



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

Climate macro-modeling tools to address emerging policy questions in Ministries of Finance: why new tools are now needed for the urgent task of implementation

Coalition for Capacity on Climate Action (C3A)

Jean-Francois Mercure, Asjad Naqvi, and Etienne Espagne

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: Specific analytical tools and approaches relevant to Ministries of Finance

June 2025

Access the full Compendium at www.greenandresilienteconomics.org

This contribution was prepared at the request of, and with guidance from, the Ministry of Finance of Denmark as Lead of the Coalition's Helsinki Principle 4 initiative 'Economic Analysis for Green and Resilient Transitions' and its Steering Group, with input from its Technical Advisory Group. The views, findings, interpretations, and conclusions expressed are those of the authors. While many Coalition members and partners may support the general thrust of the arguments, findings, and recommendations made in this contribution, it does not necessarily reflect the views of the Coalition, its members, or the affiliations of the authors, nor does it represent an endorsement of any of the views expressed herein by any individual member of the Coalition.

© The authors, 2025

Licensed under [CC BY-NC 4.0](https://creativecommons.org/licenses/by-nc/4.0/).

The evolution of needs for climate policy modeling and analytics

A recent technical note by the World Bank's C3A program explores the evolution of the needs for climate policy modeling and analytics by Ministries of Finance, and how the global climate macroeconomics and finance modeling community responds to these new emerging demands. Since the Paris Agreement, national and international conversations over science, policy-relevant analytics, and climate-related advocacy have evolved. Initially, the discourse on climate-related topics within economic and policy circles was confined to a relatively limited number of conceptual frameworks and challenges, such as the use of carbon budgets, technological and socio-economic scenarios for reaching climate goals, and climate mitigation costs. This has since expanded dramatically to encompass a vast set of questions. While the existing modeling tools have partially addressed these topics, a lot more work is needed to fully understand the full scope of the direct and indirect impacts of climate action.

Before the Paris Agreement, policy debates and related analytics focused largely on topics relevant to establishing the fundamental basis of the climate agenda in various countries. Following the ratification of the Paris Agreement, countries are required to submit National Determined Contributions (NDCs). This process requires each country to establish a national climate action plan. Such plans typically concern emission reduction or emission intensity reduction targets alongside low-carbon energy sector and agriculture development plans. Related debates also take place through the periodic evidence review process of the Intergovernmental Panel on Climate Change (IPCC). Many integrated assessment models (IAMs) have been developed, which contribute very effectively to either or both of these climate agenda-setting exercises, which combine science with policymaking.

As countries increasingly turn toward the implementation of climate policy to achieve national climate action plans, climate change considerations are being mainstreamed across a wide range of government departments, notably within Ministries of Finance, creating the need for new types of analytical tools. The implementation of climate action plans requires the development of detailed climate policy frameworks that tackle national decarbonization challenges while also accounting for national priorities for sustainable economic development, while also addressing constraints imposed by the global economic and financial climate. As the design of climate policy involves multiple government departments, new questions emerge that require support from the wider research and analytical communities.

Policy design questions and identifying knowledge gaps

Recent engagement by the C3A program with MoFs via a range of formats (e.g., thematic workshops, surveys, interviews) has highlighted multiple policy design questions that are not well covered by the traditional international climate-economics literature. Topics range from financial and fiscal risk and management to employment, structural change, distribution, fiscal and debt sustainability, nature dynamics, inflation, innovation, and competitiveness. Given the pervasive impacts of climate change and climate mitigation policy, many more stakeholders may take part in conversations around economics and policy choices.

Existing models and model development can tackle many of these questions, but large knowledge gaps nonetheless remain. These include, but are not restricted to, system mapping and dynamic system modeling extended to bio-physical systems; cascading impacts measured through network analysis; and the integration of financial and macroeconomic dynamics, allowing for different forms of disequilibria. C3A provides a non-exhaustive survey of emergent topics and modeling approaches to tackle those topics within MoFs. These Ministries face a range of policy issues and require related knowledge support that departs from sustained growth narratives and emphasizes structural transformations and associated policies. We offer reflections and possible initiatives for the macro-modeling community working on climate issues, to better serve science-policy interfaces in different countries and regions. These take the form of dedicated platforms of knowledge mobilization targeted to these new policy issues, involving but not restricted to climate macroeconomic modelers as well as Ministries of Finance and other line ministries.