triggered Housing Crash” at 4, 14.

⁴⁶ Ibid.

⁴⁷ Ibid.

NFIP-implementing regulations to ensure the program’s construction, land-use, mapping, and mitigation components account for current and future flood risk.”⁴⁸

But this data should also ultimately be made publicly available to homebuyers, lenders, and investors, so they have an accurate picture of the risks posed by sea-level rise, coastal and river flooding, wildfires, and other perils before they invest. Everyone has a right to know their climate risk.

See also response to Question 16.

4. What risk management strategies or approaches—including but not limited to those related to pricing, insurance, credit risk transfers (CRT), loss mitigation, and disaster response—do industry participants use to address climate and natural disaster risk?

Climate and natural disaster risk are not yet adequately priced into markets; developers continue to build in vulnerable locations, and buyers continue to buy. For example, the National Bureau of Economic Research estimates that homes in floodplains may be overvalued by as much as \$34 billion. For this reason, we recommend FHFA consider a range of strategies and approaches for climate risk mitigation, adaptation, and resilience.

A. Mitigation

Climate change mitigation involves actions that reduce the rate of climate change. Climate change mitigation is achieved by limiting or preventing greenhouse gas emissions and by enhancing activities that remove these gases from the atmosphere. Given the emissions profile of US residential and commercial housing stock,⁴⁹ FHFA has a crucial opportunity to contribute to the national reduction of greenhouse gas emissions. We recommend the FHFA:

- a. Develop a comprehensive strategy to ensure that every property type plays its part to reach a net zero target based on climate risk assessments of the regulated entities and their portfolios.**

Ceres recommends that FHFA support a goal to reduce absolute carbon emissions from the US housing stock by 50% by 2030 and by 100% by 2050. These targets reflect the latest analysis from the Intergovernmental Panel on Climate Change (2018) and the goals of the Paris agreement. See more details on risk assessments in response to Question 7.

⁴⁸ Natural Resources Defense Council and Association of State Floodplain Managers, Inc., “Petition Requesting That The Federal Emergency Management Agency Amend Its Regulations Implementing the National Flood Insurance Program,” *Natural Resources Defense Council*, January 5, 2021, <https://www.nrdc.org/sites/default/files/petition-fema-rulemaking-nfip-20210105.pdf>

⁴⁹ EPA, Sources of Greenhouse Gas Emissions, <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>

b. Increase incentives to reduce GHG emissions from existing and new housing stock

Consider incentivizing properties that meet certain construction standards (like California has for seismic activity) using g-fees, facilitating the proliferation of adaptation and resilience measures throughout the industry. These types of incentives could be facilitated by incorporating climate readiness into appraisal standards in the Uniform Appraisal Dataset at the GSEs.

c. Co-convene an inter-agency process with regulated entities and outside experts to:

■ Build a collective vision for Zero Carbon housing stock

Zero carbon emissions housing is technically and economically feasible.⁵⁰ For existing buildings, zero emissions can be accomplished through electrifying the services, where appropriate, now provided with natural gas, adding roof-top solar, micro-grids and continuing to green grid-supplied electricity. New buildings can go further by also incorporating energy-saving insulation, doors, windows, and roofs, and using low- or zero-emissions building materials in construction.

The advantages of zero carbon housing go beyond climate protection. Zero carbon buildings can cost less to own and operate than conventional buildings since they are more energy-efficient, don't require gas infrastructure and can generate income from sale of solar electricity to the grid. They can be healthier for residents since they don't burn fossil fuels inside the building's envelope.

■ Frame a residential decarbonization road map and policies required to reduce GHG emissions by 50% by 2030 and by 100% by 2050.

Federal agencies could also engage state regulators and city governments to help design the road map since they exercise many of the relevant authorities.

■ Facilitate analysis and discussion on options for housing and other agencies to advance the goals of such a roadmap. For example:

- **Evaluating building material and housing certification programs to identify opportunities to reduce environmental and GHG impacts.** This could include study and tracking of existing standards, best practice and incentives to explore how they might contribute to such a roadmap. This includes:

⁵⁰ The U.S. Dept of Energy "Zero Energy Buildings" program offers a wealth of design and planning tools <https://www.energy.gov/eere/buildings/zero-energy-buildings>. The Rocky Mountain Institute's Building Electrification website offers a wealth of studies on the health, economic and climate benefits of building electrification. <https://rmi.org/our-work/building-electrification/>

- Advances in “environmental product declaration”⁵¹ systems such as the Responsible Steel Initiative⁵², Forest Stewardship Council⁵³, and Concrete Sustainability Council⁵⁴.
- Building property ratings based on building materials, such as the excellent work of the multi-family DOE Energy Star program.
- Analysis of building supply chain decarbonization advances, such as, for example, cement and concrete.⁵⁵
- **Strengthen homebuyer time-of-sale disclosures.** Housing agencies could promote the development of model disclosures that potential homebuyers could use to understand energy costs, renovation options, and potential savings from upgrades that are presented in a consistent, simple and easy-to-understand format. Such model disclosures would enable homebuyers to better understand the value of energy-related upgrades at a time when they can access financing and when a house often undergoes updates to meet the needs of a new occupant.
- **Modernize FHA and HUD energy-efficiency mortgages**⁵⁶ to include a broader suite of home decarbonization solutions, such as: electrification upgrades (ie, air source heat pumps to replace gas furnaces, induction stoves in lieu of gas stoves, etc.), and rooftop solar and battery storage.

B. Adaptation

Adaptation counters specific risks already happening from climate change that vary from place to place. In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate and its effects.⁵⁷ We recommend the FHFA:

- a. **Develop a comprehensive strategy to address the financial risk the GSEs have assumed by securitizing loans at varying risk of weather-related default based**

⁵¹ “What Is an Environmental Product Declaration (EPD)?” *Sphera*, May 13, 2020, <https://sphera.com/glossary/what-is-an-environmental-product-declaration-epd/>

⁵² *Responsible Steel*, accessed April 2021, <https://www.responsiblesteel.org/>

⁵³ *Forest Stewardship Council*, accessed April 2021, www.fsc.org

⁵⁴ *Concrete Sustainability Council, towards a sustainable, safe, durable and comfortable future*, accessed April 2021, <https://www.concretesustainabilitycouncil.com/>

⁵⁵ “Decarbonizing Concrete: Deep decarbonization pathways for the cement and concrete cycle in the United States, India, and China,” *ClimateWorks Foundation*, March 16 2021, <https://www.climateworks.org/report/decarbonizing-concrete/>

⁵⁶ “Energy Efficient Mortgage Homeowner Guide,” *hud.gov*, accessed April 2021, https://www.hud.gov/program_offices/housing/sfh/eem/eemhog96

⁵⁷ J. B. Robin Matthews, “Annex I: Glossary,” In: *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*, 2018, https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_AnnexI_Glossary.pdf

on climate risk assessments of the regulated entities and their portfolios. More details on risk assessments included in response to Question 7.

b. Get the pricing right

Upon completion of a climate risk assessment, GSEs should use their enormous leverage to incorporate that risk into the rules governing the housing market. Ensuring that climate risk is priced into the mortgage insurance and secondary mortgage markets will have a considerable impact on prices in the residential real estate market. Although (appropriate) risk-based pricing isn't the only tool at regulators' disposal for managing adaptation and retreat, it is a critical one. All market actors, from developers to lenders to investors to homeowners, will immediately respond to price increases, decreasing the likelihood that new properties will be built and purchased in areas at risk of chronic coastal and river flooding, wildfires, and other perils. Although risk-based pricing may facilitate retreat in some of the most at-risk communities, it can also facilitate investment. Accurate pricing based on climate risk implies discounted rates for properties at certain elevations and in safer geographies, making new investments in those areas more cost-effective. Specifically, we recommend exploring:

c. Include climate risk in capital requirements

Stress tests and scenario analysis conducted as part of a climate risk assessment will underpin analysis of capital adequacy to assess GSE safety and soundness and their ability to withstand climate risk.⁵⁸ Based on the results of this assessment, FHFA should explore the necessary capital requirements. This could include carrying climate risk through to g-fees, and therefore prices. Ensuring that mortgage pricing reflects climate risk would begin the process of adaptation and retreat, in part by decreasing the cost of purchasing in areas with the lowest climate risk.

While we generally support the inclusion of climate risk in capital requirements, we recommend care and deep study, on strategies to address potential risks to vulnerable and underserved populations.⁵⁹

⁵⁸ "Guide to Scenario Analysis for central banks and supervisors," *Network for Greening the Financial System*, June 2020,

https://www.ngfs.net/sites/default/files/medias/documents/ngfs_guide_scenario_analysis_final.pdf

⁵⁹ Fannie Mae and Freddie Mac charge lenders guarantee-fees (g-fees) when they acquire their single-family loans. G-fees include up-front fees (one-time fees when the lender sells the loan to the GSEs) and ongoing fees (paid each month over the life of the loan). Since 2007, Fannie and Freddie have also been required by FHFA to charge "loan-level pricing adjustments" as part of the g-fees. The LLPAs vary by borrower FICO score, the loan-to-value ratio for the home, and by mortgage product type. G-fees are critical for ensuring the safety and soundness of Fannie and Freddie—and they cover four important costs of providing the credit guarantee. These costs include the expected costs of default, a small (10 basis points) fee that goes to the Treasury, the costs of administrative expenses, and the costs of holding the capital necessary to protect against the potential of catastrophic losses from loan defaults. The final cost is by far the most significant and a clear lever for pricing based on climate risk.

See also: Owens, "Soaked: A Policy Agenda to Prepare for a Climate-Triggered Housing Crash."

d. PMIERS (Private Mortgage Insurer Eligibility Requirements)

Once the Enterprise Capital Rule includes an accounting of climate risk, FHFA should carry this through to the mortgage insurance market by repurposing the capital rules for PMIERS.

e. Minimize disparate impacts

Pricing for climate risk is a form of geographic risk-based pricing and should be undertaken thoughtfully and cautiously, with an eye toward minimizing disparate impacts. For example, FEMA has found that when it comes to flooding, “policyholders with lower-valued homes are paying more than their share of the risk while policyholders with higher-valued homes are paying less than their share of the risk.”⁶⁰

The notice-and-comment process for any rulemaking related to pricing climate risk should ensure inputs by a range of stakeholders, including fair housing experts and advocates, climate scientists, and local officials from areas that would be most impacted by this type of pricing. Members of frontline communities should provide input as well. FHFA and commenters should also consider whether climate pricing should be fixed or variable across different geographies and perils and whether the fee should be administered on a one-time or ongoing basis.

Lessons could be drawn from FEMA’s Risk Rating 2.0 program. According to FEMA, the program has found an approach to address some types of disparities. For example, the program “now has the capability and tools to address rating disparities by incorporating more flood risk variables. These include flood frequency, multiple flood types—river overflow, storm surge, coastal erosion and heavy rainfall—and distance to a water source along with property characteristics such as elevation and the cost to rebuild. Because Risk Rating 2.0 considers rebuilding costs, FEMA can equitably distribute premiums across all policyholders based on home value and a property’s unique flood risk.”⁶¹

f. Explore policies, incentives and promote research for managed retreat as a policy option to complement other adaptation policy tools

Managed retreat analysis is a necessary component of climate change adaptation policies.⁶² A range of institutions have established that a “managed retreat” for communities in specific

⁶⁰ FEMA, Risk Rating 2.0: Equity in Action, <https://www.fema.gov/flood-insurance/work-with-nfip/risk-rating>

⁶¹ Ibid

⁶² The National Oceanic and Atmospheric Administration (NOAA) definition of managed retreat: “managed retreat typically involves establishing thresholds to trigger the demolition or relocation of structures threatened by coastal hazards or sea level rise. This approach is frequently coupled with several other planning and regulatory techniques including: shoreline planning, to identify high-risk areas where this type of policy would be the only cost-effective, long-term solution; regulating the type of structure allowed near the shore to ensure that buildings are small enough and constructed in a way to facilitate relocation when needed; and instituting relocation assistance and/or buy-back programs to help with relocation costs or compensate property owners when their property becomes unusable.”

geographies facing irreversible physical risks, like sea-level rise, must be considered and studied as a possible tool to address the social and economic risks of climate change.⁶³ This is because even with infrastructure improvements, every market will not be insurable or defensible against physical climate risk over the long term.

For obvious reasons, no community would look to retreat as a first option to adapt to climate change risks. However, as a recent New York Times article highlights, “the need to make difficult decisions like these reflects the growing consensus among experts that not every community in the United States can be protected in the long run. Some areas — particularly in some coastal zones, but also inland along rivers and other areas where flooding is worsening with climate change — can’t successfully be defended no matter how much money the government might be willing to throw into fortifications, drainage upgrades or other improvements.”⁶⁴ It is not a radical concept, and the federal government has been relocating communities for decades, albeit with gaps in attention to racial and economic vulnerabilities.⁶⁵

Given the enormity and complexity of retreat as an adaptation strategy, and its potential impact on local housing stock and value, on the wealth of local business, renters and homeowners, as well as on the local tax base, the federal government should play a central role in developing policy options and tools for retreat from areas with irreversible or indefensible climate risk. The alternative, to leave the retreat unmanaged, with homeowners, business owners, renters and municipalities facing the whims of market forces and possibly overstretched capacities of disaster response, is not optimal.⁶⁶ Learnings from the emergency response to Hurricane Katrina and the long term impacts of the dramatic lack of appropriate planning, make that abundantly clear.⁶⁷

The time to develop smart strategies to manage retreat - and incentivize it if needed - is now. It is essential that FHFA begins preparations and deep study in this area in partnership with outside experts and other relevant agencies. (Please see also response to Question 20).

We also recommend FHFA begin a process to develop an iterative managed retreat policy toolkit, to document definitions, policy options, case studies and emerging research to guide and

⁶³ See Columbia University Climate Adaptation Initiative, Managed Retreat Conference, <https://adaptation.ei.columbia.edu/retreat/home> - 2019 conference convened “400 academics, scientists, practitioners, journalists, city leaders, industry representatives and others”, 2021 conference planned.

⁶⁴ Christopher Flavelle, “A crucial question looms as the White House unveils its climate plan: Which areas can be saved?” *The New York Times*, March 31, 2021, <https://www.nytimes.com/2021/03/31/us/a-crucial-question-looms-as-the-white-house-unveils-its-climate-plan-which-areas-can-be-saved.html>

⁶⁵ Yuliya Panfil, “The Case For ‘managed Retreat’” Politico, July 14, 2020, <https://www.politico.com/news/agenda/2020/07/14/climate-change-managed-retreat-341753>

⁶⁶ Kousky, C., “Managing shoreline retreat: a US perspective,” *Climatic Change*, 124, 9–20 (2014). <https://doi.org/10.1007/s10584-014-1106-3>

⁶⁷ Center for American Progress, “When You Can’t Go Home,” August 2015, <https://www.americanprogress.org/issues/green/reports/2015/08/18/119511/when-you-cant-go-home/>

promote the important work needed in this area. As a starting point, we would recommend the following resources, among others:

- State of Hawaii’s Office of Planning, Coastal Zone Management Program was funded by NOAA for a project to “Assess the Feasibility and Implications of Managed Retreat Strategies for Vulnerable Coastal Areas in Hawai’i”⁶⁸
- Dept. of Defense (DoD) practices: DoD oversees over 1,700 military installations that may be affected by sea-level rise. Building on the DoD’s *Climate Change Adaptation and Resilience* directive, Congress⁶⁹ mandated that the DoD address the risks by:
 - Directing planners for new military construction projects to identify whether they are in the Federal Emergency Management (FEMA) 100-year floodplain, and if so, requires them to specify mitigation plans and build 2-3 feet above base flood elevation.
 - Directing the Secretary of Defense to incorporate long-term climate projections into certain building requirements.

Congress also required DoD to assess and report installation vulnerability to extreme weather and sea-level rise resulting in a formal 2019 report.⁷⁰

- U.S. Department of Housing and Urban Development’s National Disaster Resilience Competition results: For example, HUD awarded a \$48 million federal grant to Louisiana to resettle families on Isle de Jean Charles, 98% of which has vanished under the waters of the Gulf of Mexico, to a site 40 miles north.⁷¹
- Georgetown Climate Center’s Managed Retreat Toolkit “synthesizes best and emerging practices for facilitating retreat in vulnerable coastal areas, conserving and enhancing important coastal ecosystems, and preparing higher-ground “receiving communities” to take in residents relocating away from vulnerable areas. The toolkit includes case studies about retreat from across the country, including examples from both coastal and riverine communities.”⁷²
- Columbia University Climate Adaptation Initiative, Managed Retreat Conference 2019.⁷³

C. Resilience

a. Explore opportunities to modernize rules for rebuilding after a disaster.

⁶⁸ Hawaii’s State Office of Planning, Coastal Zone Management Program, “Assessing The Feasibility And Implications Of Managed Retreat Strategies For Vulnerable Coastal Areas In Hawai’i Final Report” February 2019,

https://files.hawaii.gov/dbedt/op/czm/ormp/assessing_the_feasibility_and_implications_of_managed_retre_at_strategies_for_vulnerable_coastal_areas_in_hawaii.pdf

⁶⁹ This directive assigns responsibility to all organizational entities within DOD to assess the effects of climate change and integrate them into planning. See Department of Defense, “Climate Change Adaptation and Resilience”, 2018, <https://dod.defense.gov/Portals/1/Documents/pubs/471521p.pdf>

⁷⁰ Congressional Research Service, “Military Installations and Sea-Level Rise,” July 26, 2019, <https://crsreports.congress.gov/product/pdf/IF/IF11275>

⁷¹ U.S. Department of Housing and Urban Development, National Disaster Resilience Competition, January 2016, <https://www.hud.gov/sites/documents/NDRCCGRANTPROF.PDF>

⁷² Georgetown Climate Center Managed Retreat Toolkit, <https://www.georgetownclimate.org/adaptation/toolkits/managed-retreat-toolkit/introduction.html>

⁷³ <https://adaptation.ei.columbia.edu/retreat/home>

While there is uncertainty about the exact scope of climate-induced natural disasters, climate modeling suggests that in the short term, we can confidently expect increasing frequency and severity of a range of natural disasters. FHFA should be considering the next standards to make communities safer and more resilient. For example, when the GSEs support communities that are rebuilding after a disaster, the community should not build back to prior standards and rather, to new safer standards, to increase resilience to the next natural disaster. While the new standards are more expensive in the short term, they are cost effective over the medium and longer term. Stronger housing code requirements over the past several decades have significantly benefited our economy, and as a result, our housing stock, our citizens and our communities are safer due to these better rules and standards. These rules should be modernized to deliver on the statutory mission to ensure affordable, resilient housing.

b. Explore expanded use of catastrophe bonds

An approach to transfer climate risk to the capital markets from the GSEs are through catastrophe bonds.

According to Invesco, “We believe that cat bond/ILS investors can be a market force to encourage more environmentally conscious development...the cat bond/ILS market is a price indicator of climate risk and can serve as a market-enforcement mechanism that encourages better management of climate risk. Climate change trends now filter into the modeling and pricing of cat bond and insurance-linked securities. This evolution gives investors opportunities to positively influence the behavior of insured parties, who must be increasingly cognizant of their climate footprint.”⁷⁴ Other examples in the market include:

- Mortgage security focused investment manager Bayview Asset Management, LLC is protecting its portfolio by issuing parametric quake catastrophe bonds.⁷⁵
- FEMA is also using catastrophe bonds and reinsurance for flood risk.⁷⁶ Large commercial companies typically purchase all-perils insurance, which include wind, fire, earthquake and flooding.

5. How, if at all, should FHFA incorporate into its assessment of the regulated entities’ climate and natural disaster risk the potential for abrupt repricing of real estate properties exposed to acute natural hazards?

There is an assumption in this and other questions that abrupt repricing will occur. However, with proactive activities and proper planning, our hope is that abrupt re-pricing does not occur. If

⁷⁴ Caleb Wong, “Cat bonds and ILS are a fundamentally ESG-oriented investment,” *Invesco*, September 7, 2020,

<https://www.invesco.com/emea/en/invesco-insights/insights/cat-bonds-and-ils-are-a-fundamentally-esg-oriented-investments.html>

⁷⁵ Steve Evans, “Mortgage investor Bayview returns for second parametric quake cat bond,” *Artemis*, January 8, 2021,

<https://www.artemis.bm/news/mortgage-investor-bayview-returns-for-second-parametric-quake-cat-bond/>

⁷⁶ Ibid.

FHFA moves quickly, we may be able to avoid or reduce the magnitude of abrupt repricing in the future.

It would be beneficial to use catastrophe models to identify areas currently at risk from significant damage, which could render those areas unattractive after an event (or sooner if their insurance rates rise to match the risk). In addition, it is worth considering areas' tax revenue vs. the cost of protecting them against climate change, in particular sea-level rise. Areas with insufficient tax revenue may end up being left undefended (eg the Florida Keys).

6. With respect to the foregoing questions, FHFA invites interested parties to submit any studies, research, data, or other qualitative or quantitative information that supports a commenter's response or is otherwise relevant to the regulated entities' climate and natural disaster risk.

Reports and resources to share include:

- [Turning Up The Heat: The Need for Urgent Action by U.S. Financial Regulators in Addressing Climate Risk](#)⁷⁷ summarizes the significant developments in policy, regulation, finance and society that have taken place since [our last report](#)⁷⁸ on this topic. The report makes the case that bolder and more immediate action is necessary in order to protect U.S. financial markets from the systemic risks posed by the climate crisis.
- [Financing a Net-Zero Economy: Measuring and Addressing Climate Risk for Banks \(October 2020\)](#)⁷⁹ - Includes practical recommendations for the largest banks based on a financial impact assessment of potential direct and indirect bank losses to syndicated loan portfolios in a disorderly transition. Analysis was based on research by [CLIMAFIN](#),⁸⁰ a consultancy used by the European Central Bank, and others.
 - [Report webinar](#) provides more details and features Senator Brian Schatz, the California State Comptroller, Bank of America, and Rocky Mountain Institute.⁸¹
 - [Additional research](#) that covers the climate-related elements of relationship banking, time horizons and client engagement.⁸²

⁷⁷ Ramani, "Turning Up the Heat"

⁷⁸ Ramani, "Addressing Climate as a Systemic Risk"

⁷⁹ Blair Bateson and Dan Saccardi, "Financing a Net-Zero Economy: Measuring and Addressing Climate Risk for Banks," *Ceres*, October 19, 2020, <https://www.ceres.org/resources/reports/financing-net-zero-economy-measuring-and-addressing-climate-risk-banks>

⁸⁰ CLIMAFIN, accessed April 2021, <https://climafin.com/>

⁸¹ "Financing a Net-Zero Economy: Measuring & Addressing Climate Risks for Banks," *Ceres*, October 2020, Webinar, <http://ec2-52-26-194-35.us-west-2.compute.amazonaws.com/x/d?c=12149989&l=b7be48ce-194d-4489-8895-b3304bd30e52&r=8448e1da-7ba7-4602-880d-b67b78d092de>

⁸² Blair Bateson and Dan Saccardi, "Financing a Net-Zero Economy: The Role of Time Horizons and Relationship Banking," *Ceres*, February 2021, <https://www.ceres.org/news-center/blog/financing-net-zero-economy-role-time-horizons-and-relationship-banking>

- [Soaked: A Policy Agenda To Prepare For A Climate-triggered Housing Crash](#).⁸³ Dr. Lindsay Owens provides a practical set of recommendations including:
 - Investments in high-quality, asset-level data on common perils, including from flooding and wildfires. This data could be used to update FEMA’s flood maps but also be made available to homebuyers, lenders and investors.
 - Performance of a “climate audit” of GSEs to account for exposure to mortgage debt from climate change.
 - Possible modifications of capital standards in light of growing climate risks.
 - Consideration of a suite of options to assist homeowners in certain at-risk regions, particularly black and brown homeowners who have already borne the brunt of discriminatory housing policies.

II. Enhancing FHFA’s Supervisory and Regulatory Framework

As the FHFA explores the supervision and regulatory improvements needed to ensure that regulated entities’ effectively assess and manage the impacts of climate and natural disaster risk, we recommend the FHFA leverage the positions and investments by other financial regulators and consider the following recommendations:

A. FHFA should acknowledge that climate change poses a systemic financial risk

There is emerging global and domestic consensus that climate change poses a systemic financial risk to the U.S. and global financial systems. Ceres’ 2020 and 2021 reports provide detailed context on the progress of U.S. financial regulators on addressing climate risk.^{84 85}

U.S. financial regulators have developed helpful analytical frameworks to support evaluation and understanding of the nature and dynamics of the systemic risks caused by climate change. We have highlighted several below and encourage FHFA to draw on these for its own analysis.

- **Federal Reserve:** “By themselves, climate-related economic or financial risks need not affect financial stability; the economy can experience a decline in output, and investors can experience losses, without these effects being amplified by the financial system. Under some conditions, however, these risks could increase financial-system vulnerabilities through losses to levered financial intermediaries, disruption in financial market functioning, or sudden repricing of large classes of assets. This cascade of consequences fits within the Federal Reserve’s financial stability monitoring framework...”⁸⁶ It also found that “[c]limate change adds a layer of economic uncertainty and risk that we have only begun to incorporate into our analysis of financial stability.

⁸³ Owens, “Soaked: A Policy Agenda to Prepare for a Climate-Triggered Housing Crash.”

⁸⁴ Ramani, “Addressing Climate as a Systemic Risk”

⁸⁵ Ramani, “Turning Up the Heat”

⁸⁶ Brunetti, “Climate Change and Financial Stability.”

<https://www.federalreserve.gov/econres/notes/feds-notes/climate-change-and-financial-stability-20210319.htm>

Different sectors of the economy and geographic regions face different risks that will diverge from historical patterns. In this discussion, we focus on how climate change, which increases the likelihood of dislocations and disruptions in the economy, is likely to increase financial shocks and financial system vulnerabilities that could further amplify these shocks.”⁸⁷

- **CFTC Climate Market Risk Subcommittee:** “A central finding of this report is that climate change could pose systemic risks to the U.S. financial system. Climate change is expected to affect multiple sectors, geographies, and assets in the United States, sometimes simultaneously and within a relatively short timeframe. As mentioned earlier, transition and physical risks—as well as climate and non-climate-related risks—could interact with each other, amplifying shocks and stresses. This raises the prospect of spillovers that could disrupt multiple parts of the financial system simultaneously. In addition, systemic shocks are more likely in an environment in which financial assets do not fully reflect climate-related physical and transition risks. A sudden revision of market perceptions about climate risk could lead to a disorderly repricing of assets, which could in turn have cascading effects on portfolios and balance sheets and therefore systemic implications for financial stability.”⁸⁸

B. FHFA should consider adoption the CFTC report’s definition of “sub-systemic” shocks as it analyzes vulnerabilities

“At the same time, this report finds that regulators should also be concerned about the risk of climate-related ‘sub-systemic’ shocks. Sub-systemic shocks are defined in this report as those that affect financial markets or institutions in a particular sector, asset class, or region of the country, but without threatening the stability of the financial system as a whole. This is especially relevant for the United States, given the country’s size and its financial system, which includes thousands of financial institutions, many regulated at the state level. Sub-systemic shocks related to climate change can undermine the financial health of community banks, agricultural banks, or local insurance markets, leaving small businesses, farmers, and households without access to critical financial services. This is particularly damaging in areas that are already underserved by the financial system, which includes low-to-moderate income communities and historically marginalized communities.”

7. How should FHFA evaluate the adequacy of a regulated entity’s ability to assess and manage the impacts of climate and natural disaster risk, particularly in light of the significant uncertainties and data limitations?

A. FHFA should immediately assess the climate change exposure of mortgage holdings of the GSEs and the Federal Home Loan Banks, keeping in mind

⁸⁷ See section entitled “The Implications of Climate Change for Financial Stability” in “Financial Stability Report,” *Board of Governors of the Federal Reserve System*, November 2020, <https://www.federalreserve.gov/publications/2020-november-financial-stability-report-near-term-risks.htm>

⁸⁸ “Managing Climate Risk in the U.S. Financial System,” *CFTC*, ii-iii

up-to-date projections on the impacts of climate change on commercial and residential properties.

B. Fannie and Freddie should undertake a climate risk assessment to:

- a. Properly account for the financial risk the GSEs have assumed by securitizing loans at varying risk of weather-related default, including exposure to storm surges, increased nuisance flooding, sea-level rise, and wildfires.**

These assessments should be jointly overseen by FHFA and by Fannie and Freddie's audit committees. They should contract with outside auditors, climate experts, and actuaries to undertake the assessment. The assessment should also include a series of stress tests to determine the potential economic fallout they face under a variety of different best- and worst-case scenarios across geographies and time horizons (e.g., a summer with multiple major storms and fires hitting major metropolitan areas in quick succession).

- b. Assess impact to vulnerable and underserved populations**

Special attention should be paid in a climate risk assessment on the Duty to Serve plans of the GSEs. These plans support the entities' housing finance mission and charters and are important regulatory requirements. The climate risk associated with the activities within these plans should be assessed to ensure that while increases in affordability are being targeted, risks associated with climate and natural disasters are also not unintentionally being increased.

C. FHFA should establish baselines to assess GSEs 1) contribution to GHG emissions and 2) their relative readiness to mitigate climate change and protect their portfolios from exposure to climate and natural disaster risk.

Based on the results of a climate risk assessment, FHFA should set baselines on which measure performance and identify gaps in addressing climate risk. While we welcome the voluntary disclosure by Fannie Mae and Freddie Mac of the estimated avoided emissions of their green bond and green lending portfolios, more disclosure is required of the existing GHG emissions reductions from the entire portfolio. This would be essential to set targets.

D. FHFA should establish a framework to evaluate GSE performance on GHG emissions reductions and readiness to mitigate and adapt to climate change.

As the regulated entities build their capacity to address climate change, it will be essential to have a framework with indicators that allows a minimum assessment of progress, and provides a direction of travel. The framework should integrate baselines and establish a mechanism to

develop short, medium and long-term targets that support the US Nationally Determined Contribution (NDC) to the Paris Agreement.⁸⁹

Assessments based on the framework could provide useful inputs for public reports to regulators and to Congress. Basic indicators to be assessed could include:

- Have they assessed their portfolio risk?
- Have they disclosed their portfolio risks and their plans to address that risk?
- Is the risk being addressed in the appropriate governance structures?
- What are the human and financial resources invested to address these risks?

FHFA can also leverage and engage with a range of existing efforts underway on best practice and standards for GHG assessments. For example:

- **The GHG Protocol** has been accepted as a global standard for assessing GHG emissions.⁹⁰
- **Partnership for Carbon Accounting Financials (PCAF)**. Based on the GHG protocol, the “PCAF is a global partnership of financial institutions that work together to develop and implement a harmonized approach to assess and disclose the greenhouse gas (GHG) emissions associated with their loans and investments. The harmonized accounting approach provides financial institutions with the starting point required to set science-based targets and align their portfolio with the Paris Climate Agreement. PCAF enables transparency and accountability and has developed an open-source global GHG accounting standard for financial institutions, *the Global GHG Accounting and Reporting Standard for the Financial Industry*.⁹¹ The Standard provides detailed methodological guidance for asset classes. Widely tested by banks and investors, these methods assist in the measurement and disclosure of GHG emissions associated with six asset classes: listed equity and corporate bonds, business loans and unlisted equity, commercial real estate, mortgages, motor vehicle loans, project finance.”⁹² Notable

⁸⁹ “Nationally Determined Contributions (NDCs),” *UNFCCC*, accessed April 2021, <https://unfccc.int/process-and-meetings/the-paris-agreement/nationally-determined-contributions-ndcs/nationally-determined-contributions-ndcs>

⁹⁰ <https://ghgprotocol.org/>

⁹¹ <https://carbonaccountingfinancials.com/about>

⁹² PCAF, “Global GHG Accounting and Reporting Standard for the Financial Industry”, <https://carbonaccountingfinancials.com/standard#the-global-ghg-accounting-and-reporting-standard-for-the-financial-industry>

PCAF members include Amalgamated Bank⁹³ (PCAF Chair), Morgan Stanley⁹⁴, Bank of America⁹⁵, Citi⁹⁶.⁹⁷

State Street Global Advisors (SSGA) provides a useful primer on portfolio carbon footprinting: “Portfolio carbon footprinting captures an investor’s exposure to carbon emissions by quantifying the GHG emissions associated with a portfolio’s underlying holdings and allows investors to quickly appraise large numbers of holdings for carbon emission ‘hot spots’ regardless of asset class, size, geography or portfolio style. As a result, it is often the first step investors take when beginning to address climate risk.” Key metrics include:

- **Weighted Average Carbon Intensity** shows a portfolio’s exposure to carbon-intensive companies. As carbon-intensive companies are likely to be more exposed to carbon pricing mechanisms or other carbon regulatory risks, this metric is regarded as a useful indicator of a portfolio’s potential exposure to transition risks (such as policy intervention or changing consumer behaviour) relative to other portfolios or benchmarks.
- The **Total Carbon Emissions** metric measures a portfolio’s carbon emissions allocated to the portfolio in absolute terms and is the starting point for carbon footprinting.
- **Carbon Emissions to Value Invested** - By normalising Total Carbon Emissions, market participants can compare portfolios of different sizes and still use a metric that is consistent with the GHG protocol. The Carbon Footprint metric offers one approach for doing this, showing carbon emission for a portfolio normalised by the market value of the portfolio or fund and expressed in metric tons Co2 e/\$million invested. This approach tells an investor which portfolios are the most carbon intensive, and therefore, where attention should be focused first when it comes to managing carbon risk.
- **Carbon Emissions to Revenue Intensity** performs a similar function to the Carbon Emissions to Value Invested metric but, in addition, it normalises the Total Carbon Emissions by the issuer’s revenues to enable comparison across portfolios of different sizes.^{98 99}

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<https://www.amalgamatedbank.com/news/amalgamated-bank-announces-new-initiatives-to-advance-commitment-to-responsible-and-sustainable-banking>

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<https://www.morganstanley.com/press-releases/morgan-stanley-joins-leadership-of-global-carbon-accounting-part>

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<https://newsroom.bankofamerica.com/press-releases/environment/bank-america-largest-us-financial-institution-join-partnership-carbon>

⁹⁶ <https://www.citigroup.com/citi/news/2020/200729a.htm>

⁹⁷ See also <https://rmi.org/financing-1-5c-contextualizing-wall-streets-latest-climate-commitments/>

⁹⁸ State Street Global Advisors, “Carbon Footprinting: An Investor Toolkit,” at P. 8-11, September 2020, <https://www.ssga.com/library-content/pdfs/insights/carbon-footprinting-an-anvestor-toolkit.pdf>

⁹⁹ See also UN Principles of Responsible Investing, “How measuring a portfolio carbon footprint can help,” May 2015,

<https://www.unpri.org/climate-change/how-measuring-a-portfolio-carbon-footprint-can-assist-in-climate-risk-mitigation-and-reducing-emissions/608.article>

Based on the principles above and the GHG Protocol, there is a vibrant and emerging market to provide portfolio GHG emissions assessments.¹⁰⁰ There are also carbon footprinting case studies that can be explored:

- Henderson Global Investors “How Green is my Portfolio” - believed to be first public facing example of a performed carbon footprint of a managed portfolio.¹⁰¹
- Green Century Balanced Fund “A Green(er) Portfolio”¹⁰²
- AP6 Carbon Footprint - Portfolio¹⁰³
- De Volksbank - Mortgage portfolio¹⁰⁴ - This is noted as a best practice by PCAF.
- ABN AMRO - Real estate¹⁰⁵ - This is noted as a best practice by PCAF.
- Trillium¹⁰⁶

E. FHFA should develop a strategy to address risks of disclosure on groups that have been historically pushed into low-lying and highest-risk areas.

Disclosure is critical, but comes with substantial risk that needs careful analysis. Disclosure could impact pricing, with disparate impacts on vulnerable groups living in areas facing existing and future climate and natural disaster risk.

As a result, FHFA has a statutory directive to explore the risks climate poses. But this disclosure is beginning to happen in the market, and therefore federal regulators should be at the table examining and managing any disparate impacts.

8. What specific processes and systems of a regulated entity should FHFA examine in its supervision of the regulated entities’ climate and natural disaster risk management?

A. FHFA should explore opportunities within every element of the loan processing to address climate risks. A few examples include:

- a. Appraisal:** When the property is being appraised, is the appraiser identifying the property’s susceptibility specifically to climate and natural disasters and its resilience to those disasters in comparison to comparable?

¹⁰⁰ For example, TruCost of S&P Global. “Portfolio footprinting is a well-established tool that identifies carbon exposure. It’s now possible to supplement traditional carbon footprint information with metrics that provide more insight on the risks of climate change and the positive contribution of certain investments as we transition to a low carbon economy.” TruCost, Carbon and Energy Transition Metrics, September 2016, <https://www.trucost.com/publication/carbon-energy-transition-metrics/>

¹⁰¹ <https://www.trucost.com/publication/green-portfolio-carbon-audit-henderson-global-care-income-fund/>

¹⁰² <https://www.greencentury.com/green-century-balanced-funds-carbon-footprint-is-almost-half-that-of-the-s-p-500/>

¹⁰³ <https://www.ap6.se/en/responsible-investments/climate/carbon-footprint-portfolio/>

¹⁰⁴ <https://carbonaccountingfinancials.com/best-practice/de-volksbank-mortgages>

¹⁰⁵ <https://carbonaccountingfinancials.com/best-practice/abn-amro-real-estate>

¹⁰⁶

<https://www.trilliuminvest.com/leadership-corporate-engagement/trilliums-carbon-impact-measurement-of-our-equity-strategies>

- b. **Underwriting:** For single-family properties, is underwriting factoring in loss of income due to natural disasters? For multifamily properties, is underwriting factoring in long-term capital investments required to ensure the property’s resilience to natural disasters or increasing capital reserves required for repairs due to natural disasters?
- c. **Products:** Are the GSEs creating loan products that mitigate climate risks? How are these climate risk issues built into their pricing? How are the risks and mitigation strategies addressed differently based on the length of the mortgage term?
- d. **Asset Management/Servicing:** After a flooding event, does insurance incentive homeowners to build to prior standards or instead to meet new standards and reduce the risk of flooding and other disasters associated with climate change?

B. Building on a climate risk assessment of the regulated entities, FHFA should begin a process to update its Examination Manual to include climate change considerations.

Given the significant research on climate risk and projections for climate impacts to date, the FHFA should immediately begin work to assess and consider updates needed to the Examiner Manual. Logical entry-points for such updates include Enterprise Risk Management,¹⁰⁷ Strategic Planning, Credit Risk, Operational Risk Management, and others. A number of key areas in the manual offer opportunities can be updated to reflect existing understanding on climate risk.

The Federal Reserve has established the Supervision Climate Committee (SCC), that will review Supervision and Regulatory processes that require amendment and strengthening to address climate risks. This includes assessing and recommending updates to the bank examiner manuals.¹⁰⁸ We encourage the FHFA to engage with the SCC as it develops this work.

9. How should FHFA prioritize the various climate and natural disaster risks to the regulated entities?

FHFA should first align with the US government’s position, and conduct a data-driven prioritization of risks. Once FHFA has conducted stress tests, scenario analyses and other climate risk assessments, we recommend prioritizing interventions based on a) funds available and b) the disparate impacts on low- to moderate-income borrowers.

¹⁰⁷ “Enterprise Risk Management,” *Federal Housing Finance Agency*, accessed April 2021, <https://www.fhfa.gov/SupervisionRegulation/ExaminerResources/Documents/Enterprise-Risk-Management-FINAL.pdf>

¹⁰⁸ “Financial Stability Implications of Climate Change - Remarks by Gov. Lael Brainard,” *Federal Reserve System*, March 2021, <https://www.federalreserve.gov/newsevents/speech/files/brainard20210323a.pdf>

A. FHFA should acknowledge the U.S. government’s official position on the scientific consensus on the causes, occurrence, and impacts of climate change, and the goals and U.S. contribution to reduce climate change as part of the Paris Agreement.

The current climate policy of the United States states that the “Federal Government must drive assessment, disclosure, and mitigation of climate pollution and climate-related risks in every sector of our economy, marshaling the creativity, courage, and capital necessary to make our Nation resilient in the face of this threat. Together, we must combat the climate crisis with bold, progressive action that combines the full capacity of the Federal Government with efforts from every corner of our Nation, every level of government, and every sector of our economy.”¹⁰⁹

The FHFA should reference and rely on the Fourth National Climate Assessment (NCA)¹¹⁰, which makes clear that the consensus of the U.S. government is that it is “extremely likely that human activities, especially emissions of greenhouse gases, are the dominant cause of the observed warming since the mid-20th century”. Both the Federal Reserve¹¹¹ and the CFTC¹¹² reference the NCA in their analyses of climate risk. The NCA makes clear that “[c]urrent and future greenhouse gas emissions, and thus mitigation actions to reduce emissions, will largely determine future climate change impacts and risks to society.”¹¹³

Limiting GHG concentrations to a level consistent with a warming of well below 2 degrees Celsius above pre-industrial levels—the core objective of the Paris Agreement on climate change—is therefore essential to achieve a reasonable probability of avoiding irreversible, catastrophic impacts. The best current science suggests that, to reach that goal, global emissions must peak during the current decade and then decline rapidly, reaching net-zero by mid-century. Limiting warming to 1.5 degrees Celsius would yield very significant additional benefits in the form of avoided damage to human populations as well as ecosystems.¹¹⁴

As the Biden administration continues to evaluate the impacts of climate changes and the role of the federal government to mitigate it, most if not all federal agencies from HUD to USDA, FEMA, Department of Energy and US EPA and more will be called to engage and address in-line with their mission and scope. According to current news reports, HUD, USDA, Fannie

¹⁰⁹ Executive Office of the President, “Executive Order 14008 of January 27, 2021: Tackling the Climate Crisis at Home and Abroad,” accessed April 2021, <https://www.federalregister.gov/documents/2021/02/01/2021-02177/tackling-the-climate-crisis-at-home-and-abroad>.

¹¹⁰ The NCA is produced by the U.S. Global Change Research Program (USGCRP) under the statutory obligation of the Global Change Research Act of 1990 to record and report on the scientific consensus on the causes and impacts of climate change. Accessed April 2021, <https://nca2018.globalchange.gov/>

¹¹¹ Federal Reserve Governor, Lael Brainard, Speech: “Financial Stability Implications of Climate Change” at “Transform Tomorrow Today” Ceres 2021 Conference, Boston. March 23, 2021. <https://www.federalreserve.gov/newsevents/speech/brainard20210323a.htm>

¹¹² “Managing Climate Risk in the U.S. Financial System,” CFTC, 2

¹¹³ *The Climate Report: National Climate Assessment*, <https://nca2018.globalchange.gov/>

¹¹⁴ IPCC, 2018).

Mae and Freddie Mac are likely to be called upon to integrate climate risk related underwriting as well as address how a new approach to disaster recovery and rebuilding efforts can provide stability to the housing market for the long-term. Ceres encourages FHFA to play a central role in these discussions with other federal agencies to ensure alignment and efficiencies for the GSEs and the overall housing market.

B. FHFA should focus on climate and natural disaster risks that currently expose the physical and financial assets of our most vulnerable citizens and homeowners including those that rely on affordable subsidized housing and very low- to low-income families.

Models and a host of recent research reports show clearly the extreme vulnerability to climate and natural disaster risks that currently exists in low income, black and brown communities and increase existing risks caused by long-term institutional systemic racism and income inequality.¹¹⁵

C. In particular, FHFA should prioritize water-related risks to these communities. This includes flooding and beach erosion.

There is significant research and evidence to support prioritizing action on water-related risks from flooding and beach erosion. A 2020 report by First Street Foundation found that 14.6 million homes--nearly 70% more than FEMA had recognized-- were at substantial risk of flooding and that the numbers will surely grow in the years ahead. FEMA's Special Flood Hazard Areas criteria determines eligibility for the National Flood Insurance Program.¹¹⁶

A 2019 study, [Flood Risk and the U.S. Housing Market](#),¹¹⁷ summarized research to date and found that: "Flooding is the most frequent and costliest natural disaster in the United States. Scientists predict more serious flood losses in the future due to the combined forces of increasing development in areas subject to flooding and climate changes, including both changing storm and precipitation patterns and sea level rise. [...] Today, many homeowners are uninsured against flood damage. For example, approximately 20 percent of homes in areas affected by Hurricane Harvey had flood insurance and only 12 percent of homes in East Baton Rouge Parish, LA were protected with flood insurance in August 2016 when severe storms caused widespread flooding.

A recent report by the Union of Concerned Scientists found that in their intermediate global sea level rise scenario of 4 feet by 2100, more than 270 communities in the United States will face

¹¹⁵ Owens, "Soaked: A Policy Agenda to Prepare for a Climate-Triggered Housing Crash," 12

¹¹⁶ "First Street Foundation Releases New Data Disclosing Flood Risk of Every U.S. Home," *First Street Foundation*, June 2020,

<https://firststreet.org/press/2020-first-street-foundation-flood-model-launch/>

¹¹⁷ Kunreuther et al., "Flood Risk and the U.S. Housing Market."

chronic inundation by 2060 with more than 10 percent of the land experiencing flooding 26 times per year.”¹¹⁸

10. Some government programs and interventions that mitigate disaster-related credit losses at the regulated entities are not available to all mortgage market participants and may not be available to the regulated entities in the future. How, if at all, should FHFA consider current risk mitigants and their uncertain future availability in its supervision and regulation of each regulated entity’s management of climate and natural disaster risk?

N.A.

11. What risks to the regulated entities’ critical service providers and other third parties—including but not limited to mortgage servicers and insurers—should FHFA consider when assessing each regulated entity’s management of climate and natural disaster risk?

N.A.

12. What differences between the Enterprises and the FHLBanks should FHFA consider in tailoring its supervision and regulation of each regulated entity’s management of climate and natural disaster risk?

N.A.

13. Should FHFA implement a stress testing, scenario analysis, or similar program to assess the regulated entities’ climate and natural disaster risk? If so, what factors should FHFA consider in defining the purposes, design, and scenarios of any such programs?

Yes, the FHFA should implement a stress testing, scenario analysis, or similar programs to assess the regulated entities’ climate and natural disaster risk. See also recommendations on Question 7. We recommend such an effort consider including the following components:

A. FHFA should co-convene a working group across financial regulators to discuss scenario analysis.

Given the shared challenge, but the specific nature of climate change risks to the housing stock and to FHFA regulated entities, it may be prudent, for example, to enlist the White House’s Council for Environmental Quality (CEQ) to facilitate a working group of science, housing

¹¹⁸ “When Rising Seas Hit Home: Hard Choices Ahead for Hundreds of US Coastal Communities,” *Union of Concerned Scientists*, July 5, 2017, <https://www.ucsusa.org/resources/when-rising-seas-hit-home>

finance agencies and other financial regulators to share learning and develop a joint approach and best practice to climate scenario analysis. This could include NOAA, HUD, USDA (office of small housing), Farmer Mac and others.

See also response to Question 24.

B. FHFA should create a climate scenario analysis program tailored to its mission, priority risks, and that leverages shorter-term opportunities to mitigate climate risks and build resilience in US housing stock.

While much uncertainty remains, a climate scenario analysis program should, at minimum:

- Integrate scenarios for each of the potential temperature scenarios;
- Integrate stress testing that includes quantitative impacts to GSE-held capital;
- Evaluate scenarios that impact underserved markets;
- Consider analysis for similar regions in the US that are prone to the same disaster would have different housing stock and demographics; and,

14. Are there alternative risk mitigation strategies, including but not limited to insurance or insurance-based financial instruments, that could transfer risk from the regulated entities' portfolios or products or assist with the market pricing of climate and natural disaster risks?

Climate risk must be addressed by every sector of our society. But it is important for FHFA not to push its risk onto others including the insurance sector. If FHFA could appropriately quantify climate risk and price it accordingly, investors may determine whether a secondary market is possible. This will require FHFA, other government entities and private sector insurance, developers, investors and others to work collaboratively.

A. FHFA should explore protecting against earthquake risks on the balance sheet as it does with flood risk.

FHFA requires insurance against flood in high risk areas, but does not do so against earthquakes, a position they may wish to revisit so the risk doesn't end up strictly with borrowers. Keeping the flood and quake risk map up to date with the latest science is also important. For risk that does end up on their balance sheet, FHFA can purchase (re)insurance, and/or issue catastrophe bonds. (See also response to Question 4). Finally, FHFA can encourage risk mitigation at the property (quake) and regional (flood, wildfire) level.

15. How might the regulated entities support their housing finance missions while minimizing the impact of climate and natural disaster risk?

To ensure the regulated entities support their housing finance missions while minimizing climate and natural disaster risk, we recommend the following (in addition to recommendations in response to Question 4):

A. FHFA should continue and expand the use of green bonds and lending, setting targets

Ceres supports the green bond programs underway at Fannie Mae and Freddie Mac. Green financing must become the status quo. We urge FHFA to study these viable and important programs, identify best practices and opportunities for growth, and facilitate their expansion to leverage strategic opportunities for climate mitigation and adaptation.

Fannie Mae issued \$87.5B in Multifamily Green Bonds¹¹⁹ and \$94 million Single-Family Green Bonds¹²⁰ through year-end 2020. Freddie Mac issues Green Bonds through their Multifamily Business. The Multifamily business has done over \$56 billion in Green Advantage Loans 2016 through 2019.¹²¹ Since first issuing Green Bonds, they have created a Sustainable Bond framework and issued additional securities under the green and/or social definitions.

Specifically, we support further expansion of Fannie Mae's Single-Family Green Bonds program to the scale of the Multifamily Program, and we would encourage Freddie Mac and the FHA to move in this direction as well.

B. All multifamily loans purchased by Fannie Mae and Freddie Mac should meet scaled green standards that conserve water, energy and reduce carbon emissions.

According to the Green Impact Reports published this year by Fannie Mae¹²² and Freddie Mac,¹²³ their green financing programs are projected to conserve billions of gallons and kilo british thermal units (Kbtus) of water and energy while also supporting reductions in property owners' and families utility costs. The definition of green standards will be key to the success of this effort. The GSEs and FHFA would need to calibrate on the level of green standards that properties' can viably make given the properties' construction and current condition, and the level of capital required to achieve them while maintaining affordable rents.

C. All single family mortgages purchased by Fannie Mae and Freddie Mac for newly constructed loans should meet or exceed current ENERGY STAR certifications.

¹¹⁹ "Multifamily Green MBS," *Fannie Mae*, accessed April 2021, <https://capitalmarkets.fanniemae.com/sustainable-bonds/green-bonds/multifamily-green-mbs>

¹²⁰ "Single-Family Green MBS," *Fannie Mae*, accessed April 2021, <https://capitalmarkets.fanniemae.com/sustainable-bonds/green-bonds/single-family-green-mbs>

¹²¹ "Impact Bonds," *Freddie Mac Multifamily*, accessed April 2021 <https://mf.freddiemac.com/investors/impact-bonds.html>

¹²² "A Decade of Positive Impact - Multifamily Green Bond Impact Report 2019," *Fannie Mae*, 2019, <https://multifamily.fanniemae.com/media/8921/display>

¹²³ "Green Bond Impact Report 2019," *Freddie Mac Multifamily*, 2019, https://mf.freddiemac.com/docs/2019_green_bond_impact_report.pdf

In the United States, developers build around 1 million units of single family housing every year. If all of these homes were built to ENERGY STAR standards, we could increase energy efficiency and make an impact on carbon emissions while at the same time lowering utility expenses for homeowners. While the GSEs do not provide construction financing, the GSEs' requirement that loans it purchases are backed by collateral meeting ENERGY STAR standards would signal to developers the importance of the standard. Particularly for large-scale single-family developers that utilize similar floorplans, there would be relative ease in adopting this standard.

For both these recommendations,¹²⁴ a step-up timeline would be developed to ensure that the critical actors in the housing market, from developers of new homes and multifamily properties to construction teams to appraisers, were given time to learn the new standards and to develop the appropriate skills, where needed.

16. Market discipline could potentially supplement FHFA's supervision and regulation of the regulated entities' climate and natural disaster risk appetite and management. Market discipline depends in part on the information that is available to shareholders, creditors, and other counterparties. Is the existing publicly available information sufficient for shareholders, creditors, CRT and other investors, and other counterparties to understand and exercise market discipline over a regulated entity's appetite for and management of climate and natural disaster risk? If not, what changes are needed? Should each regulated entity be required to disclose additional information, including but not limited to the extent to which its underwriting practices take into account climate and natural disaster risk?

No, today the existing publicly available information is not sufficient for the management of climate and natural disaster risk by shareholders, creditors, CRT and other investors. Considerable information asymmetries exist between consumers, insurers, regulators, and other financial entities. For example, millions of renters and homeowners are not aware of their level of risk, and federal analysis of populations at risk of flood is incomplete. A 2018 study found that over almost 41 million people - more than three times the estimate by FEMA - "live within the 1% annual exceedance probability floodplain"¹²⁵ and that "no comprehensive estimate of US population exposure currently exists."

Recent empirical research suggests that regulated entities may be making securitization decisions based on climate and natural disaster risk of properties that is not disclosed to the GSEs.¹²⁶

¹²⁴ Bob Simpson, "Making every loan a green loan," *Housing Wire*, September 2020, <https://www.housingwire.com/articles/making-every-loan-a-green-loan/>

¹²⁵ Oliver E J Wing et al., "Estimates of present and future flood risk in the conterminous United States," *Environmental Research Letters* 13, no. 3 (2018), <https://iopscience.iop.org/article/10.1088/1748-9326/aaac65>

¹²⁶ Kahn M.E., and Ouazad, A., 2019, When Climate Change Leads to Mortgage Defaults, Simple steps to make sure lenders and homebuyers — not taxpayers — bear the risk, Bloomberg Opinion.

Some climate data is beginning to be made available to potential homebuyers through data aggregators like Realtor.com or through local ordinances. However, the lack of a federal disclosure requirement for a property's climate risk (outside of what is required for Special Flood Hazard Areas) is not in keeping with the climate science, and the level of climate risk that is reliably projected to occur. FHFA has a statutory mandate to address these information asymmetries, increase information-flow in the market and therefore protect borrowers.

- A. Climate risk data should be made available to the GSEs, homebuyers, lenders, and investors, so they have an accurate picture of the risks posed by sea-level rise, coastal and river flooding, wildfires, and other perils before they invest. Everyone should have a right to know their climate risk.**

This data could be housed in the National Mortgage Database, which was developed in partnership with FHFA and the Consumer Financial Protection Bureau. Good data—followed by the implementation of national standards for disclosure for all residential real estate transactions—would make coastal and inland real estate markets more transparent, and ultimately facilitate adaptation and importantly, retreat, through more accurate pricing of climate-related risks. The GSEs, lenders and other parties would equally access this information at the time of loan origination and underwriting, so the same information would be available to homeowners and investors.

See also response to Question 3.

17. What, if any, additional periodic or episodic reporting requirements for the regulated entities should FHFA consider to improve the publicly available information on the regulated entities' management of climate and natural disaster risk?

There is not sufficient transparency to the public and to Congress about the management of climate and natural disaster risk. This could be improved by adopting the following recommendations:

- A. FHFA should report annually to the public and Congress, at a minimum, on its work to address and manage climate and natural disaster risk.**
- B. GSEs should produce a report to the FHFA on their strategy, policies and practices to address climate risk, to inform FHFA annual reports to the public and Congress.**
- C. FHFA should conduct a disclosure audit of the data available, such as the existing data points available at the GSEs to address climate risk, as a basis to develop a more long-term approach to disclosure.**

<https://www.bloomberg.com/opinion/articles/2019-10-03/when-climate-change-leads-to-mortgage-defaults?sref=hG59g5b4>

D. FHFA should conduct a review of the systems used by the Dept. of Energy and the EPA to rate climate and clean energy performance of regulated entities, to draw lessons on disclosure, metrics, governance, procedures and validation.

18. Policies to manage climate and natural disaster risk could increase the cost of housing, making it more difficult for lower income households in some areas to obtain affordable housing. Are there policies the regulated entities could pursue to mitigate such adverse effects for lower income households in vulnerable areas without undermining efforts to manage climate and natural disaster risk?

N.A.

19. Minority borrowers exhibit higher rates of delinquencies for longer durations following natural disasters. Are there policies the regulated entities could pursue to mitigate such adverse effects for minority borrowers exposed to climate and natural disaster risk?

N.A.

20. What type of organizational structures should FHFA and the regulated entities consider adopting for themselves to support the management of climate and natural disaster risk?

A. FHFA should join interagency bodies that address this issue.

See response to Question 24 and 13a.

B. FHFA should establish an External Advisory Committee on Climate.

The RFI and Listening Session processes have made clear the range of highly qualified stakeholders that are prepared to support the FHFA's mission and that are motivated to protect our most vulnerable citizens. We recommend establishing an Advisory Committee to complement FHFA staff research and investigate and address a range of topics covered by the RFI, to ensure priority treatment of key issues, coordination amongst other federal agencies and outside stakeholders. Amongst other duties, the committee could identify focus groups needed to gather information, examine various climate risks, and recommend a set of standard data collection tools.

The Committee could include subcommittees covering the following topics:

- Addressing climate risks and impacts to underserved and/or vulnerable communities
- Standard setting (short, medium and long term)
- Disclosure

- Product development
- Performance tracking
- Stress testing and scenario analysis
- Managed retreat

The Committee should seek opinions from many sectors including:

- Different types of investors
- Climate experts, including GHG emissions disclosure, accounting and standard setting organizations
- Non profit housing organizations
- Different types of housing developers
- Community and tenant organizations
- Low and moderate income tenant organizations
- Civic and governmental leaders
- Select ESG reporting organizations such as the Sustainability Accounting Standards Board

21. What specific issues or topics should FHFA consider for future research on climate and natural disaster risk to the regulated entities and the national housing finance markets?

We appreciate FHFA's effort to conduct research and seek outside support for research, including this process. We also believe that continued research is critical within FHFA and it is important to deepen your expertise in these issues.

A. FHFA should study existing mechanisms that already incorporate green criteria that mitigate or adapt to climate change and serve affordable housing.

Currently Qualified Allocation Protocols (QAP) for Low Income Housing Tax Credits (LIHTC) within each state currently require or allocate points towards properties that are built with green features or are built to green certifications or standards. Given the critical role that LIHTC plays particularly within the multifamily affordable market, FHFA can conduct a comprehensive study to understand the role the extent that LIHTC deals closed by the GSEs contribute to the GSEs greenhouse gas footprint and how they perform in the market.¹²⁷

¹²⁷ "State Strategies To Increase Energy And Water Efficiency In Low Income Housing Tax Credit Properties," *Energy Efficiency for All*, accessed April 2021, https://assets.ctfassets.net/ntcn17ss1ow9/7r1ftuS6Fp6ExJ09xGCSeN/6fa5b2b51a60a8dd024864a23d9f0eba/Energy_Efficiency_Strategies_in_LIHTC_properties.pdf

22. What data or housing market information would be beneficial for FHFA to make available, to the extent permitted by privacy considerations, to researchers and other interested parties to support the assessment of climate and natural disaster risk to the regulated entities or the national housing finance markets?

See response to Question 16.

23. What factors should FHFA consider in determining whether to formally participate in or informally partner with organizations or groups focused on climate and natural disaster risk management?

Climate risks is a complex issue and needs many different perspectives working on this to properly assess the risks. FHFA's perspective is critical and needed within the many US-based and international organizations working to address climate and natural disaster risk management.

Factors that FHFA should consider when deciding to partner with these organizations include:

- Existing expertise on the US housing market within the organization or represented by other entities. Most organizations lack this expertise and FHFA's perspective, expertise and knowledge will be invaluable.
- Recognition by credible investors with established ESG or sustainability strategies. There are many organizations that are newly started to address these issues however there are limited ones that have received consistent recognition by investors.
- International versus national scope. While FHFA's purview is within the US, FHFA should consider engaging with a limited set of organizations with a global scope. This is critical for two reasons: the GSEs' securities are traded globally, and therefore subject to international investors' market and regulatory requirements; and, second, international organizations often set market rules that are not in-line with the unique characteristics of the US housing and mortgage markets.

See response to question 26 for additional recommendations.

24. Are there existing or potential government agencies or programs that FHFA could partner with to enhance the Agency's supervision and regulation of climate and natural disaster risk to the regulated entities?

We believe that more coordination with other federal and state agencies is critical. Data quality and data uncertainty varies considerably across models and providers, and FHFA and other

regulators should work collectively to identify a common, trusted data set and to pinpoint private models or data that are not effective for the purposes of climate risk analysis.^{128 129 130}

A. FHFA should participate in a government-wide interagency task force composed of climate scientists, modelers, as well as regulators.

We recommend requesting the White House to establish an inter-agency task force of federal agencies to explore climate and natural disaster risk issues. There must be more active and ongoing coordination with other federal agencies. There are different data sources used by different agencies, but not enough sharing of climate risk information and best practice in risk assessment and management. These include but are not limited to the US Dept of Housing and Urban Development (and their many programs including Federal Housing Administration), Federal Emergency Management Administration, NOAA and NASA climate data, US EPA, Federal Reserve, OCC and FDIC for banking regulations and many others.

In response to Question 13, we propose an inter-agency task force specifically on scenario analysis, but the group suggested above could go beyond that mandate.

25. What, if any, other enhancements should FHFA consider to its supervision and regulation of each regulated entity's management of climate and natural disaster risk? Other enhancements could include but need not be limited to: (i) regulatory capital requirements or other loss absorbing capacity requirements that ensure each regulated entity has the capacity to absorb impacts of climate and natural disaster risk; (ii) disclosure requirements to provide shareholders, creditors, CRT or other investors, and other counterparties with appropriate information about a regulated entity's climate and natural disaster risk; and (iii) changes to FHFA's supervisory program to enhance examination of or reporting on each regulated entity's infrastructure and processes for identifying, assessing, mitigating, and monitoring the regulated entity's management of climate and natural disaster risk.

This has been addressed in prior responses.

¹²⁸ Zack Colman, "Garbage' models and black boxes? The science of climate disaster planning," *Politico*, March 16, 2021, <https://www.politico.com/news/2021/03/16/climate-change-murky-models-476316>

¹²⁹ "Managing Climate Risk in the U.S. Financial System," *CFTC*

¹³⁰ "Overview of Environmental Risk Analysis by Financial Institutions," *Network for Greening the Financial System*, September 2020, https://www.ngfs.net/sites/default/files/medias/documents/overview_of_environmental_risk_analysis_by_financial_institutions.pdf

26. To what extent, if any, should FHFA support efforts to develop standards of classification and data reporting on climate and natural disaster risk to the financial performance of companies, such as those by the Sustainability Accounting Standards Board, domestic and foreign government agencies, or others?

To the extent possible, FHFA should engage with and feed into international efforts to establish consistent standards in the tracking and reporting on climate and disaster risk. We recommend FHFA explore engagement and partnership with the following efforts underway including:

- Task Force on Climate-related Financial Disclosures (TCFD) - The TCFD was created by the Financial Stability Board to develop recommendations for more effective climate-related disclosures that “enable stakeholders to understand better the concentrations of carbon-related assets in the financial sector and the financial system’s exposures to climate-related risks.” The TCFD recommendations call for disclosures on governance, risk management, goals and targets, and performance, topics that have specifically been identified by financial market stakeholders as being most relevant for decision-useful climate risk disclosure. Since the release of the recommendations in 2017, the TCFD has garnered strong support from investors, companies, and governments worldwide. It is strongly supported by major investors and companies, including 1,340 organizations with a \$12.6 trillion market capitalization and financial institutions responsible for assets of \$150 trillion. These include 340 investors with approximately \$34 trillion in assets under management.¹³¹ Global financial regulators, including New Zealand, the U.K, and Switzerland, are already starting to integrate the TCFD into their financial disclosure rules.^{132 133 134}
- EU Taxonomy process¹³⁵ - “The EU Taxonomy is a tool to help investors, companies, issuers and project promoters navigate the transition to a low-carbon, resilient and resource-efficient economy. The Taxonomy sets performance thresholds (referred to as ‘technical screening criteria’) for economic activities which:

¹³¹ “Supporters,” *Task Force on Climate-related Financial Disclosures*, accessed February 2021, <https://www.fsb-tcfd.org/tcfd-supporters/>

¹³² “Mandatory climate-related financial disclosures,” *Ministry for the Environment*, accessed February 2021, <https://www.mfe.govt.nz/climate-change/climate-change-and-government/mandatory-climate-related-financial-disclosures>

¹³³ Dieter Holger and Emese Bartha, “U.K Requires Companies to Report on Climate Change by 2025,” November 9, 2020, <https://www.wsj.com/articles/u-k-requires-companies-to-report-on-climate-change-by-2025-11604964183#:~:text=The%20U.K.%20said%20that%20companies.curb%20their%20greenhouse%20gas%20emission>

¹³⁴ “Switzerland promotes transparency on climate-related financial risks,” *Federal Department of Finance*, accessed February 2021, <https://www.admin.ch/gov/en/start/documentation/media-releases.msg-id-81924.html>

¹³⁵ “Taxonomy: Final report of the Technical Expert Group on Sustainable Finance,” *EU Technical Expert Group on Sustainable Finance*, March 2020, https://ec.europa.eu/info/sites/info/files/business_economy_euro/banking_and_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy_en.pdf

- make a substantive contribution to one of six environmental objectives;
 - Climate change mitigation
 - Climate change adaptation
 - sustainable and protection of water and marine resources
 - transition to a circular economy
 - pollution prevention and control
 - protection and restoration of biodiversity and ecosystems
- do no significant harm (DNSH) to the other five, where relevant;
- meet minimum safeguards (e.g., OECD Guidelines on Multinational Enterprises and the UN Guiding Principles on Business and Human Rights).

The performance thresholds will help companies, project promoters and issuers access green financing to improve their environmental performance, as well as helping to identify which activities are already environmentally friendly. In doing so, it will help to grow low-carbon sectors and decarbonise high-carbon ones.”

- SASB:¹³⁶ -
 - “SASB’s *Technical Bulletin on Climate Risk* is designed to help investors better understand, measure, and manage their exposure to climate-related risk. The research finds that climate change materially affects nearly every industry, but manifests differently from one industry to the next. Investors can’t simply diversify away from climate risk; instead they must focus on managing it—and on encouraging portfolio companies to manage it—in all its forms.”
 - “*Converging on Climate Risk* demonstrates the alignment of SASB’s and CDSB’s approaches to climate-related disclosure with the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD). The TCFD recommendations, issued in June 2017, marked an important turning point for the resilience of global financial markets, providing a foundation to improve the ability of markets to properly report, assess, and price climate-related risks and opportunities.”¹³⁷

¹³⁶ “Climate Risk – Technical Bulletin,” SASB, October 2016, <https://www.sasb.org/knowledge-hub/climate-risk-technical-bulletin/>

¹³⁷ “Converging on Climate Risk: CDSB, the SASB, and the TCFD,” SASB, September 2017, <https://www.sasb.org/knowledge-hub/converging-on-climate-risk/>

APPENDIX 1

Expanded rationale for the examination of the implications of systemic racism on worsening the climate risk exposure of vulnerable communities, including their financial and real estate assets

While scientists have recognized the potential for climate-driven economic disruption for decades, systemic racism has been a defining feature of the American economy for centuries. The killings of Ahmaud Arbery, George Floyd, Breonna Taylor sparked a national outcry that forced a national reckoning with how public and private sector actors have contributed to and benefited from white supremacy.

The impact of centuries of racism has led to astonishing wealth gaps.¹³⁸ The net worth of a typical white family in the U.S. is nearly 10 times greater than that of a typical Black family. Research from the Fed demonstrates that the median and mean family wealth of Black and Hispanic families is less than 15 percent of that of white families¹³⁹, and such disparities are likely to persist across family life cycles. This disparity has contributed to long standing health, educational and social inequities.

These inequities have meant that climate change impacts - both the causes and the consequences - also fall harder on communities of color.¹⁴⁰ Numerous studies have shown that high polluting power plants and refineries are more often sited closer to African American communities than white communities, in part because of historic redlining practices.¹⁴¹ This has resulted in poor air quality¹⁴² and adverse health impacts in those communities.¹⁴³ An analysis of 108 U.S. cities found that poor urban neighborhoods are disproportionately hotter than wealthier urban neighborhoods, and that the communities facing the greatest exposure to extreme heat are also severely lacking social and ecosystem services.¹⁴⁴ Extreme heat is considered one of the most serious threats to human health in urban areas. One study found that geographic

¹³⁸ Kriston McIntosh et al., “Examining the Black-white wealth gap,” *The Brookings Institution*, February 27, 2020, <https://www.brookings.edu/blog/up-front/2020/02/27/examining-the-black-white-wealth-gap/>

¹³⁹ Neil Bhutta et al., “Disparities in Wealth by Race and Ethnicity in the 2019 Survey of Consumer Finances,” *Board of Governors of the Federal Reserve System*, September 28, 2020, <https://www.federalreserve.gov/econres/notes/feds-notes/disparities-in-wealth-by-race-and-ethnicity-in-the-2019-survey-of-consumer-finances-20200928.htm>

¹⁴⁰ Stephanie Gagnon, “The Link Between Systemic Racism and Climate Change in the U.S.” *Climate Scorecard*, September 5, 2020, <https://www.climatescorecard.org/2020/09/the-link-between-systemic-racism-and-climate-change-in-the-u-s/>

¹⁴¹ Daniel Cusick, “Past Racist “Redlining” Practices Increased Climate Burden on Minority Neighborhoods”, *Scientific American* January 21, 2020, <https://www.scientificamerican.com/article/past-racist-redlining-practices-increased-climate-burden-on-minority-neighborhoods/>

¹⁴² Ihab Mikati, et al., “Disparities in Distribution of Particulate Matter Emission Sources by Race and Poverty Status,” *American Public Health Association*, April 2018, <https://ajph.aphapublications.org/doi/abs/10.2105/AJPH.2017.304297>

¹⁴³ “Disparities in the Impact of Air Pollution,” *American Lung Association*, April 20, 2020, <https://www.lung.org/clean-air/outdoors/who-is-at-risk/disparities>

¹⁴⁴ Jeremy Hoffman, Vivek Shandas, and Nicholas Pendleton, “The Effects of Historical Housing Policies on Resident Exposure to Intra-Urban Heat: A Study of 108 US Urban Areas,” *Climate* 8, (2020), <https://doi.org/10.3390/cli8010012>

zones that are more vulnerable to heat have also experienced systematic disinvestment driven by racial bias through redlining practices.¹⁴⁵

These disenfranchised populations are also less likely to receive financial assistance after natural disasters or investments for climate resiliency or climate solutions. A 2018 Rice University study found that natural disasters widen racial gaps.¹⁴⁶ While white communities saw an increase in average wealth after natural disasters, minority communities saw a drop. The findings also showed that white communities received more aid after natural disasters. A study from the Federal Reserve Bank of San Francisco also found an overlap between communities in need of financial investment and those impacted by extreme weather events.¹⁴⁷

The latest wave of devastating hurricanes, wildfires and other extreme weather events exposed these disparities. Back-to-back hurricanes in Lake Charles, Louisiana, a city where half the population is Black, left tens of thousands without power and water¹⁴⁸ amid suffocating heat and humidity. California's record wildfires caused poor air quality for everyone, but African Americans -- who are more likely to have asthma -- suffered more.¹⁴⁹

The coronavirus pandemic has worsened broad disparities

The coronavirus pandemic has worsened the burdens faced by communities of color, and that burden has been exacerbated by a lack of equitable access to economic relief. More than 440,000 more African American businesses¹⁵⁰ have been closed than have white-owned businesses, or 41%, compared to 17%, since the start of the pandemic.

Discrimination in lending contributes significantly to racial disparities in small business survival rates, with borrowers of color confronting discrimination from the onset of the lending process. A National Community Reinvestment Coalition (NCRC) investigation found that African American testers applying for Payroll Protection Program (PPP) loans for their small businesses during the pandemic were likely to receive less information or encouragement to apply than white testers. Black- and Latin American-owned businesses also had less access to loan modifications.¹⁵¹

¹⁴⁵Bev Wilson, "Urban Heat Management and the Legacy of Redlining," *Journal of the American Planning Association* 86, no.4 (2020): 443-457,

<https://www.tandfonline.com/doi/full/10.1080/01944363.2020.1759127>

¹⁴⁶ Amy McCaig, David Ruth and Kathryn Fike, "Natural disasters widen racial wealth gap," *Rice University*, August 20, 2018,

<https://news.rice.edu/2018/08/20/natural-disasters-widen-racial-wealth-gap-2/>

¹⁴⁷ Elizabeth Mattiuzzi, "Climate Adaptation Investment and the Community Reinvestment Act," *Federal Reserve Bank of San Francisco*, June 2019.

<https://www.frbsf.org/community-development/files/climate-adaptation-investment-and-the-community-reinvestment-act.pdf>

¹⁴⁸ Sarah Gibbens, "After record-setting hurricane damage, Louisiana town struggles to rebuild", *National Geographic*, September 2020,

<https://www.nationalgeographic.com/science/2020/09/louisiana-struggles-to-recover-hurricane-laura-lake-charles/#close>

¹⁴⁹ Lee Romney, "Poverty and Racism Leave People More Vulnerable Wildfire Smoke", *KPBS*, September 7, 2020, <https://www.kpbs.org/news/2020/sep/07/poverty-and-racism-leave-people-more-vulnerable-wi/>

¹⁵⁰ Rodney Brooks, "National Geographic, "More than half of black-owned businesses may not survive COVID-19," *National Geographic*, July 17, 2020,

<https://www.nationalgeographic.com/history/2020/07/black-owned-businesses-may-not-survive-covid-19/>

¹⁵¹Anneliese Lederer and Sara Oros, "Lending Discrimination Within the Paycheck Protection Program," *National Community Reinvestment Coalition*, July 2020,

<https://ncrc.org/lending-discrimination-within-the-paycheck-protection-program/>

Ultimately, only around one in 10 Black and Latinx businesses received assistance they requested under the PPP.¹⁵²

Even the first stimulus recovery package passed by Congress last spring was distributed unevenly. 74 % of eligible white adults received stimulus checks, in contrast to 69 % of Black Americans and 64 % of Latin Americans.¹⁵³

NCRC recently released a major report¹⁵⁴ finding significant correlations between historical redlining practices and present day susceptibility to COVID. In the 1930s, the Home Owners Loan Corporation (HOLC) commissioned the production of maps that rated neighborhoods based on the risk of lending in them. Working class and minority neighborhoods usually received the riskiest designation of hazardous. The designations subsequently facilitated redlining and discrimination against these neighborhoods, which remain deprived of credit and are predominantly lower-income and minority neighborhoods to this day. These neighborhoods also have the highest incidence of health conditions such as asthma, diabetes, kidney disease and stroke, all conditions that make residents more susceptible to COVID-19. Life expectancy is almost four years lower in the redlined communities than the neighborhoods not designated as hazardous by HOLC.

¹⁵² “Federal Stimulus Survey Findings,” *Global Strategy Group for Color of Change*, May 18, 2020, <https://theblackresponse.org/wp-content/uploads/2020/05/COC-UnidosUS-Abbreviated-Deck-F05.13.20.pdf>

¹⁵³ Janet Holtzblatt and Michael Karpman, “Who Did Not Get the Economic Impact Payments by Mid-to-Late May, and Why?” *Tax Policy Center*, July 16, 2020, <https://www.taxpolicycenter.org/publications/who-did-not-get-economic-impact-payments-mid-late-may-and-why/full>

¹⁵⁴ “Redlining and Neighborhood Health,” *National Community Reinvestment Coalition*, September 2020, <https://ncrc.org/holc-health/>

APPENDIX 2

Recommendation Summary

Ceres believes it is time to write climate risks into the rules of the housing market. To meet its statutory obligations, FHFA must make investments to better understand their climate exposure and develop policies to better price climate risk into the mortgage market.

I. Identifying and Assessing Climate and Natural Disaster Risk

1. The federal government should invest in high-quality, asset-level data on all sources of climate risk, including floods, wildfires, sea-level rise, and others.
2. The FHFA should collect and publicly disclose portfolio level and asset level data on climate risks across all perils.
3. Mitigation
 - a. Develop a comprehensive strategy to ensure that every property type plays its part to reach a net zero target based on climate risk assessments of the regulated entities and their portfolios.
 - i. Ceres recommends that FHFA support a goal to reduce absolute carbon emissions from the US housing stock by 50% by 2030 and by 100% by 2050.
 - b. Increase incentives to reduce GHG emissions from existing and new housing stock
 - c. Co-convene an inter-agency process with regulated entities and outside experts to:
 - i. Build a collective vision for Zero Carbon housing stock
 - ii. Frame a residential decarbonization road map and policies required to reduce GHG emissions by 50% by 2030 and by 100% by 2050.
 - iii. Facilitate analysis and discussion on options for housing and other agencies to advance the goals of such a roadmap. For example: Evaluating building material and housing certification programs to identify opportunities to reduce environmental and GHG impacts.
 - iv. Strengthen homebuyer time-of-sale disclosures.
 - v. Modernize FHA and HUD energy-efficiency mortgages.
4. Adaptation
 - a. Develop a comprehensive strategy to address the financial risk the GSEs have assumed by securitizing loans at varying risk of weather-related default based on climate risk assessments of the regulated entities and their portfolios.
 - b. Get pricing right
 - c. Include climate risk in capital requirements
 - d. PMIERS (Private Mortgage Insurer Eligibility Requirements)
 - e. Minimize disparate impacts
 - f. Explore policies, incentives and promote research for managed retreat as a policy option to complement other adaptation policy tools
5. Resilience
 - a. Explore opportunities to modernize rules for rebuilding after a disaster.
 - b. Explore expanded use of catastrophe bonds

II. Enhancing FHFA's Supervisory and Regulatory Framework

6. FHFA should acknowledge that climate change poses a systemic financial risk
7. FHFA should consider adoption the CFTC report's definition of "sub-systemic" shocks as it analyzes vulnerabilities
8. FHFA should immediately assess the climate change exposure of mortgage holdings of the GSEs and the Federal Home Loan Banks, keeping in mind up-to-date projections on the impacts of climate change on commercial and residential properties.
9. Fannie and Freddie should undertake a climate risk assessment to:
 - a. Properly account for the financial risk the GSEs have assumed by securitizing loans at varying risk of weather-related default, including exposure to storm surges, increased nuisance flooding, sea-level rise, and wildfires.
 - b. Assess impact to vulnerable and underserved populations
10. FHFA should establish baselines to assess GSEs 1) contribution to GHG emissions and 2) their relative readiness to mitigate climate change and protect their portfolios from exposure to climate and natural disaster risk.
11. FHFA should establish a framework to evaluate GSE performance on GHG emissions reductions and readiness to mitigate and adapt to climate change.
12. FHFA should develop a strategy to address risks of disclosure on groups that have been historically pushed into low-lying and highest-risk areas.
13. FHFA should explore opportunities within every element of the loan processing to address climate risks. A few examples include:
 - a. Appraisal
 - b. Underwriting
 - c. Products
 - d. Asset Management/Servicing
14. FHFA should begin a process to update its Examination Manual to include climate change considerations.
15. FHFA should acknowledge the U.S. government's official position on the scientific consensus on the causes, occurrence, and impacts of climate change, and the goals and U.S. contribution to reduce climate change as part of the Paris Agreement.
16. FHFA should focus on climate and natural disaster risks that currently expose the physical and financial assets of our most vulnerable citizens and homeowners including those that rely on affordable subsidized housing and very low- to low-income families.
17. In particular, FHFA should prioritize water-related risks to these communities. This includes flooding and beach erosion.
18. The FHFA should implement a stress testing, scenario analysis, or similar programs to assess the regulated entities' climate and natural disaster risk.
19. FHFA should co-convene a working group across financial regulators to discuss scenario analysis.
20. FHFA should create a climate scenario analysis program tailored to its mission, priority risks, and that leverages shorter-term opportunities to mitigate climate risks and build resilience in US housing stock.
21. FHFA should explore protecting against earthquake risks on the balance sheet as it does with flood risk.

22. FHFA should continue and expand the use of green bonds and lending, setting targets.
23. All multifamily loans purchased by Fannie Mae and Freddie Mac should meet scaled green standards that conserve water, energy and reduce carbon emissions.
24. All single family mortgages purchased by Fannie Mae and Freddie Mac for newly constructed loans should meet or exceed current ENERGY STAR certifications.
25. Climate risk data should be made available to the GSEs, homebuyers, lenders, and investors, so they have an accurate picture of the risks posed by sea-level rise, coastal and river flooding, wildfires, and other perils before they invest.
26. FHFA should report annually to the public and Congress, at a minimum, on its work to address and manage climate and natural disaster risk.
27. GSEs should produce a report to the FHFA on their strategy, policies and practices to address climate risk, to inform FHFA annual reports to the public and Congress.
28. FHFA should conduct a disclosure audit of the data available, such as the existing data points available at the GSEs to address climate risk, as a basis to develop a more long-term approach to disclosure.
29. FHFA should conduct a review of the systems used by the Dept. of Energy and the EPA to rate climate and clean energy performance of regulated entities, to draw lessons on disclosure, metrics, governance, procedures and validation.
30. FHFA should establish an External Advisory Committee on Climate.
31. FHFA should study existing mechanisms that already incorporate green criteria that mitigate or adapt to climate change and serve affordable housing.
32. FHFA should participate in a government-wide interagency task force composed of climate scientists, modelers, as well as regulators.

About Ceres

Ceres is a nonprofit organization working with the most influential capital market leaders to solve the world's greatest sustainability challenges. Through our powerful networks and global collaborations of investors, companies and nonprofits, we drive action and inspire equitable market-based and policy solutions throughout the economy to build a just and sustainable future. For more information, visit ceres.org and follow [@CeresNews](https://twitter.com/CeresNews).

About Ceres Accelerator for Sustainable Capital Markets

The [Ceres Accelerator for Sustainable Capital Markets](https://ceres.org/accelerator) is a center within Ceres that aims to transform the practices and policies that govern capital markets in order to reduce the worst financial impacts of the climate crisis. It spurs action on climate change as a systemic financial risk -- driving the large-scale behavior and systems change needed to achieve a net-zero emissions economy. For more information, visit ceres.org/accelerator.