The Honorable Mark Calabria

Director

Federal Housing Finance Agency

Office of the Director

400 Seventh Street, S.W.

10th Floor

Washington, DC 20219

April 19, 2021

RE: RenaissanceRe Comments in Response to FHFA January 2021 Request for Input on “Climate and Natural Disaster Risk Management at the Regulated Entities”

Dear Director Calabria:

This letter is submitted by RenaissanceRe, a global provider of reinsurance and insurance that specializes in matching well-structured risks with efficient sources of capital.

RenaissanceRe underwrites risk in numerous jurisdictions and accordingly its operating subsidiaries are subject to a high level of scrutiny from both regulators and rating agencies. When we were formed 27 years ago, RenaissanceRe was principally a reinsurer of property catastrophe risk. Today, we are a global multi-line reinsurer and leader in an ever-growing number of lines of business. As of January 1, 2021, RenaissanceRe’s current portfolio is comprised of approximately $5.8 billion of Gross Written Premium and $19 billion in total managed capital across our subsidiary balance sheets. We have been an underwriter of mortgage risk globally since 2010 and an active participant in structuring and pricing US mortgage reinsurance transactions since the first placement following the Global Financial Crisis in 2013.

We thank you for your leadership in addressing the crucial issue of climate change and how the FHFA and its managed entities can prepare for the risks and costs associated with rising sea levels, increasing temperatures, and more frequent and costlier disasters. At RenaissanceRe, a core pillar of our environmental, social and governance (ESG) strategy is to promote climate resilience. Our ESG strategy focuses on the areas where we can apply our core business strengths to make a meaningful impact, and for many years we have been committed to developing and sharing our skills and expertise to help the world better manage climate risk. We have invested significantly in internal resources and tools to assess and analyze climate-related risks, including the expansive team of scientists in our wholly owned RenaissanceRe Risk Sciences subsidiary. Our corporate strategy includes a core focus on superior risk management, which incorporates climate-related risks, and as an outgrowth of these activities we focus on sharing our perspectives and research to mitigate the impact of climate change on society.

Given our detailed knowledge of the risk presented by natural disasters and significant trading relationship with the GSEs, we are uniquely positioned to provide feedback and potential solutions to this most significant of risks. We look forward to engaging broadly on this topic and have responded to specific questions within the RFI below:

Q2. 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? 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?

We think the risk to the GSEs is twofold. In the short term, the GSEs are exposed to the risk of physical damage and the ensuing increases in delinquencies and defaults that are likely to arise from climate and natural disaster risks that cause physical damage to guaranteed mortgages. Mortgage Guarantees provided by both Fannie Mae and Freddie Mac, referred to as the GSEs, are subject to significant risk of credit default arising from natural disasters. Current guidance requires only a standard fire insurance policy on most residences, and in the event of the property being designated in a Special Flood Hazard Area, additional flood coverage. As such there is a substantial insurance coverage gap that the GSEs are exposed to from the impact of immediate events, most notably in our view is the risk of a major California Earthquake. There is also risk from other perils including but not limited to the direct impact of severe flooding. As noted in research provided by CoreLogic[[1]](#footnote-1) there is an immediate and appreciable increase in mortgage delinquencies for properties following a natural disaster declaration by FEMA. This is most significant on properties that have suffered damage, but consistently spreads beyond those directly damaged by the event. Furthermore, the presence of restoration clauses in mortgage insurance policies means that this risk on lower income borrowers, who are more likely to supplement their down payment with mortgage insurance, will be disproportionately borne by the GSEs. Analysis from ourselves and others strongly indicates that this risk is appreciably rising due to climate variability.

Secondly, we believe that climate variability and natural disasters could lead to secular changes to demand in certain geographies, significantly impairing the buying behavior for properties and causing increases in both loss frequency and severity. With respect to the earthquake peril specifically, a reduction in demand for properties in certain regions could arise due to how geophysical hazards increase an event’s impact. Ground motions can be significantly amplified in certain locations where very weak and unconsolidated soils exist, thereby creating outsized shaking levels for buildings in that local area. Precise soil micro-zonation maps coupled with engineering analysis is necessary to understand where these extreme hazards arise – intelligence that is not typically employed in designing residential structures. Another example is earthquake-related liquefaction. Liquefaction is the phenomena where selected soil types are “activated” by a combination strong ground motions and high ground water tables, to such an extent that those areas affected instantaneously lose bearing capacity. The “liquified” soil results in a range of damage that can be highly consequential to buildings that have no mitigation for liquefaction incidence. This includes differential displacement, tilting, cracked foundations, etc. Such damage modes are very expensive to repair and often result in near total loss of the structure. Residential buildings are not typically designed to resist liquefaction events.

Earthquakes can and will reveal these high-risk locations through outsized damage to buildings in the area – and consumers will quickly recognize (post-earthquake) that these areas are less desirable from a risk standpoint. Such differential results are often show up on a sub-ZIP code level after moderate to large earthquakes. There are numerous examples in past earthquakes where high ground motion amplification areas were observed. Similarly, the recent (2010-11) earthquake sequence striking Canterbury, New Zealand is a prime example of how vast areas of liquefaction incidence affected residential (and commercial) structures, often to such an extent that buildings were not repairable, and in many cases large tracts of the affected region were deemed unusable for redevelopment due to the high mitigation expense necessary for existing soils. Many earthquake regions in the United States have the potential for significant liquefaction incidence, including the San Francisco Bay Area, Seattle-Tacoma region, and parts of the New Madrid region of the Midwest. It is reasonable to conclude that the impact to demand could spread to other regions with similar geophysical properties and soil characteristics, thus impacting credit losses in a region not impacted by a natural disaster.[[2]](#footnote-2)

We are already seeing the impacts of climate change on the property market with portions of Florida, most exposed to sea level rise, already showing decreases in home prices[[3]](#footnote-3). Our expectation is that this will continue in the highest impacted areas from climate change, particularly in relation to wildfires and sea level rise.

Another avenue to losses is the reduction in value for properties due to changing government guidelines (i.e. redesignation of flood plains) making an area less attractive for broad scale development. Flood-related physical damage is a clear example where short-term atmospheric risk continues to “surprise” communities and longer-term trends are expected to expand the reach and overall impact of flood risk. In the United States the flood risk is communicated to the public through flood hazard maps developed by FEMA based on numerous location-specific scientific studies.

Flood studies vary greatly in quality and level of sophistication and age of study leading in many cases to severely underestimated flood risk. Large flood events can reveal problems with flood zone delineation resulting in major flood zone revisions over large areas. For instance, hurricane Sandy (2012) caused unprecedented storm surge along NJ, NY, and CT coast resulting in major flood zone revisions in affected areas. Similar revisions of FEMA flood zones in Florida Panhandle were triggered by hurricane Michael (2018) that created storm surge inundation way beyond previously identified flood zones V and A. Flood zone revisions can have significant negative impact on property values over large areas.

The flood maps developed by FEMA were never expected to inform the public of their full risk from flood. They were created to draw a line to determine if flood coverage was mandated for GSE backed mortgages. Having a single line determining if flood coverage is mandatory creates a false sense of low to zero flood risk for those not in the SFHA areas. This false sense of security has created a large uninsured risk from flood leading to a high credit risk for the GSEs. “After Hurricane Harvey devastated the Gulf Coast in 2017, CoreLogic estimated that 70% of the flood damage was uninsured,” said Dr. Howard Botts, executive and chief scientist at CoreLogic.[[4]](#footnote-4)

Q10. How should FHFA prioritize the various climate and natural disaster risks to the regulated entities?

Prioritization of various climate and natural disaster related risks must account for a range of risk management challenges that affect exposures financed by GSEs. Importantly, prioritization should account for potential impact of natural catastrophes to portfolios, the level of insurance protection purchased by homeowners specific to a region and peril combination, and how non-stationarity may affect the baseline risk in the intermediate future. Thinking across these variables leads us to propose the following order of priority:

1. Earthquake
2. Sea Level Rise
3. Inland Flood
4. Hurricane

Our prioritization first reflects the existing protection gaps in residential exposures in the United States, and where those unprotected exposures are most concentrated.

Earthquake risk, and particularly California earthquake risk, represents the highest priority risk to GSEs, because the take-up rates for homeowner’s earthquake insurance is very low. In California, the number of homes that are protected with earthquake insurance hovers around 10%. In other states it varies, but it is also very low. This means that significant earthquakes will result in many properties with significant-to-major damage, that are uninsured. This will of course heighten the likelihood of default, depending on the homeowner’s ability to repair damage from their own funds or access to financing. Depending on the earthquake scenario examined, the difference between insured and insurable loss is substantial and the absolute loss figures for large earthquake easily exceed the $100 billon threshold. For very large earthquake events, losses should be expected to be exacerbated by the impacts of demand surge (making repairs and rebuilding more costly and time consuming), hardships due to loss of use for damaged buildings, significant lifeline interruption (i.e., water, gas, electric services, and transportation), and secondary economic impacts especially affecting employment stability in the affected region. Finally, hard to anticipate collateral hazards (i.e., dam failures, landslides, and tsunami) would be expected to increase overall losses to residential construction, which would potentially be uninsured as well.

Also considered in this prioritization is the quickening pace of sea-level rise and its impact for coastal regions of the United States. This impact is especially important as the proportion of United States residential exposures situated in coastal counties continues to grow. This sea-level rise is a critical driver of increasing flood risk associated with hurricane landfalls and Nor’easters, each delivering stronger impacts further inland as sea-levels increase. A good example of such risk increase is Hurricane Sandy in the New York area, where scientists have identified climate change to be responsible for 10-12% of the total storm surge impact. Many areas along the Gulf and East coast of the United States are disasters waiting to happen. A prime example of a high consequence storm surge catastrophe would be a large hurricane landfall in the Tampa-St. Petersburg region. In combination with the enhanced risk due to sea-level rise, there is a significant lack of insurance protection for flood related hazards. This should be a high concern to GSEs – one that will expand as sea-level rise from climate change continues

Climate change will also increase precipitation-related risk for inland areas. This is directly related to the ability of a warmer atmosphere to hold more moisture, which in turn increases the potential for more intense precipitation events. This will affect both tropical cyclone related rainfalls as well as other rain events not associated with tropical cyclones. Already, scientists have shown that increased precipitation in catastrophic flood events is attributable to climate change. In Hurricane Harvey, rapid attribution studies have shown that 20% or more of the total precipitation volume in that event are the result of climate change impacts. Again, low take-up rates for residential flood insurance (on the order of 30% or less in some critical areas), result in a significant credit risk for GSEs today, and it should be expected to increase in the future.

Finally, hurricane risk in general should be considered a high priority. As noted above, hurricane related storm surge and inland flooding will increase with climate change while impacting residential properties that have low or no protection for flood-related damage. In addition to increased flooding effects, hurricane intensity is also expected to increase. Although the science is less settled on the exact amount of the expected increase, the consensus is that winds will increase enough to significantly expand the damage footprints of landfalling storms. Those same increased average winds may further increase the intensity of storm surge effects associated with those landfalling storms, on top of the increase associated with the sea level rise. In the former, larger damage footprints will increase insured losses due to wind, but simultaneously, the effects of storm surge damage attributable to the same event will also likely increase, from the increased wind as well as sea level rise, while impacting uninsured (for flood) residential properties. In the latter, impacts to properties at risk for flood (both storm surge related, and rainfall related) will increase over time, exacerbating insurance protection gaps and increasing the risk of credit losses to GSEs.

Q3. 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?

Quantifying climate change impacts on risk means informing short-term horizon view with longer-term intelligence. For any simulation model being employed, even for a one-year horizon, the characterization of risk and uncertainty needs to account for the progression of climate influence in a way that is nuanced and reflects the physics of that region-peril combination. Are there indications that the overall uncertainty modeled should be more robust because climate impacts could appear more quickly than anticipated? This is an important criterion for the usefulness of a vendor model – does the model allow users to modify baseline stochastics to test the sensitivity of climate influenced parameters? It is important to establish a climate change ramp for each peril being addressed and use that to gauge how robust the models are. A rigorous approach will also recognize that scientific consensus about how future climates might affect perils is not about certainty – inter-model uncertainty is important information in how much variation needs to be anticipated in the ultimate view of risk.

With respect to the influence of climate change on current and future risks, any valid quantification approach needs to recognize key non-stationary factors in addition to climate. Understanding that climate change risk is intertwined in many other non-stationary elements of a peril is critical for successful risk management practice. It is important to understand how model vendors and risk-assumers are capturing these interactions, as they often constructively interfere.

It is also important to consider about how risk metrics might impact risk management decisions like exposure allocation and financing costs. For instance, if expected loss is the key measure, then the potential impact of climate change on loss volatility might be overlooked. The shape of the distribution and how climate change might enhance short but impactful departures to high loss volatility should be an important consideration in how loss exposures are managed and financed. Climate change can be an enhancer of volatility, recognizing that in a period of high volatility, both spatial and temporal correlation of loss exposures increase, which means portfolios can get significantly riskier from a risk allocation standpoint.

Finally, recognize the multiplicative effects of climate change. Such impacts are sometimes “daylighted” because climate change effects operate on various natural systems in the background -- these separate physical systems can interact and sometimes coordinate to produce outcomes that are a multiplicative in degree.

For instance, when considering tropical cyclones, we generally understand that climate change will slightly increase their intensity over time (i.e., wind velocity) and significantly increase their ability to deliver intense rain after landfall. Sea-levels are also increasing at the same time, so climate change will expand catastrophic coastal impacts due to higher sea-levels coordinating with more wind driving larger storm surge – a multiplicative effect, which is yet again enhanced by average larger rainfall volumes and associated flooding aligned with the same catastrophe event. These multiplicative effects will vary as each sub peril coordinates with the others, but importantly, the effect is very easy to underestimate.

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**Conclusion**

RenaissanceRe is supportive of the FHFA’s initiative as presented in its 2021 Climate RFI and are available to assist with the FHFA’s efforts to better understand, quantify and subsequently mitigate the impacts of climate and natural disaster risk to the GSEs, homeowners and taxpayers. The reinsurance industry has a proven track record in providing innovative solutions to the challenges presented by unique and volatile events supporting both private and public enterprises.

At RenaissanceRe, we have a long track record of leadership in applying our risk expertise and leveraging our partnerships to increase economic resiliency. We have made significant commitments to reduce the protection gap and mitigate the impact of climate change on both populations and economies, including our active role in the Insurance Development Forum and being a founding member of the Lloyd’s Disaster Risk Facility, within which we have proven how industry capabilities can be applied to reduce risk and promote resilience.

Our view is that the best way for the GSEs to protect themselves, and taxpayers, from the increasing weather-related risk exposure, is to pursue more risk transfer to the private sector. This can be accomplished by traditional insurance/reinsurance, by insurance linked securities like traditional catastrophe bonds, or by more recent innovations like parametric bonds.

Whatever the method, the underlying principle remains the same: to transfer risk from the GSE balance sheet to the private markets. This would simultaneously reduce the risk of exposure to the taxpayer, while providing a critical feedback loop around the suitability of risk mitigation and aggregation measures currently being undertaken by the GSEs. We are available to discuss various options with you in the future. Please feel free to me or others within our company as you continue to consider your possible solutions going forward.

Sincerely,

Michael Cohen

SVP, Chief Counsel—Government Affairs

1. https://www.corelogic.com/blog/2018/09/the-impact-of-natural-catastrophe-on-mortgage-delinquency.aspx [↑](#footnote-ref-1)
2. Similarly, ensuing fire from earthquake presents a very real and extreme risk for areas of high-density wood-frame construction. The risk of conflagration after an earthquake, while rare and expected to be covered by the borrower’s insurance, could also result in a change in the desirability of high-density residential housing in the aftermath of a large earthquake, especially as an informed public would correctly anticipate strong and impactful aftershocks in the months following the mainshock event. Recent conflagration examples from wildfire events in California amply demonstrate the credibility of this risk to high-density wood frame construction. Of course, the 1906 Great San Francisco Earthquake caused a devastating conflagration that destroyed much of that city. This remains an important consequence of earthquake risk in many regions of the United States. [↑](#footnote-ref-2)
3. <https://www.nber.org/papers/w27930> [↑](#footnote-ref-3)
4. <https://www.corelogic.com/news/protecting-the-american-dream-corelogic-finds-opportunities-for-insurers-to-better-protect-homeowners-from-flood-damage.aspx> [↑](#footnote-ref-4)