



FEDERAL RESERVE



THE CERES ACCELERATOR FOR
SUSTAINABLE CAPITAL MARKETS

ADDRESSING CLIMATE AS A SYSTEMIC RISK

A call to action for U.S. financial regulators

JUNE 2020

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LETTER FROM THE CHAIR

I am thrilled that this new Ceres report, “Addressing Climate as a Systemic Risk: A call to action for U.S. financial regulators,” identifies so many important recommendations to address the systemic risk that the climate crisis presents. I have spent many years in risk markets, at the intersection of capital markets and insurance, so I am particularly aware of the importance of climate risk in both industries.

We hope that this first report from the new Ceres Accelerator for Sustainable Capital Markets will contribute to the critical discussions among federal and state regulators, legislators and others focused on these issues.

I hope you will consider joining us to advocate for these changes as quickly as possible.



Barney Schauble

Chair, Ceres Board of Directors

Chairman, Nephila Climate

About the Ceres Accelerator for Sustainable Capital Markets

The Ceres Accelerator for Sustainable Capital Markets (the “Ceres Accelerator”) aims to transform the practices and policies that govern capital markets in order to accelerate action on reducing the worst financial impacts of the global climate crisis and other sustainability threats. The Ceres Accelerator will spur capital market influencers to act on these systemic financial risks and drive the large-scale behavior and systems change needed to achieve a net-zero carbon economy and a just and sustainable future.

For more information visit: ceres.org/accelerator.

FOREWORD

It is a special pleasure to prepare this foreword for Ceres' "Regulating Climate as a Financial Risk: A call to action for U.S. agencies."

Why such pleasure? The time for the release of this report and the place where I've just read it might have something to do with it. Considering place, I am in my house, as are you, I imagine, having just devoured this report, and wondering about the potential for action in a time of lockdown. In terms of the time, as you know, we are in the midst of a deepening recession, triggered by the federal government's failure to act early enough to contain a deadly pandemic, or swiftly enough to forestall the mass layoffs that have occurred. In the midst of all this, you may wonder, as do many, whether the climate change agenda has been knocked off course.

To the contrary. Absolutely not. It is both on course and absolutely relevant. If there could ever be a convergence of events in which we would most deeply feel and understand how an invisible enemy can totally upend a society and an economy, we are seeing it here and now. The pandemic reminds us, daily, of what we miss in our beautiful world, how it is threatened by deforestation, infectious disease, food scarcity, and pollution, and how interconnected and interdependent we all are.

The pandemic has exposed the fact that the best-paid workers many not be the most essential; that the U.S. is particularly vulnerable to shocks that hit our collective well-being like those related to health and climate; that financial markets cannot perform the work of assuring collective well-being; and that the magnitude of a crisis is determined not just by the impact of precipitating events, but by the fragility of the system it attacks. The world has been forced into a recalibration of values.

And so it is, that with near-perfect prescience, the work of the Ceres Accelerator for Sustainable Capital Markets, like this report, underscores that it is possible to act before catastrophe, and that there is opportunity in preemptive, early and bold actions by federal economic policy makers looking to avoid catastrophe. The tools exist. They are available now, and ready to be picked up and deployed.

Which brings us to "Regulating Climate as a Financial Risk." With both breadth and depth, Ceres offers us 50 specific recommendations covering seven key federal financial regulatory agencies, along with state and federal insurance regulators. These recommendations outline the affirmative steps that regulators should take to protect the financial system and economy from potential climate-related shocks that can flatten an economy and grind it to dust. Climate change affects financial stability, and in this report Ceres provides the action plans for federal financial regulators to do the work to protect that stability -- now.

If we want to create a sustainable climate, we need to transition to a net-zero carbon economy. This transition is not going to happen without guidance. Financial markets, themselves, are not going to be the first responders to keep us from the threats posed by a climate emergency. We are learning this the hard way. Thankfully, in many countries central banks and other financial regulators know that when it comes to curbing the effects that climate risk will have on the economy, particularly the heightened chance that such risks will bring about economic catastrophe, leadership must exist and concerted action must be taken. In this report, Ceres gives us, right when we need it most, a comprehensive set of valuable recommendations for United States' financial regulators -- something they can pick up and deploy now.

As I draft this foreword, our hearts are stuck in pain and grief, and our heads are in a place of anger, frustration and awful astonishment. The need to address both the current medical issues and the massive economic losses is critical. But even in the midst of this, Ceres helps us see that in this place and time there is a portal -- a gateway -- to an economy that is resilient and up to the task of handling the fast-unfolding effects of climate change.

At the very least, we must rebuild with an economy where the values of sustainability are explicitly embedded in market valuation. This transformation will come, in part, from urging the leaders of our financial regulatory bodies to do all they can – which turns out to be a lot – to bring about the adoption of practices and policies that will allocate capital and align portfolios toward sustainable investments that do not depend on carbon and fossil fuels.

Ceres has done us a great service by showing us the tools to take with us as we move through this portal to an environment that we can live in, both supported by and supporting an economy and society that is resilient enough to be transformed. Let's pick up these tools as we walk through this portal, leaving behind our former sense of what's possible, while walking towards an environment and an economy that we have confidence-- this time--can be sustained.



Best wishes, and onward,

A handwritten signature in black ink that reads "Sarah Bloom Raskin". The signature is fluid and cursive.

Sarah Bloom Raskin
Former United States Deputy Secretary of the Treasury;
Former Member, Federal Reserve Board of Governors

EXECUTIVE SUMMARY

Systemic risks have the potential to destabilize capital markets and lead to serious negative consequences for financial institutions and the broader economy. Under this definition, climate change, like the current COVID-19 crisis, is indisputably a systemic risk. Its wide-ranging physical impacts, combined with expected transitions to a net-zero carbon economy and other socio-economic ripples, are likely to manifest in both cumulative and unexpected ways and present clear systemic risks to U.S. financial markets -- and the broader economy. Left unmanaged, these risks could have significant, disruptive consequences on asset valuations, global financial markets and global economic stability.

This Ceres report, "Addressing Climate as a Systemic Risk: A call to action for U.S. financial regulators," outlines how and why U.S. financial regulators, who are responsible for protecting the stability and competitiveness of the U.S. economy, need to recognize and act on climate change as a systemic risk. It provides more than 50 recommendations for key financial regulators to adopt, including the Federal Reserve Bank (the Fed), the Office of the Comptroller of the Currency (OCC), the Federal Deposit Insurance Corporation (FDIC), the Securities and Exchange Commission (SEC), the Commodity Futures Trading Commission (CTFC), state and federal insurance regulators, the Federal Housing Finance Agency (FHFA), and the Financial Stability Oversight Council (FSOC).

Given the ongoing response to the COVID-19 pandemic, the role of financial regulators is more prominent than ever. While financial regulators are taking critical actions to support the U.S. economy in response to this immediate crisis, it is imperative that their efforts do not inadvertently worsen the impacts of climate change.

"The evidence on climate risk is compelling investors to reassess core assumptions about modern finance. Research from a wide range of organizations – including the U.N.'s Intergovernmental Panel on Climate Change, the BlackRock Investment Institute, and many others, including new studies from McKinsey on the socioeconomic implications of physical climate risk – is deepening our understanding of how climate risk will impact both our physical world and the global system that finances economic growth."

"These questions are driving a profound reassessment of risk and asset values. And because capital markets pull future risk forward, we will see changes in capital allocation more quickly than we see changes to the climate itself. In the near future – and sooner than most anticipate – there will be a significant reallocation of capital."

Larry Fink

Chairman and CEO, BlackRock

"A fundamental reshaping of finance,"

Fink's 2020 CEO Letter to BlackRock portfolio companies



ADDRESSING CLIMATE AS A SYSTEMIC RISK

Frequent extreme weather events are leading to mounting economic losses.

Physical risks from [rising global temperatures](#) – up 1.8° F since the mid-20th century – are the most immediate threat to the U.S. economy. Catastrophic flooding, droughts, [wildfires and storms are becoming more frequent and extreme](#) and have caused billions of dollars in financial losses. As global greenhouse gas (GHG) emissions and temperatures continue to rise, deeper economic losses are projected for the years ahead.

The [Fourth National Climate Assessment \(Vol.11\)](#), based on the work of thousands of researchers, suggests that unmitigated climate change could reduce the U.S. economy by as much as 10% annually by 2100. In a 2019 [CDP survey](#), 215 of the world's largest listed companies reported nearly \$1 trillion at risk from climate impacts, much of it in the next five years. A [London School of Economics](#) study projects that, unless it is addressed, climate change could reduce the value of global financial assets by as much as \$24 trillion – resulting in permanent damage that would far eclipse the scale of the 2007-2009 financial crisis.

Social and environmental factors are exacerbating the economic impacts.

Unmitigated climate change and extreme weather events will have significant health impacts, including respiratory issues, the spread of diseases and premature deaths. Climate change and extreme weather events will also create major [productivity losses](#), particularly in industries that require workers to be outside. Migration forced by [climate change has already displaced an average of 26.4 million people per year](#) globally between 2008 and 2015. By 2050, [climate change will force 50 to 700 million people to emigrate](#). Finally, the rapid loss of forests and other ecosystems is starting to impact ecosystem-dependent industries such as agriculture, tourism, drinking water and pharmaceuticals.

Climate impacts are already manifesting in the largest state economies.

In just the last few years, [California has experienced recording-breaking wildfires](#), in both number and size, that have taken hundreds of lives, bankrupted the state's largest utility, left millions regularly without power and brought home insurability into question. Florida is facing rapidly rising sea levels and now-routine flooding that are eroding coastal property values and wiping out freshwater supplies. [Texas experienced two devastating once-in-a-thousand-years flood events between 2016 and 2019](#), each caused by torrential rains of 40 inches or more.

An unplanned transition to a low-or-zero-carbon economy could cripple key industries.

Changes in government policies, consumer sentiment, liability risks and technological innovation could cause significant losses for high-carbon industry sectors, and those that rely on them. Given the large size of these industries, these cumulative losses could send broad, intersecting and amplifying financial ripples on major financial institutions holding related assets.

Economists and financial leaders say the scale of the [losses from climate change could eclipse the subprime mortgage securities meltdown](#) that triggered bank failures and, ultimately, a deep global recession a dozen years ago. "Even if only a fraction of the [climate] science is right, this is a much more structural, long-term crisis [than the 2007-2009 recession]," said BlackRock CEO Larry Fink in 2020.

Despite these risks, national and global efforts to mitigate climate change's impacts could create enormous clean energy investment opportunities that would translate into economic growth and job creation. Research suggests that transitioning to a low-carbon [sustainable economy could deliver direct economic gains of \\$26 trillion](#) through 2030, compared to business as usual.

Insurance companies and banks are on the frontlines of risk.

The insurance sector is particularly vulnerable to the physical impacts of climate change, and has already faced growing losses; insurers' investments are also at risk. Banks and financial institutions that have lent to and invested in risky, carbon-intensive sectors have the potential to have their investments become "stranded" in the face of the transition to a low-or-zero-carbon future.

The cumulative and unpredictable nature of climate impacts poses a risk to financial market stability.

While any of the impacts outlined above are significant, their cumulative, correlated and nonlinear nature poses the real risk to financial market stability. To put it simply, the whole is not only greater than the sum of its parts – it magnifies them, as well. If climate change affects markets suddenly and unexpectedly, it could burst a "carbon bubble," which could pose grave dangers to financial markets and the real economy, already weakened from the ongoing coronavirus pandemic.

At the same time, the response to the pandemic has also underscored the power financial regulators have to buttress markets in the face of a disruptive risk. With that power, regulators also have the responsibility to assess market vulnerability to such risks, and take action to make the economy resilient to such shocks. As stewards of the largest economy in the world, U.S. financial regulators, including the Federal Reserve, the SEC and others, have critical roles to play. They can send the appropriate market signals about the risks posed by climate change to the U.S. and global economy, and take the necessary steps to recalibrate our financial system.

**ACTIONS NEEDED**

This report outlines why and how key U.S. financial regulators can and should take action to protect the financial system and economy from potentially devastating climate-related shocks. Financial regulators have a mandate to maintain financial market stability, foster capital growth and competitiveness, protect consumers and investors and ensure market efficiency and integrity. Climate risk is relevant to each of these considerations.

This report focuses on the roles of those financial regulators that Ceres believes are particularly important to jumpstart the necessary action on climate risk now. However, we also believe that all regulators – financial and otherwise – have important roles to play in addressing the climate risk. "Addressing Climate as a Systemic Risk" makes a series of recommendations that build on the existing mandates of the relevant regulatory agencies. We also identify similar actions being taken by global regulators that could serve as important models for U.S. agencies to consider.

Our key recommendations:

The **Federal Reserve System**, including the **Federal Reserve Bank**, should:

- Acknowledge that climate change poses risks to financial market stability and immediately begin assessing their impacts. This includes building awareness of regional climate vulnerabilities, and conducting the needed research.
- Integrate climate change into their prudential supervision and regulation of systemically important financial institutions to ensure they adequately address climate change as a part of their risk management and are well prepared for transition risks. One clear opportunity is to require financial institutions to conduct climate stress tests. Another opportunity is to work with the SEC and other agencies to require banks to assess and disclose climate risks, including carbon emissions from their lending and investment activities. Finally, the Fed should coordinate with its global counterparts to define activities that are likely to exacerbate climate risks.
- Explore how climate risks can be addressed through monetary policy to keep the economy resilient in the face of disruptive risks. This policy assessment should include considering the climate impacts of injecting more liquidity into the economy, and integrating climate risk into collateral frameworks and economic outlook assessments.
- Explore the integration of climate risk into the community reinvestment process to bolster the resilience of low-income communities to climate change.
- Join efforts, such as the [Network for the Greening the Financial System](#), and to allow for globally coordinated efforts on climate risks.

“When you put all these pieces together, it becomes pretty clear: climate change is an economic issue we can’t afford to ignore.

This isn’t just a concern for the Twelfth District. Or even the United States. Countries around the world are dealing with the economic impacts of climate change. And conferences like this are essential to understanding the challenges that lie ahead – for all of us.

Ultimately, this is our job. The San Francisco Fed is a public service organization. We’re responsible for the people and the communities we serve. So, we have to get out in front of this issue and do what we do best.

Convene the best people and ideas. Study data and conduct research.

Talk to the communities we serve – and really listen when they tell us what they need.”

Mary Daly

President and CEO, Federal Reserve Bank of San Francisco

“Why climate change matters to us,” November 2019

The **Office of the Comptroller of the Currency** and the **Federal Deposit Insurance Corporation** should:

- Coordinate with each other and all banking regulators to ensure that climate change is integrated into the financial supervision process. This integration could include jointly issuing a bulletin highlighting the wide ranging ways that climate risks could impact financial performance and outlining principles to help financial institutions prudently manage them.
- (OCC) update the Comptroller’s Handbook to issue enhanced guidance on climate risk to examiners, to be used in supervision of financial institutions. They should also integrate climate-risk supervision into the examiner education process.
- (FDIC) closely monitor the impacts of climate risk on bank lending and investments activities and explore how to integrate climate risk into the risk-based premium system for the Deposit Insurance Fund.

The Securities and Exchange Commission should:

- Analyze climate risk impacts on the securities markets and on the SEC mandate, and consider establishing a cross-divisional taskforce to allow for coordinated responses.
- Make clear that consideration of material environmental, social and governance (ESG) risk factors, such as climate change, is consistent with investor fiduciary duty.
- Issue rules mandating corporate climate risk disclosure, building on the framework established by the Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD). In the short term, the SEC should enforce the existing regulations and interpretive guidance on climate risk.
- Direct the Public Company Accounting Oversight Board (PCAOB), overseen by the SEC, to assess whether firm audits adequately detect climate risks, and issue guidance to help auditors better understand how climate risk affects audits and accounting. The PCAOB should also assess existing standards to identify when amendments and updates may be needed, and issue such amendments.
- Encourage the Financial Accounting Standards Board to drive consistency in the way that climate risk is disclosed in financial statements.
- Issue guidance encouraging credit raters to provide more disclosure on how climate risk factors are factored in ratings decisions. They could also examine the extent to which climate risk is considered by credit raters, and summarize findings in annual examination reports.

The Commodity Futures Trading Commission should:

- Upon receiving the Climate-Related Market Risk Subcommittee's report, engage other financial regulators on climate change.
- Use the report's recommendations to enhance oversight of climate risk in the commodities and derivatives market.

“We purport to modernize, without mentioning what may be the single most momentous risk to face markets since the financial crisis. Where we should be showing leadership, we are conspicuously silent. In so doing, we risk falling behind international efforts and putting U.S. companies at a competitive disadvantage globally.”

State and federal insurance regulators should:

- Acknowledge the material risks climate change poses to the insurance sector and pledge coordinated action to address them.
- Assess the adequacy of current insurer actions for addressing climate risks.
- Join the Sustainable Insurance Forum.
- Require insurance companies to conduct climate risk stress tests and scenario analyses to evaluate potential financial exposure to climate change risks.
- Require insurers to integrate climate change into their Enterprise Risk Management (ERM) and Own Risk and Solvency Assessments (ORSA) processes.
- (State regulators) require insurance companies to assess and manage their climate risk exposure through their investments, and examine how climate trends affect company holdings and long-term solvency.
- (State regulators) encourage insurers to develop products for the new technologies, practices and business models that will emerge in response to climate risk that are responsive to both risks and opportunities.
- (State regulators) mandate insurer climate risk disclosure using the TCFD recommendations.
- Assess the sector's vulnerabilities to climate change, and report findings to the Financial Stability Oversight Council.

Allison Herren Lee
Commissioner, Securities and Exchange Commission

“Modernizing’ Regulation S-K: Ignoring the elephant in the room,”
January 2020

The **Federal Housing Finance Authority**, responsible for government-sponsored mortgage giants Freddie Mae and Fannie Mae, should:

- Acknowledge the impacts of climate risk on the housing market.
- Conduct research to examine the impacts of climate risk on the mortgage holdings of Government-Sponsored Enterprises, particularly Fannie Mae and Freddie Mac.
- Launch a formal effort to develop strategies to address climate risk, being particularly aware of the impacts on vulnerable communities disproportionately threatened by climate change.

The **Financial Stability Oversight Council**, whose mandate is to identify risks to financial stability, should:

- Identify climate risk as a vulnerability and make recommendations on regulations that relevant agencies could adopt.
- Coordinate regulatory actions on climate change and the integration of efforts by all financial regulators addressing climate risk to allow for overall financial stability.

“In the crowded regulatory and supervisory space, there is limited scope for focusing attention on new issues but climate risks need immediate action in order to limit or reverse the impact of some of the negative trends under way. It is incumbent on supervisors to put in place the necessary measures for insurers to address any significant risks that could adversely affect policyholders and financial stability. In previous financial crises, events once deemed implausible have materialized. Climate change poses the same threat.”

Bank of International Settlements
“Turning up the heat: Climate risk assessments in the insurance sector,” 2019

CONCLUSION

Ceres knows that climate change is the biggest sustainability issue of our time, affecting everything from our financial markets, to our political security to our very existence on earth. For over three decades, Ceres has worked with companies, investors and policy makers to drive the consideration of climate change as a financial risk, and foster the uptake of climate solutions. We also believe that legislative action on climate change – such as a carbon price – is necessary to move the U.S. economy towards a competitive and prosperous net-zero carbon future.

But while policymakers at the federal, state and global levels need to take the lead in tackling the climate crisis, U.S. financial regulators themselves have critical roles to play in keeping a now-weakened economy resilient in the face of ongoing and future climate shocks. Rather than standing back, they should seize the opportunity in this moment of potential economic transformation to join global peers and develop a playbook for climate action. With global emissions and average temperatures still rising, watching and waiting are no longer responsible options, and will in fact guarantee the worst. And, unlike in the possible resolution to the COVID-19 pandemic, there will never be vaccines developed to protect against climate risk. But the good news is: we already have all the tools and knowledge in the financial markets to take sound preventative action.

Climate change presents risks to both the future and today -- unless regulators act boldly, now.

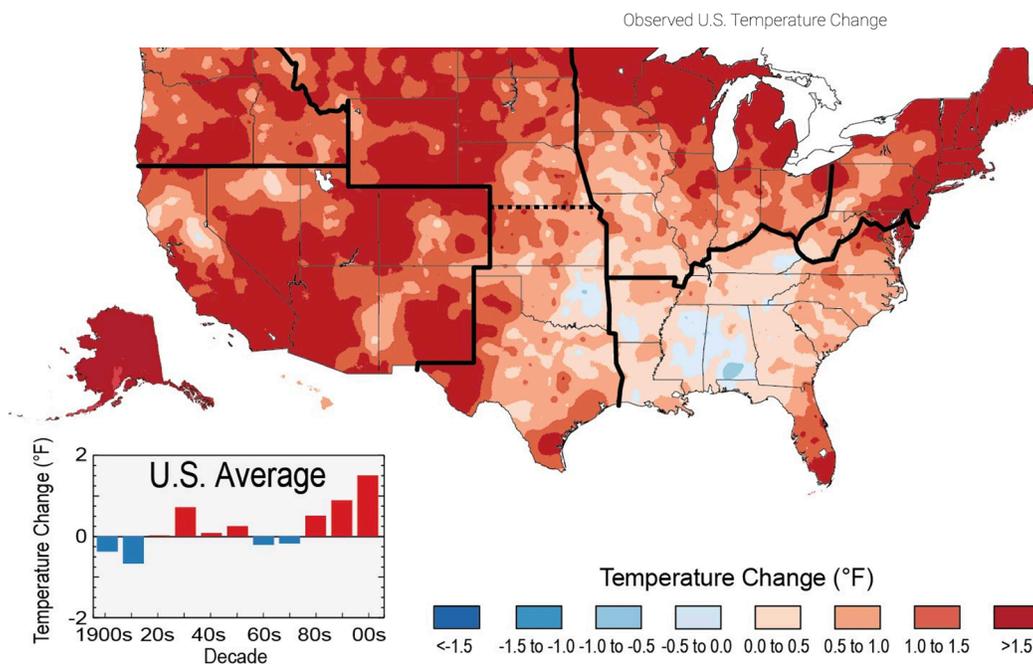


INTRODUCTION

While our world and economy are reeling from the ongoing effects of the COVID-19 pandemic, climate change also continues to have devastating impacts.

Average temperatures have risen by approximately 1°C since 1900,¹ making the world warmer than it has been in the past thousand years. More warming is expected as global greenhouse gas (GHG) emissions continue to rise. Catastrophic floods, droughts, wildfires and storms are becoming more frequent, more severe and more costly.

GRAPHIC OF US MAP ² showing U.S. temperature changes (National Climate Assessment)



Since 1980, the U.S. has sustained more than 265 climate-related extreme weather events with losses exceeding \$1 billion³ - the total cost of which has cumulatively exceeded \$1.775 trillion. Direct economic losses totaled more than \$500 billion⁴ between 2015 and 2019.

Even deeper economic losses are projected in the years ahead. The landmark Stern Review, “[The Economics of Climate Change](#),”⁵ warned in 2006 that unmitigated climate change could cost the world 5 - 20% of GDP per year. In a 2019 CDP survey,⁶ 215 of the world’s largest publicly listed companies reported nearly \$1 trillion at risk from climate impacts, much of it in the next five years. A London School of Economics⁷ study projects that, unless addressed, climate change could reduce the value of global financial assets by as much as \$24 trillion by the end of the century – permanent damage far worse than the 2007-2009 financial crisis. And, a 2019 study⁸ by the National Bureau of Economic Research warns that if GHG emissions are not significantly reduced, the U.S. could see a 10.5% drop in real income by 2100.

Given these extensive and burgeoning financial impacts, it is clear that climate change poses a systemic risk to U.S. financial markets. Financial regulators, who are responsible for protecting the stability and competitiveness of the U.S. economy, should build on the well-established body of research to assess the impacts of climate change on the U.S. economy, and act to address the risks that are surfaced. Left unmanaged, these risks will have significant, disruptive consequences on asset valuations, financial markets and economic stability. Proactive action by financial regulators and policy makers will also encourage the necessary adaptations that could lead to innovation, offer growth opportunities and strengthen U.S. competitiveness.

Financial regulators in other parts of the world, including central banks and securities regulators in China, Europe, the U.K., and South America, are already responding to climate change as a systemic risk and are taking steps to protect their markets. [A 2019 survey⁹](#) of 33 central banks and supervisory authorities, collectively representing 77% of global GDP, found that 70% of them saw climate change “as a major threat to financial stability,” and showed more than half are already acting to monitor and address climate risk.

Ceres knows that climate change is the biggest sustainability issue of our time, affecting everything from our economic systems to our political security to the availability of food and water and to our very existence on earth. For over three decades, Ceres has worked with companies, investors and policy makers to drive the consideration of climate change as a financial risk and foster the uptake of climate solutions. However, continued market mispricing of climate factors in the face of exacerbating risks puts the stability of our national and global financial systems, already vulnerable from the ongoing COVID-19 pandemic, in further jeopardy. The ongoing pandemic, which is disrupting financial markets and the real economy globally, has underscored the interconnectedness of our global financial system and the importance of coordinated and proactive leadership at the state, federal and global levels. Financial regulators are taking unprecedented and critical actions to support the economy. At the same time, it is imperative that action on the COVID-19 pandemic does not have the inadvertent effect of worsening the impacts of climate change.

As stewards of the world’s largest economy, it is critical for U.S. financial regulators to also take immediate action on climate change. Inaction or further delays will exacerbate the economic risks we already face. Using the diverse tools at their disposal will help ensure that banks, insurers and other key financial institutions are prepared for and resilient to all types of relevant climate risks.

This report outlines why and how key U.S. financial regulators – including the Federal Reserve System (the Fed), the Office of the Comptroller of the Currency (OCC), the Federal Deposit Insurance Corporation (FDIC), the Securities and Exchange Commission (SEC), the Commodity Futures Trading Commission (CFTC), state and federal insurance regulators, the Federal Housing Finance Agency (FHFA), and the Financial Stability Oversight Council (FSOC) – can take affirmative steps to protect the financial system and economy from potential climate-related shocks that will harm American workers, families and taxpayers alike.

The Climate Crisis and Economic Stability

Systemic risk has been defined¹⁰ as a risk of disruption to financial services that is (i) caused by an impairment of all or parts of the financial system and (ii) has the potential to have serious negative consequences for the real economy.

We have known for years that climate change is altering regional ecosystems and weather events – creating **physical risks** that have led to significant financial hits for companies, investment returns, communities and households. But the situation is far worse today, with what was once considered rare climate-related catastrophic events becoming the norm. Climate change is no longer solely an environmental issue, but one that affects our environment, our society, our health and well-being, and our economy.

While some governments have tried to reduce their countries' GHG emissions, and some have succeeded, global emissions are still rising, and the damage is escalating. Extreme weather events are more frequent and severe, leading to cascading economic losses. **Socioeconomic risks** like health care impacts, lost productivity and forced migration are likely to multiply these losses as the average temperature rises. **Geographic hot spots** such as California and Florida face some of the biggest risks, whether from scorching heat, droughts, uncontrollable wildfires, storm flooding or rising sea levels.

And the problem is not going away. With global emissions still rising, enough global warming is already “baked into the system” to cause significant disruptions and impacts to financial assets regardless of the speed of global climate mitigation efforts. Scientists have warned that factors like the **rapidly melting permafrost and continental ice sheets could release billions of tons of methane into the atmosphere**,¹¹ pushing warming over tipping points that could significantly worsen climate change's impacts on economies and humanity at large.

While a faster transition to a net-zero carbon economy will reduce the magnitude of future losses, **the transition itself also presents risks and opportunities**. Sectors that are critical to our economy – such as energy, transportation and agriculture, each worth many trillions of dollars every year – are particularly vulnerable to a poorly planned, yet inevitable, transition to a net-zero carbon economy. Banks and insurance companies have significant exposure to climate risk, but could also drive important solutions.

Each of the risks noted above has already led to price volatility, competitiveness impacts, asset losses and more. Taken cumulatively, they can affect the very stability of the financial system. U.S. financial regulators need to take immediate action to assess and address the impacts of climate change.

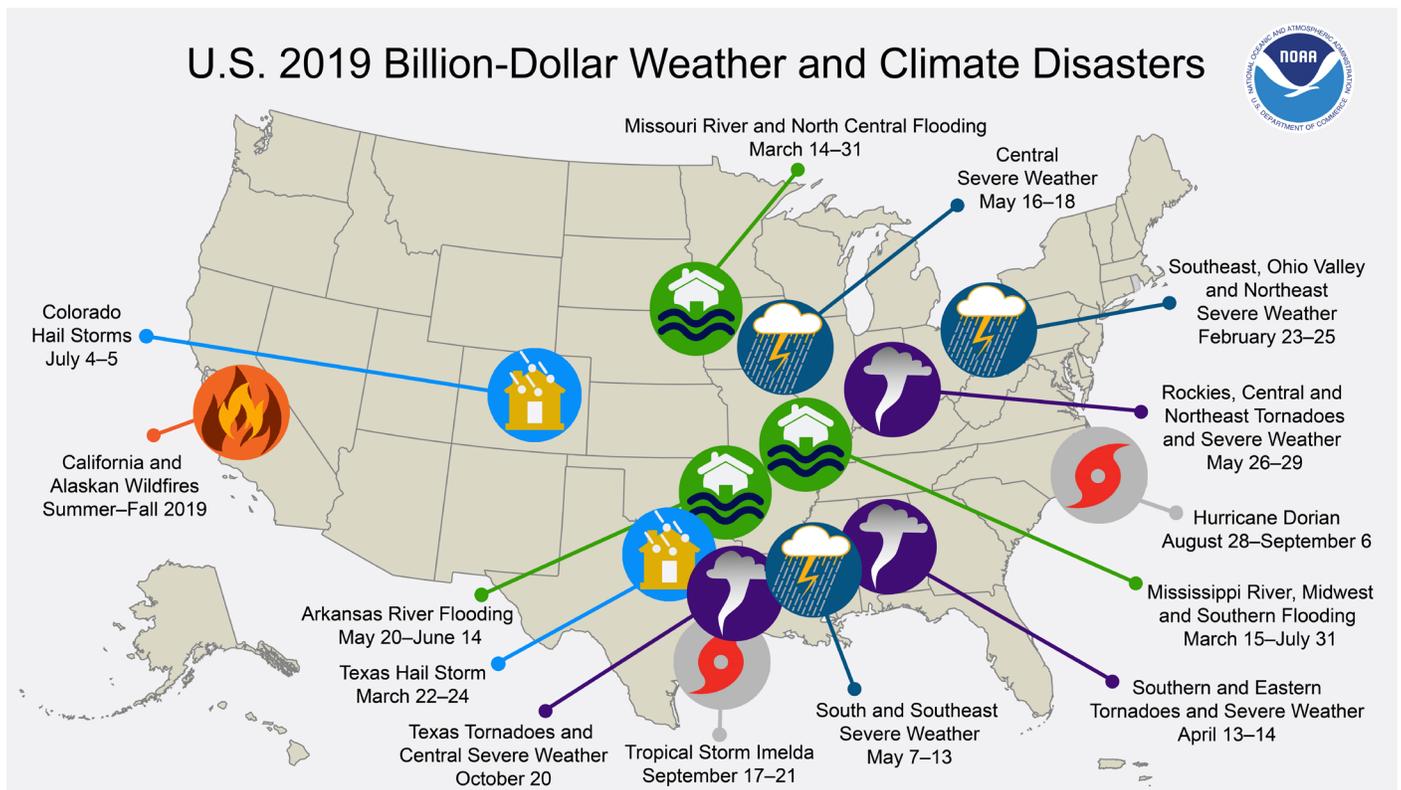
“Climate change will affect all agents in the economy (households, businesses, governments) across all sectors and geographies. The risks will likely be correlated and potentially aggravated by tipping points and non-linear impacts. This means the impacts could be much larger, more widespread and diverse than those of other structural changes.”

**“Macroeconomic and Financial Stability: Implications of Climate Change,”¹²
Network for the Greening of the Financial System, 2019**

Frequent extreme weather events are resulting in mounting economic losses

The increase in the frequency and severity of climate-influenced floods, droughts, hurricanes, wildfires, as well as sea level rise, is now well-documented. According to a 2019 attribution analysis,¹³ more than two-thirds of extreme weather events studied globally were made more likely or more severe by human-caused climate change. Data has also confirmed that such extreme weather events have become more frequent over the past decades.¹⁴

U.S. 2019 Billion-Dollar Weather and Climate Disasters National Centers for Environmental Information¹⁵



These same trends can be seen in the United States. From 1980 through 2019, the country averaged six natural disasters per year that caused over **\$1 billion of losses annually**.¹⁶ From 2016 through 2019, the country experienced 59 such disasters with over **\$1 billion in damages**,¹⁷ including 14 in 2019.

EXTREME WEATHER EVENTS IN THE U.S.

Over the past few years, the U.S. has been battered by multiple extreme weather events that caused billions of dollars in damages. Such events are expected to worsen¹⁸ going forward.

Between 2016 and 2019, Texas experienced two “once-in-a-thousand-years” flood events,¹⁹ each caused by torrential rains of 40 inches or more. 2017’s Hurricane Harvey²⁰ alone caused \$125 billion in damages.

The 2017 hurricane season caused \$58- \$63B in damages in Florida²¹ in a 60-day period.

2012’s Hurricane Sandy, which closed Wall Street for days and severely impacted both New York and New Jersey, resulted²² in \$70.2B in economic damages.

In 2018, California experienced record wildfires²³ that burned 1.96 million acres, causing over \$12B in losses.²⁴ The wildfires also forced the state’s largest electric utility, PG&E, into bankruptcy.²⁵ The damage continued in 2019,²⁶ with 7,860 fires burning another 250,000 acres.

Studies show that hotter temperatures and longer fire seasons have contributed to a 400% jump in the frequency of Western U.S. fires since 1970.²⁷

These and other events exacerbated by climate change are causing significant financial losses across the economy – disrupting supply chains and consumption patterns and threatening real assets including real estate, infrastructure and agriculture. Research²⁸ from Stanford University suggests that there is a 51% chance that climate change will reduce global output by more than 20% by 2100, compared to a world without warming. And, there’s a 12% chance it will lower per capita GDP by 50% or more by then unless emissions decline. Under a scenario of 2.5°C (4.5°F) of warming by 2100, the London School of Economics estimated²⁹ that 1.8 to 16.9% of global financial assets would be at risk from climate impacts. That’s \$2.5 trillion to \$24.2 trillion in value at risk.

Social and environmental factors are exacerbating economic impacts

Studies on climate change's impacts³⁰ have two common threads: first, they all show that future damages and losses will likely be far higher than what we are experiencing today; secondly, most of these predictions likely underestimate the impacts of climate change on the economy.

As climate change begins to play out, we are already seeing its economic impacts both affecting and being affected by social and community factors such as health, productivity and population disruptions, and by environmental factors like biodiversity loss. As climate trends worsen, all of these negative, intersecting ripples will become more pronounced, triggering even deeper economic disruptions.

Health and productivity

If emissions continue to rise through the end of the century, average U.S. summers will be unrecognizable. According to one study, the number of people experiencing a month's worth of [days with a heat index above 105°F in an average year will increase from just under 900,000 to more than 90 million](#) by mid-century.³² This number will expand to 180 million people by the end of the century. In the same timeframe, at least 120 million will face more than seven days that feel hotter than 127°F.

We're already seeing evidence of the debilitating effects of climate-related warming. In densely populated cities like Chicago, which are especially prone to the "urban heat island" effect, single heat waves have caused³³ hundreds of deaths. In Florida, [a 2018 study showed](#)³⁴ agriculture workers were routinely dehydrated with core body temperatures over 100°F – the tipping point for serious injury.

Crank up temperatures a few more degrees – as scientists say is likely – and the health and economic damages multiply. By the end of the century, [productivity losses](#)³⁵ due to extreme heat in jobs that require being outside, such as agriculture and construction, could result in some \$170 billion in lost wages every year. Productivity in the Southwest and Florida could drop by 5 – 7%.

As temperatures rise, health impacts will be accompanied by rising healthcare costs. Worsening air quality will be a major culprit. The [National Climate Assessment](#)³⁶ forecasts higher ozone and particulate matter (PM) pollution in many parts of the country by 2050 due to expected higher temperatures. States in the Midwest will see some of the biggest ozone increases. Without additional adaptation, unmitigated climate change and resulting [extreme temperatures are projected to cause between 4,500 to 9,000 premature deaths](#)³⁷ per year by the end of the century, at a cost of between \$60 and \$140 billion a year.

We are already seeing climate change's financial impacts. [A study of 10 "climate-sensitive events"](#)³⁸ in the U.S. in 2012 alone found they cost the economy more than \$10 billion, along with causing 917 deaths, 20,568 hospitalizations and 17,857 emergency room visits. The types of events studied were those likely to become worse and more frequent with unchecked climate change.

The spread of diseases in places that were once too cold to allow them to develop and spread is another growing risk. According to the Centers for Disease Control and Prevention (CDC), [cases of diseases from mosquitoes, ticks and fleas more than tripled](#)³⁹ to 96,000 cases between 2004 and 2016. [Testimony](#)⁴⁰ from the CDC underscored that these numbers were likely significantly underreported, and that 2017 featured a record number of reported cases.

"I would like to highlight the risk of extreme outcomes, so-called threshold effects. This is the starkest example of fundamental uncertainty – science cannot say that this will happen, but neither can it completely rule out disastrous outcomes. Threshold effects occur when climate change reaches a tipping point and cannot be reversed, but instead speeds up further change. There are several examples: melting icecaps, thawing permafrost, forest fires that can devastate areas of the Amazon rain forest."

Anna Breman

Deputy Governor, Riksbank (Swedish Central Bank) "How the Riksbank can contribute to climate policy",³¹ Mar 2020

Community impacts and mass migrations

Climate change is also precipitating mass migrations, as communities impacted by extreme weather events are forced to leave their homes, even if only temporarily. From 2008-2015, extreme weather displaced an average of 26.4 million people per year globally,⁴¹ according to the Internal Displacement Monitoring Center (IDMC). By 2050, climate change will force 50 to 700 million people to emigrate.⁴² In the U.S., communities that have been impacted by extreme weather events, such as those in New Orleans⁴³ and New Jersey,⁴⁴ have still not fully recovered.



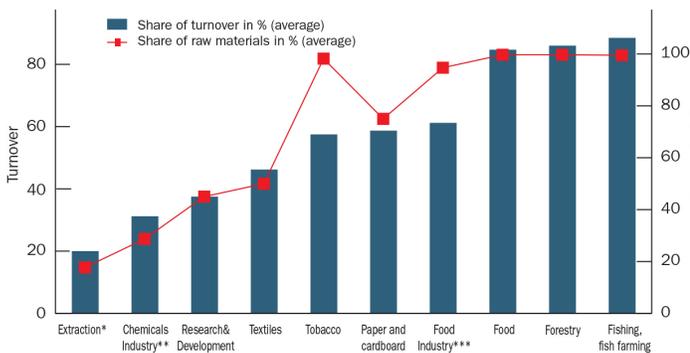
Efforts to mitigate climate impacts in the U.S. come with a hefty price tag. A 2019 study found that critically needed infrastructure to protect vulnerable U.S. coastal cities from storm surges alone will, conservatively, cost over \$400 billion in the next 20 years,⁴⁵ and many improvements are needed much sooner.

Biodiversity Losses

The rapid loss of forests (120 million forest hectares lost since 1990)⁴⁶ has led to a myriad of environmental and social impacts -- from ecosystems degradation to land rights violations to worsening climate impacts due to carbon dioxide releases.

Deforestation, in turn, is exacting a toll on global biodiversity, which underpins critical industry sectors. Research shows that 40% of the world's economy -- specifically the agricultural and food, pharmaceutical, forestry, tourism, and drinking water industries -- relies on biological products or processes.⁴⁷

Proportion of Revenues Directly Linked to Biodiversity and Ration of Raw Materials Which Come from Biodiversity AXA Investment Managers⁴⁸



Source of data: Incorporating biodiversity into business strategies, the biodiversity equation for organisations, Orée, Fondation pour la Recherche sur la biodiversité, 2008

A study based on the INSEE statistics agency French Official Activity Terminology

* Coal, lignite and peat extraction

** Chemicals industry (including paint, varnish, pharmaceutical industry, soap, maintenance products, explosives, artificial fibres)

*** Food industry (including animal feed and alcoholic beverages)

A 2019 UN study⁴⁹ warned that up to one million plant and animal species face extinction within this century, at least partially due to climate change. While biodiversity and ecosystems services are rarely calculated in economic forecasting, they cannot be ignored when it comes to climate change.

A higher carbon dioxide concentration in oceans results in warming and acidifying waters. These in turn damage both coral reefs and commercial fisheries, affecting coastal populations that rely on tourism and seafood for protein, respectively. In the U.S., the loss of coral reefs alone would shave as much as \$140 billion off recreation industries,⁵⁰ according to the 2018 Fourth National Climate Assessment (Vol II).

Bees and other plant pollinators, which support roughly a third of global food production, face growing population stress from damaging land practices and warming trends. The value of global crops directly relying on pollinators⁵¹ is estimated to be \$235 to \$577 billion a year. Without these pollinators, yields for major fruits, nuts and vegetables would be greatly reduced.

Climate impacts are already being felt in the largest state economies

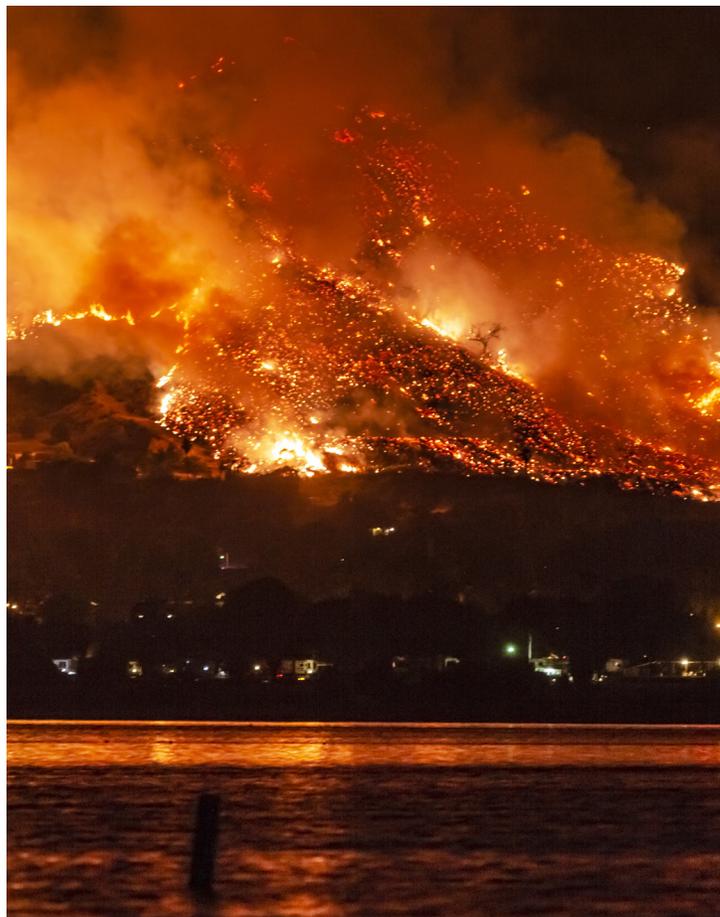
California's economy is now the largest in the country and fifth largest in the world. Florida, with the country's third largest population and fourth largest economy, is another economic powerhouse. Climate change is beginning to wreak havoc on the economies in both states.

California

Wildfires in California⁵² have caused wide-ranging damages across the state's economy, affecting hundreds of businesses and communities. In 2019, the state experienced **more than \$25 billion in losses from wildfires and resultant blackouts**.⁵³

Hotter and drier conditions, combined with forests providing fuel and a growing urban-wildfire interface, means that **wildfires will grow increasingly worse**.⁵⁴ Electric utilities' long transmission lines are often prime sources of **sparks**⁵⁵ that can trigger an inferno during hot, windy summers. PG&E, the state's largest utility, **declared bankruptcy**⁵⁶ in 2018 due to soaring insurance claims and other potential liabilities of up to \$30 billion for the role its transmission lines played in wildfires. To prevent such sparks, PG&E and other electric utilities in the state now periodically cut off power for millions of customers living in high-risk areas during fire-prone weather, **and have warned customers**⁵⁷ to expect rolling blackouts to continue for another decade.

Wildfires could also wipe out up to \$2 trillion in property values⁵⁸ in California. Yet another concern is the **insurability**⁵⁹ of millions of homes in areas at high risk from wildfires. Insurers are already dropping policies in hard-hit areas, **forcing the state to issue a one-year ban**⁶⁰ on such practices in 2019.



California is still recovering from the record low rainfall and high temperatures that it experienced between 2014 and 2016, which caused \$3.8 billion in losses,⁶¹ primarily to the agricultural sector.



Florida

Low-lying parts of Florida are wrestling with rising sea levels that threaten billions of dollars of coastal real estate.⁶² Higher sea levels (up six inches in the last three decades), more frequent "sunny-day flooding" and more powerful storm surges are already impacting property values and insurance premiums in low-lying areas of Miami-Dade County. **Research predicts**⁶³ that in Miami-Dade County alone, the percentage of vulnerable oceanfront properties affected by extreme flooding will rise from 5% in 2019 to 98% by 2050. And, the **McKinsey Global Institute**⁶⁴ recently predicted a 15 to 35% drop in real estate values in all low-lying areas of Florida by 2050.

The likelihood of more powerful hurricanes and potentially dire losses for homeowners and insurers is now a looming risk in Florida. In 2004-05, **private insurers fled the Florida market**⁶⁵ after a spate of hurricanes. Having

no options, millions of homeowners were forced to join the state-backed insurer of last resort – a situation that put Florida taxpayers at enormous risk if a catastrophic hurricane were to hit. Since then, private insurers have re-entered the market and, thankfully, their ability to cover Florida properties has not been tested by a major hurricane in over a dozen years. But the threat remains, and with it, the likelihood of price increases, which in turn affects real estate values and access to mortgages.

In addition to the states above, Federal Reserve officials representing the country's southern and western regions (covering Texas, parts of Louisiana and New Mexico), have begun speaking out about dangers that climate change poses to the economy in those regions. "We're seeing a frequency and intensity of weather events ... that are starting to be more than tail events," Robert Kaplan, the president of the Federal Reserve Bank of Dallas, [told a group of bankers in early 2020](#),⁶⁶ saying, "They're starting to affect economic outcomes."

"As the Illinois State Treasurer, I believe that the climate crisis is a systemic risk that we all need to address. My office is working hard in this area and we appreciate Ceres' work to outline thoughtful recommendations for federal and state financial regulators. We hope, for the sake of the planet, that financial regulators move forward and adopt these recommendations."

Michael W. Frerichs
Illinois State Treasurer
May 2020

An unplanned transition to a low-or-zero carbon economy could cripple key industries

In March 2020, Kevin Stiroh, Executive Vice President in the New York Federal Reserve [defined transition risks](#)⁶⁷ as "the potential for significant losses resulting from a shift toward a lower-carbon economy as government policy, consumer sentiment and technological innovation impact the value of certain assets and liabilities." He went on to note that "these effects will likely be felt across business sectors and asset classes, and on the strategies, operations and balance sheets of financial firms." While such a transition is both inevitable and urgently needed, financial regulators need to play an important role to ensure that the financial markets, which are already weakened from the ongoing COVID-19 pandemic, are resilient enough to absorb the resulting transition impacts.

International policy is already driving global efforts to limit GHG emissions. Even though [the U.S. announced](#)⁶⁸ its intention to pull out of the [Paris Climate Agreement](#),⁶⁹ most other countries have [ratified](#)⁷⁰ the accord and many are taking steps to reduce emissions -- which has implications for companies that function across national boundaries. Additionally, as of July 2019, 23 states and the District of Columbia established statewide GHG-reduction targets. [New York enhanced its ambition to achieve net-zero emissions by 2050](#),⁷¹ and [Massachusetts](#)⁷² and [Washington state](#)⁷³ are considering the same.

[The investor-led Inevitable Policy Response \(IPR\) project argues](#)⁷⁴ that as the realities of climate change become more and more apparent, it is inevitable that governments will act more decisively to reduce their carbon footprints. "The question for investors now is not if governments will act, but when they will do so, what policies they will use and where the impact will be felt," IPR notes. The IPR project forecasts a response by 2025 that will be "forceful, abrupt, and disorderly because of the delay."

"Climate change has become a defining issue in companies' long-term prospects. It is driving a profound reassessment of risk and asset values."

Larry Fink
Chairman and CEO, BlackRock
"A fundamental reshaping of finance,"⁷⁵
2020 CEO Letter to portfolio companies

Some market impacts from the transition are already being felt. For example, as public and business awareness about climate risk has grown, [capital spending](#)⁷⁶ is moving away from high-carbon sectors viewed as risky financial bets. This trend, along with other market forces, has contributed to a downward spiral in coal-burning energy use in the U.S. and other parts of the world. In recent years, a number of U.S. coal companies have gone into [bankruptcy](#).⁷⁷ These bankruptcies also disrupted local economies that relied on [coal jobs](#).⁷⁸

While the impacts on local communities in states like West Virginia [have been devastating](#),⁷⁹ the impacts on the financial system writ large have been relatively limited, to date. The coal sector contraction has been mostly concentrated and has not triggered a systemwide crisis. But future climate-related transition risks will affect far more industries and be far more disruptive – potentially affecting [trillions of dollars in assets](#).⁸⁰

These large-scale changes both pose market risks and offer market opportunities. On one hand, transition changes in a relatively short period of time could cause major disruptions and reduced valuations for the carbon-intensive assets that underpin much of today's economy. Given the massive size of these industries -- as much as [a third of all equity and fixed income](#)⁸¹ assets are tied to carbon-related extraction and carbon-intensive industries such as utilities, transportation, chemicals and industrial goods – these cumulative losses could have deep negative impacts on major financial institutions and other financial intermediaries holding these devalued assets. Some economists are concerned that if these changes strike lenders and investors quickly, [the value of carbon-related assets could suddenly burst](#),⁸² deeply damaging asset values and bank balance sheets. Net exporters of fossil fuels, such as the U.S., are projected to be “losers” in this scenario.

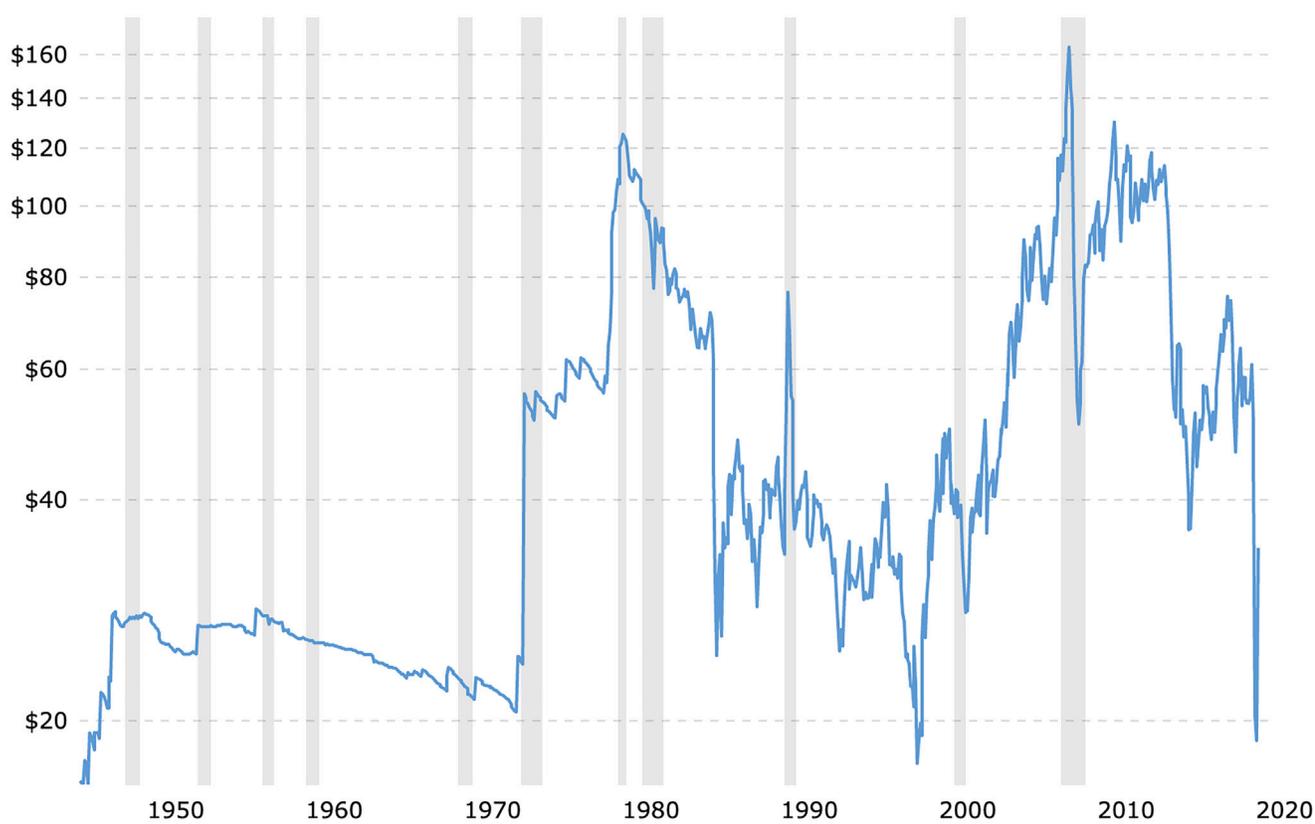


STRANDED ASSETS

Investments in long-lived carbon-intensive assets – such as extensive oil and natural gas reserves, currently worth trillions of dollars – would face the risk of becoming [stranded assets](#)⁸³ if they are retired before the end of their productive lifespans, thereby creating financial losses. A major drop in oil demand and oil prices, driven by a global net-zero carbon transition, may cause the carbon bubble built on long-term investments to burst. [According to a 2018 study](#),⁸⁴ the equivalent of between \$1 trillion to \$4 trillion could be wiped off the global economy in fossil fuel assets alone in the next 15 years. Another estimate that takes a broader view of stranded assets, assuming a later and more abrupt transition scenario, puts the value of [potential losses as high as \\$20 trillion](#).⁸⁵

The recent fall in oil prices precipitated by the [historic drop in demand](#)⁸⁶ from the ongoing COVID-19 pandemic has caused oil suppliers globally to significantly cut production. It remains to be seen how oil demand patterns may change as the global economy starts to recover.

Crude Oil Prices – 70 Year Historical Chart

Macrotrends⁸⁷

On the other hand, the national and global efforts needed to mitigate the worst effects of climate change and drive towards a [net-zero, or even low-carbon, economy would generate](#)⁸⁸ tens of trillions of dollars of clean energy investment opportunities by 2050. [Research suggests](#)⁸⁹ that a low-carbon economy could deliver at least \$26 trillion in economic benefits through 2030, as opposed to a business-as-usual scenario.

“Managing the transition by participating in the financing of decarbonization is a major opportunity for investors. It does imply a sweeping reallocation of resources and technological revolution, but this reallocation would generate new, creative investment at a pace, by some estimates, of roughly quadruple the present rate. Indeed, we see that green finance will be emerging as a force even stronger and more attractive than it is today, potentially reflecting a reallocation of capital that reflects fundamentals, including social impacts that previously had been neglected as externalities.”

Sarah Bloom Raskin

Former member, Federal Reserve Board of Governors;

Former U.S. Deputy Secretary of the Treasury

Testimony to Senate Climate Crisis Committee,⁹⁰ March 2020

Liability exposure is another factor that fossil fuel companies and investors face as climate-related losses and damage claims increase. In 2019, a number of [energy companies were sued for damages](#)⁹¹ amounting to potentially billions of dollars to cover the costs of climate change adaptation. While no costly verdicts have been awarded yet, the increasing sophistication of attribution science – determining the likelihood that a particular extreme weather event was caused by climate change – will also increase the threat of legal liability for companies and boards.

While much emphasis has been placed on direct risks for extractive companies that produce and sell fossil fuels – such as coal, oil and gas producers – transition risks will also impact asset values across sectors such as utilities, heavy industry, petrochemicals, cement, transportation (including ground transportation, aviation, and shipping), real estate, and agriculture. [The lost value of these assets is potentially](#)⁹² worth trillions or even tens of trillions of dollars.

Insurance companies and banks are on the frontline of risk

As physical risks and transition risks from climate change increase, the impacts on large financial institutions such as banks, insurance companies and other investment firms will increase as well.

Insurance

The insurance sector, which serves as the economy's shock absorber for risks, is particularly subject to the physical impacts of climate change. As damages from extreme weather events have continued to mount, the insurance industry has faced growing losses. [Munich Re reported that](#)⁹³ 2017-18 was the worst two-year period for natural catastrophes on record, with insured losses totaling \$225 billion. The reinsurer also said that hurricanes, wildfires and floods cost the world \$150 billion in 2019. [Companies are warning](#)⁹⁴ that premiums will rise as [the insurance industry](#)⁹⁵ assesses the growing risks associated with climate change and the potential for greater losses down the line.

Property and casualty insurance, which generates more than a \$1 trillion of premiums annually, can be enormously profitable as long as risks remain within familiar limits and are largely uncorrelated. But climate change calls these assumptions into question. As [former Bank of England Governor Mark Carney described](#)⁹⁶ the foreseeable impacts, "the tail risks of today" will likely be the "catastrophic norms of the future." Climate change will increase loss frequency and severity and, even more importantly, increase the correlation of loss events. While insurers and actuaries have begun to develop sophisticated models for handling catastrophic risk, a recent modeling exercise by the rating agency S&P suggests [the reinsurance industry](#)⁹⁷ may be underestimating possible losses from extreme weather by as much as 50%.

Insurers, who are among the largest investors nationally, face climate-related physical and transition risks to the value of their investments. These risks can result in investment losses which reduces their ability to pay future claims. A spike in climate-related losses would hit insurers from both sides – as claims increase and their investment portfolios are impaired. A poorly planned or abrupt transition to a net-zero carbon economy will only magnify such risks.

Banks and other financial institutions

Decarbonizing the global economy would send shocks across the financial system. [A 2019 paper](#)⁹⁸ modeling climate change impacts on global financial stability projects that climate-related impacts could increase the frequency of banking crises by 26 to 248%.

“The main result is that climate damages significantly reverberate to the financial system: our results clearly show that firms’ survival likelihood reduces almost three times, while the risk of banking crises doubles. This entails further costs, that is an additional fiscal burden of approximately 5 to 15% of GDP per year to absorb losses and rescue insolvent banks.”

Massimo Tavoni

Director of RFF-CMCC European Institute on Economics and the Environment,

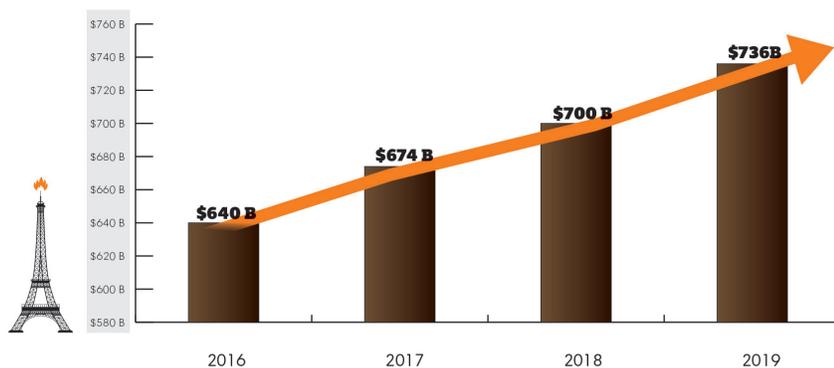
Professor at Politecnico di Milano, [Climate change affects the stability of the global financial system](#),⁹⁹

November 2019

Rather than acknowledging and acting on climate risk, bank finance and investment trends seem to be headed in the opposite direction. Research suggests that [the largest global banks have continued to provide](#)¹⁰⁰ trillions of dollars of financing to the fossil fuel sector since the Paris Climate Agreement was ratified in 2016, and the numbers continue to grow annually. A forthcoming research report from Ceres suggests that the exposure of major U.S. banks to climate risk in their lending portfolio is even larger than previously understood, with banks facing climate risk from a range of sectors including agriculture, transportation and real estate. This research also notes that the largest threat to banks is the aggregate risk exposure, rather than the risk in any single sector.

Total Financing for Fossil Fuels Rainforest Action Network¹⁰¹

TOTAL FINANCING for Fossil Fuels (\$USD)



- » **35** global banks financed fossil fuels with **\$2.7 trillion** since Paris.
- » Bank financing for fossil fuels has increased each year since the Paris Agreement.
- » At this rate, fossil financing will hit **\$1 trillion** per year by **2030**.

The cumulative and unpredictable nature of climate risk poses a systemic threat to financial stability

While each of the climate change risks and impacts discussed above is significant on its own terms, the cumulative, correlated and nonlinear nature of these impacts poses the greatest risk to overall financial market stability. To adjust the maxim, the whole is not only greater than the sum of its parts – it magnifies them, as well.

If financial markets have time to adjust, even large losses can be absorbed. But if changes strike lenders and investors suddenly and unexpectedly, they risk triggering what former [Bank of England Governor Mark Carney](#) calls “a climate Minsky Moment.”¹⁰² Named after Hyman Minsky, an economist whose model was widely deployed to understand the events behind the 2007-2009 financial crisis, a “Minsky Moment” would be, in this case, a snowballing scenario where a sudden drop in assets triggered by a bursting “carbon-price bubble” precipitates broader financial and economic instability.

The COVID-19 pandemic has starkly demonstrated the impacts of a sudden and disruptive event on an interdependent and multi-layered financial market. It underscores how stresses and failures can have cascading impacts across the system.

It is the job of financial regulators to guard against such worst-case scenarios. An already weakened national and global economy is now even more vulnerable to additional shocks from climate change. Financial regulators have an essential role to play in ensuring that the coming economic recovery is climate-change resilient.

The time for action is now

The 2018 special report from the Intergovernmental Panel on Climate Change (IPCC)¹⁰³ underscored that we have less than a decade to act to keep global temperature rise under a 1.5°C threshold before the worst impacts of climate change become irreversible. Despite this, carbon emissions have continued to rise.¹⁰⁴ While the ongoing COVID-19 pandemic has led to a reduction of greenhouse gases emissions¹⁰⁵ globally, this is not likely to be a permanent change without government action.

While prior sections of this report focused on macroeconomic effects, impacts at the household level cannot be overestimated. Families are already reeling from the financial consequences of the coronavirus pandemic, and are potentially even more vulnerable to the financial impacts of unaddressed climate change on our economy.

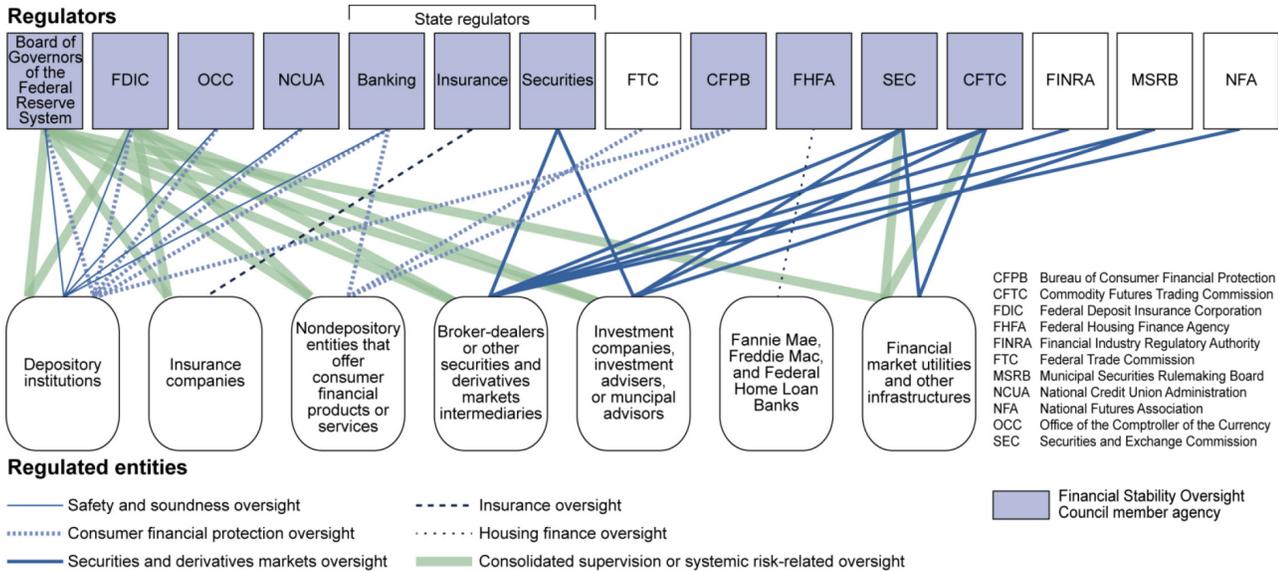
Actions U.S. Financial Regulators Should Take to Address Climate Change

Climate change considerations are relevant to the roles of U.S. financial regulators

U.S. financial regulators oversee a wide range of business activities that underpin the nation’s economy, including banking, insurance, securities markets and the overall financial system.

Regulatory Jurisdiction by Agency and Type of Regulation

Government Accountability Office¹⁰⁶



Source: GAO. | GAO-16-175

While there are numerous regulatory bodies with overlapping areas of responsibility, the broad goals of [the financial regulatory ecosystem](#)¹⁰⁷ can be broken down into five core areas:

- Financial stability**
 Maintain financial stability through preventative measures that reduce systemic risks and build market efficiency.
- Capital formation and economic competitiveness**
 Ensure that businesses and consumers can access credit and capital to meet their needs, thus enabling economic activity growth at a healthy rate.
- Consumer and investor protection**
 Ensure that consumers and investors are not being defrauded or manipulated, such as by not being given the information they need to understand the risks in financial transactions.
- Market efficiency and integrity**
 Ensure that market activities are transparent and that the “rules of the game” are enforced. Such market integrity generally leads to greater efficiency and reduced exposure to potential market failures.
- Minimize losses to U.S. taxpayers**
 Ensure that losses or failures in financial markets do not result in costs and liabilities unduly borne by taxpayers.

Climate change considerations are relevant to financial regulators looking to achieve each of the goals outlined above.

U.S. financial regulators should proactively address and act on climate change across their mandates

Based on the risk that climate change poses to capital markets, U.S. financial regulators should address climate change in the following ways:

- **Assess climate impacts on financial market stability**

Recognizing that climate change poses a financial stability risk is a critical first step for all financial regulators and will, in itself, send an important message to capital market actors. Upon acknowledging the risk, financial regulators should also undertake deeper economic research on how climate change could affect U.S. economic stability related to their specific mandates.

- **Integrate climate change's financial risks into institutional oversight**

The financial sector – banks and insurance companies, in particular – is exposed to climate change risk through lending and investment portfolios. As a part of their role in maintaining financial stability and safety and soundness of individual institutions, many regulators have explicit responsibilities to supervise the risks the financial sector takes on. Regulators should leverage their oversight and supervision of these financial institutions to ensure they adequately integrate climate change into their stress tests and risk management processes, and reflect the costs of climate change in their decision making.

- **Foster climate risk transparency**

Good information to inform sound decision-making is at the heart of efficient markets. Current climate risk disclosure practices do not meet this threshold. Ten years after the Securities and Exchange Commission (SEC) issued climate risk disclosure guidance, [corporate climate disclosure practices](#)¹⁰⁸ are still spotty and inconsistent, preventing investors and regulators from making informed decisions. Federal regulators should mandate consistent, comparable, reliable and decision-useful climate risk disclosure from companies and financial intermediaries.

- **Reorient capital flows towards climate change solutions**

As part of their charge to foster healthy markets, economic growth and job creation, U.S. regulators should recognize the tremendous economic opportunities associated with climate change and the importance of their proactive market stewardship during the transition toward a net-zero carbon future. Such stewardship would bring U.S. regulators and markets more in line with the rest of the world. [Global clean energy spending](#)¹⁰⁹ has quadrupled over the past 15 years, reaching \$363 billion in 2019 – and exponentially larger investments will be needed to reduce global GHG emissions in order to keep global warming well-below 2° C, the overarching goal of the Paris Agreement.

In the remainder of this section, we outline why and how the following key U.S. financial regulators can and should move more affirmatively to protect the U.S. financial system, its economy, and the global economy from potentially devastating climate-change related shocks:

The Federal Reserve System (Fed)

The Office of the Comptroller of the Currency (OCC)

The Federal Deposit Insurance Corporation (FDIC)

The Securities and Exchange Commission (SEC)

The Commodity Futures Trading Commission (CFTC)

Insurance regulators

The Federal Housing Finance Authority (FHFA)

The Financial Stability Oversight Council (FSOC)

While there are other agencies and departments that clearly have material impact on U.S. financial markets, such as Housing and Urban Development, the Department of Labor, and others, we do not address their specific mandates in this report.

This report demonstrates that financial regulator action on climate change risk falls within the existing mandates of the agencies in question. In fact, [research](#)¹⁰ from the Great Democracy Institute argues that the 2010 Dodd Frank and Wall Street Reform and Consumer Protection Act gives regulators broad authority that could be leveraged to require financial institutions to address climate risk. We also note that financial regulators globally are already taking such actions.

While this report focuses on the roles of a few key regulators, all federal and state financial regulators have an important role in fostering a sustainable and resilient capital market system and we hope that every such agency will further examine its role in this work. We look forward to working with federal and state agencies to follow-up on the recommendations in this report and subsequent reports.

FEDERAL RESERVE SYSTEM

The role of the Fed in addressing climate risk:

Financial stability

- Acknowledge climate change poses risks to financial market stability
- Assess climate change's impacts on financial stability
- Build awareness of regional climate vulnerabilities
- Organize events and conduct research on economic impacts unique to jurisdictions

Prudential supervision and regulation

- Integrate climate change into prudential supervision and regulation
- Ensure climate risk, including transition risk, is integrated into micro-prudential supervision of financial institutions
- Conduct climate stress tests on financial institutions and define scenarios, time horizons and modeling approaches that should be used
- Coordinate with the SEC and other regulatory agencies to require banks to assess and disclose climate risks, including carbon emissions from lending and investment activities
- Define activities more likely to exacerbate climate change risk and those likely to mitigate risks, building on work being done globally

Monetary policy

- Consider the climate-related impacts of efforts to infuse more liquidity in the economy to fuel economic growth
- Integrate climate risk into collateral frameworks
- Integrate climate risk into economic outlook assessments

Community reinvestment

- Integrate climate adaptation efforts to bolster the resilience of low-income communities to climate change

International efforts

- Join the Network for Greening of the Financial System (NGFS)
- Become part of international community of central banks pledging coordinated action on climate risk

The Federal Reserve System, often referred to as the Federal Reserve or the Fed, is the central bank of the United States and one of the largest central banks in the global financial system.

The Fed's mission is to foster the stability, integrity and efficiency of the nation's monetary and financial systems, in order to maximize economic performance. It sets U.S. monetary policy, supervises and regulates financial institutions, monitors financial system risks, and promotes consumer protection. Of particular importance, it supervises bank holding companies and other key financial institutions.

The Fed's potential impact on risk response, management and mitigation is enormous. Its response to the coronavirus pandemic, to use a current example, underscores the scope and scale of its potential to impact every aspect of the U.S. financial system.

There are several key areas where the Fed could act on climate change risk, including assessing the impacts of climate change on financial stability, exploring how climate change fits into prudential regulation and monetary policy, and integrating climate considerations into financial supervision. Many of these approaches are already being pursued by other central banks worldwide, providing valuable examples the Fed can learn from.

Financial stability

The physical, socioeconomic and transition risks of climate change are significant, and can combine in non-linear and unexpected ways to pose risks to the stability and competitiveness of the U.S. economy.

Identifying and responding to threats to financial stability is a core responsibility of the Fed via its Division of Financial Stability. Accordingly, the Fed should acknowledge that climate change poses risks to financial market stability and immediately begin researching their potential impacts. This assessment could include quantifying the embedded climate risks across the financial system, studying risk-transmission systems, and considering credit exposures and risk concentrations and how they combine into even greater outcomes. Such research will underpin any further action that the Fed and other financial market regulators could take on climate change.

Recent statements from the leadership of the Federal Reserve Board indicates that the agency may be starting to consider the implications of climate change. In January 2020, [Fed Chair Jerome Powell](#)¹¹¹ said, “The public has every right to expect, and will expect, that we will ensure that the financial system is resilient and robust against the risks of climate change.”

Similarly, [Board of Governors member Lael Brainard](#),¹¹² who chairs the Fed’s Committee on Financial Stability, said “The Federal Reserve will need to assess the financial system for vulnerabilities to important climate risks” at an Economics of Climate Change conference in November 2019. She went on to say “Although there is substantial uncertainty surrounding how or when shifts in asset valuations might occur, we can begin to identify the factors that could propagate losses from natural disasters, energy disruptions, and sudden shifts in the value of climate-exposed properties. As was the case with mortgages before the financial crisis, correlated risks from these kinds of trends could have an effect that reaches beyond individual banks and borrowers to the broader financial system and economy.”

The twelve regional banks of the Federal Reserve have a much closer connection to economic activity in their districts than the U.S. Fed or central bank, and generate valuable data and insights on such activity, which ultimately feeds “up” to shape national policy.

Regional banks of the Federal Reserve System could jumpstart this process by building awareness of regional climate vulnerabilities such as extreme weather events, and by organizing events and conducting research on the economic impacts unique to their jurisdictions. Such efforts could contribute to a better understanding of the macroeconomic picture across the U.S. financial system. Regional banks could also establish advisory committees to bring together networks of experts and stakeholders to provide regional perspectives on the current and anticipated impacts of climate risk and to brainstorm solutions.

Climate risk mapping: Regional impacts

Region (Federal Reserve)	Present 2020	Mid-Century 2036-2065	Late-Century 2100
Northeast (1-3)	 <ul style="list-style-type: none"> Largest observed changes in heavy rainfall in US Superstorm Sandy \$74.1b in damage (2nd costliest in US history (NOAA)) 	<ul style="list-style-type: none"> +5.09° F "ocean heatwaves" more common 	<ul style="list-style-type: none"> +9.11° F
Midwest (4,8,7,9)	 <ul style="list-style-type: none"> Increase in heavy precipitation 2019 second wettest year in US history. Flooding cost \$6.2b in damage to Midwest (NOAA) 	<ul style="list-style-type: none"> +5.29° F Extreme heat & cold waves 	<ul style="list-style-type: none"> +9.49° F
Southeast (5,6)	 <ul style="list-style-type: none"> Tidal flooding accelerating in >25 Atlantic + Gulf States Miami-Dade \$465m in property value losses 2005-2017 	<ul style="list-style-type: none"> +4.30° F Expansion of mosquito activity 	<ul style="list-style-type: none"> +7.72° F Abandonment of coastal property
Great Plains (9-11)	 <ul style="list-style-type: none"> Northern Great Plains Largest changes in net warming in US (+1.69° F) 	<ul style="list-style-type: none"> +4.86° F Extreme heat & cold waves 	<ul style="list-style-type: none"> +9.91° F
Northwest (11,12)	 <ul style="list-style-type: none"> Warmed 1.54° F since 1900 	<ul style="list-style-type: none"> +4.67° F Heavy rainfall, atmospheric rivers 	<ul style="list-style-type: none"> +8.65° F
Southwest (12)	 <ul style="list-style-type: none"> CA wildfires, \$24b in losses. Camp fire (\$16.5b) costliest natural disaster in world in 2018 (Munich Re) Threats to agriculture: Produces >50% of US high-value specialty crops which are irrigation dependent (NCA, 2014) Second largest net warming in US (+1.61° F) 	<ul style="list-style-type: none"> +4.80° F Heatwaves, drought, reduced snowpack, insect outbreaks, wildfire 	<ul style="list-style-type: none"> +8.51° F 'Mega drought' risk (10, 100, 1000 years)



Prepared for Ceres drawing on various publicly available sources.¹¹⁵

“It is the view of the Dallas Fed economists that severe weather events pose a “tail risk” for certain cities and industries in our district.”

“If the National Climate Assessment’s predictions regarding the likely frequency and/or severity of extreme weather events turn out to be accurate, these extreme weather events may begin to have a negative impact on the region’s longer-term business prospects and migration trends.”

Robert Kaplan

President, Federal Reserve Bank of Dallas

“Economic Conditions and the Stance of Monetary Policy,”¹¹⁴ June 2019

In 2019, **The Federal Reserve Bank of Dallas** warned¹¹⁵ of deeper losses and more economic disruption from climate-driven extreme weather in Texas and other Gulf Coast states. The Federal Reserve Bank of St. Louis estimates¹¹⁶ a potential 5 to 10% loss in GDP in its region as a result of climate change.

“When you put all these pieces together, it becomes pretty clear: climate change is an economic issue we can’t afford to ignore.

This isn’t just a concern for the Twelfth District. Or even the United States. Countries around the world are dealing with the economic impacts of climate change. And conferences like this are essential to understanding the challenges that lie ahead – for all of us.

Ultimately, this is our job. The San Francisco Fed is a public service organization. We’re responsible for the people and the communities we serve. So, we have to get out in front of this issue and do what we do best.

Convene the best people and ideas. Study data and conduct research. Talk to the communities we serve – and really listen when they tell us what they need.”

Mary Daly

President, Federal Reserve Bank of San Francisco

“Why climate change matters to us,”¹¹⁷ November 2019

Prudential supervision and regulation

Climate change poses – and will continue to pose – credit, market, and liquidity risks by reducing the value of assets and making the evaluation of long-term credit risk and collateral value more difficult. The purpose of prudential action is to protect individual firms and the economy writ large from risks and economic shocks using risk controls and capital/liquidity requirements.

As a core part of its mandate to ensure the safety and soundness of the entire financial system, the Fed coordinates with other financial regulators to supervise systemically important financial institutions whose collapse has the potential to pose serious risks to the economy. As a part of its oversight, the Fed imposes additional requirements on these institutions such as enhanced prudential supervision, higher capital and liquidity requirements, and stress tests to ensure that they are resilient to economic shocks. This group of institutions includes some of the [largest fossil fuel financiers in the world](#),¹¹⁸ such as Bank of America, Citigroup, JP Morgan, and Wells Fargo.

The Fed should ensure that climate risk, including transition risk, is integrated into its microprudential supervision of financial institutions.

An [April 2020 survey](#)¹¹⁹ of the 27 members of the Basel Committee on Banking Supervision found that a majority of them found it appropriate to integrate climate change within their supervisory frameworks, and have raised risk awareness with the banks that they supervise through a number of channels.

“In the context of climate change, in my view, bank supervision should focus on ensuring that appropriate risk management frameworks are in place, rather than using supervisory tools for broader objectives. That is, supervisors can focus on identifying and managing risks, both microprudential and macroprudential, that emerge along a transition path to a more sustainable economy.”

Kevin Stiroh

Executive Vice President, Federal Reserve Bank of New York

“Climate Change and Risk Management in Bank Supervision,”¹²⁰ March 2020

The Fed should conduct climate stress tests on the financial institutions that it supervises and define the scenarios, time horizons and modeling approaches that should be used as a part of this. Setting robust scenarios and assumptions will be critical to getting useful results, and the Fed should look to work done by its global counterparts, as well as climate change experts, in developing these.

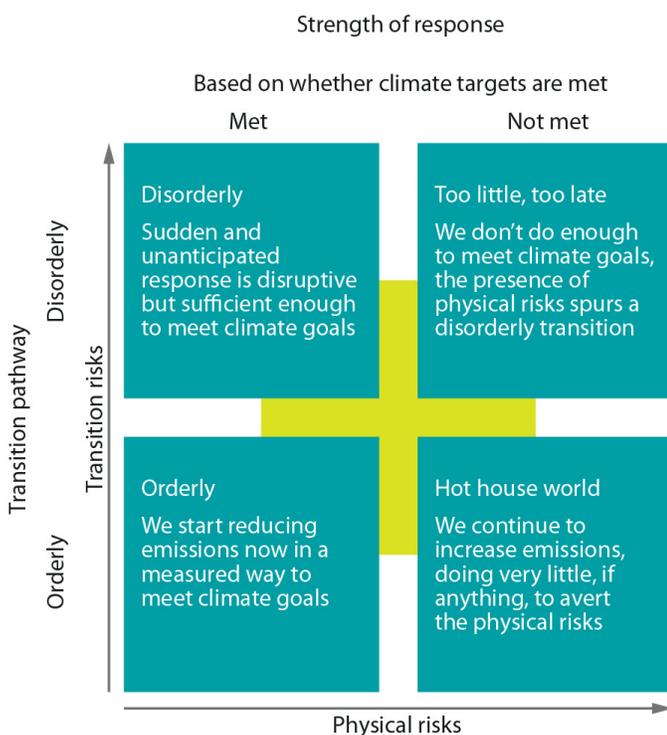
In December 2019, the [Bank of England announced](#)¹²¹ plans to conduct mandatory stress tests of the resilience of major U.K. banks and insurers on a range of climate scenarios, including how they would cope with more frequent severe weather events such as flooding and rising sea levels, as well as what would happen if there was a sudden “fire sale” of fossil fuel-related assets. In the most severe scenario, lenders and insurers will be tested against global temperature rise of as much as 4°C by 2080.

Similarly, the [Bank of France has stated](#)¹²² that it will subject banks and insurers to climate stress tests, beginning this year. The [Australian Prudential Regulation Authority plans](#)¹²³ to introduce mandatory stress tests of the country’s banks, insurers and the pension fund industry to better understand climate impacts on the Australian economy. In March 2020, the [European Central Bank announced](#)¹²⁴ that preparations are underway for a macroprudential stress test aimed at understanding “how climate risks propagate across the real economy and the financial system.” And, in 2017, the [Bank of The Netherlands conducted two studies](#)¹²⁵ of the Dutch financial system showing that while the exposure to fossil fuel producers is small, broader exposure to carbon-intensive sectors is significant enough to cause systemic risks.

Baselines for Climate Scenario Analyses

The **Central Banks and Supervisors Network for Greening the Financial System (NGFS)** has defined a climate change scenario analysis framework to support central bank efforts on stress testing.

Network for Greening the Financial System Climate Change Scenario Analysis Framework Network for Greening the Financial System¹²⁶



The **Climate Change Financial Risk Act**,¹²⁷ introduced in the U.S. Senate in 2019, directs the Federal Reserve to conduct such stress tests on large financial firms to measure their resilience against climate-related risks. The legislation also calls on the Fed to establish an advisory group of climate scientists and climate economists to help develop climate change scenarios for these financial stress tests.

Corrective action stemming from such stress tests should address the desirability of holding risky assets over a period of time. Banks and insurers whose balance sheets show unacceptably high vulnerability to climate risks could be required to hold additional capital to mitigate potential losses. For instance, **it has been suggested**¹²⁸ that central banks should tighten risk-weights associated with coal financing given the “high risk of default of the underlying business.” Financial institutions could be required to sell off high-risk assets to reduce their vulnerability. Additionally, financial institutions could be asked to enhance their risk management processes to better identify and address climate change risks.

To be effective, the Fed’s actions on financial stability assessment and microprudential supervision need to be anchored in a foundation of robust information on climate risk and climate impacts. To that end, **the Fed should coordinate with the SEC and other regulatory agencies to require that financial institutions provide robust climate change disclosure, including assessing and disclosing carbon emissions from their lending and investment activities.** This would both help them understand their risk exposure, as well as provide relevant information to financial markets. Regulators should encourage financial institutions to use established frameworks in providing such disclosure. The **Platform for Carbon Accounting Financials (PCAF)** is one of several examples that warrant exploration.

Both the NGFS and a number of central banks have identified the Recommendations of the **Taskforce for Climate-related Financial Disclosures (TCFD)**¹²⁹ as a useful place to start. Climate disclosures from banks should include not only details on the risks the financial institutions face, but also on portfolio-level financed emissions. Such information would provide a window into systemic risks stemming from institutions' lending and investment activities.

Microprudential supervision could also be supported by macroprudential efforts. **The Fed should define activities that are more likely to exacerbate climate change risks as well as those that are likely to mitigate such risks, building on the work being done globally.** In 2019, the **European Union** agreed on a taxonomy for "**environmentally sustainable economic activity**,"¹³⁰ a key step in providing clarity and agreement on where billions in financing should flow to meet the EU's climate mitigation and adaptation objectives. Surveys of central banks have also underscored¹³¹ the importance of harmonization as multiple taxonomies are developed globally.

Monetary policy

The Fed's efforts on monetary policy are linked to its goals to promote maximum employment, maintain price stability and allow for moderate long-term interest rates. The physical and transition risks associated with climate change have the potential to result in economic shocks or slowdowns which could result in falling growth, rising unemployment and price volatility.

Monetary policy has typically been used to stabilize the financial system in the face of economic disruptions and shocks. We are seeing the Fed's power in this regard demonstrated in its ongoing response to the COVID-19 pandemic. At the time of this report's publication, the Fed had thus far announced **plans to inject more than \$4 trillion**¹³³ into the economy. And, in addition to deploying traditional crisis response tactics such as **cutting interest rates and quantitative easing**,¹³⁴ the Fed has also **expanded**¹³⁵ corporate bond buying and has announced plans to lend directly to certain businesses.

The Fed should consider the climate-related impacts of its efforts to infuse more liquidity in the economy to fuel economic growth.

These efforts would include examining its asset purchases, as well as keeping in mind the climate exposure of the businesses it lends to. When climate risk is not factored into decision-making, capital can get directed into risky, high-carbon sectors, which can worsen climate change impacts. For instance, as a part of its expansions of the Main Street Lending Program as a part of its response to the COVID-19 pandemic, **the Fed has made it easier**¹³⁶ for oil companies to qualify for loans. Many of the companies that would benefit from such loans faced financial difficulties¹³⁷ before the COVID driven downturn, in part driven by investor concerns¹³⁸ about climate risk. At a minimum, such support should be underpinned by conditions relating to improved climate risk management, guarantees regarding repayment, which would include a financial upside for taxpayers and robust disclosure, including on climate change.

"Increasingly, it will be important for the Federal Reserve to take into account the effects of climate change and associated policies in setting monetary policy to achieve our objectives of maximum employment and price stability. Monetary policy seeks to buffer the economy from unexpected adverse disruptions, or "shocks." It is generally more challenging for monetary policy to insulate the economy from shocks to the supply side of the economy than to the demand side. So, it is vital for monetary policymakers to understand the nature of climate disturbances to the economy, as well as their likely persistence and breadth, in order to respond effectively"

Lael Brainard
Member, Board of Governors
of the Federal Reserve System
"Economics of Climate Change,"¹³² November 2019

In April 2020, a group of Senators called on the Fed to provide full transparency on the terms and criteria guiding corporate debt purchases,¹³⁹ including underlying investment guidelines, noting that “the US financial system’s blindness to climate financial risk means that our response to the current economic crisis will make a future climate crisis more likely.”

“Climate change does not recognize human-drawn borders, and neither should our international response. At the urging of His Holiness Pope Francis who has declared a climate emergency, it is encouraging to see oil and gas company CEOs, investors, and climate experts agree that the pressing transition to a low-carbon global economy depends on more robust climate-related disclosure and carbon pricing policies while advancing human and economic prosperity.”

Betty Yee

California State Controller

“Controller Yee supports Vatican Climate Action Statement,”¹⁴⁰ June 2019

Clean technology offers major investment opportunities. In September 2019, the **Bank of International Settlements** launched¹⁴¹ an open-ended fund for central bank investments in green bonds.

As the **European Central Bank** has launched a quantitative easing effort to revitalize the Eurozone economy, its new **President Christine Lagarde** has indicated that¹⁴² she is reviewing the impacts on the ECB’s bond portfolio in light of the bank’s policy of “market neutrality.” She is also considering whether this policy should be changed, particularly in light of the EU’s own commitments to tackle climate change.

The Fed should explore how interest rates may need to be adjusted in response to more frequent extreme weather events, just as other central banks have done for other disasters. The **Bank of Japan** eased its **monetary policy**¹⁴³ after the 2011 earthquake to encourage business activity and reduce risk concerns in financial markets. Similarly, the **Bank of Thailand**¹⁴⁴ cut interest rates in 2011 in response to the worst floods in nearly 70 years.

The Fed could integrate climate risk into its collateral frameworks. Collateral frameworks define the nature of eligible assets that financial institutions can use in operations with central banks to obtain their money. Examples of **assets commonly pledged to the Fed**¹⁴⁵ include collateralized mortgage obligations, asset backed securities, residential real estate loans and commercial, industrial or agricultural loans. Many of these assets are exposed to climate risk, and the Fed should consider this exposure in the pricing of the collateral pledged to it.

The Fed could integrate climate risk into their economic outlook assessments, which influences monetary policy. Both extreme weather events and sudden policy changes have the potential to create “supply chain shocks” across the economy. By understanding the nature of these impacts, the Fed could set monetary policy to allow for growth resilient to climate-induced disruptions.

Community reinvestment

The [Fourth National Climate Assessment \(Vol. II\)](#)¹⁴⁶ made clear that climate change will disproportionately affect low income communities and communities of color. The existing inequalities these communities face will only be exacerbated by climate change. Specific climate change vulnerabilities include access to housing, health impacts, transportation accessibility and the destruction of household wealth and savings.

A part of the Federal Reserve's mandate is to assess community reinvestment activities and undertake research to better understand the impacts of financial services policies and practices on consumers and communities. The Community Reinvestment Act of 1977 requires banking regulators, including the Fed, to assess how well prepared depository institutions, which they supervise, are to meet the credit needs of low-income communities. This is done by evaluating bank CRA performance, and factoring in that evaluation when approving expansionary activities such as mergers, acquisitions and new branches. [In recent years](#),¹⁴⁷ the Federal Reserve has looked at this issue more broadly, addressing many issues faced by the workforce and vulnerable communities.

Banking regulators such as the Fed should explore how bank community reinvestment efforts could integrate climate adaptation efforts to help bolster the resilience of low-income communities to climate change. Depository institutions' efforts towards this goal could be integrated into the CRA evaluation and rating process.

In October 2019, the **Federal Reserve Bank of San Francisco** issued a report, "[Strategies to address Climate Risk in Low and Moderate Income Communities](#),"¹⁴⁸ covering a range of options for the banks in the Federal Reserve to consider, including insurance innovations, forest finance, the need for healthful aging and strategies to promote equitable climate adaptation.

International efforts

In 2017, eight central banks and regulators launched the **Network for the Greening of the Financial System (NGFS)** to "help strengthen the global response required to meet the goals of the Paris Agreement and to enhance the role of the financial system to manage risks and to mobilize capital for green and low-carbon investments in the broader context of environmentally sustainable development." Coordination between central banks on issues such as climate stress testing scenarios could also ease compliance burdens on financial institutions. [As of March 26th, 2020, the Network consisted of 63 members and 12 observers](#).¹⁴⁹ In January 2020, Fed Chair Powell said¹⁵⁰ that the Fed is in discussions on whether to formally join the NGFS. As of May 2020, the Fed was not yet a member.

The Fed should immediately join the NGFS and become a part of the international community of central banks that is pledging coordinated action on climate risk.

The **Bank of International Settlements** also called on central banks in January, 2020 to advocate for [broad and coordinated changes to address climate risk](#).¹⁵¹ It also pledged to coordinate its actions with a broad set of measures to be implemented by other players (governments, the private sector, civil society and the international community).

OFFICE OF THE COMPTROLLER OF THE CURRENCY AND THE FEDERAL DEPOSIT INSURANCE CORPORATION

Roles of the OCC and FDIC in addressing climate risk

Financial supervision

- Issue a joint bulletin highlighting various climate risks and outlining principles to help financial institutions prudently manage them
- Ensure all financial institutions integrate climate risk into risk management systems
- Update the Comptroller's Handbook to issue enhanced guidance on climate risk to examiners, to be used in examination and supervision of financial institutions
- Integrate climate risk supervision into examiner education process

Deposit Insurance Fund

- Closely monitor the impacts of climate risk on bank lending and investments
- Explore how to integrate climate risk into its risk-based premium system

The OCC charters, regulates, and supervises national banks and federal thrift institutions. The FDIC is a government corporation providing deposit insurance to depositors in U.S. commercial banks and savings banks. Individually and together, these two agencies coordinate with the Federal Reserve on maintaining the safety and soundness of the U.S. banking sector.

These banking regulators should work together to integrate climate risk into their financial supervision processes to ensure the safety and soundness of the institutions they supervise, and thereby of the entire financial system. Additionally, the FDIC could explore the impacts of climate change on short and potential long-term risk exposure to the Deposit Insurance Fund itself.

Financial supervision^{152*}

While the systemically important financial institutions supervised by the Fed are critical actors for climate change action, all banks face risks from climate change. Banks face increased climate risks from a range of sources – from risky mortgages in areas vulnerable to rising sea levels and wildfires to farm loans in areas prone to droughts and other extreme weather. Climate change is relevant to both credit risk, affecting the viability and value of collateral, and concentration risk, where financial institutions may be significantly exposed to industries especially vulnerable to physical and transition risks.

The banking regulators (the Fed, the OCC and the FDIC) should issue a bulletin highlighting the various risks that climate change could pose to financial institution performance, and outline principles to help these institutions prudently manage these risks. Such a bulletin could be coordinated under the umbrella of the Federal Financial Institutions Examinations Council (FFIEC). [The FFIEC is an interagency body with a mandate¹⁵³](#) to promote uniformity in the supervision of financial institutions. Banking regulators already regularly issue [joint bulletins¹⁵⁴](#) on issues like cybersecurity, and have also issued [interagency statements¹⁵⁵](#) on supervisory practices when financial institutions have been impacted by extreme weather events, so such a bulletin on climate risk in general would have precedents.

In 2013, the FFIEC [created a joint working group](#)¹⁵⁶ between member agencies to improve communication and coordination between agencies, enhance the state of industry preparedness and identify the gaps in examination procedures in order to improve oversight of cybersecurity preparedness. This model could be replicated to address climate risk.

The OCC and the FDIC should ensure that all financial institutions that they supervise integrate climate-related risks into their risk management systems. Such efforts should take place both individually and in a coordinated manner. The [Dodd-Frank Act](#)¹⁵⁷ requires that certain national banks and federal savings institutions conduct stress tests to determine the impacts of financial shocks and adverse economic conditions on capital levels. The OCC and the FDIC set the rules and parameters that banks use in conducting their bank-level stress tests. Given the potential impact of climate change on bank portfolios, the OCC and the FDIC should coordinate with the Fed and integrate climate change considerations into the rules it uses for annual stress tests, including identifying relevant climate scenarios, defining reporting templates and requiring disclosure of results.

The OCC should update the Comptroller’s Handbook to provide enhanced guidance on climate risk to their examiners, to be used in their examination and supervision of financial institutions. [The Handbook](#)¹⁵⁸ covers a wide range of risk management principles, including capital adequacy, asset quality, liquidity and earnings, market risk and governance. While robust application of these principles would necessarily incorporate climate change, given the unique, rapidly evolving and systemic nature of climate risk, additional policy guidance is still warranted to demonstrate how climate risk could specifically factor into them.

For instance, the [Oil and Gas Exploration and Production Lending Handbook](#)¹⁵⁹ could be updated to include references to transition risks, given the evolving legal regime around climate change, and given heightened investor engagement with oil and gas companies on their business models and strategies. The [Agricultural Lending Handbook](#)¹⁶⁰ could also make references to the increasing frequency and severity of droughts and flooding related to climate change as specific risks the industry faces.

Building on the above, the banking regulators should also integrate climate risk supervision into their examiner education process.

Deposit Insurance Fund

The FDIC is responsible for protecting the Deposit Insurance Fund (DIF) – the pool of money devoted to insuring deposits of individuals covered by the FDIC – from threats to the banking system. If climate risk remains unaddressed in the economy and its regulators, banks across the country will face credit risks throughout their lending portfolios. Large increases in loan defaults could cause banks to fail and require FDIC intervention. If many banks start to fail, public confidence in the DIF itself and its federal guarantees could be threatened.

To protect the DIF, the FDIC should more closely monitor the impacts of climate risk on bank lending and investment activities and, where appropriate, integrate climate risk into its risk-based premium system for the Deposit Insurance Fund.

SECURITIES AND EXCHANGE COMMISSION

Roles of the SEC in addressing climate risk

Economic and policy research

- Analyze climate risk impacts on the securities markets and on the SEC mandate
- Establish an internal, cross-divisional taskforce to allow for coordinated responses

Investor fiduciary duty

- Make clear that consideration of material environmental, social and governance (ESG) risk factors, such as climate change, is consistent with investor fiduciary duty

Disclosure

- Issue rules mandating corporate climate disclosure, building on the framework established by the TCFD
- Enforce the existing regulations and interpretive guidance on climate risk

Auditing and the PCAOB

- Examine whether firms' audits and overall systems of quality control adequately detect and address climate risks that could result in material misstatements
- Issue guidance to help auditors understand the full range of audit and accounting issues affected by climate risk
- Assess existing auditing standards to determine whether amendments are needed to emphasize and address the risk of material misstatements due to a climate-related matter
- Amend the standard on "other information" to require auditors read companies' climate risk disclosures
- Consider whether and, if so, how these disclosures bear on the fairness of financial statements

Financial reporting standards and the FASB

- Drive consistency in the way that climate-based financial disclosures are integrated explicitly as part of financial statements

Credit raters and Office of Credit Ratings

- Issue guidance encouraging credit raters to provide more disclosure on how climate risks are factored in ratings decisions
- Examine the extent to which climate risk is considered by credit raters, and summarize their findings in their annual examination reports.

The SEC is charged with regulating securities markets and the securities industry. Its core mission is to protect investors, maintain fair, orderly and efficient markets, and facilitate capital formation.

There are many core areas where the SEC could do more on climate change: analyzing climate impacts on securities markets; clarifying climate considerations as a part of investor fiduciary duty; strengthening climate risk disclosure rules; ensuring accounting and auditing focus on climate disclosure; and integrating climate risk in oversight of credit raters.

Economic and policy research

[Research from Mercer](#)¹⁶¹ and other groups has underscored that climate change poses significant impacts to investor portfolios across all asset classes.

As a first step, the SEC should undertake analysis to examine climate risk impacts on the securities markets and assess the impacts on the SEC's own mandate. The role of the SEC's Division of Economic and Risk Analysis is to conduct economic and risk analyses on market-wide, systemic risks to inform SEC policy-making, rulemaking and enforcement.

By conducting its own research into the nature of climate impacts, the SEC can do a better job of integrating the consideration of climate risk into its core functions, including policy decisions and rulemaking. Building on its analysis, **the SEC could establish an internal, cross-divisional taskforce to allow for coordinated responses**, similar to the approach taken when it addressed Y2K risks.

Regulatory agencies in other countries have conducted such research and used it to inform coordinated action against climate risk. In 2018, the **Canadian Securities Administrators**¹⁶² issued a report on the state of climate risk disclosures which will inform new guidance and other efforts to educate issuers about disclosure of climate-related risks, opportunities and financial impacts.

Investor fiduciary duty

As fiduciaries, **investors are required to "exercise their management responsibilities prudently, in a fact-based and forward-looking manner, with reference to the care, skill, diligence and prudence used by similar investors."**¹⁶³ In order to fulfill this duty, investors, financial advisors, asset managers, and other fiduciaries need the ability to address material climate risks in their portfolios with all the tools available to them.

The **Sustainable Accounting Standards Board's** 2016 **Technical Bulletin on Climate Risks**¹⁶⁴ affirmed that investors consider climate risks as being material to 72 of 79 industries, which covers 93% of U.S. equities by market capitalization. As the impacts of climate change become more apparent, **some investors**¹⁶⁵ are starting to view climate change as a systemic risk affecting companies across their portfolios.

"The evidence on climate risk is compelling investors to reassess core assumptions about modern finance. Research from a wide range of organizations – including the U.N.'s Intergovernmental Panel on Climate Change, the BlackRock Investment Institute, and many others, including new studies from McKinsey on the socio-economic implications of physical climate risk – is deepening our understanding of how climate risk will impact both our physical world and the global system that finances economic growth."

"These questions are driving a profound reassessment of risk and asset values. And because capital markets pull future risk forward, we will see changes in capital allocation more quickly than we see changes to the climate itself. In the near future – and sooner than most anticipate – there will be a significant reallocation of capital."

Larry Fink

Chairman and CEO, BlackRock

*"A fundamental reshaping of finance,"*¹⁶⁵ 2020 CEO Letter to portfolio companies, January 2020

The SEC should make clear that consideration of material environmental, social and governance (ESG) risk factors, such as climate change, to portfolio value is consistent with investor fiduciary duty.

Clarity from the SEC on this issue will affirm the notion that fiduciary duty is a dynamic concept that should accommodate the evolving understanding on the financial impacts of climate risk. Such clarity will also align with the fiduciary duty of impartiality, which calls on trustees to identify and reasonably balance the transfer of risk and value creation between beneficiary generations. By stressing that investors have the flexibility to address climate risk now, the SEC will assert the potential that climate risk impacts could be passed to future generations.

Unfortunately, the integration of material ESG issues and climate-related risks into investment decision-making processes has been called into question. In 2019, the Trump Administration directed the Department of Labor to assess the energy sector investment trends of retirement funds, seeming to call into question whether such investments meet the standards of “objective materiality and fiduciary duty.” In response, the [Department of Labor stated](#)¹⁶⁷ that investment advisers working on plans tied to ERISA “must not too readily” put ESG factors ahead of economic interests when making an investment choice.

The SEC is also considering [rulemaking that would limit the ability of investors to file shareholder resolutions](#),¹⁶⁸ a critically important [process](#)¹⁶⁹ investors use to engage their portfolio companies on the climate risks they face. Finally, the Division of Corporate Finance has interpreted Rule 14a-8 of the Securities Exchange Act as restricting the ability of investors to engage with corporations on issues like GHG-reduction targets and climate risk disclosure -- topics that help investors understand corporate approaches to climate risk management.

Supporting the ability of investors to engage on climate risks with their portfolio companies in an unimpeded manner would align with the SEC’s mission to foster “fair, orderly and efficient markets.” In the same vein, the Department of Labor should initiate an inter-agency process with the SEC to clarify the right of pension fund trustees and administrators to integrate ESG factors such as climate change into their investment decisions.

In contrast to what’s been happening in the U.S., global efforts to affirm the relevance of ESG and climate risks as a part of the investment process are already gaining traction among global securities regulators. A 2019 statement by the [International Organization of Securities Commissions \(IOSCO\)](#)¹⁷⁰ included the following recommendation for securities regulators: “Consistent with their fiduciary duties, institutional investors, including asset managers and asset owners, are encouraged to incorporate ESG-specific issues into their investment analysis, strategies and overall governance, and take into account material ESG disclosures of the entities in which they invest.”

European regulators have taken it a step further. In 2019, the [European Securities and Markets Authority](#),¹⁷¹ the EU’s securities markets’ regulator, issued technical advice outlining how fund managers will need to disclose how they integrate ESG risks in investment decisions, as well as their methodologies for measuring the ESG impacts of investments and products. In February 2020, [the U.K. government unveiled a proposal](#)¹⁷² that would require pension funds to disclose how they integrate climate change across their governance, strategies and risk management.

The **United Nations’ Environment Programme (UNEP) and Principles for Responsible Investment (PRI)** conducted a detailed global four-year study that addressed the question, “Is fiduciary duty a legitimate barrier to ESG integration by investors?” Their [2019 report](#)¹⁷³ produced extensive evidence showing the critical importance of incorporating ESG standards into regulatory concepts of fiduciary duty. The report affirmed that most markets around the world have seen progress in incorporating ESG issues into expectations around investors’ fiduciary duty – including in Canada, China, the EU, and the UK – with the notable exception of U.S. markets.

Analysis submitted to [the SEC has outlined](#)¹⁷⁴ the ways in which ESG considerations could fit into investor fiduciary duty. The SEC has previously taken steps to clarify the fiduciary duty of some stakeholders in the investment landscape, such as investment advisors, suggesting that [similar efforts are warranted on climate risks](#).¹⁷⁵

The SEC is also focused on the issue of “greenwashing” and [requested comment](#)¹⁷⁶ on such behavior to ensure the creators of investment funds develop their products to actually match up with how these funds are named. This interest appears to build on [the recent rules](#)¹⁷⁷ issued by the **French Securities Regulator** establishing a set of minimum standards to test whether the marketing of “ESG funds” actually conforms with the investment approaches these funds take.

Disclosure

Investors and other capital market actors simply cannot make smart decisions on the material climate risks they face without the right information. Robust climate change disclosure is fundamental to marketplace efficiency.

The SEC's Division of Corporation Finance (CorpFin) oversees disclosure of information to the investing public by SEC-regulated companies, including required filings regarding companies' financial conditions and business practices, such as registration statements for new securities, annual and quarterly filings (10-Ks, 10-Qs), and proxy materials sent to shareholders.

At the request of investors, the SEC issued interpretive guidance on climate risk disclosure in 2010, but it has been minimally enforced. Over the years, CorpFin has sent fewer and fewer comment letters to companies regarding the quality of their climate risk disclosure. [Forty-nine letters](#)¹⁷⁸ were sent in 2010 and 2011, but only three in 2012 and none in 2013. Between 2016 and 2020, only 6 comment letters were issued. [SEC enforcement on this issue has also been lacking.](#)¹⁷⁹

“We purport to modernize, without mentioning what may be the single most momentous risk to face markets since the financial crisis. Where we should be showing leadership, we are conspicuously silent. In so doing, we risk falling behind international efforts and putting U.S. companies at a competitive disadvantage globally.”

Allison Herren Lee

Commissioner, Securities and Exchange Commission

*“Modernizing’ Regulation S-K: Ignoring the elephant in the room,”*¹⁸⁰ January 2020

As a result, the quality of climate change disclosure in financial filings remains poor, with little quantification of risks and little decision-useful information. [A 2019 status report](#)¹⁸¹ by the TCFD stated simply, “Disclosure of climate-related information has increased since 2016, but it is still insufficient for investors.”

In 2016, when the SEC issued a concept release to revamp its corporate disclosure framework, it received more than 26,500 comments from investors and the general public. [A detailed analysis](#)¹⁸² showed the comments overwhelmingly favored the need for SEC action to achieve stronger ESG and climate risk disclosure.

The SEC should issue rules mandating corporate climate disclosure, building on the disclosure framework established by the Financial Stability Board’s TCFD. In the short term, the SEC should more fully enforce the existing regulations and guidance. The TCFD’s principles can be viewed as already being an implied part of Reg S-K, though formal rules would address any ambiguity in interpretation.

Taskforce on Climate-Related Financial Disclosures

TCFD recommendations on decision-useful climate risk disclosure in financial filings were formally released in 2017 after extensive input from investors and companies. The recommendations outline material and decision-useful climate disclosures that investors can use to determine climate risks in their portfolios. Since these recommendations were released, [more than 600 global investors collectively representing more than \\$37 trillion of dollars](#)¹⁸³ in assets have backed the them and called on the FSB and G20 financial regulators to incorporate them into their standards.

Core Elements of Recommended Climate-Related Financial Disclosures

Task Force on Climate-Related Financial Disclosures¹⁸⁴



In 2018, investors representing \$5 trillion in assets and other stakeholders filed [a petition](#)¹⁸⁵ calling for rulemaking on ESG disclosure. [The 2019 Climate Risk Disclosure Act filed in the Senate calls on](#)¹⁸⁶ the SEC to issue climate risk disclosure rules in two years.

[Article 173 of France's Energy Transition Law](#)¹⁸⁷ outlines mandatory climate disclosure requirements for listed companies, as well as for investors. The regulation uses a "comply or explain" approach, providing flexibility for how firms disclose their risks. Additionally, Art. 173 calls for an assessment of reporting progress made during the first two years of its application. This review may lead to more explicit guidance on reporting methodologies. Similar models are being explored by a number of jurisdictions, including in [Spain](#)¹⁸⁸ and [Sweden](#).¹⁸⁹

The **U.K. government has set up a task force**¹⁹⁰ to examine whether climate disclosure should be made mandatory and called on all listed companies and large asset managers to disclose in line with the TCFD recommendations by 2022. **Canada's Expert Panel on Sustainable Finance proposed**¹⁹¹ that Canada adopt the TCFD recommendations on a "comply or explain" basis. In May 2020, the Canadian government announced that companies that received new financing as part of the government's economic recovery package would be [required to publish TCFD-based climate disclosures](#).¹⁹² In Jan 2018, the **Japanese Ministry of Trade, Economy and Industry published guidance**¹⁹³ on how companies should implement the TCFD recommendations and has held [a summit](#)¹⁹⁴ to advance the implementation of the recommendations.

In April 2020, the **International Organization of Securities Commissions** announced it would establish a new [Board level Task Force on Sustainable Finance with the aim](#)¹⁹⁵ of improving ESG disclosures and enhancing coordination of relevant regulatory and supervisory approaches.

It is worth noting that global stock exchanges are also pushing for stronger ESG and climate-related disclosure. Nearly 50 exchanges, including the [Nasdaq stock exchange](#),¹⁹⁶ have issued guidance on ESG disclosure and another 24 already have [disclosure rules](#).¹⁹⁷ The [London Stock Exchange's ESG Disclosure Guidance](#)¹⁹⁸ specifically references the TCFD.

Auditing

Given the financial impacts of material climate risks, some of the disclosures that companies are required to provide may already fall within the regulations for financial statements, where they are subject to assurance.

The **Public Company Accounting Oversight Board (PCAOB)**, which falls under the SEC's purview, oversees accounting professionals who provide independent audit reports for publicly traded companies. The SEC should encourage the PCAOB to issue guidance to public company auditors on assessing the adequacy of climate risk disclosures.

As a first step, the PCAOB should examine, through its inspections and other oversight activities, whether registered public accounting firms' audits and overall systems of quality control detect and address climate-related risks that could result in material misstatements in company financial statements.

Areas of potential misstatement include, but are not limited to, determining asset life (for depreciation expense purposes), fair value measurement, asset impairment, asset retirement obligations, other contingent liabilities or reserves, and accounting for financial instruments and credit losses. These are all areas where, under current auditing standards, auditors are required to plan and perform the audit to detect and address any material misstatements.

The PCAOB should issue written guidance to help auditors understand the full range of audit and accounting issues that may be affected by climate risk (including both physical risk and transition risks).

The guidance should explain how existing audit requirements apply to the consideration of climate risks' impacts on financial statements. The guidance should also address the consideration of climate risk when assessing how effective companies' internal controls over financial reporting are, as well as their quality control over audits. For example, the guidance could recommend ensuring audit engagement teams include appropriate EST and climate expertise to detect and address relevant audit risks. This guidance could be in the form of a Staff Audit Practice Alert in a first effort, and then the PCAOB would monitor compliance with the requirements discussed in the alert.

The PCAOB should assess its existing auditing standards to determine whether any amendments are needed to better emphasize and address the risk of a material misstatement due to a climate-related matter. Such internal evaluations are a key part of the PCAOB's routine practices that make sure the standards it sets are up to date regarding emerging risks.

The PCAOB could amend its standard on "other information" to require auditors read companies' climate-related disclosures and consider whether and, if so, how those disclosures bear on the fairness of their financial statements. While auditors are not required to read any disclosures outside the 10-K and 10-Q, companies now routinely provide significantly broader disclosures on their performance using a range of forums including, importantly, their sustainability reports. By reading these disclosures, auditors will gain a more rounded sense of a company's performance and will be better able to identify material misstatements in the financial statements. Building on this idea, the PCAOB should update its standards to require specific procedures to identify the risk of material misstatement in financial statements due to inaccurate or omitted climate-related matters.

Once again, actions like these are already being taken in other countries. In April 2019, the **Australian Accounting Standards Board and the Auditing and Assurance Standards Board** issued a joint bulletin¹⁹⁹ outlining their interpretation of accounting and auditing standards related to climate and other emerging risks. The bulletin is clear: if climate-related risks are important to investor decisions, those risks are material and should be reflected in financial statements.

Financial reporting standards

The Financial Accounting Standards Board also plays an important role in creating financial reporting standards, having been legally assigned this role by the SEC in 1973. **FASB should undertake a process to drive consistency in the way that climate based financial disclosures are integrated explicitly as a part of financial statements.** In November 2019, **the International Accounting Standards Board (IFRS) issued a bulletin**²⁰⁰ clarifying how the principle-based approach of its standards means that climate change and other emerging risks are indeed addressed by the existing requirements, even if risks are not explicitly referenced.

Credit raters

Investors and other capital market stakeholders rely heavily on credit ratings of companies and assets when making investment decisions. While a growing number of credit rating agencies are starting to integrate climate change into their ratings analyses, the actual impacts on ratings themselves remains unclear.

Recognizing the impacts of credit ratings on capital flows, the SEC's Office of Credit Ratings (OCR) oversees the performance of key credit rating agencies, monitors their compliance with regulations, and issues guidance on rules adopted and issued by the Commission. Given the growing investor interest in climate risks, the **OCR should issue guidance encouraging credit raters to provide more disclosure on how climate risks are factored in ratings decisions, as well as to offer details on underlying assumptions and approaches used in ratings.**

In July 2019, **the European Securities and Markets Authority issued guidance**²⁰¹ to credit rating agencies to improve transparency about when sustainability factors are driving factors in ratings actions.

Examinations are the primary way in which the OCR supervises credit raters. In addition to statutory annual examinations, **OCR staff have the authority**²⁰² to conduct targeted exams based on specific risk areas. **The OCR should examine the extent to which climate risk is considered by credit raters, and summarize their findings in their annual examination reports.**

COMMODITY FUTURES TRADING COMMISSION

Roles of the CFTC in addressing climate risk

- Upon receiving the Climate-Related Market Risk Subcommittee's report, engage other financial regulators on climate change
- Use the report's recommendations to enhance oversight of climate risk in the commodities and derivatives market

The Commodity Futures Trading Commission (CFTC) is an independent agency that regulates the U.S. derivatives markets, including futures, swaps and certain options. The mandate of the CFTC is to promote the integrity, resilience and soundness of the U.S. derivatives market through sound regulations.

Derivative markets perform several functions. They enable investors to hedge against the risk of price movements in underlying commodities, and also perform an important price discovery function. The ability of the derivative markets to perform these traditional functions depends on the adequacy of risk disclosure in the underlying financial markets.

“The United States has the best derivatives markets in the world – the most dynamic, innovative, competitive and transparent. They have been an engine of our economic growth and prosperity, in large part because they have served the needs of the commercial end-users who depend on them. But, as we learned in the 2008 global financial crisis, inadequate disclosure of risks in underlying financial markets limit derivatives’ usefulness to investors, and can contribute to systemic risk. That is why robust climate risk disclosure is needed so that derivatives markets can help enable investors price and manage climate-related risks.”

Timothy Massad

Former Chair, U.S. Commodity Futures Trading Commission

Former Assistant Secretary for Financial Stability, U.S. Department of the Treasury

May 2020

For example, the most actively traded physical commodities in U.S. markets are energy and agricultural commodities. Both are significantly impacted by climate change, so better disclosure would facilitate greater accuracy in the futures market. Referring to climate impacts, [CFTC Commissioner Rostin Behnam noted in a February 2020 speech](#)²⁰³ that, “Agricultural producers reported they were not able to plant crops on more than 19.4 million acres in 2019. Of those acres, more than 73% were in 12 Midwestern states, where the heavy rainfall and flooding prevented many producers from planting core commodities like corn, soybeans and wheat.”

Enhance integration of climate risk in commodity futures markets: While the derivatives market is exposed to the very same risks as the underlying financial markets, they can actually help with risk mitigation. In July 2019, Commissioner Behnam announced the establishment of [the Climate-Related Market Risk Subcommittee](#)²⁰⁴ to identify and examine climate change-related financial and market risks. As part of its mandate, it will consider “policy initiatives and best practices for risk management and disclosure of financial and market risks related to climate change that support financial stability.”

The report, which is being pulled together through a deliberative, consultative and multi-stakeholder process, is the first time that a financial market regulator is conducting a comprehensive assessment of the range of ways in which US agencies can address climate change as a systemic risk. [The sub-committee itself is composed of a range of experts](#)²⁰⁵ representing financial market institutions, banking and insurance sectors, data service providers, environmental and sustainability organizations and others. Ceres is a member of the sub-committee.

Upon receiving the report the CFTC should engage other financial regulators on climate change.

Additionally, the CFTC should use the recommendations to enhance its own oversight of climate risk in the commodities and derivatives market. Options include issuing analyses on the impacts of climate risk in the affected futures markets such as agriculture and energy, integrating climate risk into risk management standards identified for market participants and promoting transparency. [An August 2019 paper](#)²⁰⁶ from the **World Federation of Exchanges** lays out how commodities derivatives exchanges could develop new risk mitigation tools for ESG factors, or integrate these elements into existing contracts.

STATE AND FEDERAL INSURANCE REGULATORS

Roles of insurance regulators in addressing climate risk

Prioritization

- Acknowledge the risks climate change poses to the insurance sector and pledge coordinated action to address them
- Assess the adequacy of current insurer actions for addressing climate risks
- Join the Sustainable Insurance Forum

Risk management

- Require insurance companies to conduct climate risk stress tests and scenario analyses to evaluate potential financial exposure to climate change risks
- Require insurers to integrate climate change into their ERM and ORSA processes

Investments

- Require insurance companies to assess and manage their climate risk exposure through their investments
- Examine how climate trends affect insurance company investment holdings and long-term solvency

Products

- Encourage insurers to develop products for the new technologies, practices and business models that will emerge in response to climate risk that are responsive to climate risks and opportunities

Disclosure

- Mandate insurer climate risk disclosure using the TCFD recommendations
- Assess the insurance sector's vulnerabilities to climate change, and report findings to the Financial Stability Oversight Council

The U.S. insurance industry,²⁰⁷ which collected \$1.2 trillion in net premiums in 2017 and has substantially larger investment holdings, is primarily regulated at the state level. Each state and territory has an insurance department charged with licensing and regulating insurance companies and overseeing their market conduct. **The National Association of Insurance Commissioners (NAIC)** represents state insurance regulators and develops and adopts model legislation and regulations for states to consider, but these must be enacted by state regulators to have legal effect. The **Federal Insurance Office (FIO)** monitors the insurance industry and represents the U.S. on international insurance matters, but does not have regulatory authority. The FIO is also a non-voting member of the Financial Stability Oversight Council.

State and federal insurance regulators have multiple tools to elevate climate action, most of them regulatory steps focused on the industry's direct and indirect exposure to climate risk.

Prioritization

The impacts of climate change on the insurance sector are clearer than ever. [According to Swiss Re](#),²⁰⁸ the world's largest reinsurer, total losses from natural disasters and "man-made disasters" totaled more than \$316 billion in 2018 and 2019.

“In the crowded regulatory and supervisory space, there is limited scope for focusing attention on new issues but climate risks need immediate action in order to limit or reverse the impact of some of the negative trends under way. It is incumbent on supervisors to put in place the necessary measures for insurers to address any significant risks that could adversely affect policyholders and financial stability. In previous financial crises, events once deemed implausible have materialized. Climate change poses the same threat.”

Bank of International Settlements

“Turning up the heat: Climate risk assessments in the insurance sector,”²⁰⁹ 2019

As a first step, the ecosystem of insurance regulators, including state insurance regulators and the FIO, should acknowledge the significant risks climate change poses to the insurance sector, and pledge coordinated action to address them. Additionally, the FIO should assess the adequacy of current insurer actions for addressing climate risks facing the insurance sector.

In 2008, the NAIC published “The Potential Impact of Climate Change on Insurance Regulation,”²¹⁰ which concluded: “As a regulator of one of the largest American industries, the insurance industry, it is essential that we assess and, to the extent possible, mitigate the impact global warming will have on insurance.” NAIC also formed a climate change and global warming working group. The activities of this group include expanding the recognition of climate-driven extreme weather events in its Risk Based Capital Formula and developing a centralized repository on evaluating the impacts of climate risk on insurance products.

In 2016, 13 insurance regulators from across the world, led by the **California Insurance Commissioner**, formed the Sustainable Insurance Forum (SIF)²¹¹ to strengthen regulators’ understanding of and responses to sustainability issues, including climate change, regarding the insurance business. As of April 2020, this global forum includes more than two-dozen insurance regulators from across the world, regulators from **New York, California** and **Washington** state, and the **NAIC and International Association of Insurance Supervisors (IAIS)**. SIF has identified climate change and natural disasters as two of its three priority areas for the insurance sector. **The FIO and other state U.S. state insurance regulators should join the SIF.**

Risk management

Regulators in other countries are increasingly aware of the risk that climate change poses to insurance companies. A **global survey of 232 insurance actuaries**²¹² identified climate change as the top “current and emerging risk” in 2019, ranking higher than both cyber-security and terrorism.

Given the mounting costs of climate change, state insurance regulators should require insurance companies to conduct climate risk stress tests and scenario analyses to evaluate potential financial exposure to both the physical and transition impacts of climate change. As noted earlier, **central banks such as the Bank of England**²¹³ have put forward proposals to require such stress tests by major insurers and banks.

State insurance regulators should also require insurers to integrate climate change into their Enterprise Risk Management (ERM) and Own Risk and Solvency Assessments (ORSA) processes. NAIC describes an ORSA²¹⁴ as a “confidential internal assessment conducted by an insurance company on the adequacy of its risk management and solvency positions under normal and severe stress scenarios.” **The NAIC’s Risk Management and Own Risk and Solvency Assessment Model Act**²¹⁵ requires large and medium-sized U.S. insurance and insurance groups to regularly perform an ORSA and file a confidential summary report with appropriate insurance regulators.

In November 2019, the **Dutch Central Bank** issued a [good practice document](#)²¹⁶ on how insurers should factor climate risk into their ORSA assessments, which could be used as a model for future work by U.S. regulators. **BIS's 2019 survey of insurance regulators**²¹⁷ noted the following: "Currently, only Italy and the United Kingdom have specific and explicit ERM requirements that cover climate risks. Insurance supervisory authorities in Australia and Singapore require insurers to capture climate risks if material, but regulatory requirements do not explicitly identify climate risks. Under the European Union Solvency II framework, and in South Africa, climate risks are implicitly covered if the risks are viewed to be material."

Investments

As a group, [insurers are the second largest type of institutional investor](#),²¹⁸ based on assets under management, in the world. Transition risks from rapid shifts in policy, changing consumer behaviors and technology innovations could cause profound changes in asset valuations that would ripple across securities markets. Extensive investments in long-lived carbon-intensive assets – whether fossil fuel reserves or direct and indirect fossil fuel-related infrastructure – are a particular concern due to stranded asset risks.

State regulators should require insurance companies to assess and manage their climate risk exposure through their investments. They should also examine how current and future climate trends may affect insurance company investment holdings and their overall long-term solvency.

California has taken a big step in this direction. In 2016, the **California State Insurance Commissioner** required over 600 of the largest insurance companies operating in the state to report and disclose their investments in carbon-intensive sectors, and since then [has made the information available](#)²¹⁹ in a public database. Also in 2016, [the California Insurance Commission asked](#)²²⁰ all 1300 insurance companies it regulates to voluntarily divest from thermal coal investments. In response, [insurance companies reported](#)²²¹ they divested \$4 billion in thermal coal and fossil fuel investments out of \$21.4 billion in total insurer coal holdings, and made commitments to divest an additional \$944 million. Six hundred and seventy insurers said they had divested some or all (or had no coal holdings), while 325 said they would refrain from future coal investments.

The state office also conducted a [first-in-the-nation assessment](#)²²² in 2018, evaluating how insurer investment portfolios stood to be affected by a [scenario where global temperature rise is limited to 2°C by 2100](#).²²³ Insurers analyzed held \$4 trillion in investment holdings, including more than \$500 billion in fossil-fuel related securities.

Products

In addition to managing their own climate risk exposure, insurance companies have tremendous influence over the risks taken by other capital market actors. **Insurance regulators should encourage insurers to develop products for the new technologies, practices and business models that will emerge in response to the physical and transition risks of climate change.**

Some insurance companies are already acting in this fashion. There is a growing demand for insurance products – in both property and energy warranty insurance -- related to wind, solar and other [renewable energy](#)²²⁴ technologies. Some insurers are [offering](#)²²⁵ lower-priced insurance for energy-efficient buildings with LEED certifications, due to better building performance. [Mileage-based](#)²²⁶ auto insurance incentivizing car owners to reduce mileage and/or use public transportation is another burgeoning opportunity. The **California Department of Insurance** has developed a [searchable database](#)²²⁷ for "climate smart" insurance products.

Building on these developments, insurance companies should research the low-carbon market, associated risks and where their products could fit. For example, insurers could research whether “all electric” houses and buildings (with no gas appliances) pose lower risks and thus warrant lower insurance prices. Manufacturers and users of new battery and other energy storage technologies also need insurance, as will developers of new GHG capture and storage technologies, should they emerge.

Insurance products and their associated underwriting and pricing should account for the risk and loss reduction benefits of climate resiliency. Home insurers’ underwriting and fire risk score models ought to consider homeowner and community actions to “harden” against wildfire risk. [Munich Re worked with The Nature Conservancy to develop a coastal resilience insurance product](#)²²⁸ for coastal assets and properties that considers the risk-reduction benefits of coral reefs, salt marshes and mangrove forests adjacent to those assets and properties.

Disclosure

[A 2019 Deloitte survey of U.S.-based insurance regulators](#)²²⁹ makes clear that many regulators do not have a solid sense of the climate risk exposure of the insurance companies they regulate. One third of responding state insurance regulators said they don’t know how well insurers are preparing for the potential impacts of climate risk on financial stability. Among those who were aware, only a handful answered that they believed insurers were largely or fully prepared.

A clearer understanding of insurers’ climate risk exposure and their actions to manage and mitigate would help regulators and other market influencers make more informed decisions.

As a first step, all state insurance regulators should mandate that insurance companies in their jurisdictions disclose climate risk using the TCFD recommendations.

In 2010, the NAIC adopted a climate risk disclosure survey, which has thus far only been administered by six states - **California, Connecticut, Minnesota, New Mexico, New York** and **Washington**. [Companies were encouraged](#)²³⁰ to incorporate TCFD guidelines when answering the survey in 2019. For the 2020 Climate Risk Disclosure Survey, participating insurers will be allowed to submit a TCFD report in place of the survey. [NAIC is in the process of updating its survey](#)²³¹ to be in line with the TCFD.

In 2017, [the Sustainable Insurance Forum formally endorsed](#)²³² the TCFD recommendations for climate risk disclosures. In 2018, **Brazil declared its support**²³³ for finding practical and effective ways to use the TCFD climate disclosure framework. [Draft legislation in Connecticut calls on](#)²³⁴ the insurance commissioner to assess the feasibility of TCFD-based climate risk disclosures, including the gross premiums earned from carbon-intensive coal and tar sands projects.

Once insurers improve their disclosure, the Federal Insurance Office should work with the NAIC to assess the insurance sector’s vulnerabilities to climate change, and then report its findings to the Financial Stability Oversight Council. It is important to note that the FIO’s September 2019 report, [“Annual Report on the Insurance Industry,”](#)²³⁵ did not make any mention of climate change.

FEDERAL HOUSING FINANCE AGENCY

Roles of the FHFA in addressing climate risk

- Acknowledge the impacts of climate risk on the housing market
- Conduct research to examine the impacts of climate risk on the mortgage holdings of Government-Sponsored Enterprises, particularly Fannie Mae and Freddie Mac
- Launch a formal effort to develop strategies to address climate risk, being particularly aware of the impacts on vulnerable communities disproportionately threatened by climate change

The Federal Housing Finance Agency (FHFA) was established in 2008 and is responsible for effectively supervising, regulating, and overseeing the housing mission of mortgage giants Fannie Mae and Freddie Mac, and the Federal Home Loan Bank.

The [impetus to create FHFA](#)²³⁶ in 2008 came from the subprime mortgage securities meltdown, and it was designed to address risks, including systemic risks, posed by Fannie Mae and Freddie Mac, which guarantee an estimated 45% of the country's mortgages.

Examine and address the impact of climate change on GSE-mortgage holdings: A 2019 research paper²³⁷ suggests financial institutions are shifting riskier mortgages, such as those in low-lying coastal areas, off their books and over to the federal government. The researchers found that, after hurricanes occurring between 2004 and 2012, lenders increased the share of those mortgages they sold to Fannie Mae and Freddie Mac by almost 10%. These trillions of dollars of debts are backed by U.S. taxpayers. [A February 2020 paper published by the National Bureau of Economic Research also found that](#)²³⁸ homes at risk of flooding in the U.S. are currently overvalued by \$34 billion, suggesting a real estate bubble subject to climate threats.

The findings above recall 2008's subprime lending crisis, when unexpected drops in home values cascaded through the securities market and the economy, triggering a global recession.

The FHFA should acknowledge the impacts of climate risk on the housing market and conduct research to examine the impacts of climate risk on the mortgage holdings of Government-Sponsored Enterprises (GSE), particularly Fannie Mae and Freddie Mac.

[In Jan 2020, U.S. Senators sent a letter](#)²³⁹ to the GSE CEOs requesting information on steps these institutions were taking to "assess and prepare for the effects of climate change on their business and on American communities, homeowners, and renters." However, the agency's [most recent annual report](#),²⁴⁰ released in 2019, makes no mention of either climate change or extreme weather events.

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."](#)²⁴¹

Once this examination is complete, the FHFA should launch a formal effort to develop strategies to address climate risk, being particularly aware of the impacts on vulnerable communities disproportionately threatened by climate change.

FHFA actions could include [mandating differential mortgage pricing in communities with higher risks of flooding or other natural disasters, and requiring flood insurance in mortgages held by GSEs in flood prone areas](#).²⁴² The FHFA could also use its influence to direct investment and development away from the riskiest geographical areas and promote affordability in a climate-conscious way. Finally, it could develop programs to help mitigate displacement and other housing equity issues caused by climate change.

FINANCIAL STABILITY OVERSIGHT COUNCIL

Roles of the FSOC in addressing climate risk

- Identify climate risk as a vulnerability and make recommendations on regulations that relevant agencies could adopt
- Coordinate regulatory actions on climate change, including integrating efforts by all financial regulators to address climate change risk to allow for overall financial stability

Established in 2010 through the Dodd-Frank Act, the Financial Stability Oversight Council (FSOC) is responsible for identifying risks to the financial stability of the country and responding to emerging threats. In particular, the FSOC facilitates regulatory coordination among financial regulators; facilitates information sharing and collection; and intervenes with firms that pose a threat to financial stability. It is chaired by the Secretary of the Treasury.

A key first step for the FSOC is to **identify climate change as a vulnerability and make recommendations on climate change regulations that relevant financial regulatory agencies could adopt**. This could include, where appropriate, considering climate risks as a part of the process to designate nonbank financial institutions as systemically important. This prioritization of climate risk should be communicated in the FSOC's annual report to Congress, which in turn could provide the basis for congressional oversight and action.

Despite growing evidence of climate change's impacts, the [2019 FSOC annual report](#)²⁴³ did not include mention of climate risk.

The FSOC could also **coordinate an integration of efforts by all financial regulators to address climate change risk to allow for overall financial stability**. The FSOC was created to assume a coordinating mission across regulatory agencies and proactively address systemic risks before they disrupt the economy.

In 2009, former [Treasury Secretary Timothy Geithner said the lack of federal coordination on systemic risk management was a key contributing factor to the 2008-2009 recession](#).²⁴⁴ "Our financial system operated with large gaps in meaningful oversight and without sufficient constraints to limit risks. Even institutions that were overseen by our complicated, overlapping system of multiple regulators put themselves in a position of extreme vulnerability. These failures helped lay the foundation for the worst economic crisis in generations."

CONCLUSION

Mitigating climate risk impacts requires collective, global leadership at all levels. Those with the tools and influence able to make the biggest differences are especially important in this effort. As stewards of the world's largest, most interconnected economy, U.S. financial regulators have a unique responsibility to make a difference in tackling climate change risk.

The COVID-19 pandemic fully underscores the interconnectedness and fragility of global financial markets, as well as the potential for unforeseen or unaddressed risks to massively disrupt both Wall Street and Main Street. At the same time, actions taken by financial regulators to keep the U.S. economy functioning demonstrate the broad scope and power of the tools at their disposal.

While addressing the human and financial pain caused by the pandemic must be their first priority, regulators should also keep in mind that climate change still poses the risk of systemic damage, and consider the effects of their current efforts on the levels of climate risk. Stemming and repairing the damages of the COVID-19 crisis need not, and should not, worsen the climate crisis.

While policymakers at the federal, state and global levels need to take the lead in tackling the climate crisis, U.S. financial regulators themselves have critical roles to play in keeping a now-weakened economy resilient in the face of ongoing and future climate shocks. Rather than standing back, they should seize the opportunity in this moment of potential economic transformation to join global peers and develop a playbook for climate action. With global emissions and average temperatures still rising, watching and waiting are no longer responsible options, and will in fact guarantee the worst. And, unlike in the possible resolution to the COVID-19 pandemic, there will never be vaccines developed to protect against climate risk. But the good news is: we already have all the tools and knowledge in financial markets to take sound preventative action.

Climate change presents risks to both the future and today — unless regulators act boldly, now.

CERES ACCELERATOR FOR SUSTAINABLE CAPITAL MARKETS

In the last three decades, Ceres and our influential networks have achieved significant progress in integrating sustainability into the capital markets. However, private and public sector progress is not happening fast enough or with the right level of ambition to tackle not only the global climate crisis, but the growing threats around deforestation, water scarcity and pollution.

Building on our more than 30 years of leadership and impact, the Ceres Accelerator aims to transform the practices and policies that govern capital markets in order to accelerate action on reducing the worst impacts of the climate crisis and other sustainability threats. It will spur capital market influencers to act on these systemic financial risks and drive the large-scale behavior and systems change needed to achieve a net-zero carbon economy and a just and sustainable future.

The Ceres Accelerator will initially focus on four flagship initiatives that aim to accelerate large-scale capital markets behavior and system changes needed to address the climate crisis.

- **Regulating Climate as a Systemic Risk**
- **Achieving Paris-Aligned Portfolios**
- **Financing a Net-Zero Carbon Economy**
- **Board Governance for a Sustainable Future**

This report is the first in a series of studies and initiatives that aims to shed more light on the ways in which climate risk affects the roles of critical capital market actors, influencers and regulators.

For more information about the Accelerator, and previews of our upcoming work, please visit ceres.org/accelerator

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