

STATEMENT OF ROBERT B. LITTERMAN, PHD
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CONCERNING
“THE COST OF INACTION ON CLIMATE CHANGE”
DELIVERED TO
UNITED STATES SENATE COMMITTEE ON THE BUDGET
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Introduction

Chairman Sanders, Ranking Member Graham, and members of the Committee: Thank you for inviting me to address the risks that climate change poses to the economy and my suggestions for how to deal with them. The best science shows that damage from climate change is already serious, and could range in the future from severe to catastrophic. Risk of this magnitude demands an immediate ambitious response, including a price on carbon. Today the world is hopeful for U.S. leadership on climate action, but appropriate management of climate risk requires action by this Congress.

When the stakes are high, as they are with our planetary future, uncertainty often compels more action rather than less. And in the presence of such large risks, delay in responding is costly. We need to act — immediately and forcefully. Thankfully, the solutions we need to manage these risks are at hand; in particular, a clear, strong price signal will let markets function efficiently and effectively to reduce emissions. A carbon price can be equitable, bipartisan, and the core of effective climate response.

Background

My name is Bob Litterman. I am an economist by training and have spent my career managing financial risk. I worked at Goldman Sachs for 26 years. I was a partner and head of our firmwide risk department. I am now the chair of the risk committee at Kepos Capital, and I sit on several boards for groups that study and propose responses to climate risk, including the Climate Leadership Council, which I co-chair with Kathryn Murdoch; the Niskanen Center, which I chair; Ceres; Climate Central; Resources for the Future; the Stanford Woods Institute for the Environment and the Stanford Natural Capital Project; the Woodwell Climate Research Center; and the World Wildlife Fund.

Section 1: Lessons from Financial Risk Management

Financial risk management has several simple principles that apply to managing climate risk. Most importantly, risk management requires imagining “worst case” scenarios, by which we really mean scenarios that are extremely bad, but plausible. When I took over risk management

at Goldman, we would analyze scenarios where markets would lose half their value overnight. In such an extreme event, would we have enough capital to open in the morning?

Risk managers do not only worry about expected outcomes. Our job is to prevent disasters. This means that we must look at the full distribution of potential future outcomes and evaluate how changes in policy could hedge against bad outcomes. Identifying the worst-case scenario for climate risk is challenging because we are performing this experiment for the first time, it is practically irreversible, the impacts will be felt for many decades to come, and we must make judgements about how society will respond to large physical changes. I am pleased to provide testimony today alongside David Wallace-Wells because he has done exactly that with respect to climate change and done so in remarkably humane terms.

Another principle of financial risk management, which is perhaps not as obvious, is that our objective is not to minimize risk, but to price risk appropriately. In the private sector, risk managers make sure that risks are identified and only taken when the reward is commensurate. For example, at Goldman Sachs we would charge traders for the risks they took, forcing them to take risks only where the firm would be more than compensated by the expected returns on their trades.

With public policy, the objective is to use prices to incentivize the right level of insurance against bad outcomes. Without pricing, we would either be too cavalier in the face of oncoming disaster, which describes our current approach to climate change, or paralyzed by an inability to accept some risk as the normal course of things. Neither is necessary in this context. I am also pleased to provide testimony alongside Professor Stiglitz, because he is a Nobel laureate in economics, and I am quite sure that he can explain better than I the importance of incentives in directing the flow of capital and why failing to force economic actors – the fossil fuel industry, manufacturers, and consumers – to pay a price for the climate risk to which we are all exposing ourselves is extremely dangerous.

A third principle of risk management is that time is a scarce resource. If we have enough time, we can solve almost any problem. It is when time runs out that a risk becomes a catastrophe. The risk from climate change is increasing as we fill the atmosphere with greenhouse gases. We do not know how much time we have before we cross a tipping point, or multiple tipping points, after which unmanageable disaster becomes inevitable. This is an extremely urgent matter and the cost of inaction mounts year over year as climate risks loom larger.

Explaining how uncertainty affects risk management decisions in everyday terms, I often use the analogy of cycling in the mountains, one of my favorite forms of exercise. Imagine two scenarios: In the first scenario you are riding down a road you know well. Up ahead you know that there is a dangerous hidden curve with a sharp drop-off. Since you know the road well, you know where to start braking, and how fast you can safely go around the curve. Given this knowledge, you would ease on the brake well ahead of time, using maximum pressure right before you enter the curve.

Now consider a different scenario, in which you have never been down this road before. Because of your uncertainty about the road you realize you need to be more cautious. You have not eased

onto the brakes by the time you spot the hidden curve, and you realize you might be going too fast. So you brake hard. The intent is not to stop, but to go into the curve with more control and more options. You may even let up on the brakes as the curve reveals itself. Aware of the curve, but uncertain of its shape, is where we are with respect to climate risk. We have seen the curve ahead and are going too fast.

And with respect to the potential cost of delay, I remember a specific incident from my own experience. Years ago (on December 6, 2014), my wife and I were driving on the freeway when she exclaimed “Oh my God, Bob — watch out!” From her tone, the urgency in her voice, I knew instantly I had to pay attention. She had spotted, across the divider about a quarter of a mile in front of us, an oncoming 18-wheeler, bouncing out of control and spewing flames from the passenger-side wheel well. I remember immediately slamming on the brakes, even before I had realized, as my wife already had, that the truck was careening diagonally right towards us, which terrified her. Five seconds later we narrowly avoided, by a fraction of a second, plowing head on into a gasoline tanker that had exploded right where we would have been. That quick response to my wife’s warning saved our lives because I was able to safely steer our car through the fire and out the other side.

We are today, with respect to climate action, in the same position I was when my wife sounded her warning. A growing chorus of scientists, CEOs, national security experts, and financial experts have all seen climate change barreling toward us. They are shouting “Watch out.”

Section 2: The Implications of Climate Risks for the Financial System and Economy

Last year, I had the honor of serving as the chair of the Commodity Futures Trading Commission’s Climate-Related Market Risk advisory subcommittee. The CFTC is responsible for regulating the derivatives markets in the United States to ensure “integrity, resilience, and vibrancy.” Members of the subcommittee included representatives of market participants — banks, institutional investors, non-financial corporations, and a commodity exchange — as well as academics and nonprofit organizations. We focused on the principles of risk management outlined above, and that led to a clarity of vision that allowed us to create, and unanimously support, a detailed road map for managing climate risk in the U.S. financial system.¹

That road map focuses on two types of climate-related financial market risks. First are the specific risks, for example to individuals and corporations, from increasingly extreme weather events such as storms, wildfires, and sea-level rise that are expected to increase in number and intensity over the next 50 years. Specific risks are growing over time, but are manageable. The second type of risk, which I will come back to, is systemic risk to society.

Specific risks take many forms. For example, in the Western U.S., scientists have established a link between the area burned by wildfires and climate change, which creates dry and warm conditions amenable to large wildfires.² This has clear implications. We have recently seen the

¹ U.S. Commodity Futures Trading Commission, “[Managing Climate Risk in the U.S. Financial System](#),” September 9, 2020.

² John T. Abatzoglou and A. Park Williams, “[Impact of anthropogenic climate change on wildfire across western US forests](#),” *PNAS*, 113, no. 42 (October 2016): 11770-11775.

Southwest experiencing record wildfire seasons, exacerbated by both land management practices and climate change.³ The confluence of those factors has real costs. The CFTC report highlights the case of Pacific Gas and Electric in California, which entered bankruptcy because of \$30 billion in liability associated with its infrastructure sparking record wildfires. Meanwhile, the effects of climate change loom even larger in the future.

Another example is flooding incidents in coastal regions brought about by sea-level rise. This is a visible and accelerating manifestation of global warming.⁴ Higher sea levels increase the risk of damaging floods in coastal areas, whether they are driven by tides, storm surges, or other weather events. Markets are already starting to respond to this increasing risk, with detectable changes in prices due to perceived flooding risk. This portends significant financial risks, as we reported to the CFTC, “Declining real estate values — driven by climate-related impacts or the perception of such impacts in the future — could substantially depress economic activity. Some populations and local communities within the United States may ultimately be required to relocate, with potentially significant economic losses for households and investors.”

Lastly, scientists in recent years have begun to identify how climate change has affected individual weather extremes. Last January, the American Meteorological Society published its annual update to an ongoing series of reports, *Explaining Extreme Events of 2019 from a Climate Perspective*, which found climate linkages to large fires in Alaska, the extreme rainfall associated with hurricanes, and heat waves.⁵ All of them were from 2019 alone. The report is released each year. As the symptoms of climate change develop, they will continue to increase risks to infrastructure and economic activity.

The distinguishing feature of specific risks is that they can be insured against, and, of course, they should be. Insurers can diversify exposure to specific risks, and they can share them broadly through reinsurance markets. The cost of insuring against climate-related risks will no doubt rise, but in a market economy those increased insurance costs send powerful economic signals that individuals and corporations will be safer if they avoid exposed locations and prepare for extreme weather.

If these specific risks are addressed and meaningfully disclosed with transparent, auditable, decision-useful metrics, investors will be protected. In our road map we have 53 high-level recommendations, most of which addressed specific risks. As an appendix to this testimony, I have included the chapter of that CFTC report that lists those recommendations.

I am pleased to see that many of those recommendations are being taken up. Since we published that report, the Federal Reserve has joined the international Network for Greening the Financial System. The SEC has started soliciting public comment on regulations for climate risk disclosure by firms. And Randal Quarles, Federal Reserve vice chair and chair of the Financial Stability

³ Erin Hanan, “[Megafires: Climate change or land management?](#),” Niskanen Center, September 15, 2020.

⁴ Paul Voosen, “[Seas are rising faster than ever](#),” *Science*, November 18, 2020.

⁵ Stephanie Herring et al., “[Special Report: Explaining Extreme Events of 2019 from a Climate Perspective](#),” *Bulletin of the American Meteorological Society*, 102, no. 1, (January 2021).

Board, recently wrote that the Financial Stability Board is designing a road map for understanding and managing climate risks for the G20 and central bankers.⁶

Unfortunately, these actions are not enough. There are risks that are so extreme that there is no way to diversify the exposure, they are systemic. This is the second kind of risk we need to manage, and it requires a societal response. No entity, for example, can insure society against an equity market crash, nuclear war, or a global pandemic; and similarly, none can insure society against the systemic exposure created by climate change. This risk requires a systematic, coordinated, and comprehensive national and global policy response.

Today, when specific risk protections are inadequate because of the scale of the disaster, we depend on the federal government to provide an emergency backstop. But we cannot simply assume that such a backstop will always be there. We need to act decisively today to ensure that more and more federal bailouts will not overwhelm federal coffers in the case where climate change is unmanageable. If we were to find ourselves in that world, domestic disaster response would not be the only challenge. The indirect effects of climate change — new pandemics, threats to national security from failed states or climate-induced mass emigration⁷, economic retraction in some places — will also demand response. In a world where the effects of climate change are severe, society is likely to start removing CO₂ from the atmosphere by artificial means to restore lower temperatures, at great expense. In that scenario, every ton we release today is a future liability.

To avoid the worst of these systemic threats, we must transform our economy to stop emissions. The scale and urgency of that transformation require that financial markets immediately and dramatically increase the flow of capital toward investments that will reduce emissions. Congress plays a critical role in addressing systemic climate risk. Through fiscal policy, and to a lesser degree direct programs, the federal government directs the flow of capital and supports innovation. The CFTC report is clear: Creating these appropriate incentives “is the single most important step to manage climate risk and drive the appropriate allocation of capital.”

Section 3: Responding to Climate Risks

To reduce our exposure to systemic climate risk, we must start rapidly decreasing our greenhouse gas emissions year-over-year. The longer we wait, the more severe the climate risk will get. To avoid the worst-case scenarios, we should work quickly and effectively to secure absolute emissions reductions. The commonly accepted goal of keeping global warming within 2 degrees centigrade, or as close to 1.5 degrees centigrade as possible, implies that the global economy should operate with net-zero greenhouse gas emissions by the mid-21st century.⁸

The United States has made significant progress in reducing its greenhouse gas emissions while maintaining economic growth over the past decade and a half. The U.S. EPA reports that in 2019, gross greenhouse gas emissions were 6577 million metric tons of CO₂-equivalent (MMT-

⁶ Randal Quarles, “[FSB Chair’s letter to the G20 Finance Ministers and Central Bank Governors: April 2021](#),” Financial Stability Board, April 6, 2021.

⁷ National Intelligence Council, “[Global Trends 2040: A More Contested World](#),” March 2021: 32-41

⁸ UN International Panel on Climate Change, “[Special Report on Global Warming of 1.5C](#),” 2018: Chapter 2

CO₂e), down nearly 12 percent from their 2007 peak.⁹ That reduction was largely the result of changes in the power sector: switching from coal to natural gas and increasing the share of renewables.

Despite our substantial progress in reducing emissions, if we are to meet midcentury targets, we will have to accelerate emission reductions by two to three times. Last month, President Biden proposed The American Jobs Plan, which would spend billions on climate-related infrastructure, technology innovation, and subsidies for clean energy. Many of those investments will help reduce the costs of low-carbon technology and improve the resiliency of our energy systems.

The level of attention the President, members of Congress on both sides of the aisle, and this committee are devoting to climate change is encouraging. But at the end of the day, the effectiveness of such spending measures, in terms of tons of emissions-reduction per dollar spent, could be many times greater if we created the appropriate incentives for the private sector to fully join the effort. As things stand, there is a bug in the tax code. We allow the risks of climate change to go almost unpriced in market transactions. The best fix for this bug is establishing a price on carbon. I and many other economists can tell you how that price can be determined, but we cannot fix the bug on our own.

Why Carbon Pricing is Important

It was the first recommendation of the CFTC subcommittee — unanimously agreed to by more than 30 subcommittee members — that the United States should establish a price on carbon:

Recommendation 1: The United States should establish a price on carbon. It must be fair, economy-wide, and effective in reducing emissions consistent with the Paris Agreement. This is the single most important step to manage climate risk and drive the appropriate allocation of capital. – pp 123

As we wrote in the report:

Without an effective price on carbon, financial markets lack the most efficient incentive mechanism to price climate risks. Therefore, all manner of financial instruments — stocks, bonds, futures, bank loans — do not incorporate those risks in their price. Risk that is not quantified is difficult to manage effectively. Instead, it can build up and eventually cause a disorderly adjustment of prices. – pp 4

A carbon price is an essential incentive for a productive net-zero economy, one where gross greenhouse gas emissions are balanced by intentional removal of carbon dioxide from the atmosphere. The call for a price on carbon was recently echoed in the National Academies report *Accelerating Decarbonization of the U.S. Energy System*.¹⁰ The report has a host of recommendations for how the U.S. government can act to reduce greenhouse gas emissions and put the country on an effective path to net-zero, including support for new technologies and

⁹ U.S. Environmental Protection Agency, “[Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2019](#),” accessed April 2021.

¹⁰ National Academies of Sciences, Engineering, and Medicine, “[Accelerating Decarbonization of the U.S. Energy System](#),” 2021.

environmental management. The authors of that report identified an economy-wide carbon price, set at \$40 per ton and rising at 5 percent per year above inflation, as one of the key policies for “[establishing] U.S. commitment to a rapid, just, equitable, transition to a net-zero economy.”

With a carbon price, the public will get more for its money when making investments. In the presence of a portfolio of policies, even a modest carbon price would contribute to a portfolio of climate policies by reducing the cost per ton of emissions reductions and driving capital into low-carbon investments.¹¹ It aligns the incentives felt by businesses and individuals with the low-carbon economy. It will amplify investments in low-carbon infrastructure, complement energy efficiency improvements, and supercharge innovation from the research bench to the factory floor. And as a more primary instrument for emissions reductions, a carbon price can be an effective way to reduce emissions with minimal administrative or legal challenges and can put us on a durable path toward ambitious climate targets.

Risk management allows us to integrate the costs of climate change into economic decisions by establishing prices for risks. How should we set that price? Doing so requires applying new models to the problem of climate economics, but illustrates how taking a risk-based approach encourages strong action.

Along with two colleagues, in 2019 I published a new methodology to price climate damages from today’s emissions.¹² We used the same methods that asset managers use to set prices to estimate a price on carbon *that would incorporate risk*. This improves over previous models, like that created by the Nobel-winning economist William Nordhaus. Nordhaus’ work showed us that acting to reduce emissions leads to substantial net benefits, but in his model that reduction could happen slowly and allow for large temperature increases. When we include risk in these models, including a small probability of a worst-case or “catastrophic” scenario, the findings motivate an ambitious and rapid response.

First, we found that the price of climate risks should be much larger than is commonly assumed, and that it should start high and slowly decrease over time. When risk is included, the value of avoiding the worst-case scenarios increases the value of reducing emissions. This is the pricing version of braking hard. Later in my testimony I will highlight some promising carbon pricing proposals that would help us get started.

Second, our results highlight the costs of delay as unpriced risks mount each year. In our model one year of delay in adequately pricing the risks of climate change reduces future consumption by the equivalent of 2 percent. That cost rises rapidly for longer delays, as does the cost of each additional ton of emissions. A decade of delay in adequately pricing climate risk costs the future the equivalent of about \$10 trillion a year, or \$100 trillion for the whole decade. Further delays would cost even more, as mounting risks accelerate the costs of each year of delay.

¹¹ Emil Dimanchev and Christopher Knittel, “[Working Paper: Trade-offs in Climate Policy: Combining Low-Carbon Standards with Modest Carbon Pricing](#),” MIT Center for Energy and Environmental Policy Research, November 2020; Brian Prest et al., “[Waiting for Clarity: How a Price on Carbon Can Inspire Investment](#),” Resources for the Future, Report 21-8, April 2021.

¹² Kent Daniel et al., “[Declining CO2 price paths](#),” PNAS, 116, no. 42 (October 2019): 20886-20891

A carbon price would make material improvements to our ability to manage climate risks and living without one is risky business. So how to do it?

Proposals to Price Carbon

I would like to briefly pay a tribute to Ted Halstead, an incredibly talented and inspirational leader with the dream of bringing all parties together on this issue. Many of you probably knew Ted and his indefatigable nature. Before his untimely death this past year, Ted was the CEO of the Climate Leadership Council (CLC), which he founded to lead the development of a bipartisan plan to enact a meaningful and durable carbon price in the United States and in major economies around the world.

The CLC, where I serve as board co-chair, has built a large coalition of leading businesses, environmentalists, and luminaries in support of a detailed and actionable proposal to establish a carbon price. The plan that CLC developed and continues to support would allow the U.S. to achieve large emissions reductions while providing direct cash benefits to households in the form of dividend payments, or carbon dividends.¹³

The CLC proposal is built around four pillars: a steadily increasing carbon price, a corresponding household dividend, a border adjustment to enhance the competitiveness of U.S. firms and increase global climate ambition, and a package of regulatory simplification to offer businesses and innovators a more certain investment environment. These pillars work together to create a package that responds to climate risks with the urgency they deserve, provides immediate and visible benefits to American households, allows the best-practices of U.S. manufacturers recognition in markets, and makes industry a partner in climate action. This framework has been endorsed by over 3,500 economists, including four former Fed chairs and 28 Nobel Laureates.

In the CLC plan, the carbon price also starts at \$40 per ton (in 2017 U.S. dollars) in 2023 and increases 5 percent each year over inflation. On its own, such a tax could reduce U.S. greenhouse gas emissions to half of their peak values by 2035, nearly 2,000 MMT CO₂eq from today's levels.

Revenue would be sent back to households in a dividend, ensuring the vast majority of households come out ahead financially, despite the new carbon price. Many believe that a carbon price is regressive, but with a carbon dividend policy the benefits are greatest for middle- and low-income households. In every state, the average household in the lowest seven income deciles is better off with the carbon dividends plan than without it. And those benefits are clear before taking account of the positive benefit to these households of reduced climate risk and local air pollution. Through the COVID-19 pandemic, direct transfers have proven an effective means of improving outcomes for low- and middle-class households. They can do same throughout the transition to a low-carbon economy.

Every corner of the economy would be encouraged to innovate and decarbonize. Economic modeling indicates that the council's plan would unlock \$1.4 trillion of private investment in

¹³ Climate Leadership Council, "[Bipartisan Climate Roadmap](#)," February 2020.

energy innovation and create 1.6 million jobs.¹⁴ A carbon price would accelerate economy-wide electrification, move our electricity grid towards being carbon-free, expand the market for electric vehicles, boost industrial efficiency, secure a future for carbon capture technologies, and make decarbonization itself a competitive advantage.

Adding a border adjustment will give cleaner U.S. firms an advantage over their less efficient competitors, expand the impact of the U.S. climate action footprint, and induce emissions reductions in other countries.¹⁵ The U.S. economy is 80 percent more carbon-efficient than the global average and at least 300 percent more carbon-efficient than major competitors like China, India, and Russia. Adding a carbon price to imports that generate overseas emissions ratchets up ambition for domestic policy and makes the U.S. market a demand-driver of clean goods. There is no other climate policy that simultaneously addresses the emissions footprint of our supply chains, drives manufacturing investment back onto U.S. soil, and forces foreign manufacturers to compete on the basis of carbon efficiency.

It is remarkable that energy companies like BP, ConocoPhillips, Shell, Exxon Mobil, Exelon, Calpine and Vistra; consumer brands like AT&T, Ford and GM, and Procter & Gamble; NGOs like the World Wildlife Fund, the World Resources Institute, and Conservation International; and leaders from both Republican and Democratic administrations like James Baker, George Shultz, Larry Summers and Ernie Moniz have all come together in support of a plan for using market instruments to reduce greenhouse gas emissions. But given the win-win outcomes, it should not be surprising.

Carbon pricing in the context of the federal budget

As your committee considers the federal budget, I note that an economy-wide carbon price could raise a significant amount of revenue. The CBO reports that a carbon tax starting at just \$25 per ton could raise just over \$1 trillion in 10 years.¹⁶ The higher carbon price levels imagined by the NAS committee or the CLC could raise approximately \$2 trillion dollars over 10 years. That revenue could be used to reduce the budgetary impact of climate action by investing in infrastructure, budgeting for other tax changes, or sending cash back to households as a dividend as with the CLC proposal. Under any of those scenarios, the tax would motivate private-sector investment in low-carbon technology and innovation. But Congress will need to act to make it happen.

As Congress is considering the President's proposed infrastructure package, there are other proposals that you may want to be aware of. They share many elements with the CLC plan, but differ in broad policy implementations. For example, the Market Choice Act has had bipartisan support in the House of Representatives for the past two Congresses.¹⁷ It is a proposal that would levy a carbon tax to provide funding for infrastructure as a replacement for the federal gas tax. In

¹⁴ Rob West, "[Analysis of Climate Leadership Council Proposal](#)," Thunder Said Energy, July 2020.

¹⁵ Catrina Rorke and Greg Bertelsen, "[America's Climate Advantage](#)," Climate Leadership Council, September 2020.

¹⁶ Congressional Budget Office, "[Options for Reducing the Deficit: 2021 to 2030](#)," December 2020.

¹⁷ Nader Sobhani et al., "[The Market Choice Act of 2019](#)," The Niskanen Center, October 13, 2019.

addition to fully funding the highway trust fund, it would provide revenue for broader infrastructure investment, advanced energy R&D, and rebates to lower-income households.

Modeling of that proposal shows that it could reduce energy-related CO₂ emissions by nearly 1900 million metric tons by 2035¹⁸, while raising about \$1.8 trillion for infrastructure and energy R&D spending. Here too rebates, though smaller than a full dividend, could offset increased prices for low-income workers and retirees. This approach shows that a carbon tax can raise revenue to pay for infrastructure investments while accelerating emissions reductions.

The President has proposed to pay for infrastructure spending with increases in the corporate tax rate and other business taxes. That is a decision that is best left to Congress, but I would note that taxing bad activities, like risking the planetary climate, offers both revenue and social benefit.

Beyond these specific proposals, market-based instruments enjoy substantial support from economists and business leaders. Last year, the Business Roundtable called for “a market-based emissions reduction strategy that includes a price on carbon.” Earlier this year, the U.S. Chamber of Commerce wrote climate policy should “support a Market-Based Approach to Accelerate GHG Emissions Reductions Across the U.S. Economy.” And just weeks before this hearing, the American Petroleum Institute endorsed “a carbon price policy to drive economy-wide, market-based solutions.”¹⁹

Several members of this committee have introduced carbon pricing legislation in the past or actively support it now. The exact policy construction varies among proposals, but there are other experts who can help Congress understand those policy questions and any resulting tradeoffs. I recognize that there are a variety of opinions about carbon pricing and its design, but leadership and compromise can help build strong coalitions of support.

To manage our climate challenge, the key principles are to create a price immediately, set it high enough to meaningfully reflect the risks imposed by greenhouse gas emissions, and apply it broadly throughout the economy (likely by taxing producers).

Conclusion

Thank you kindly for the invitation to testify today. I hope that this testimony has shown how the tools and insights of financial risk management can be meaningfully applied to the climate problem. When I take this approach, I find compelling reasons to act. We need to take the worst-case scenarios seriously and respond adequately. Because of the nature of climate risks, time is not on our side. There are real costs to waiting. While many of the individual risks from climate change can be managed well by companies, individuals, and governments, the systemic nature of climate risk means we should be doing much more to price it and reduce greenhouse gas emissions.

¹⁸ Marc Hafstead, “[Carbon Pricing Calculator](#),” Resources for the Future, accessed April 2021.

¹⁹ Business Roundtable, “[Market-Based Solutions Best Approach to Combat Climate Change](#),” September 2020; U.S. Chamber of Commerce, “[Our Approach to Climate Change](#),” Accessed April 2021; American Petroleum Institute, “[API Outlines Path for Low-Carbon Future In New Climate Action Framework](#),” March 25, 2021.

I and my colleagues at the Climate Leadership Council, the Niskanen Center, and others stand ready to help you deliberate on these policies and do what is best for Americans and the future. Thank you for your attention and I look forward to answering any inquiries you may have.

Appendix:

[CFTC Report of the Climate-Related Market Risk Subcommittee,](#)

[“Managing Climate Risk in the U.S. Financial System”](#)

List of Recommendations

MANAGING CLIMATE RISK IN THE U.S. FINANCIAL SYSTEM

Report of the Climate-Related Market Risk Subcommittee,
Market Risk Advisory Committee of the
U.S. Commodity Futures Trading Commission



Commissioner Rostin Behnam, Sponsor

Bob Litterman, Chairman

List of Recommendations

Chapter 1

Recommendation 1: The United States should establish a price on carbon. It must be fair, economy-wide, and effective in reducing emissions consistent with the Paris Agreement. This is the single most important step to manage climate risk and drive the appropriate allocation of capital.

Chapter 4

Market participants and the regulatory community, in the United States and abroad, are in the early stages of understanding and experimenting with how best to monitor and manage climate risk. Given the considerable complexities and data challenges involved, regulators and market participants should adopt pragmatic approaches that stress continuous monitoring, experimentation, and learning. Regulatory approaches in this area are evolving and should remain open to refinement, especially as the understanding of climate risk continues to advance and new data and tools become available.

At the same time, regulators should establish a clear framework with appropriate milestones. This is what financial regulators are already doing in some jurisdictions and is consistent with recommendations of financial regulatory bodies (Bank of England, 2019; Bank for International Settlements, 2020; NGFS, 2020). As explained above, in general, regulators have sufficient authority to start tackling climate risk immediately. The following recommendations provide, in our view, a good starting point.

Systemic Risk Oversight

Recommendation 4.1: All relevant federal financial regulatory agencies should incorporate climate-related risks into their mandates and develop a strategy for integrating these risks in their work, including into their existing monitoring and oversight functions. Regulators should further develop internal capacity on climate-related risk measurement and management, including through their strategic planning, organizational structure, and additional resourcing.

Recommendation 4.2: The Financial Stability Oversight Council (FSOC), of which the Commodity Futures Trading Commission (CFTC) is a voting member, should undertake the following:

- As part of its mandate to monitor and identify emerging threats to financial stability, incorporate climate-related financial risks into its existing oversight function, including its annual reports and other reporting to Congress;

- Encourage and coordinate, across the Council’s member agencies, the sharing of best practices concerning the monitoring and management of climate-related risks, the building of relevant institutional capacity, the integration of climate-related risks into the risk monitoring function of the agencies and into financial supervision and regulatory frameworks, and the potential for second-order impacts, such as the migration of financial activity from one part of the financial system to another; and
- Task the Office of Financial Research with developing a long-term program of research on climate-related risks to the financial system, paying close to the potential interconnectivity and spillovers of climate-related risks across the financial system; monitoring relevant developments; and developing tools that regulators can use for the monitoring and management of climate-related risks.

Recommendation 4.3: Research arms of federal financial regulators should undertake research on the financial implications of climate-related risks. This research program should cover the potential for and implications of climate-related “sub-systemic” shocks to financial markets and institutions in particular sectors and regions of the United States, including, for example, agricultural and community banks and financial institutions serving low-to-moderate income or marginalized communities. Research should also include the impact of climate risk on financial system assets and liabilities, including by sensitivity of specific sectors to climate change, geographic location, and tenor. In doing so, regulators should identify data gaps and approaches to address these shortcomings. Regulators should develop assessments of the magnitude of the impact of climate on these assets and liabilities, for example through scenario analysis.

Recommendation 4.4: Relevant federal regulators should assess the exposure and implications of climate-related risks for the portfolios and balance sheets of the governmentsponsored enterprises (GSEs) and strongly encourage the GSEs to adopt and implement strategies to monitor and manage those risks.

Recommendation 4.5: The Federal Insurance Office, in collaboration with state insurance regulators, should undertake an assessment of the insurance sector’s systemic vulnerability to climate-related impacts and report the findings to the FSOC. FIO should also evaluate the adequacy of state insurance regulators’ oversight of climate-related risks.

Recommendation 4.6: Federal financial regulators should actively engage their international counterparts to exchange information and draw lessons on emerging good practice regarding the monitoring and management of climate-related financial risks. U.S. regulators should join, as full members, groups convened for this purpose, including the Central Banks and Supervisors Network for Greening the Financial System (NGFS), the Coalition of Finance Ministers for Climate Action, and the Sustainable Insurance Forum (SIF). The United States should also engage actively to ensure that climate risk is on the agenda of Group of Seven (G7) and Group of Twenty (G20) meetings and bodies, including the Financial Stability Board (FSB) and related committees and working groups. The Federal Reserve already participates in the Basel Committee on Banking Supervision’s climate task force, and the

Securities and Exchange Commission participates in the International Organization of Securities Commissions' (IOSCO) sustainable finance network.

Risk Management

Recommendation 4.7: Financial supervisors should require bank and nonbank financial firms to address climate-related financial risks through their existing risk management frameworks in a way that is appropriately governed by corporate management. That includes embedding climate risk monitoring and management into the firms' governance frameworks, including by means of clearly defined oversight responsibilities in the board of directors.

Recommendation 4.8: Working closely with financial institutions, regulators should undertake—as well as assist financial institutions to undertake on their own—pilot climate risk stress testing as is being undertaken in other jurisdictions and as recommended by the NGFS. This will enable stakeholders to better understand institutions' exposure to climate-related physical and transition risks, as well as to explore climate-related opportunities. The pilot program should include the testing of balance sheets against a common set of scenarios (elaborated on in Chapter 6 and Recommendation 6.6), covering how financial institutions might respond to climate-related risks and opportunities over specified time horizons. This climate risk stress testing pilot program should include institutions such as agricultural, community banks, and non-systemically important regional banks.

Recommendation 4.9: Regulators should closely monitor international experience with climate risk stress testing of banks and insurers and apply relevant lessons to the U.S. context. U.S. regulators should engage in international forums, such as the NGFS, to ensure that climate risk stress testing conducted in the United States is comparable to similar exercises in other jurisdictions and avoid duplicative exercises for institutions with a multi-jurisdictional footprint.

Recommendation 4.10: Financial authorities should consider integrating climate risk into their balance sheet management and asset purchases, particularly relating to corporate and municipal debt.

Recommendation 4.11: The CFTC should:

- Undertake a program of research aimed at understanding how climate-related risks are impacting and could impact markets and market participants under CFTC oversight, including central counterparties, futures commission merchants, and speculative traders and funds; the research program should also cover how the CFTC's capabilities and supervisory role may need to adapt to fulfill its mandate in light of climate change and identify relevant gaps in the CFTC's regulatory and supervisory framework;
- Drawing on the conclusions of the research program above, review the extent to which existing CFTC rules are adequate to monitor and manage climate-related risks. For example, CFTC should review the extent to which rules for non-centrally cleared over-the-counter derivatives (NCD) are appropriate for monitoring and managing climate-related risks. It should also review rules related to capital and margin requirements of futures commission merchants and swap dealers, as well as initial

margin and default fund rules, risk management rules, and capital requirements pertaining to central counterparties;

- Expand its own central counterparty stress testing to cover the operational continuity and organizational resilience of central counterparties, including organizational resilience of operations, contingency planning, and engineering resilience for facilities exposed to climate-related physical risks. Where central counterparties and market infrastructure are not within the CFTC’s direct supervisory remit, the supervision of physical risks should be addressed by the relevant FSOC member in a consistent fashion; and ● As better understanding emerges of the risk-transmission pathways and of where the material climate risks lie, consider expanding the CFTC’s risk management rules and related quarterly risk exposure reports to cover material climate-related risks.

Recommendation 4.12: State insurance regulators and insurance regulators’ supervisory colleges, which are convened by regulators where an insurer or its subsidiaries or affiliates operate in multiple jurisdictions, should:

- Require insurers to assess how their underwriting activity and investment portfolios may be impacted by climate-related risks and, based on that assessment, require them to address and disclose these risks; and
- To facilitate the risk assessment mentioned in the point above, insurance regulators should conduct, or 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; state insurance regulators should provide the scenarios, assumptions, and parameters for the stress testing exercise.

Recommendation 4.13: Regulators should require insurers to integrate consideration of climate risks into insurers’ Enterprise Risk Management (ERM) and Own Risk Solvency Assessments (ORSA) processes.

Recommendation 4.14: Regulators should require credit rating agencies to disclose the extent to which their ratings take into account climate risk, including for issuers of corporate, municipal, and sovereign debt. This should include a disclosure of applicable methodologies for those credit rating products that consider climate risk.

Financial Market Utilities

Recommendation 4.15: Federal regulators should ensure that risk management standards governing the operations related to the payment, clearing, and settlement activities of FMUs incorporate measures to monitor and manage physical climate risks. The CFTC, in its capacity as an FSOC member, should recommend that the Council oversee and coordinate this process as it pertains to FMUs designated as systemically important.

Recommendation 4.16: The CFTC should review the extent to which financial market infrastructure—including but not limited to systemically important FMUs for which it is the primary regulator—is resilient against losses that could arise through the physical impacts of climate change.

Chapter 5

Recommendation 5.1: Financial regulators, in coordination with the private sector, should support the availability of consistent, comparable, and reliable climate risk data and analysis to advance the effective measurement and management of climate risk.

- Regulators and financial institutions should support the range of platforms for climate data and analysis, including improving public access to governmental data and expertise that can enable climate risk management. They should also support new and existing open source platforms, as well as proprietary efforts to develop new climate risk datasets and tools that leverage innovative technologies.

Recommendation 5.2: Financial regulators, in coordination with the private sector, should support the development of U.S.-appropriate standardized and consistent classification systems or taxonomies for physical and transition risks, exposure, sensitivity, vulnerability, adaptation, and resilience, spanning asset classes and sectors, in order to define core terms supporting the comparison of climate risk data and associated financial products and services.

- To develop this guidance, the United States should study the establishment of a Standards Developing Organization (SDO) composed of public and private sector members.
- Recognizing that this guidance will be specific to the United States, this effort should include international engagement in order to ensure coordination across global definitions to the extent practicable.

Recommendation 5.3: Financial regulators should proactively encourage capacity building for climate risk management. This should be consistent with the education and training practices supported by agencies in implementing the Sarbanes-Oxley Act of 2002. It should align with and aid in meeting regulator expectations around embedding climate risk in governance frameworks.

Chapter 6

Scenarios and Scenario Analysis

Climate scenario analysis should focus on potential material impacts to the institution's financial portfolio, whether loans, derivatives, or investments. In this context, the following guidelines should be useful:

Recommendation 6.1: Analyze more than one warming path. Various long-term paths for climate change exist and can be used for scenario analysis. Three common scenarios are (i) Paris-aligned (for example, consistent with limiting temperatures well below 2 degrees Celsius above pre-industrial levels), (ii) current trajectory and (iii) in-between (for example, late policy adoption with a more abrupt and disruptive response). Each will produce different impacts on institutional portfolios and provide insights that will help to more effectively manage risk, particularly bookends of best- and worst-case scenarios. Scenarios should include both shorter- and longer-horizon paths as appropriate.

Recommendation 6.2: Analyze disruptive policy. It is particularly important to analyze a scenario involving a major policy disruption. Transition scenarios have wide implications across the economy, industries, and markets. Unanticipated policies can abruptly strand long-lived capital assets or induce rapid reallocation of capital across sectors and industries. Increasing physical impacts may increase the risks of a disorderly transition as fires, floods, and hurricanes, and the attendant shifts in public sentiment, force governments into unanticipated policy responses. Scenarios are therefore especially relevant for risk management.

Recommendation 6.3: Analyze both broad and specific impacts. Scenarios should capture the breadth of impacts but with a focus on materiality, covering a global perspective but enabling regional, country, and sectoral analysis appropriate to the firm's business.

Recommendation 6.4: Map macroeconomic and financial impacts. Scenarios should take into account macroeconomic and financial outcomes since these are likely to be most material to financial institutions. Coming up with additional temperature scenarios, for example, is less important than providing some common guidance on potential transmission mechanisms and implications for macroeconomic and financial factors.

Recommendation 6.5: Account for adaptation actions to the extent feasible. Tackling climate change necessarily involves myriad adjustments by a range of actors. Modeling the effects of such adaptation actions on portfolios is complex but may become more feasible with future technology and scenario modeling development.

Policymakers and Regulators

Recommendation 6.6: Prescribe a consistent and common set of broad climate risk scenarios, guidelines, and assumptions and mandate assessment against these scenarios, as described in Chapter 4. Regulators, in consultation with industry participants, external experts, and other stakeholders, should develop and prescribe a consistent set of broadly applicable scenarios, guidelines, and assumptions and require institutions to assess their exposure to those scenarios. Climate scenarios should be both plausible and relevant, all the while informed by climate science. Regulators should require a range of climate scenarios, including scenarios covering severe but plausible outcomes. Key assumptions (including policy pathways) and limitations should be transparent. Scenarios, assumptions,

and guidelines should be updated as relevant factors are better understood and as policy and technology evolve. There should be a recognition that climate risk will manifest differently across various parts of the financial system.

Recommendation 6.7: Provide analytical discretion, to the extent practicable, as long as regulatory needs for consistency and comparability are met. Given the many unknowns and complexities inherent in modeling the economy, climate change science, and policy, regulated entities will need some discretion in how they perform their analysis based on the prescribed scenario. On the other hand, regulators need consistent approaches across firms so they can ensure risks are responsibly analyzed and reported. Investors would benefit from better comparability across scenario-related disclosures. To achieve a balance across these needs, regulators, in consultation with the firms they regulate, should specify key assumptions, scope, and the outputs they expect. As long as regulators' prescribed expectations are satisfied, regulators should allow financial institutions to provide additional context and analysis informed by the nature and complexity of their business.

Recommendation 6.8: Encourage domestic and global coordination across regulators to provide a coherent approach. This is an overarching theme of this report and especially applicable to the use of scenarios for risk management. Requiring entirely different stress scenario exercises from institutions operating under different jurisdictions would be costly while generating uncertain value. Harmonizing requirements and prioritizing practical, actionable exercises where feasible would be useful. The high costs associated with multiple regulatory regimes is a lesson of post-financial crisis regulation that can be applied now to climate risk.

Recommendation 6.9: Focus on materiality and risk management. Climate risks can manifest in many different ways. Institutions should focus on what matters for them and what decisions need to be made given their specific exposures and vulnerabilities. Such an approach facilitates effective risk management by laying out plausible ways climate risk-related financial losses could occur.

Recommendation 6.10: Ensure a mechanism for ongoing refinement and improvement. As science, data, tools, conditions, and policy change, it is important for regulatory guidelines to evolve as well. Data in particular is evolving rapidly. Creating a mechanism for regular updating, rather than relying on ad hoc adjustments, would be beneficial to ensure effective and pragmatic oversight. As regulators better understand the material risks in the system and their spillover effects across industries and markets, a mechanism for ongoing learning and timely refinement from these lessons learned will ensure they are most effectively managing risk across the system.

Capabilities and Applications

Given the uncertain nature of how the climate will evolve and the limited ability to rely on historical data and back-testing, robust scenario analysis calls for a new set of capabilities that combines statistical, financial, and environmental knowledge.

Recommendation 6.11: Tailor analysis to specific exposures. How an institution analyzes scenarios should be determined based on the unique nature of its portfolio. Not every scenario will be material to an institution's portfolio, depending on its largest asset concentrations, longest-dated assets, and highest potential sensitivities.

Recommendation 6.12: Use results to upgrade risk management capabilities. Regulators and risk managers can use insights coming from scenario analyses to strengthen and augment existing institutional risk management. Each institution should determine how to do so within its own framework but could include climate-related limits, adjustment to underwriting processes, client engagement, and climate risk appetite.

Recommendation 6.13: Beware of false precision. Scenario analysis can provide great value in understanding a range of potential outcomes (particularly between worst and best cases) and in identifying concentrations and relative sensitivities in a portfolio. But results, especially quantitative ones, will be illustrative, not precise, and so should be used accordingly in risk management decisions.

Risk Managers

Recommendation 6.14: Risk managers should develop in-house capabilities, as relevant and in line with best practices, to analyze climate scenarios, understand the key underlying assumptions, and recognize the limitations.

Recommendation 6.15: Firms and institutions should consider additional climate scenarios, guidelines and assumptions tailored to their specific needs and vulnerabilities, in addition to those provided by policymakers and regulators, to enhance internal risk management and decision-making. This can focus on generating decision-useful information for identifying and managing climate risk given their specific exposures and vulnerabilities.

Recommendation 6.16: The scope, depth, and complexity of the analyses performed by institutions should be proportionate to the materiality of the impact measured.

Chapter 7

In developing and implementing the recommendations below, financial regulators and the entities they oversee should consult with stakeholders, including investors, businesses, global peers, and other market intermediaries to create a U.S. climate disclosure regime. They also should closely coordinate with international bodies and foreign regulators to ensure the U.S. regime is aligned internationally. Because the understanding of climate risk remains at an early stage, any regulatory approach to climate-related disclosure should evolve in line with emerging best practices. Regulators should continually monitor the state of corporate climate disclosures, evolving clarity on the financial impacts of climate change and emerging best practices. This will allow regulators to continually monitor the quality of the information disclosed in a sophisticated manner, and issue supplemental guidance or begin rulemaking where needed to reflect emerging best practice and market needs. A mandatory, standardized disclosure framework for material climate risks, including guidance about what should be disclosed that is closely aligned with developing international consensus, would improve the utility and cost-effectiveness of disclosures.

Financial Market Regulators

Recommendation 7.1: All financial regulators should consider the following principles for effective disclosure, which are mainly derived from principles developed by the Task Force on Climate-related Financial Disclosures, when developing rules on climate risk disclosure, implementing existing rules or guidance, or seeking public comment on actions they should take:

- Disclosures should represent relevant information.
- Disclosures should be specific and complete.
- Disclosures should be clear, balanced, and understandable.
- Disclosures should be consistent over time.
- Disclosures should be comparable among companies within a sector, industry, or portfolio.
- Disclosures should be reliable, verifiable, and objective.
- Disclosures should be based on current consensus science (and updated as the science evolves) and the best available projections regarding climate change impacts.
- Disclosures should be provided on a timely basis.

Recommendation 7.2: Material climate risks must be disclosed under existing law, and climate risk disclosure should cover material risks for various time horizons. To address investor concerns around ambiguity on when climate change rises to the threshold of materiality, financial regulators should clarify the definition of materiality for disclosing medium- and long-term climate risks, including through quantitative and qualitative factors, as appropriate. Financial filings should include disclosure of any material financial risks from climate change in a consistent but non-boilerplate manner, as well as a qualitative description of how firms assess and monitor for potential changes in climate risks that may become material.

Recommendation 7.3: Regulators should consider additional, appropriate avenues for firms to disclose other substantive climate risks that do not pass the materiality threshold over various time horizons outside of their filings. Regulators should consider that a growing number of companies are creating greenhouse gas reduction targets and strategies out to the year 2035 or 2050, and targeted disclosure related to these items may be appropriate to facilitate robust efforts toward this positive trend.

Recommendation 7.4: Recognizing the costs associated with collecting, assessing and disclosing climate risk information, financial regulators should consider whether smaller companies could be provided a longer period of time to provide their initial disclosures, and the specific disclosures required of those companies could be different and less burdensome than those required of larger issuers.

Recommendation 7.5: In light of global advancements in the past 10 years in understanding and disclosing climate risks, regulators should review and update the SEC's 2010 Guidance on climate risk disclosure to achieve greater consistency in disclosure to help inform the market. Regulators should

also consider rulemaking, where relevant, and ensure implementation of the Guidance. Such an update could incorporate advice on:

- Information that is needed from all companies in order to enable financial regulators to assess the systemic risks posed by climate change. Federal financial market regulators should work closely with prudential regulators to develop these rules.
- Industry-specific climate risk information. Rules should build from existing standards that provide industry-specific climate disclosure recommendations, for example, those developed by the TCFD, SASB, CDSB, the Physical Risks of Climate Change (P-ROCC) framework, and the Global Real Estate Sustainability Benchmark (GRESB) standards for real estate and infrastructure. Because these standards are already sophisticated, regulators do not need to create their own standards or metrics from scratch. Regulators should encourage stakeholders to partner with these standardsetting bodies to further develop, standardize, implement, and validate these metrics over time. Regulators should also acknowledge, in any rulemaking, that climate disclosure standards continue to evolve, and it could provide issuers flexibility, where appropriate, to adopt these evolving standards.
- Governance, risk management and scenario planning information that demonstrates how well companies are situated for a clean energy transition. Federal financial market regulators should work closely with prudential regulators to develop these rules. Scenario planning disclosure is discussed in Chapter 6. Regarding governance and risk management disclosure, regulators should consider the TCFD's recommendations and the Committee of Sponsoring Organizations of the Treadway Commission/World Business Council for Sustainable Development (COSO/WBCSD) guidance, applying enterprise risk management to environmental, social and governance-related risks.

Recommendation 7.6: Regulators should require listed companies to disclose Scope 1 and 2 emissions. As reliable transition risk metrics and consistent methodologies for Scope 3 emissions are developed, financial regulators should require their disclosure, to the extent they are material.

Recommendation 7.7: Regarding derivatives, financial regulators should examine the extent to which climate impacts are addressed in disclosures required of the entities they regulate and consider guidance and rulemaking if disclosure improvements are needed. This could include, for example, swap dealers registered with the CFTC, risk management rules that govern risk identification approaches; Quarterly Risk Exposure Reports, and business conduct rules that govern disclosure of material information to counterparties prior to entering into a swap.

Accounting Standards Regulators

Recommendation 7.8: Once climate risk disclosure standards are well advanced, accounting standards regulators should undertake a mapping exercise of the applicability of accounting standards to climate-related disclosure and subsequently issue guidance on disclosure, as appropriate. This would provide U.S. companies greater clarity about how climate risks may be integrated into financial statements.

Recommendation 7.9: The United States should direct the Federal Accounting Standards Advisory Board (FASAB) to study and pilot the development of climate-related federal accounting standards, disclosure procedures and practices for U.S. government departments, agencies and administrative units.

Municipal Securities Regulators

Recommendation 7.10: Municipal securities regulators should provide improved tools on the EMMA website to search for climate-related disclosure in municipal bond filings, similar to that provided for publicly traded companies, to allow better assessments of potential climate risk exposure in such assets and how they are being addressed.

Recommendation 7.11: Municipal securities regulators and the federal financial market regulator overseeing them should examine the quality of climate-related disclosures in municipal bonds' official statements and continuing disclosures, and whether the disclosure provided is adequate for market participants to assess any underlying climate risk exposure. If disclosure is found to be deficient, they should issue a public statement calling on key stakeholders to improve disclosure, including municipalities, municipal advisers, and banks.

Recommendation 7.12: Municipal securities regulators and federal financial market and prudential regulators should study how risks facing municipalities differ from—and could in some cases be more impactful than—risks facing issuers and explore options to enhance disclosure on these issues. Some municipalities already disclose information, as part of their bond issuances, about floods, storms, dam safety, droughts, wildfires, sea level rise, and risk mitigation efforts, and further study could demonstrate that such disclosure should be enhanced.

Chapter 8

Effective and well-functioning markets should allocate capital efficiently to net-zero emissions investments, spur innovation, and create and preserve quality jobs in a growing net-zero economy. These recommendations seek to meet these goals by improving the functioning of markets by reducing structural barriers and catalyzing private sector innovation. In undertaking these efforts, consideration should be paid to the distributional and equity impacts on low-to-moderate income households and marginalized communities. In addition, efforts should aim to facilitate an orderly transition, where possible, avoiding adding financial strain on already stressed sectors, including agricultural producers and commercial and industrial companies, among others.

Recommendation 8.1: The United States should consider integration of climate risk into fiscal policy, particularly for economic stimulus activities covering infrastructure, disaster relief, or other federal rebuilding. Current and ongoing fiscal policy decisions have implications for climate risk across the financial system.

Recommendation 8.2: The United States should consolidate and expand government efforts, including loan authorities and co-investment programs, that are focused on addressing market failures by

catalyzing private sector climate-related investment. This effort could centralize existing clean energy and climate resilience loan authorities and co-investment programs into a coordinated federal umbrella.

Recommendation 8.3: Financial regulators should establish climate finance labs or regulatory sandboxes to enhance the development of innovative climate risk tools as well as financial products and services that directly integrate climate risk into new or existing instruments.

Recommendation 8.4: The United States and financial regulators should review relevant laws, regulations and codes and provide any necessary clarity to confirm the appropriateness of making investment decisions using climate-related factors in retirement and pension plans covered by the Employee Retirement Income Security Act (ERISA), as well as non-ERISA managed situations where there is fiduciary duty. This should clarify that climate-related factors—as well as ESG factors that impact risk-return more broadly—may be considered to the same extent as “traditional” financial factors, without creating additional burdens.

Recommendation 8.5: The CFTC should pursue the following activities to further catalyze climate finance market development:

- Survey market participants about their use of climate-related derivatives, the adequacy of product availability and market infrastructure, and the availability of data to incorporate climate impacts into existing and new instruments.
- Consider appropriate and targeted exemptions where needed to help facilitate coordination with other regulators and promote market development.
- Support the study and adoption of alternative execution methods, such as block trading, auction style markets, or incentive programs, to attract liquidity providers to make climate-related markets.
- Coordinate with other regulators to support the development of a robust ecosystem of climate-related risk management products.



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