



April 19, 2021

The Honorable Mark Calabria  
Director  
Federal Housing Finance Agency  
Office of the Director  
400 7<sup>th</sup> Street, SW, 10<sup>th</sup> Floor  
Washington, DC 20219

**RE: Response to FHFA's Climate and Natural Hazard Risk RFI**

Dear Director Calabria

Thank you for the opportunity to respond to the Federal Housing Finance Agency's (FHFA) January 19, 2021 Request for Input (RFI) regarding the impact of climate and natural hazard risk on mortgage finance markets. As a safety and soundness regulator, FHFA has proven itself to be proactive on this issue through the establishment of a new Division of Research and Statistics (DRS) and their subsequent hosting of a robust dialogue regarding climate risks during their biannual economic research summit. The establishment of a Working Group on Climate Natural Disaster Risk is further indication of the Agency's commitment to ensuring a persistent and informed dialogue where all stakeholder views are heard. CoreLogic has appreciated the opportunity to brief the working group on the views of our CoreLogic community of scientists, modelers, civil engineers and actuaries as well as to serve as a discussant during its recent listening sessions which augment the DRS's efforts. Ultimately, CoreLogic agrees with the statement you made during the March 4, 2021 listening session where you stated:

*"I think it's fair to say there may be no part of our financial system that's more vulnerable to climate and natural disasters than our mortgage finance system. It is also critical in my view that we have to examine how our mortgage finance policies may be adversely contributing to climate and natural disaster risk."*

**Market-tested Resources Can Inform Sound Policy Development**

The FHFA regulates and sets policy for the majority of the conforming U.S. mortgage finance market and must continue to take a strategic approach to identifying, measuring and ultimately setting policies to manage climate and natural disaster risks on a year-over-year, standardized, and systematic basis. Because of advancements in science, data assets and modeling, FHFA and their regulated entities are in a much better position today to identify and quantify climate risk exposure. For example, probabilistic risk modeling methods developed in the crucible of the

global and domestic property and casualty insurance markets can help FHFA, government sponsored enterprises (GSEs), servicers and primary market lenders to perform the necessary task of identifying and tracking changes in risks to physical property.

Research around the range of potential physical and meteorological impacts of climate change is an ongoing endeavor. The study of the potential impacts of natural catastrophes has led to the creation of the field of catastrophe risk modeling – quantifying the frequency and severity of potential natural catastrophes as a tool to manage, plan for, and mitigate the risks of such events. These same tools, informed by current scientific consensus, have been adapted to provide the ability to study the potential catastrophic impacts of future climate change. CoreLogic is a leader in catastrophe risk modeling and offers a number of climate-based models including our North Atlantic Hurricane Model that is certified by the Florida Commission on Hurricane Loss Projection Methodology. All of our models build on state-of-the-art science, real-world experience data, engineering insights, and CoreLogic’s extensive property characteristic datasets to support the measurement and management of property level risk.

CoreLogic is committed to supporting the FHFA’s efforts to study the risks and set sound policies informed by science. Solutions must include transparent risk assessments at all components of the U.S. mortgage sector, from origination to servicing, to mortgage risk retained by lending institutions as well as risk contained in securities owned by investors. Entities must also retain the agility to adapt as the scientific consensus evolves. Risk assessments need to be consistent across multiple perils (e.g. hurricane, flood, wildfire, severe convective storm, etc.) in order to quantify risk in an easy to interpret manner. Lastly, any solution must be updated regularly; the longer-duration securities are more likely to be impacted by property-related climate change risks, the understanding of such risks evolves over time, and future infrastructure mitigation projects will modify the risk.

### **Measuring Climate Risk**

The Fourth National Climate Assessment notes “The impacts of global climate change are already being felt in the United States and are projected to intensify in the future—but the severity of future impacts will depend largely on actions taken to reduce greenhouse gas emissions and to adapt to the changes that will occur.” The effects of a changing climate include droughts, flooding from heavy rainfall, and more wildfires and hurricanes. The Climate assessment notes “...neither global efforts to mitigate the causes of climate change nor regional efforts to adapt to the impacts currently approach the scales needed to avoid substantial damages to the U.S. economy, environment, and human health and well-being over the coming decades.”<sup>1</sup> A changing climate presents a cascading series of risks and challenges to the FHFA and its regulated entities. Risk pricing stresses are introduced with an increasing frequency of damaging weather events producing more impairments and defaults, or prepayments from insurance payments on destroyed homes. The correlation of increased natural disaster risk across loans in a mortgage pool can be a substantial source of aggregate risk for holders of

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<sup>1</sup> Reidmiller et. al, “Fourth National Climate Assessment” (2018), available at <https://nca2018.globalchange.gov/>

mortgage backed securities and the regulated entities. Absent active monitoring of portfolio risk, the FHFA rules for purchase and pricing of securitized mortgages could lead to adverse concentrations of risk in the regulated entities.<sup>2</sup> The first step towards managing this increased risk is to measure it.

Loss forecasting for natural disasters is challenging due to the variability inherent in weather. Natural catastrophe risk modeling has evolved in the insurance and government planning industry over the last 30 years, and catastrophe risk models have a track record of supporting a stable risk transfer market for extreme losses due to the weather perils of flooding (coastal and inland), hurricanes, severe convective storms including tornadoes and hail, and wildfires. These models support traditional insurance and reinsurance transactions as well as securitized risk transactions (catastrophe bonds). Natural catastrophe models combine historical disaster information with current demographic, building (age, type, and usage), scientific and financial data to determine the potential cost of catastrophes for a specified geographic area. The models use these vast databases of information to simulate the physical characteristics of thousands of potential catastrophes and project their effects on both residential and commercial property. Traditional catastrophe risk models are based on a static climate regime consistent with the immediate past; these models can use a modified climate regime leveraging forward-looking simulations of the interaction between energy and matter in the ocean, atmosphere, and land based on levels of greenhouse gases emissions. Climate adjusted probabilistic risk models can provide insights into the riskiness of our environment given specific boundary conditions or stress pathways.

The measurement of climate risk relies upon data that is a granular and accurate representation of the risk, and for the FHFA the data is for the portfolios of the regulated entities, as well as the entire footprint of the 100+ million residential structures in the U.S., with building characteristics for location, topography, and other risk factors. A complete understanding of risk includes both individual property risk assessments and an understanding of the single event aggregation of risk potential. Both these elements address risk factors affecting community sustainability as well as financial risks to FHFA.

The best way to measure climate risk is to use industry leading tools that are market-tested in conjunction with data, technology, and internationally recognized climate scenarios for stress testing catastrophe models. CoreLogic recommends the Intergovernmental Panel on Climate Change, or IPCC, as the leading world body for assessing the latest science related to climate change, its impacts, and potential future risks. In order to appropriately manage climate risk on the existing portfolio, FHFA must first conduct a Climate Audit. Next, FHFA should consider policy changes at origination that will allow FHFA and the regulated entities to gather more risk and insurance information at the point of the transaction, to more accurately forecast risk, which will allow FHFA and the regulated entities to implement new policy and create products, pricing strategies, and resiliency measures to mitigate that risk. In addition to origination,

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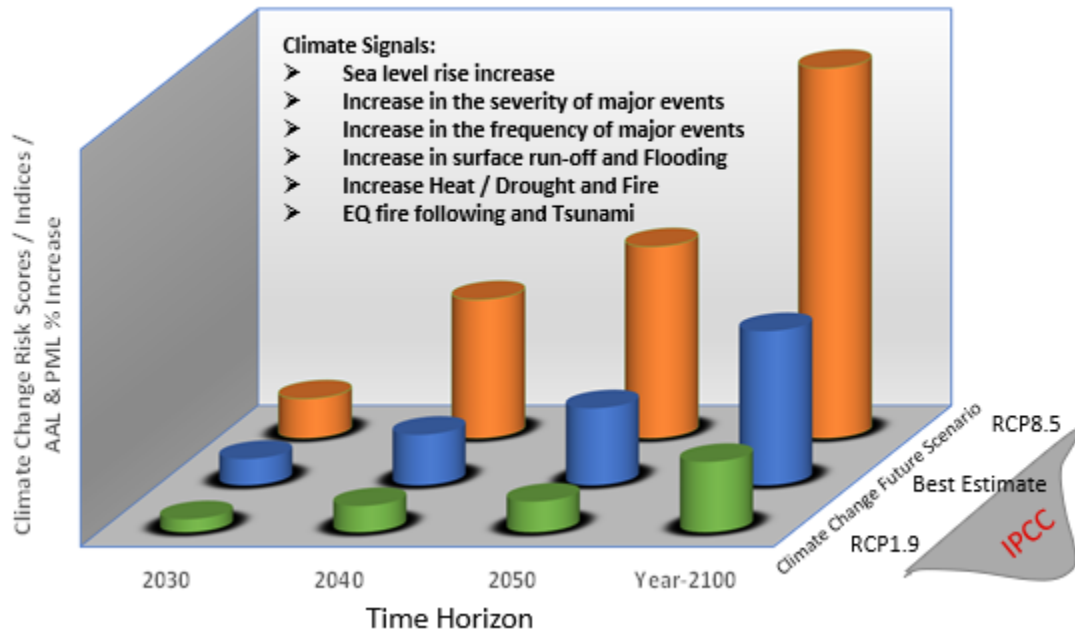
<sup>2</sup> Ouazad & Kahn, "MORTGAGE FINANCE IN THE FACE OF RISING CLIMATE RISK" (September 2019), available at [https://www.nber.org/system/files/working\\_papers/w26322/visions/w26322.rev0.pdf](https://www.nber.org/system/files/working_papers/w26322/visions/w26322.rev0.pdf)

disclosures on GSE securitizations, and updated risk scoring over the life of the loan is recommended as climate science and the rate of change in climate impact are constantly evolving.

### Climate & Natural Disaster Audit – Portfolio Analysis

Loss projection models for natural catastrophes can deliver insights into portfolio exposures due to climate and natural disaster risk. Insights from these analyses include attritional risks from higher levels of low-severity events as well as concentration risks produced by large scale weather events. With this information, FHFA can better identify market dislocations and prioritize new rulemaking. FHFA and the regulated entities should conduct a Climate and Natural Disaster Audit (also known as a Climate Risk Stress Test) on the existing regulated portfolios to assess the total amount of risk based on Natural Disaster Risks. Only by evaluating the entire portfolio, will FHFA be able to assess total risk exposures, correlation risk, concentration risk, and counterparty risk. A Climate Risk Stress Test is defined as using catastrophe risk models, adapted to reflect future climate scenarios, and different time horizons on an existing portfolio of assets to determine overall loss exposures. CoreLogic has adapted our catastrophic risk models to run on various IPCC future scenarios and time horizons, from moderate to severe.

Figure 1 - Impact to risk scores and other risk metric changes based on different IPCC scenarios and time horizons.



Modeling output can quantify both the absolute natural hazard risk to a portfolio and the incremental risk solely from climate change for specific stress scenarios (a stress scenario can be devised from a selected Representative Concentration Pathway, which is a greenhouse gas concentration trajectory adopted by the IPCC, providing time-dependent projections of atmospheric greenhouse gas concentration, noted in the IPCC report). The estimated losses output by the models should be compared to insurance coverage to identify underinsured assets, areas of underinsurance, concentration risk, and counterparty risk. Ultimately, the Audit provides an indication of the distribution of collateral risk from climate change and natural disasters, as well as portfolio risk analytics (including a distribution of climate change affected natural hazards and sea level rise).

FHFA's economists and analysts can incorporate model outputs into the FHFA's home price index as consumer/lender behavior changes in response to Climate Change. FHFA is well aware of the impact that Natural Disasters can have on borrower incomes and the ability to continue making mortgage payments, which can more accurately be forecasted upon the results of the Climate Risk Stress Test.

FHFA should determine a schedule to complete these stress testing scenarios that balances the cost of conducting these tests, with the critical information they provide and ongoing climate change. Completing an audit every 3-5 years to account for changes to the regulated entities' overall portfolios and climate change is recommended.

### **Additional Disclosures – Loan-Level & Securitizations**

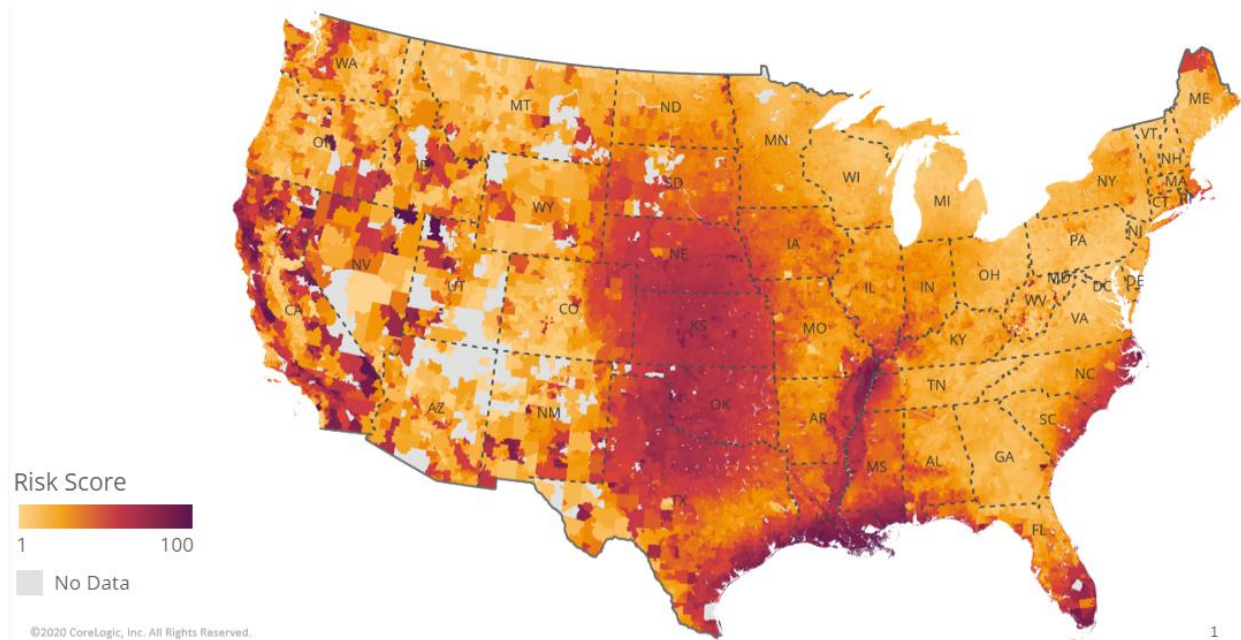
The effects of climate change upon real estate will vary between properties, will be disassociated from historic trends for the property and or region, and have the potential to impose significant costs upon the occupants of some properties. These are challenges that are likely to affect the price of properties, and an efficient market will require a transparent assessment of the forward-looking natural peril risk to a property. Looking to the future, FHFA must consider policy changes that account for climate risk through lender/servicer disclosures during origination, securitization, and over the life of the loan. A natural peril assessment at the time of origination, should be required from all lenders at origination. Assessments, in the form of a composite risk score, as well as individual scores by peril, should be shared with the borrower and other stakeholders to eliminate any information asymmetries, which the GSEs' can potentially mandate via their Seller/Servicer guide or perhaps encourage via coordination with other agencies like the CFPB. Adding the assessments as a delivery requirement to the Uniform Mortgage Data Program (UMDP) for tracking and reporting purposes would ensure that the assessment tracks along with the mortgage note and isn't lost in change of ownership, and is readily available for risk modeling. This loan-level data should be available to MBS investors in order to analyze natural hazard risk and its impact on delinquency/default and therefore prepayment risk. For Credit Risk Transfer (CRT) investors, this information is

fundamental to their decision regarding if they want to invest in holding the credit risk privately and at what price.

Since climate change is dynamic and constantly evolving, an updated composite risk score could be used by servicers to track changes in risks they report to the regulated entities on an annual basis. The regional aggregation of data included in MBS disclosures (CBSA level) is too coarse to allow the quantification of climate change risk based on these disclosure packets. Including the loan-level composite risk scores in the disclosure could help address this problem. This additional disclosure will greatly improve the utility of the disclosure to participants in the MBS market while not providing disclosure of sensitive borrower information.

*Figure 2 – CoreLogic’s Composite Risk Score, Aggregated by Zip Code*

*The composite risk score is comprised of Inland Flood, Hurricane Wind, Severe Convective Storm, Wildfire, Storm Surge, Earthquake, and Winter Storm Risks which can all be viewed individually.*



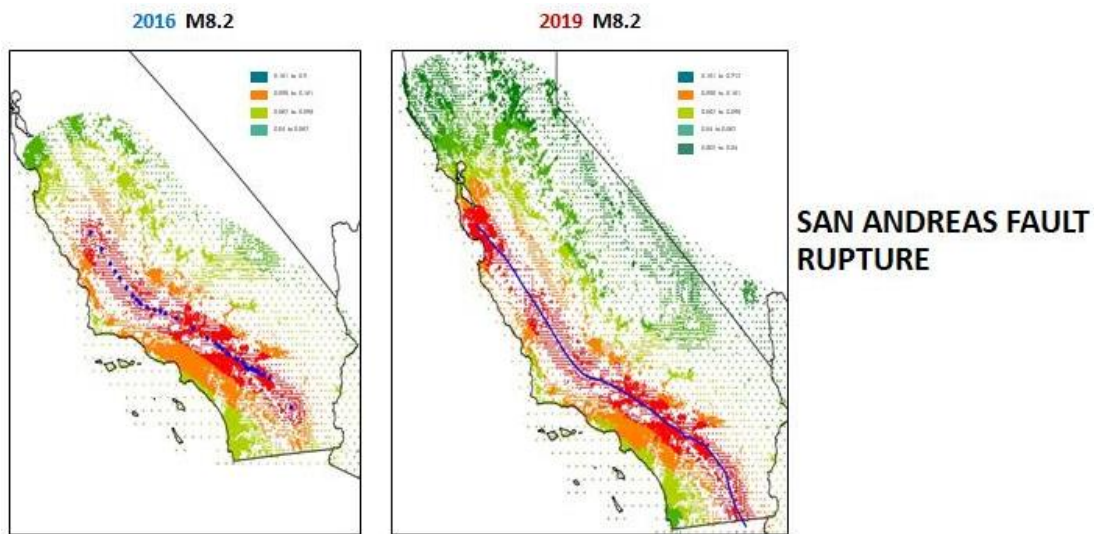
## Data Quality

It is imperative that FHFA and the regulated entities put data quality at the forefront of any Climate Risk Stress Tests conducted, as well as any Additional Disclosures required from their counterparties. To this end, evaluating model accuracy does not need to be a labor intensive, time consuming effort. Using Catastrophe Models that are certified and/or recognized by state agencies and commissions is a strong indicator of model accuracy, sound modeling methodology, and trustworthiness. A second consideration for Catastrophe Models is the number of perils available. At a minimum, FHFA and the regulated entities should be evaluating models that cover the following primary perils in the United States: (climate related) Inland Flood, Storm Surge, Wildfire, Hurricane Wind, Severe Convective Storm, and Winter Storm; and

(non-climate related) Earthquake. Additionally, FHFA and the regulated entities should also monitor secondary perils, like Fire Following Earthquake and Tsunami. The model must also have the ability to model related climate signals e.g. increased frequency and severity of major hurricanes, sea level rise, increased precipitations and flooding, and increased heat waves and fires.

Figure 3 – CoreLogic continuously updates our models as shown below

Earthquake model updates from 2016 to 2019



For reconstruction cost data evaluation as a part of the Climate Risk Stress Test, the most important factor to consider when choosing a data source is accuracy. Accuracy for these tools is based on the quality of local building material and labor costs, which are the basis of ‘ground-up’ construction for the best modeling tools available.

As it relates to Additional Disclosures, Natural Hazard Risk Scores should be evaluated based on the same perils listed above, and also include a standardized, granular scoring methodology that is easy to understand and properly quantifies risk.

- Standardized – an easy to read composite score, as well as individual scores by peril that inform the type of insurance needed, and proper coverage amounts
- Granular - a risk score at the property structure level, providing a risk score on the building footprint, not just the parcel boundaries. This level of granularity requires high-quality parcel geocoding, including structural footprints, and first-floor elevation data.

## **Impact to the Regulated Entities**

The Government Sponsored Enterprises and the Federal Home Loan Banks are exposed to credit risk where probable losses exceed insured amounts, geographic concentration risk, and counterparty risk. Balancing these risks without impacting mortgage pricing and creating disparate impact will require creative solutions from FHFA and the regulated entities.

Physical loss – defined as damage/loss to the underlying collateral – caused by natural disasters (accelerated by climate change) poses the greatest financial risk to the regulated entities' guaranteed portfolios. The only reliable way to calculate the probability and severity of those losses is by coupling catastrophe risk models, reconstruction data, and insurance information to uncover gaps in coverage, underinsurance, concentration risk, and counterparty risk. On a go forward basis, using natural hazard risk scores to evaluate risk and inform insurance requirements and amounts is a prudent way to mitigate these risks and provide uniform disclosures to stakeholders.

In addition to physical loss, delinquency rates and borrower financial health are significantly impacted in the wake of a natural disaster. Increases in delinquency and foreclosure pose risk to the regulated entities, which FHFA has started to address through a customized loss mitigation toolkit, however further action is required in order to mitigate existing risk and account for future risks. A corollary to this is the impact climate change exacerbated natural disasters have on the financial health of borrowers, which has been covered in greater detail by other entities.<sup>3</sup>

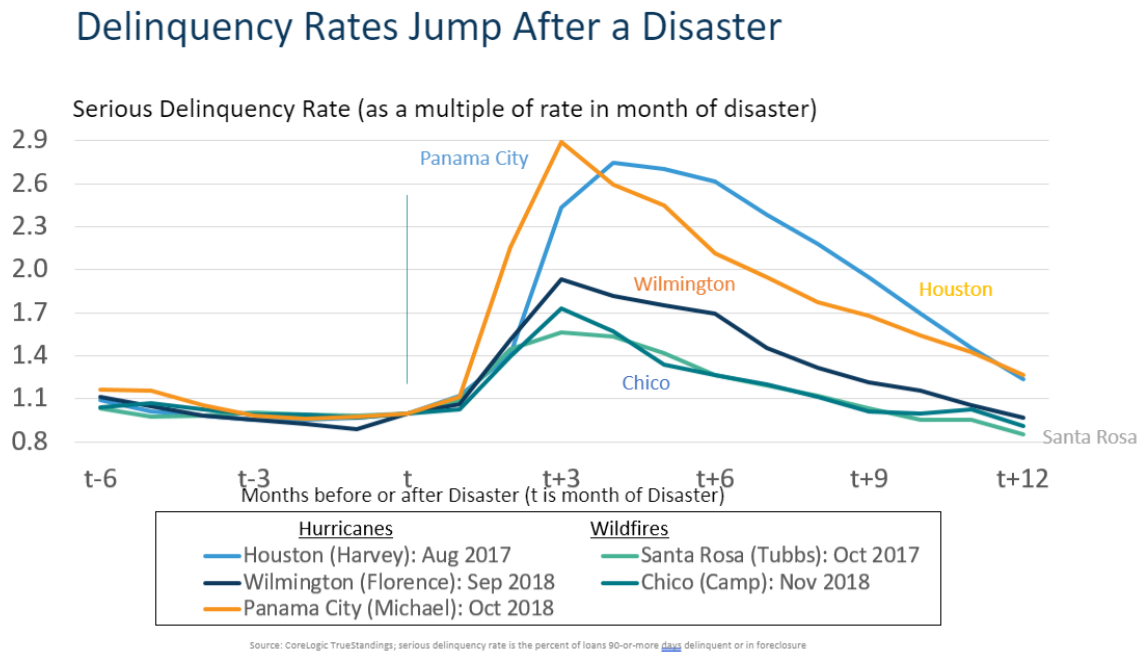
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<sup>3</sup> Ratcliffe et. al, "Insult to Injury" Urban Institute (April 11, 2019), available at [https://www.urban.org/research/publication/insult-injury-natural-disasters-and-residents-financial-health/view/full\\_report](https://www.urban.org/research/publication/insult-injury-natural-disasters-and-residents-financial-health/view/full_report)



Figure 4 – Natural Disaster impact on delinquency rates



Since home prices have a direct impact on LTV and borrower impact, FHFA should track closely any changes in borrower/lender behavior to this end. There are early signs in certain markets that this has already started to take place.<sup>4</sup> Incorporating these trends into FHFA’s home price index would allow FHFA to track this closely in derivative modeling efforts.

Absent these important disclosures and stress tests, investors may begin to lose confidence in GSE products if they cannot quantify risks to the underlying collateral, which in turn could have an impact on liquidity. As it relates to the Federal Home Loan Banks, the structure of these entities inherently poses geographic concentration risk, which should be prioritized and addressed upon the results of a Climate Risk Stress Test.

### Risk Mitigation Strategies

A Climate Audit/Climate Risk Stress Test would give FHFA and the regulated entities more information as it relates to existing and future natural hazard risk exposures. Additional disclosures at origination, securitization, and over the life of the loan provide the framework on which to build customized mitigation solutions.

<sup>4</sup> Keys & Mulder “Neglected No More: Housing Markets, Mortgage Lending, and Sea Level Rise” National Bureau of Economic Research (October 2020), available at <https://www.nber.org/papers/w27930>

Natural Hazard Risk Scores are the most cost-effective tool to implement into the loan underwriting process by the lender. A combined score, as well as individual peril scores should be collected on each loan at origination and reported via UMDP. These should be refreshed by the loan servicer on an annual basis to ensure the scores are current and to account for changing natural hazard conditions. These risk scores should be disclosed to the borrower at the time of mortgage application to eliminate any information asymmetries that may exist and already be factored into the home price. Additionally, the insurer name, "Coverage A" amount from the policy coversheet (the total insured amount), and whether that insurer is admitted (refers to whether the insurer is licensed by the state insurance agency) should be clearly disclosed by the lender and readily available to the lender, servicer, the regulated entities, and FHFA. This is a critical change to the current environment and allows probable losses to be compared to insurance amounts and therefore be used for effective risk modeling. Adding these disclosures will also allow the regulated entities to evaluate counterparty risk.

Loan Level risk scoring should be made available in MBS data to allow investors and rating agencies to more accurately model the credit risk of those transactions, leading to more informed and prudent investment decisions. Providing the property level score collected at origination is critical, as CBSA level information is not granular enough when evaluating natural disaster risk - small location and elevation changes can make the difference between a 'low risk' and 'high risk' property.

Once FHFA is able to accurately measure loss exposures, and stakeholders are informed of Natural Hazard Risks, FHFA and the regulated entities can consider various policy, product, pricing, capital requirements, and resilience options to mitigate these risks. These risks need to be carefully evaluated and implemented in tandem with other loan programs in order to ensure consistency and not create perverse incentives favoring specific programs that do not account for these risks.

### **Third-Party/Counterparty Risk**

FHFA and the regulated entities should evaluate Counterparty risk in the banking, insurance, and servicing industries related to Climate and Natural Disaster Risk. Depositories, Non-Bank Lenders, and Mortgage Servicers should be evaluated based on their holdings/servicing portfolios to determine any concentration risk based on the location of the underlying collateral underpinning their portfolios.

Insurance companies are at the forefront of Climate and Natural Hazard Risk, protecting homeowners as well as the regulated entities from losses due to catastrophic events. Requiring the disclosure of the high-level insurance information referenced in Section III will allow FHFA and the regulated entities to evaluate concentrations of risk amongst particular insurance companies, namely along two major categories. First, insurance companies with concentration risk in riskier areas should be evaluated closely, especially if they are not admitted, as those entities do not have the same financial requirements as admitted entities. Similarly, insurance

companies which are at a greater risk of more severe events leading to total loss should be evaluated closely for financial stability and the ability to pay claims in full.

## Conclusion

FHFA is right to consider an infrastructure of science, data and analytics to measure the immediate and future risk to all stakeholders by climate change and natural disasters. As FEMA notes, "...that each dollar spent on mitigation saves an average of four dollars", early action, additional disclosures, and portfolio analyses will put FHFA and the regulated entities in an improved position to manage the increasing frequency and severity of natural disasters due to climate change. Industry leading climate and natural hazard data/tools will give FHFA and the regulated entities the information needed to engage in evidence-based policymaking, as well as other creative solutions to mitigate and transfer risk.

CoreLogic's community of scientists, modelers, civil engineers, database architects and actuaries look forward to continuing to contribute to FHFA's inquiry.

Sincerely



Stuart K. Pratt  
Global Head  
Public Policy & Industry Relations

## About CoreLogic

**CoreLogic (NYSE: CLGX)** the leading provider of property insights and solutions, promotes a healthy housing market and thriving communities. Through its enhanced property data solutions, services and technologies, CoreLogic enables real estate professionals, financial institutions, insurance carriers, government agencies and other housing market participants to help millions of people find, acquire and protect their homes. For more information, please visit [corelogic.com](http://corelogic.com).