



**The Coalition  
of Finance Ministers  
for Climate Action**

# **The United States' efforts to account for climate-related financial risk to the federal budget**

**United States under the Biden-Harris Administration—  
Council of Economic Advisors (CEA)/Office of Management  
and Budget (OMB), Executive Office of the President of the  
United States (EOP)**

**A contribution to the 'Compendium of Practice from a Global Community of Ministries of Finance and Leading Organizations: Economic analysis and modeling tools to assist Ministries of Finance in driving green and resilient transitions'**

**Topic:** Addressing the climate policy questions facing Ministries of Finance: the economic and fiscal impacts of climate change

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## Introduction

The United States embarked on a whole-of-government approach to achieve the Biden-Harris Administration's national climate target to reduce economy-wide net greenhouse gas emissions by 50–52% below 2005 levels by 2030. Under the leadership of the Biden-Harris Administration, federal agencies placed the climate crisis at the forefront of domestic and international policymaking and strategic planning. This included federal agencies identifying and mitigating the financial risks of climate change and prioritizing actions that reduce emissions, increase resilience, protect public health, and support economic growth. In addition to executive actions, President Biden signed the Bipartisan Infrastructure Law and the Inflation Reduction Act, which comprise the most significant investment toward mitigating the effects of climate change in the history of the U.S. These actions were designed to help build a clean energy economy, reduce emissions across the U.S., and enhance the resilience of communities, infrastructure, and natural resources.

A key foundation of this U.S. government-wide approach to tackling the climate crisis was the President's Executive Order 14030 on [Climate-Related Financial Risk](#), which called for the Government to assess, disclose, and mitigate the financial risks posed by climate change to federal agencies and the nation more broadly. Section 6 of the Executive Order directed the Office of Management and Budget (OMB), the Department of the Treasury (Treasury), the Council of Economic Advisers (CEA), and others to develop methods to quantify risks posed by climate change to the Federal fiscal outlook, improve accounting of climate-related federal expenditures, and reduce long-term risk exposure through the formulation of the President's Budget and oversight. The Executive Order emphasized the importance of accounting for physical risks and for transition risks and opportunities in order to produce robust assessments of climate-related financial risk.

Section 6 of Executive Order 14030 included a number of specific directives. Section 6(a) called for OMB, in consultation with the Treasury, CEA, the National Economic Council, and the National Climate Advisor to "identify the primary sources of Federal climate-related financial risk exposure and develop methodologies to quantify climate risk within the economic assumptions and the long-term budget projections of the President's Budget." The President's Budget was the Administration's proposal for expenditure in a specific fiscal year, presented to Congress, and included analyses on budget and tax policies over the coming decade. The economic assumptions were the Administration's forecast of the macroeconomic conditions over the 10-year budget window. They were jointly produced by the CEA, OMB, and Treasury and play two prominent roles in the development of the President's Budget. First, they inform initial assessments of the fiscal outlook, helping to shape policy proposals included in the President's Budget. Second, they are integral to the process of producing the Budget: agencies rely on the economic assumptions' macroeconomic outlook to generate detailed forecasts of receipts and outlays from the existing policies. These detailed forecasts, in turn, determined the fiscal forecast of the Federal Government under the Administration's policy agenda. Regarding the economic assumptions and the long-term budget projections of the President's Budget,<sup>1</sup> Section 6(a) of Executive Order 14030 mandated the development of methods that can account for climate risks within the key macroeconomic analyses in the President's Budget.

Section 6(b) of Executive Order 14030 directed the OMB and CEA, in consultation with others, to develop and publish an assessment of the Federal Government's climate risk exposure annually within the President's Budget. Climate change is expected to affect public spending and revenue substantially ([Hsiang et al., 2023](#)). Damages from extreme weather events in the United States have risen sharply in recent decades and are expected to increase significantly in the coming decades because of climate change ([CEA, 2022](#); [Jay et al., 2023](#)). This is expected to spur increases in federal relief and recovery requests necessary to rebuild and better protect communities within the United States and its territories. Climate change may cost U.S. taxpayers around US\$88 billion per year (in 2022 dollars) in public healthcare expenditures associated with extreme temperatures by 2026, rising

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<sup>1</sup> The long-term budget projections are presented in the Long-Term Budget Outlook of the Analytical Perspectives of the President's Budget and assess the sensitivity of the Budget's central fiscal projections to different economic scenarios.

to US\$220 billion per year by 2050 in a medium/high emissions scenario, due to both increased program costs and foregone tax revenues ([Barrage, 2024](#)). These estimates are large relative to prior projections of the impacts of climate change in the United States, with estimated damages of 23% to 33% over previous studies (see, for example, Nordhaus 2018; Hsiang et al., 2017). Still, these figures likely underestimate the damages, as they do not include effects such as wildfire impacts on healthcare costs. Emerging research suggests that exposure to wildfire smoke may be among the most underestimated impacts of climate change in the U.S. ([Qiu et al., 2024](#)). In addition, extreme weather events fueled by climate change—such as flooding and extreme heat—are also expected to impact real property management and investment decisions for federal facilities and require additional considerations for the Federal workforce. As broad economic damages from climate change grow, so will the impact of the climate crisis on the Federal Budget.

A comprehensive climate financial risk assessment of the Federal Budget requires a vast amount of data and a methodological framework that can be applied consistently across Federal Agencies and programs. While further data and methodological advances are necessary for an assessment of the entire Federal Budget, the United States Government has made substantial progress in evaluating climate risk to specific Federal programs. Through analyses published in the [2023, 2024, and 2025](#) President's Budgets, OMB has sharpened its understanding of some of the largest impacts of climate change on the Federal Budget. These analyses included climate-related risk assessments of government programs, such as the United States Department of Agriculture (USDA) Federal Crop Insurance Program, the Department of Energy's Low Income Home Energy Assistance Program, the USDA Livestock Forage Disaster Program, and the USDA Forest Service's and Department of the Interior's wildfire suppression costs.

Section 6(c) Executive Order 14030 called for OMB, where appropriate, to reduce the Government's long-term fiscal exposure to climate-related risk through the President's Budget. Information from the climate financial risk assessments developed under Sections 6(a) and 6(b) helps highlight the Federal Government's exposure to climate-related risks and facilitate identification of areas that require investments to reduce these risks. The Federal Government has made some progress to limit fiscal exposure to climate change, but significant work remains ([GAO, 2023](#)). Specifically, the Federal Government can enhance its climate resilience efforts—planning and preparing for climate hazards now to reduce potential future losses—to help limit federal fiscal exposure and the need to take far more costly actions in the future. Recent investments requested in the 2025 President's Budget to reduce exposure include support for a wildland fire management workforce (US\$522 million); grants to municipalities and state agencies for planning, designing, or constructing projects that increase the resilience to natural hazards (US\$90 million); funding to develop methods for projecting future disaster-related outlays due to coastal hazards and hurricane events (US\$2 million); and numerous investments across the Government to promote climate resilience and adaptation.

The next section summarizes the work CEA, OMB, Treasury, and others have done to develop climate-energy-macroeconomic methodologies, pursuant to Section 6(a) of Executive Order 14030. The following section summarizes the development of the Government's program-scale climate-related financial assessments under Section 6(b) of the Executive Order. The last section discusses areas where additional modeling advances would be particularly helpful, as informed by the Agencies' analysis.

## **Development of climate-energy-macroeconomic methodologies**

To address the mandate of Section 6(a) of Executive Order 14030, in 2021, the CEA and OMB established an interagency technical working group (ITWG) to further develop the U.S.' analytical capabilities on climate-energy-macroeconomic issues. The ITWG brings together subject matter experts from relevant federal agencies and disciplines. The U.S.'s climate and energy-systems models are primarily developed and operated by scientific and technical subject matter experts within federal agencies. The resulting breadth in expertise provided by the ITWG is critical for addressing the multifaceted challenges climate risk poses to the macroeconomic outlook. Its partnership ensures that the Federal Government's climate and energy-systems modeling can be used alongside the CEA,

OMB, and Treasury’s macroeconomic modeling in the development of new methods on climate-energy-macroeconomic forecasting.

With the support of the ITWG, the CEA and OMB have published three white papers on climate-energy-macroeconomic forecasting. The [2022 white paper](#) described the primary conceptual issues motivating climate-energy-macroeconomic forecasting and documented expertise and resources across the United States Government that could contribute to this effort. It also categorized existing research by “top-down” studies that estimate directly the effect of climate change on aggregate economic outcomes (e.g., using reduced-form econometric techniques), and “bottom-up” studies that integrate local or sectoral effects of climate change through a structural representation of the economy (e.g., using enumerative or equilibrium methods). Building off this assessment and typology, the [2023 white paper](#) described modeling approaches for integrating climate risks into the process used to develop the economic assumptions of the Budget. It also outlined specific criteria and evaluated a number of outside modeling platforms for use in executing on Executive Order 14030’s directives on climate-energy-macroeconomic modeling and laid out a series of near- and medium-term steps for advancing these methods.

Informed by the ITWG’s progress over those steps, the [2024 white paper](#) presented a general methodological framework for integrating climate risk into a macroeconomic forecast. The paper is organized as a playbook—a general, flexible tool that can be readily adapted to specific use cases. This flexibility is important to accommodate the different needs and priorities of different modelers across the climate-energy-macroeconomic space. Underpinning the framework is the supply-side identity of gross domestic product. For specific purposes of Executive Order 14030, the supply-side identity is particularly useful, as it forms the foundation of the Budget’s economic assumptions. For more general purposes, the supply-side identity can also offer a helpful way to systematically aggregate across bottom-up estimates and to decompose top-down estimates over a broader range of macroeconomically relevant variables.

The framework laid out in the 2024 white paper separately considers physical risks and transition risks and opportunities, though the paper acknowledges that in practice these factors are often interrelated. Key policy-related questions include (i) how to consistently account for the macroeconomic effects of multiple, distinct types of physical risk, (ii) how the United States’ transition policies alter the macroeconomic outlook relative to a business-as-usual baseline, and (iii) the effects of policies throughout the world on physical risks and transition risks and opportunities within the U.S. In addition to developing step-by-step approaches for estimating the macroeconomic effects of both types of climate risk, the paper highlights analytic questions—discussed in the final section below—where further research advances would be particularly helpful.

Within the step-by-step approaches, the paper considers a range of existing modeling techniques and discusses their relative strengths and weaknesses under different contexts. For example, top-down methods can be particularly useful when the relevant climate impacts are well identified with historic data ranges, and implications for outcomes beyond GDP or channels of transmission are of less interest. Bottom-up methods help to identify critical transmission pathways and to account for climate impacts to specific aspects of the economy. In practice, Ministries of Finance may benefit from both approaches; for example, top-down methods could be more useful for projecting aggregate measures such as tax receipts, while bottom-up methods could be more useful for determining the needs of particular social safety net programs, or impacts on regional or sectoral capital flows. The 2024 white paper does not endorse a particular approach. Instead, it presents a generally applicable framework that is adaptable and can incorporate new advances in analytic methods.

## **Development of program-scale climate-related financial risk assessment methodologies**

Public budgets represent a wide array of programs that assist citizens, affect a range of sectors, and have a variety of heterogenous exposures to climate impacts ([Hsiang et al., 2023](#)). Quantifying the Federal Government’s exposure to physical climate risks at a program or sector scale (i.e., taking a

bottom-up approach) involves modeling and data challenges. These challenges overlap with macroeconomic modeling needs but are distinct in their focus on specific agency programs or the mechanics of how the Federal Government provides payments, receives revenues, and manages long-term assets. The FY2024 President's Budget *Analytical Perspectives* [chapter](#) on climate-related financial risk identified three core data requirements that any physical climate risk assessment methodology requires: (1) exposure modeling (data and models of specific climate variables and damage to the Federal Government's assets or programs); (2) availability of downscaled climate data at appropriate geographic regions and at appropriate spatial and temporal scales for the programs being assessed; and (3) a robust set of program- or sector-specific (physical and economic) damage functions that allow for modeled physical changes to be expressed as financial estimates. Key policy-related questions include (i) how to consistently account for the programmatic effects of multiple, distinct types of physical risk, (ii) how to improve the accounting of climate-related federal expenditures, and (iii) how to reduce the Federal Government's long-term fiscal exposure to climate-related financial risk through formulation of the President's Budget and oversight of budget execution.

The FY2025 President's Budget *Analytical Perspectives* [chapter](#) continues to address these challenges, by applying exposure modeling and downscaled climate data tailored for specific agency assets or programs. These modeling challenges, while unique in the broad scope of the Federal Government's programs, are common across other sectors that are assessing climate-related financial risks. The FY2025 *Analytical Perspectives* chapter also advances the framework laid out in the FY2024 Budget and highlights two federal agency assessments of climate-related financial risk. The USDA estimates that the annual expenses for its Livestock Forage Disaster Program, which helps ranchers during periods of prolonged and intense drought, are expected to increase, up to US\$800 million per year (in 2022 dollars) more than current expenditures, by the end of the century, due to projected increases in drought due to climate change. The USDA Forest Service and the Department of the Interior wildland fire suppression spending on federal lands is expected to increase by more than US\$2.5 billion per year over current expenditures by late-century in response to the dramatic increase in wildfires due to climate change.

## **Additional modeling needs for the community of practice**

As noted above, further analytic improvements would enhance both climate-energy-macroeconomic modeling and program-scale climate-related financial risk assessments. The U.S. has made targeted efforts to advance its capabilities on both fronts. The focus on distinct methodologies for macroeconomic and programmatic risks is important for climate-related economic and fiscal analysis for several reasons. First, climate-related risks do not have uniform geographic effects, and it is critical to have a detailed understanding of which government capacities are most sensitive to particular risks. Additionally, it is beneficial to develop methodological capabilities tailored to specific use cases, particularly in areas such as climate-economic and -fiscal analyses, which are emerging fields of study. Lastly, separately estimating macroeconomic and program-specific exposures allows for a holistic accounting of climate-related risks. These risks often affect specific programs both directly and indirectly through their influence on the broader macroeconomic landscape. This section considers modeling needs for macroeconomic analyses before turning toward programmatic assessments.

To carry out Executive Order 14030's directive on climate-energy-macroeconomic modeling (in Section 6(a)), the CEA, OMB, and ITWG identified the need for new modeling and data tools to support the quantification, assessment, and the management of economic and financial climate risks. Discussions with non-governmental partners—including [in academia](#), [multilateral institutions](#), other [national governments](#), and [private-sector firms](#)—underscored that such new models and tools would benefit the broader community of practice as well. In December 2023, the CEA, OMB, and Treasury publicly released a [memo](#) on "tools to support the management of near-term macroeconomic and financial climate risks," conveying to Federal Government partners and external stakeholders the priorities for advancing climate-energy-macroeconomic methodologies. The memo outlined a set of enhancements that could improve Federal Government modeling tools for economic risk-

management applications. Additionally, the memo identified specific opportunities to improve existing tools. These recommendations are complemented by the research needs highlighted in the CEA and OMB's 2024 white paper. Across the December 2023 memo and 2024 white paper, key opportunities for improvement on climate-energy-macroeconomic modeling issues include accounting for:

- Distributional effects, such as on particular income groups, subnational units, and subsectors of the economy
- Extreme weather risks
- Regional demographic and socioeconomic changes pertinent to climate risk management
- Physical risks and transition risks and opportunities already reflected in the data and in existing macroeconomic forecasts
- Relationships between climate information at high spatial and temporal resolutions and macroeconomic outcomes.

For program-scale climate risk assessment method development, the FY2024 President's Budget *Analytical Perspectives* chapter on climate-related financial risk described three approaches that the Federal Government could take as part of a comprehensive framework to assess the financial risk due to physical climate impacts on Federal programs and assets (OMB 2023): (1) comprehensively modeling physical damages and expenditures, (2) modeling expenditures directly from climate variables, and (3) modeling expenditures as a proportion of economic damages. Related to the first approach, the FY2025 President's Budget *Analytical Perspectives* chapter on climate-related financial risk presented advances in physical climate exposure assessment tools, namely the [Fifth National Climate Assessment Interactive Atlas](#), the [Climate Mapping for Resilience and Adaptation](#) tools, and advances in the Federal Emergency Management Agency's climate risk analytical tools (OMB 2024). All three approaches continue to have gaps in research and government capabilities. These include needed improvements in:

- The availability of standard climate financial risk assessment methods for sector-specific applications
- The availability of associated Federal climate data for the application of these methods and
- Capacity and training across agencies and sectors to identify appropriate climate data, build capacity to conduct exposure modeling, and enhance capacity and expertise to link physical risk modeling with economic modeling approaches.

The FY2024 and FY2025 *Analytical Perspectives* chapters identified key opportunities for improvement on climate-budgetary modeling beyond the three gaps previously outlined, including:

- Developing a common framework for assessing exposure to climate-related financial risks to the President's Budget across a range of Federal assets and programs
- Establishing a framework for quantifying mission and operations risks to Federal Agencies and
- Identifying necessary and emerging climate data and information resources, where information is currently unavailable (e.g., projecting physical impacts of tropical cyclones).

Advances in any of the areas outlined in the 2023 CEA-OMB-Treasury memo, 2024 CEA-OMB white paper, and FY2024 and FY2025 *Analytical Perspectives* chapters would improve the accuracy and robustness of estimates of the macroeconomic and programmatic impacts of physical risks and of the transition to a clean energy economy, and would enhance the methodologies relevant to budget-focused economic and fiscal forecasts. At the same time, such advances could inform a broader range of analyses, including scenario analysis, policy development, and stress testing, that are also

central to the Biden-Harris Administration's commitment to be a leader in the fight against the climate crisis.

**Please note that Executive Order 14030 on Climate-Related Financial Risk has been revoked under the Trump-Vance Administration via Executive Order 14154 on Unleashing American Energy.**

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