

**Minutes of the Climate-related Financial Risk Advisory Committee
of the Financial Stability Oversight Council**

March 8, 2024

PRESENT:

Department of the Treasury (Treasury)

Sandra Lee, Deputy Assistant Secretary for the Financial Stability Oversight Council (Council)
and Chairperson of the Climate-related Financial Risk Advisory Committee (CFRAC)

CFRAC Members

Bob Litterman, Founder of Kepos Capital and Presiding Member of the CFRAC

Catherine Ansell, Executive Director of Climate Risk, JPMorgan Chase

Ed Kearns, Chief Data Officer, First Street Foundation

James Stock, Vice Provost for Climate and Sustainability, Harvard University

Laura Bakkensen, Associate Professor, University of Arizona's School of Government and
Public Policy

Noah Kaufman, Research Scholar, Columbia University School of International and Public
Affairs, Center on Global Energy Policy (via videoconference)

Peter Wilcoxon, Professor, Syracuse University

Department of Public Administration and International Affairs

Viral Acharya, C.V. Starr Professor of Economics, New York University Stern School of
Business, Department of Finance

William Pizer, Vice President for Research and Policy Engagement, Resources for the Future

Emily Grover-Kopec, Director, Energy and Climate Practice, Rhodium Group

Ilmi Granoff, Senior Fellow and Adjunct Research Scholar, Columbia Law School Sabin Center
for Climate Change Law

Ivan Frishberg, Senior Vice President and Chief Sustainability Officer, Amalgamated Bank

Janine Guillot, Board Member, B Lab Global

Julie Leonard, President and Chief Executive Officer, Lake Michigan Credit Union

Karen Diver, Senior Advisor to the President for Native American Affairs, University of
Minnesota (via videoconference)

Michael Panfil, Principal, Solaris

Wendy Cromwell, Vice Chair and Head of Sustainable Investment, Wellington Management

Tracey Lewis, Policy Counsel for the Climate Program, Public Citizen

GUESTS:

Treasury

Nellie Liang, Under Secretary for Domestic Finance

Adam Wang-Levine, Deputy Assistant Secretary for Climate, Energy, and Infrastructure

Ethan Zindler, Climate Counselor to the Secretary

Matthew Aks, Senior Advisor, Climate Hub

Burcu Duygan Bump, Counselor to the Under Secretary for Domestic Finance

Nicholas Steele, Director of Analysis, Office of the Financial Stability Oversight Council

Sean Hoskins, Director of Policy, Office of the Financial Stability Oversight Council

Silab Mohanty, Deputy Director of Policy, Office of the Financial Stability Oversight Council

Kaitlin Hildner, Senior Policy Advisor, Office of the Financial Stability Oversight Council
Sini Matikainen, Senior Policy Advisor, Office of the Financial Stability Oversight Council
Gordon McDonald, Senior Policy Advisor, Office of the Financial Stability Oversight Council
Jared Greufe, Policy Analyst, Office of the Financial Stability Oversight Council (via
videoconference)
Claire Howard, Junior Fellow, Office of the Financial Stability Oversight Council

Board of Governors of the Federal Reserve System (Federal Reserve)

Morgan Lewis, Manager, Division of Supervision and Regulation
Adele Morris, Senior Advisor, Financial Stability (via videoconference)
Kevin Stiroh, Senior Advisor, Supervision and Regulation
Caroline Norris, Financial Analyst, Financial Stability Climate Committee

Federal Deposit Insurance Corporation (FDIC)

Juan Cardenas, Senior Complex Financial Institution Specialist, Complex Institution Supervision
& Resolution

Securities and Exchange Commission (SEC)

Mika Morse, Climate Policy Counsel

Commodity Futures Trading Commission (CFTC)

Rostin Behnam, Chairman
David Gillers, Chief of Staff
Abigail Knauff, Special Counsel, Office of the Chairman

Federal Housing Finance Agency (FHFA)

Dan Coates, Deputy Director, Division of Research and Statistics
Jessica Shui, Supervisory Economist, Division of Research and Statistics

Comptroller of the Currency (OCC)

Yue (Nina) Chen, Chief Climate Risk Officer
Timothy Stumhofer, Director of Climate Risk
Naresh Raheja, Senior Climate Risk Specialist, Office of Climate Risk

Federal Insurance Office (FIO)

Elizabeth Brown, Senior Insurance Regulatory Policy Analyst

PRESENTERS:

*Presentation on First Charge Questions: Building off the framework presented in the July
CFRAC meeting, how would you design a reverse stress analysis to determine what climate-
related events (physical or transition risk related) could result in a financial stability concern?*

- Peter Wilcoxon, Professor, Syracuse
University Department of Public Administration and International Affairs
- Viral Acharya, C.V. Starr Professor of Economics, New York University Stern School of
Business, Department of Finance

- Noah Kaufman, Research Scholar, Columbia University School of International and Public Affairs, Center on Global Energy Policy (via videoconference)

Presentation on the Federal Reserve Pilot Climate Scenario Analysis Exercise

- Morgan Lewis, Manager, Division of Supervision and Regulation, Federal Reserve
- Kevin Stiroh, Senior Advisor, Supervision and Regulation, Federal Reserve

Presentation on Second Charge Questions: Following up on the panel on climate-related financial risk at the October meeting, describe the pros and cons of potential transition risk metrics that can be used for risk analysis.

- Ilmi Granoff, Senior Fellow and Adjunct Research Scholar, Columbia Law School Sabin Center for Climate Change Law
- Janine Guillot, Board Member, B Lab Global
- Michael Panfil, Principal, Solaris

1. Welcome and Opening Remarks

Sandra Lee, Chairperson of the CFRAC, called the meeting to order at approximately 9:00 A.M.

The Chairperson introduced Rostin Behnam, Chairman of the CFTC. Chairman Behnam began his remarks by referencing the CFTC’s Market Risk Advisory Committee (MRAC) report, *Managing Climate Risk in the U.S. Financial System*, which was released in 2020. Chairman Behnam noted that at the time, the CFTC’s MRAC was chaired by the CFRAC presiding member, Mr. Litterman. He said that one of the CFTC’s responsibilities is to manage and mitigate risks in the derivatives markets. He said that the CFTC’s focus on climate is an important part of its efforts to manage long-term risk for CFTC-regulated entities.

Chairman Behnam said that carbon markets have evolved in recent years. He said that carbon markets provide significant opportunities for countries to transition to net-zero and to receive assistance in financing this transition. He said that the CFTC has an interest in maintaining the health of carbon markets. He said that this includes working to ensure that the underlying price is rational and transparent; that the market has integrity; that investors can be confident that they know what they are paying for; and that paid-for carbon is being sequestered. He said that the CFTC intended to finalize guidance later this year that would provide further clarity regarding exchange-listed carbon credit derivatives and also support the development and scale of the market. He concluded by saying that climate change presents difficult issues and that he looked forward to the CFRAC’s future efforts in this area.

The Chairperson then described the remainder of the agenda for the meeting, including the two charge presentations and a presentation by staff of the Federal Reserve on the Pilot Climate Scenario Analysis Exercise. She said that the FSOC and FSOC member agencies had continued their efforts to better assess and address climate-related financial risk. She noted that the FSOC’s most recent annual report was released in December and included an update on work by FSOC member agencies on climate-related financial risk. She then acknowledged SEC’s actions

earlier in the week to enhance and standardize climate-related disclosures for investors and introduced Mika Morse, Climate Policy Counsel at the SEC, to provide further remarks.

Ms. Morse noted that the SEC had voted to approve a final rule, “The Enhancement and Standardization of Climate-Related Disclosures for Investors,” on March 6, 2024. She said that the final rule cited to comment letters to defend each aspect of the rule. She also said that the rule took into account the CFTC’s MRAC Report and the FSOC’s 2021 Climate Report, and represented the first final rule issued by a U.S. federal agency premised on the concept that climate risk is financial risk. Ms. Morse said that the Commission Guidance Regarding Disclosure Related to Climate Change, issued by the SEC in 2010, differs from the final rule, because the guidance explained the requirements under existing rules but did not, for example, address the disclosure of a metric such as greenhouse gas (GHG) emissions to help investors understand material risk. She also said that, in comparison to the 2010 guidance, the final rule requires new and more detailed disclosures, is enforceable, and addresses costs and burdens. As an example of how the rule presents metrics for physical risk, she said that the rule will facilitate greater insight into the extent of insurance coverage, by requiring disclosure of gross impacts from physical risk in addition to net insurance proceeds. She also noted that the disclosures under the rule will be structured, which she said will enable investors to search across tagged data items. She said that this feature would yield richer data sets than were currently available. Ms. Morse concluded by stating that the materiality requirements should not be equated with optionality, and that the materiality requirements in the final rule are consistent with the SEC’s approach to materiality in other rules.

2. Presentation on First Charge Questions

The Chairperson turned to Bob Litterman, Founder of Kepos Capital and Presiding Member of the CFRAC, to introduce the presenters for the first charge questions: *Building off the framework presented in the July CFRAC meeting, how would you design a reverse stress analysis to determine what climate-related events (physical or transition risk related) could result in a financial stability concern?* Mr. Litterman called on Peter Wilcoxon, Professor at Syracuse University Department of Public Administration and International Affairs; Viral Acharya, C.V. Starr Professor of Economics at New York University Stern School of Business, Department of Finance; and Noah Kaufman, Research Scholar at Columbia University School of International and Public Affairs, Center on Global Energy Policy, to begin their presentation.

Mr. Wilcoxon began the presentation by saying that he started with the framework presented at the July 2023 CFRAC meeting that mapped how climate risk shocks transmit to the economy. He then presented a conceptual approach for carrying out a comprehensive reverse stress analysis using a multi-sector model of the economy. He said it would begin by constructing a baseline distribution of outcomes, such as macroeconomic variables, assets, and bank valuations, given a baseline level of physical and transition risks. He said that the second step of the analysis would calculate the outcomes again, given a set of exogenous shocks to the baseline levels of physical and transition risks. He said that the final step of the analysis would use the

outcomes from the second step to reverse-engineer the specific shock or combination of shocks that cause the probability of loss to exceed a model-specified level of tolerance.

Mr. Wilcoxon then provided an example of how the approach would work using a stylized model with two banks of different sizes that specialize in different portfolio mixes as compared to how the model works if the two banks have the same portfolio mix. He said that he applied the model to identify when physical and transition shocks result in either one or both of the banks exceeding a 30 percent probability of loss threshold. He said that the equations in the model marked the frontier at which a bank transitions from not being at risk to being at risk due to a shock. He said that this model could be extrapolated to apply to the banking sector as a whole. He said that this approach could provide a method for systemic reverse stress analysis for a wide range of transition and physical risk shocks.

Mr. Acharya said that he and his coauthors were developing an alternative approach to a reverse stress test model that uses market price data, which he said is more readily accessible to the public, instead of data on financial institutions' asset composition. He said that he and his coauthors had developed market proxies for physical and transition risk. He said that to generate a market-based measure of transition risk, they compared the value of a portfolio of stocks that are more likely to be exposed to carbon emissions to the value of a portfolio of stocks in clean energy exchange traded funds (ETF). To test the measure, he said that they measured how the difference between market values changed in response to events that they would expect to shift transition risk expectations, such as the announcement of the Paris Agreement. He said that they observed the expected value shifts.

Mr. Acharya said he and his coauthors estimated a bank's expected equity loss conditional on climate stress using the bank's estimated measures of volatility. He said that they then determined the level of expected equity loss that would be needed to reach a target stressed equity-to-debt ratio of 0.04. He said that he and his coauthors then determined the threshold level of climate stress that would be needed to reach that level of expected equity loss. He said that no single transition risk event that they examined had met this threshold. As a result, he said that they examined which combinations of hypothetical market and transition risk stresses could cause banks to pass this threshold level, such as the simultaneous occurrence of a COVID-level pandemic and the Paris Agreement announcement.

Mr. Acharya said that he and his coauthors extended their analysis to physical risk using property and casualty insurers. He said he and his coauthors conducted a similar analysis to determine the level of physical stress, either alone or in combination, that would sufficiently affect property and casualty insurers in a way that puts banks above the threshold.

Mr. Kaufman said that he had several concerns about using reverse stress analysis for climate risk, including that stress tests traditionally use historical data, which he said may not be accurate for measuring climate risk. He said that for reverse climate stress tests to be useful, they would need to be agreement on which risks lead to systemic failure. He said that it would be helpful to systemically monitor real-time data for symptoms of distress.

Following the first charge presentation, participants discussed the relevance of the speed of climate shocks for the models; whether the models can incorporate endemic conditions; the

differences between chronic and acute risks for these models; how the models could accommodate the relationship between physical and transition risk; whether climate risks alone could ever be large enough to cause a bank failure; the usefulness of reverse stress tests for identifying blind spots; and whether climate risk is being factored into asset pricing and portfolio management.

3. Presentation on the Federal Reserve Pilot Climate Scenario Analysis Exercise

The Chairperson introduced Morgan Lewis, Manager in the Division of Supervision and Regulation at the Federal Reserve, and Kevin Stiroh, Senior Advisor for Supervision and Regulation at the Federal Reserve, to present on the Federal Reserve's approach to conducting the Pilot Climate Scenario Analysis. Mr. Stiroh said that the Federal Reserve's mandate with respect to climate change is important but narrow, focusing on two areas: supervision and financial stability. He said that given the Federal Reserve's role as a microprudential supervisor, the pilot climate scenarios are useful to gauge individual bank risk. He said that a core part of the exercise was designing the scenarios. He said that the focus of the exercise was on how climate risk drivers and transmission channels can materialize on the balance sheet or income statement of banks supervised by the Federal Reserve. He said that climate change can materialize as traditional risk, including credit risk, market risk, operational risk, and liquidity risk. He said that from a bank supervision perspective, it is important to understand the flow of risk through the financial system, and which party bears the losses from these risks.

Mr. Stiroh said that the exercise was designed to build capacity at the participating banks and gather information about the banks' activities related to managing and analyzing climate-related financial risks. He said that the Federal Reserve considered several factors when designing the pilot climate scenario analysis exercise. For example, he said that the Federal Reserve considered whether the banks or supervisor should do the analysis; the appropriate time horizon; the relevant baseline; the level of granularity; which portfolios should be stressed; whether the balance sheet should be static or dynamic; whether the exercise should be conducted for a broad group or targeted at a few banks; whether the exercise should focus on quantitative or qualitative analysis; and how prescriptive the scenarios should be.

Ms. Lewis said that the pilot exercise was launched with six large bank holding companies in 2023. She said that the exercise was exploratory and there were no regulatory capital or supervisory implications from the exercise. She said that the exercise design had one module on physical risk and a separate one on transition risk. She said that the Federal Reserve provided forward-looking scenarios for the banks to use in the exercise and the banks were asked to estimate the probability of default and loss given default at an asset level. She said that banks submitted quantitative results as well as qualitative responses about governance and risk management practices.

Ms. Lewis noted that for the physical risk module, the Federal Reserve asked participants to estimate the impacts of a hurricane in the Northeast and an idiosyncratic shock selected by

participants based on materiality. She said that the idiosyncratic shock selection provided insights on how banks assessed materiality. She said that for each shock, the Federal Reserve provided a combination of climate pathways and return periods (e.g., one in one hundred years, one in two hundred years). She said that the Federal Reserve was interested in exploring how property insurance might mitigate risks to banks and in understanding firms' abilities to incorporate indirect effects, such as effects on house prices, supply chains, etc. She said that the Federal Reserve was also interested in understanding which indirect effects the participating banks considered most important to incorporate into the firms' assessments of the risks.

Ms. Lewis said that the Federal Reserve selected two scenarios for the transition risk module from scenarios developed by the Network of Central Banks and Supervisors for Greening the Financial System (NGFS): Net Zero 2050, which represents an ambitious scenario limiting global warming to 1.5°C, and Current Policies, which assumes only currently implemented policies are preserved. She said that the exercise used a 10-year projection horizon and assumed a static balance sheet as of December 31, 2022. She said that participating firms had the option to incorporate information about obligors' transition capacity in their estimation approaches.

Ms. Lewis said that the qualitative aspects of the exercise were also important and included questions about governance and risk management; measurement methodology; results; and lessons learned. She said that the Federal Reserve received thousands of pages of documentation from the participating entities. She said that the Federal Reserve committed to making public aggregate results from the exercise.

Following the presentation, participants discussed considerations for future iterations of the exercise and the scalability of the exercise. The Chairperson then invited staff members of the Climate-Related Financial Risk Committee attending the meeting to provide updates on their agencies' recent efforts. Dan Coates, Deputy Director of the Division of Research and Statistics at the FHFA, said that FHFA had held a symposium on climate risk, housing, and insurance in November. Elizabeth Brown, Senior Insurance Regulatory Policy Analyst at FIO, said that FIO had launched a collaboration with the National Association of Insurance Commissioners (NAIC) to collect data to better understand impacts of climate-related financial risks on the insurance sector. She said that the NAIC would be collecting ZIP code-level data, and would begin providing certain anonymized data to FIO in late June, with the final set of data expected in September. She said that the data would help FIO respond to Executive Order 14030 on Climate-related Financial Risk as well as FIO's statutory mandate to monitor the extent to which traditionally underserved communities and consumers have access to affordable insurance.

4. Presentation on Second Charge Questions

The Chairperson turned to Mr. Litterman to introduce the presenters for the second charge question: *Following up on the panel on climate-related financial risk at the October meeting, describe the pros and cons of potential transition risk metrics that can be used for risk analysis.* Mr. Litterman called on Ilmi Granoff, Senior Fellow and Adjunct Research Scholar at Columbia Law School Sabin Center for Climate Change Law; Janine Guillot, Board Member at B Lab Global; and Michael Panfil, Principal at Solaris, to begin their presentation.

Mr. Granoff said that there were many ways that transition risk could have an effect – from regulation, public investment, technology changes that lead to substitution effects, revealed preferences of businesses, and legal risk. He said that the presentation would present three arguments: (1) transition risk could flow through and ultimately manifest in conventional financial measures; (2) transition risk to financial institutions primarily results from transition risk to non-financial industries that are financed by such institutions; and (3) transition risk should be evaluated in terms of its ability to trigger shocks and create vulnerabilities to other shocks, thereby translating to systemic risks.

Mr. Granoff said that the use of a GHG footprint as a measure of transition risk has strengths and weaknesses. He said that GHG emissions are an impact indicator and also have the potential to be a relevant proxy for risk. He said that using aggregate GHG emission as a risk indicator can be useful under a narrow set of circumstances, such as when a universal carbon price is available, or when seeking to approximate reputational risk to a firm's brand. He said GHG emissions footprints need to be disaggregated when potential costs or lost revenue associated with the transition away from high-GHG emissions differ across the company or when transition risk arises from different channels, such as policy, technology, or consumer preferences. He said that to be useful for financial firms' understanding of financed emissions, measures of GHG emissions need to be disaggregated to better differentiate the source of the transition risk exposure across the portfolio.

Mr. Granoff said that the GHG emissions footprint components can be broken down by level of scope, but may be more useful broken down by upstream components (within operations) and downstream components. He said that the risk signals from the emissions footprints from inputs can be negative or positive. He said that for real assets owned or operated by the financed company, or for the products those real assets produce, there are transition risks associated with the potential loss of revenue due to substitution, costs from policy, and costs from changes in legal liability. He said that understanding risk implications from investments can be difficult and would require additional analysis. He said that reputational risks should be addressed separately, functioning like an implicit weak carbon price, and GHG footprints can be a relevant proxy for reputational risk if one assumes the footprint affects the brand generally rather than affecting individual products.

Ms. Guillot said that the Sustainability Accounting Standards Board (SASB) standards can provide insight into how transition risk can ultimately manifest as traditional financial risks. She said that SASB developed a framework to identify how physical effects, the transition to a low-carbon and resilient economy, and regulatory risks ultimately impact financial statements. She said that SASB focused on individual industries for its analysis, because the impacts will vary by industry. She said that SASB did not calculate the size of the impacts but instead focused on identifying the connections that would lead to transition risks impacting the companies' financial statements. She said that SASB sought to identify by industry (1) significant climate risks and opportunities; (2) how those risks and opportunities impact financial performance; and (3) metrics to measure those risks and opportunities as inputs for climate-related disclosures for 77

industries. She said that the SASB disclosure standards provide useful information for understanding transition risk in financed entities.

Mr. Panfil said that it is useful to develop a taxonomy that frames how risk in financed entities transmits to financial institutions and to the financial system. He said that transition risk is likely to lead to a buildup of valuation imbalances in the financial system that accumulate over time. He said that corrections from these imbalances could lead to a financial shock via a “Minsky moment” or, more likely, via an erosion of asset values in particular industries. He said that risks to the system could also occur through contagion risk, noting that for example, if the value of leased gas-powered cars decreases, it could lead to decreases in the value of asset-backed securities backed by gas-powered car loan or leases, which could cause sell-offs in both the gas-powered car and auto asset-backed security markets. He said that the financial system may also face risks from macro shocks from the transition that are widespread and affect a range of intermediaries or markets simultaneously. He said that macro shocks and contagion could interact, leading to widespread disruption.

Mr. Panfil said that GHG emissions are most useful as an analytic tool when disaggregated, as previously discussed. He said that there needs to be a disciplined process to integrate transition risk into traditional risk management. He said that transition risk is less likely to manifest as a shock by itself and is more likely to cause a vulnerability to shocks through widespread, correlated degradation in asset quality or earnings.

Following the second charge presentation, participants discussed the premise that transition risk is more likely to lead to degradation in values than a shock to the financial system; what information and disclosures about climate risk are relevant and useful to which audiences; GHG emissions serving as a proxy for capital assets that emit or produce something that emits GHG; the usefulness of upstream and downstream emissions to understand risk at the financed entity level; considerations for emissions from other countries; the interplay between transition risk and physical risk; the importance of understanding the marginal cost of moving away from GHG emissions rather than the costs of current emissions; carbon pricing as a tool supporting substitutions from high-GHG emissions to low-GHG emissions; and how transition risks could affect the values of U.S. exports and imports. The presenters emphasized that transition risks are affected by physical risk, noting that an integrated approach is essential to identifying and mitigating significant losses.

5. Discussion Regarding Upcoming Set of Proposed Charges

The Chairperson turned to Mr. Litterman to introduce the upcoming set of proposed charges, which the CFRAC subsequently discussed. The proposed charges were presented as follows:

- Discuss data sources and collection methods for human factors that serve as potential physical risk mitigants, e.g., people’s awareness of risks and people’s desire to live in high-risk areas. How should financial institutions consider these risk mitigants? Is there research on what resources make a difference in educating consumers about the risks?

- Some smaller financial institutions may face disproportionately larger climate-related financial risks than their larger counterparts, but with fewer resources to identify, measure, and monitor these risks. What should smaller financial institutions do to manage these risks? What information, data, or resources are needed to help smaller financial institutions manage climate-related financial risk?

Following the discussion, the Chairperson offered closing remarks.

The meeting adjourned at approximately 3:30 P.M.