HP 4 CAPABILITIES SERIES

HOW MINISTRIES OF FINANCE CAN BUILD CAPABILITIES FOR ECONOMIC ANALYSIS AND MODELING TO DRIVE GREEN AND RESILIENT TRANSITIONS

Taking stock of challenges, strategies, and lessons learned

OCTOBER 2025

A report of the Coalition of Finance Ministers for Climate Action Helsinki Principle 4 initiative: Economic Analysis for Green and Resilient Transitions

About this report

This publication is a product of the Helsinki Principle 4 (HP4) workstream under the Coalition of Finance Ministers for Climate Action. The overall aim of HP4 is to mainstream climate action into economic and fiscal policy. The report forms part of an effort to improve macroeconomic analysis and modeling tools for Ministries of Finance (MoFs) to drive climate action, including the capacity to assess the economic impacts of physical climate risk, climate mitigation, and adaptation measures. This effort recognizes that many MoFs urgently need improved access to tools to be able to address the most pressing climate policy questions they now face, tailored to and appropriate for their context, and operating on timescales that meet the needs of decision-makers.

This report aims to support MoFs in building and boosting the analytical capabilities needed to drive the green and resilient transition. It takes stock of the ongoing efforts by MoFs and presents a first attempt to compile an overview of the existing literature, case studies, and lessons learned. The report highlights three key elements necessary to enhance analytical capability: (1) leadership and governance, (2) coordination and collaboration, and (3) skills and expertise.

The report was led by Anika Heckwolf, Policy Fellow at the Grantham Research Institute on Climate Change and the Environment at the London School of Economics and Political Science (LSE), with support from Moritz Baer, Hipólito Talbot-Wright, Jessica Nicol, Hannah Maier-Peveling, Nick Godfrey, Roberta Pierfederici and Sam Loni (all LSE) and guidance from Mads Libergren (Ministry of Finance, Denmark). The author team is especially grateful for the input of Jennifer Carroll, whose vision and engagement have been instrumental to this effort.

The report benefited from review from Benjamin Lerch (Federal Department of Finance of Switzerland), Diana Jimenez (Secretariat of Finance and Public Credit of Mexico), Saara Tamminen (Prime Minister's Office, Finland), Joaquim Leite and Jesus Alvarado (NDC Partnership), Andrea Bassi (KnowlEdge Srl), Anna Murphy (S Curve Economics), Leonardo Garrido (World Bank), Raúl Delgado and Marcio Alvarenga (Inter-American Development Bank), Dina Azhgaliyeva (Asian Development Bank), Jane Mariara (Partnership for Economic Policy) and Leonardo Garrido (World Bank). It also benefited from the many individuals and institutions who contributed to the Compendium of Practice that supports this workstream and the convening of stakeholders at the online inaugural Forum on the Macroeconomics of Green and Resilient Transitions held in April 2024, and from the discussions held by the program's MoF Steering Group and Advisory Group. Sarah King and Georgina Kyriacou at the Grantham Research Institute edited the report, with typesetting by Joseph Adjei. Table A provides an overview of the Compendium contributions the report draws on.

The Compendium of Practice that partly informs this report is a global collaborative effort that consists of contributions from over 100 leading organizations and individuals gathered for this workstream. The author team would like to thank the numerous Coalition members, partners, and other individuals and organizations who directly contributed to the Compendium. The Compendium and complementary reports are available on a dedicated website, https://greenandresilienteconomics.org/. These include a survey of the world's Ministries of Finance, a report summarizing the Compendium, and thematic papers in areas related to Ministries' pressing climate policy needs. Further reports are under development.

About this report

Disclaimer

This report was prepared at the request of, and with the 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 a synthesis of the diverse views of the authors, contributors, and reviewers. While many Coalition Members and partners may support the general thrust of the arguments, findings, and recommendations made in this report, they do not necessarily reflect the views of the Coalition, its Members, or the affiliations of the authors, nor does this report represent an endorsement of any of the views expressed herein by any individual Member.

This report was first published in October 2025.

Suggested citation: Coalition of Finance Ministers for Climate Action (2025) *How Ministries of Finance Can Build Capabilities for Economic Analysis and Modeling to Drive Green and Resilient Transitions: Taking stock of challenges, strategies, and lessons learned.* Report for the HP4 initiative 'Economic Analysis for Green and Resilient Transitions'.

About this report

Table A. Contributions to the Compendium of Practice used in this report

Institution	Authors	Title (and Compendium web link)
Australia—Department of the Treasury	Rebecca Cassells, Gerard Hawkins	Re-establishing the Australian Treasury's climate modeling capability
Australia—Department of the Treasury	Freya Carlton, Rebecca Cassells, Rebecca Colquhoun, Sebastian Porter	Estimating the impact of selected physical climate risks on the Australian economy
Canada—Department of Finance		Finance Canada CGE model
Coalition for Capacity on Climate Action (C3A)		Financing the transition: how can Ministries of Finance build sustainable financial strategies and what analytical tools do they need?
Coalition of Finance Ministers for Climate Action		Capability Assessment Framework (CAF): a new self-assessment tool to empower Ministries of Finance to build capabilities to mainstream and drive climate action
Council of Economic Advisors (CEA)/Office of Management and Budget (OMB), Executive Office of the President of the United States (EOP) under the Biden-Harris Administration		The United States' efforts to account for climate-related financial risk to the federal budget
Danish Research Institute for Economic Analysis and Modelling (DREAM)	Peter Stephensen, Jens Sand Kirk	The GreenREFORM model
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	Naima Abdulle, Sebastian Homm, Christian Fischle, Victoria Montenegro	Modeling climate-resilient economic development: GIZ's approach to supporting sustainable economic growth
Environment for Development Initiative		EfD—a global research network combining research, academic training, training of civil servants, and advisory to inform policy
Finland—Prime Minister's Office	Sara Tamminen, Pekka Moren	Strengthening capabilities to undertake economic impact assessments of climate strategies and impacts: the Finnish experience
International Monetary Fund (IMF) Fiscal Affairs Department	Emanuele Massetti	The critical role of Ministries of Finance for investment in adaptation and the analytical principles and tools available
Institute for New Economic Thinking at the Oxford Martin School	Doyne Farmer	Time series models for forecasting technological change, particularly for energy technologies: approaches relevant to Ministries of Finance
International Growth Centre—Rwanda Office (with Rwanda Ministry of Finance)		The use of climate–economy models in Rwanda's Ministry of Finance and public institutions: the challenges in building analytical capability
Italy—Ministry of Economy and Finance		The Italian Ministry of Economy and Finance climate-related modeling tools: how to build a flexible suite of models serving different purposes
Mexico—Ministry of Finance		Assessing the fiscal risks of physical climate change
NDC Partnership	Joaquim Leite, Adrian Flores, and Jesus Alvarado	Unpacking options for Ministries of Finance to leverage modeling and economic analysis to accelerate climate action

About this report

Table A *cont*. Contributions to the Compendium of Practice used in this report

Institution	Authors	Title (and Compendium web link)
Independent contribution	Leonardo Garrido	Summary of emerging and new approaches to modeling the economic case for climate action: lessons from the New Climate Economy for Ministries of Finance and future model development agenda
Sierra Leone—Ministry of Finance		Climate policy priorities in Sierra Leone
Switzerland—Federal Department of Finance	Benjamin Lerch, Thomas Brändle, Martin Baur	Modeling the fiscal impacts of the net zero target within fiscal sustainability analysis
University of East Anglia	Rachel Warren	Methodological recommendations for Ministries of Finance on climate change risk assessment and the enhancement of damage functions
U.S. Department of the Treasury under the Biden-Harris Administration		Economic impact assessment of the Inflation Reduction Act (IRA)
World Bank	Heather Ruberl, Pascal Saura, Balsher Singh Sidhu	Data sources for the macro-modeling of climate change impacts and policies
World Bank/International Monetary Fund Fiscal Affairs Department		The Climate Policy Assessment Tool (CPAT)
World Resources Institute (WRI)	Vanessa Pérez-Cirera, Luis Miguel Galindo, Rajat Shrestha	Informing economic modeling approaches for effective climate transitions
World Resources Institute/SOAS University of London—Resilience Adaptation Mainstreaming Program (RAMP)	Carter Brandon, Ulrich Volz	Resilience Adaptation Mainstreaming Program (RAMP): building capacities at Ministries of Finance through local universities

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Ministries of Finance (MoFs) play a central role in advancing green and resilient transitions, given their influence over budgets, investment, and economic policy.

A recent Global Survey of Ministries of Finance carried out by the Coalition of Finance Ministers for Climate Action shows MoFs are aware of both the substantial economic risks from physical climate change and the economic opportunities to be gained from driving green and resilient transitions. However, most MoFs are still at an early stage in developing the analytical tools needed to guide this effort.

This report focuses on how MoFs can boost their analytical capabilities to provide answers to complex policy questions about climate impacts and the transition's implications.

The report presents a first attempt to compile an overview of the existing literature, case studies, and lessons learned from existing efforts. The report addresses three key elements necessary to enhance analytical capability: leadership and governance, coordination and collaboration, and skills and expertise.

Throughout the Coalition of Finance Ministers for Climate Action's Helsinki Principle 4 initiative 'Economic Analysis for Green and Resilient Transitions', a clear message emerges: **MoFs are engaged, interested, and aware of the transition—but most still lack the analytical capabilities they need to lead it.** Analytical capability is about more than having access to suitable tools and models—it is about being able to firstly identify, and secondly commission or use and maintain these tools to answer relevant policy questions, and thirdly about being able to communicate results—and their limitations—and ensure their integration into decision-making processes.

Despite the challenges, momentum is building. Most MoFs we surveyed are already taking meaningful steps to engage in the transition, and there are multiple examples of MoFs systematically building and boosting their analytical capabilities.

The report highlights three key elements necessary to enhance analytical capability: (1) leadership and governance, (2) coordination and collaboration, and (3) skills and expertise.

1. Leadership and governance: Clear **roles and responsibilities**, supported by an appropriate institutional setup, are essential to ensure that climate-related economic modeling and analysis are championed within the MoF and used to inform decision-making processes.

MoFs seeking to improve leadership and governance to support improved analytical capability can:

- Build an improved **institutional understanding** within the MoF that addressing climate change can help the MoF deliver on its core objectives around growth and development, the management of the public finances, and macroeconomic stability, giving MoFs an implicit mandate for more ambitious action and supporting the case for investing in improved analytical capability. Some MoFs may choose to go further by seeking out a more formal **mandate** to engage in driving climate action, which can help to further institutionalize this understanding and the case for enhancing analytical capabilities.
- Invest in **institutions and governance structures** that link analysts, modelers, and policymakers. The best organizational structure depends on the priorities, preferences, and resources available in each MoF. Regardless of the institutional setup, effective coordination and communication across the different divisions within the MoF are key.

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- **Establish high-level support** for climate-related economic analysis and modeling through improving the ability of analysis to feed into supporting decision-making. This can include through establishing channels for continuous input, involving a wide range of stakeholders in choosing relevant variables, and prioritizing accessibility of results while being clear on purpose and limitations.

2. Coordination and collaboration: MoFs can benefit from partnerships and collaboration, both within government and beyond, to create synergies and obtain access to models, data, or expertise. Economic analysis and modeling can be complex and often require a range of inputs and close collaborations on tools, skills, and data. Yet, many MoFs do not yet regularly collaborate with key institutions.

MoFs seeking to improve coordination and collaboration can:

- **Strengthen coordination and partnerships with key ministries and agencies,** including environment ministries, statistical offices, and central banks, such as through inter-ministerial working groups or other update and feedback mechanisms. Coordination can help exploit synergies, leverage institutional strengths, and ensure joint policymaking. Collaboration can also help MoFs tap into existing expertise, models, and data within other government institutions.
- **Strengthen collaboration with non-government stakeholders,** such as civil society, the private sector, universities, and the international finance and expert community, including on building and running models, data, and technical assistance.

3. Skills and expertise: Building analytical capabilities requires ensuring dedicated staffing resources with the right mix of skills for conducting or interpreting modeling and analysis are present in the MoF. Currently, many MoFs report serious staffing and skill constraints.

MoFs seeking to enhance their climate-analytical skills and expertise can:

- **Build—or draw on—a variety of skills** going beyond economic, quantitative, and analytical skills, including sectoral expertise, and communication and stakeholder management skills. A successful analytical team will bring the full range of required skills together. While not every MoF will need to develop all the skills needed to perform analysis themselves, or at least not immediately, all will need the skills to appreciate, interpret, and communicate the results of analytical exercises.
- **Combine measures to build and strengthen skills and expertise.** A focus on staff retention and institutional capacity is as important as hiring and training to build sustained capabilities.
- **Draw on technical assistance to strengthen skills and capabilities** more broadly. However, international support often falls short in building lasting institutional capacity. More bespoke, long-term assistance and projects that enable knowledge transfers from external partners have proven more successful.

The report showcases a number of case studies, which also feature in the online Compendium of Practice, including:

- **Australia,** where the Treasury updated its institutional structure to set up a dedicated climate and industry modeling team
- **Chile,** which is building capabilities to integrate natural capital into decision-making, collaborating with partners nationally and internationally
- **Denmark,** where the MoF co-developed the one-stop-shop 'GreenREFORM model', which plays a central role in shaping climate policy

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- **Ethiopia,** which has successfully adapted a green economy model to inform key national planning instruments
- **Switzerland,** where the Federal Department of Finance has made use of pilot projects to analyze the long-term fiscal implications of the energy transition.

The report explores options for different levels of capacity in MoFs, which determine immediate priorities and opportunities. MoFs with little to no climate analytical capabilities can start by building on existing (general analytical) capabilities. After establishing priority policy questions, this could involve starting with simple forms of analysis that match existing skills, or the use of pilot studies, which can help build high-level support for analytical exercises.

MoFs with more established climate analytical capabilities can work toward gradually mainstreaming climate analytics across relevant functions and integrate climate considerations into existing tools. Some may decide to go further, introducing new tools or combining tools into tailored suites to answer complex climate policy questions. Across all levels, the goal should not be perfection but practicality.

This report also highlights that providers of technical assistance and the wider support ecosystem can play a key role in helping MoFs build climate analytical capabilities. While support is available, there is a strong demand for technical assistance providers to ramp up and reform existing offers and training provision to help MoFs develop and maintain their own internal capabilities. Technical assistance providers need to work together with universities, research institutions, and partners across government, including to:

- Provide bespoke, long-term assistance that builds long-term institutional knowledge, skills, and collaboration within MoFs and across national ecosystems
- Strengthen the ability of MoF staff to operate (and adapt/design) their own tools
- Ensure that a wide range of suitable tools are available and accessible for MoFs, both for long-term scenarios and for impromptu policy advice
- Encourage cross-institutional and cross-country collaboration and learning, including through knowledge sharing platforms that facilitate peer learning
- Fill knowledge, case study, data, and research gaps.

There is no single tool or model capable of addressing all the relevant climate policy questions facing MoFs. This report therefore does not aim to provide specific advice on choosing, using, or building specific tools and models. Rather, it discusses the general analytical capabilities needed to successfully do so to answer pressing policy questions. It should be read in parallel with the HP4 Tools Report (CFMCA, 2025c) and the forthcoming HP4 Step-by-Step Guide (CFMCA, 2026a, forthcoming). At the same time, it is important to keep in mind that building capabilities is a slow and non-linear process. Substantial improvements are rarely achieved overnight, while fluctuating government commitments to climate action mean that advancements are not always permanent. Despite these challenges, many MoFs have managed to substantially build up their climate analytical capabilities. By showcasing multiple options and examples, this report aims to help MoFs find inspiration to overcome their respective barriers and pathways toward sustainably boosting their analytical capabilities to drive effective green and resilient transitions.

1. Introduction

The ability of Ministries of Finance (MoFs) to deliver on their core priorities, including growth and development, responsible management of the public finances, and macroeconomic stability, increasingly depends on their ability to address the escalating risks from climate change and the transition to green and resilient economies, and embrace the opportunities the transition presents. The opportunities range accelerating growth and innovation to enhanced competitiveness and long-term cost savings. Addressing the risks and seizing the opportunities will require far-reaching structural transformations and investments in all sectors (e.g., Fazekas et al., 2022; CFMCA, 2023).

MoFs therefore increasingly need to address pressing policy questions related to the green and resilient transition, including around estimating the scale of investment needs and how to finance them, understanding the impacts of physical climate risks on the macroeconomy or the distributional impacts of both climate change and climate action to help support a just transition. Answers to such complex questions must be grounded in sound economic analysis that will require MoFs to both integrate climate considerations into their existing workhorse analytical tools and consider adopting new dedicated tools and analytical practices.

MoFs around the world already use a wide range of analytical tools, models, and other approaches to support decision-making on climate policy. These tools—summarized in the separate HP4 Tools Report (CFMCA, 2025c)—include quantitative climate-enhanced macroeconomic modeling tools but also dedicated physical climate risk models, decision-making frameworks and other analytical tools, and ex-post assessments of policy impact.

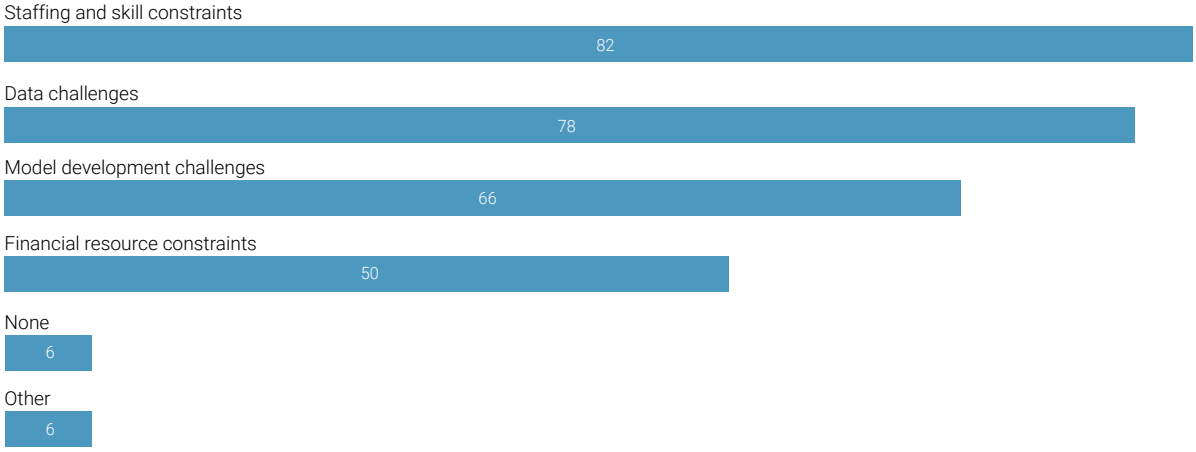
However, to successfully conduct effective analysis and modeling for driving climate action, most MoFs need to significantly strengthen the capabilities needed to effectively identify, commission, design, use, and/or maintain appropriate tools and models. This is evidenced both by existing assessments (e.g., Tamminen et al., 2022; AfDB, 2023; ADB, 2023), as well as a series of in-depth interviews and a global survey of 59 MoFs conducted for this initiative. The survey, which included 26 advanced economies (AEs) and 33 emerging market and developing economies (EMDEs), highlights that the majority of, if not all, MoFs currently lack sufficient analytical capabilities to answer the most pressing climate policy questions they face—from how much to invest in green and resilient transitions, to how to quantify the impact of physical and transition risks on the economy (CFMCA, 2025a). When asked about barriers to the integration of climate into analytics, 'staffing and skill constraints' was the most selected option, selected by 82% of respondents, closely followed by data challenges (78%) and model development challenges (66%) (see Figure 1.1). More EMDEs reported financial resource constraints (70%, compared with 26% of AEs) and data challenges (96%, compared with 57% of AEs), and only 6% of respondents said they faced none of the barriers.

In some regions, this problem is particularly acute. An assessment of macroeconomic modeling capacity in Africa finds that "macroeconomic modeling and forecasting … remains limited," which means that dealing with "emerging issues such as … climate change" is a challenge (AfDB, 2023). As a modeler in one African country interviewed for this report explains: "We don't have systems [for climate risk analysis]. So we can't even understand the actual risk itself before it becomes a damage. We don't have enough information, enough technology to inform us about the nature and the magnitude of the risk." They go on to note that the models and tools used in the MoF—external models that rely on assumptions they cannot influence—are of limited use as they cannot adequately capture the nature of the country's economy. However, the issue is not just confined to developing countries: many developed countries also face various capability challenges.

This report discusses the capability challenges MoFs are facing and presents strategies and lessons learned to

boost capabilities for integrating climate into economic analysis and modeling.[1] It represents a first attempt to compile an overview of the limited literature, case studies, and lessons learned on an area of capacity building that has so far been largely neglected. It also draws on the papers, contributions, case studies, and insights from interviews and the survey produced for the Helsinki Principle 4 workstream of the Coalition of Finance Ministers for Climate Action. While the focus of this report is on capabilities for climate-related economic analysis, many of these lessons are derived from and/or applicable to strengthening analytical capabilities in MoFs more broadly.

Figure 1.1. What barriers does the Ministry of Finance face in incorporating climate-related issues into economic analysis and modeling approaches? (%)



No. of respondents: 50

Source: CFMCA (2025a)

Building on the Coalition's flagship guide on 'Strengthening the Role of Ministries of Finance in Driving Climate Action,' this report understands capability as being "about translating inputs into outputs and outcomes through sustained leadership, clarifying roles and responsibilities internally and within other government departments, strong internal coordination and information-sharing, and strengthening skills and human resources" (CFMCA, 2023). Strengthening capability is therefore about more than just capacity and the volume of people, money, and other inputs. Specifically, when it comes to climate-related economic modeling and analysis, capability is not only about access to sophisticated tools and models, but about being able to:

- Identify appropriate models and approaches, while avoiding those that are either inappropriate for the MoF (e.g., because of a lack of analytical skills to understand, use, and maintain complex models) or unsuitable to answer the questions at hand (see also CFMCA, 2025c)
- Effectively commission or apply these approaches to address urgent questions and inform decision-making to drive climate action. (The HP4 Step-by-Step Guide to be published as part of this initiative in 2026, will highlight how tools are only one part of a series of steps that inform decision-making.)

This report looks at three aspects of capability:

1. **Leadership and governance** within MoFs (and government as a whole), as an important factor to ensure that climate-related economic modeling and analysis are championed within the MoF, used to inform decision-making processes, and supported by an appropriate institutional setup.
2. **Coordination and collaboration**, within the MoF, government, and beyond, including with those institutions that own models and data—recognizing that economic analysis and modeling are both complex and require a range of inputs, and cannot be performed without close collaborations on models, skills, and data.
3. **Skills and expertise,** i.e. ensuring dedicated staffing resources with the right mix of skills for conducting or interpreting modeling and analysis are present in the MoF.

[1] This covers macroeconomic modeling, climate–economy modeling as well as other climate-related models and analytical approaches described above and detailed in the HP4 Tools Report.

Building capabilities is a slow and non-linear process that will need to go beyond the MoF. Substantial improvements are rarely achieved overnight, while changing political priorities can mean that advancements are not always permanent. Strengthening analytical capabilities requires sustained commitment and strategic collaboration with key economic and financial institutions, line ministries, the private sector, and key policymaking bodies.

At the same time, the current level and types of capabilities present in an MoF have substantial impacts on the type of analysis that can be performed. Two MoFs faced with similar policy questions might need to take vastly different approaches to modeling policy options due to the differences in their starting capabilities. An MoF with less advanced capabilities might initially benefit from simple qualitative analysis such as the IMF/World Bank's Climate Policy Assessment Tool[2] whereas an MoF with more advanced capabilities might even consider building a dedicated framework for analysis, requiring customized models. In fact, the surveys and interviews conducted for this report have roughly identified two types of MoFs:

- MoFs with advanced capabilities, that typically already use more granular (or sophisticated) analytical tools and models that support the design of specific policies and regulation, often with a detailed sectoral or spatial focus, as well as detailed policy evaluation (although not all of these models might be suitable for analyzing climate-related issues—see also Box 1.1).
- MoFs with less sophisticated capabilities, that typically use simple analytical tools and models (e.g., basic spreadsheet models) to provide estimates for the identification of trends and changes in macro-critical indicators to inform government strategy and mapping of broader climate risk and opportunities. Many of these MoFs are not yet in a stage to inform the specific design or implementation of ambitious climate policy. Others might use granular analytical climate–economy tools and models supplied by external agencies, whose assumptions may not be fully transparent, which may limit MoFs' abilities to fully comprehend, use, or maintain them.

While this is a simplified typology, with many MoFs sitting in between these types, the survey and interviews have shown that analytical requirements, policy priorities, challenges, and responsibilities vary substantially across those two groups. The recommendations at the end of this report have been developed to guide MoFs in determining the steps to take to strengthen capabilities further, based on their existing capabilities.[3]

As highlighted in other reports produced as part of this initiative, there is no single tool or model (or even type of model) capable of addressing all climate analytical concerns of MoFs. The choice of the appropriate analytical approach is highly context dependent. Therefore, while there are important trade-offs to consider (see Box 1.1), this report does not aim to provide advice on choosing, using, or building specific tools and models. Rather, it discusses the capabilities needed to successfully use such tools to answer pressing policy questions. It should be read in parallel with the HP4 Tools Report, which provides a systematic overview of analytical tools used by and available to MoFs for integrating climate considerations into economic analysis and clarifies their uses, strengths, and limitations, and the forthcoming HP4 Step-by-Step Guide, which will outline a method for MoFs to systematically address pressing climate policy questions of any type. While most examples and case studies referenced in this report focus on quantitative modeling approaches, similar principles and lessons also apply to non-quantitative approaches.

The remainder of this report is structured as follows. The next three sections discuss, in turn, the three aspects of capability: leadership and governance; coordination and collaboration; and skills and expertise. The last section concludes and provides recommendations including for building, and further strengthening, climate analytical capabilities.

[2] See also 'The Climate Policy Assessment Tool (CPAT)', contribution from the World Bank/International Monetary Fund Fiscal Affairs Department to the HP4 Compendium of Practice.

[3] A potential third category of MoFs is those that are yet to establish basic public financial management systems and tools and that therefore lack the critical information needed to inform analysis, or to implement recommendations arising from them. These MoFs might benefit more from support to build baseline general macroeconomic analysis and public financial management that includes but is not limited to climate.

Box 1.1. Choosing suitable analytical tools and models

Depending on their underlying assumptions and theoretical foundations, different analytical tools can yield markedly different answers to pressing policy questions. This has led to an ongoing debate in the climate economics community around the suitability of different types of models to inform climate policymaking. Many models can be too complex, too opaque, or too theoretical to guide real policy decisions. A recurring concern is that MoFs rely on tools built on outdated assumptions designed for traditional economic challenges, not the complex, dynamic nature of today's climate crisis. This can lead to analyses that are not only unhelpful but potentially counterproductive to climate action (Stern et al., 2022, see also several contributions in the HP4 Compendium of Practice and summary report, CFMCA, 2025b).[4]

The HP4 Tools Report helps readers understand the strengths and limitations of different analytical tools and can help MoFs select those suitable for the task at hand. However, the choice of model is not determined by technical suitability alone—it is also shaped by an MoF's capability levels. MoFs that are already utilizing analytical tools to address climate-related questions but would like to upgrade their climate-related analytical toolkit are faced with two options—to modify and update existing models to better integrate climate change considerations, or to start employing new types of models, such as those designed to capture the dynamics of structural change (Sharpe et al., 2025).

Adopting new types of models

MoFs often rely on a narrow set of general-purpose or 'workhorse' models for macroeconomic forecasting, budgeting, and tax policy that are often not designed for today's complex climate and economic challenges. For example, conventional models typically fall short when it comes to analyzing issues such as innovation, technology diffusion, and industrial competitiveness in the context of a low-carbon transition (Sharpe et al., 2025).[5] MoFs are therefore increasingly adapting—or even investing in the development of—new and more ambitious tools. For instance, the Danish GreenREFORM model, a dynamic computable general equilibrium model with several sub models, was developed in response to a need for appropriate analytical tools that facilitate the systematic integration of climate and environmental considerations into the design of economic policy.[6] However, adopting new models is not a simple task. It requires strong political will, leadership to move beyond business-as-usual, and investments in new capabilities, including staff training, institutional support, and shifts in internal ways of thinking.

Modifying existing tools

In some contexts, modifying existing models is the more pragmatic route. Modelers and decision-makers tend to prefer tools they already know, and governments frequently request the use of familiar models. Familiarity facilitates easier integration of new variables into established frameworks, thereby enhancing the likelihood of adoption and political buy-in from decision-makers. Integrating climate considerations into existing models allows institutions to build incrementally on what already works, making this approach more feasible for many MoFs. Furthermore, even long-established models can be continuously improved—internal modifications can address some of the limitations or criticisms that have emerged over time. The Canadian and Australian contributions in the HP4 Compendium of Practice provide some insight into how this can be done.[7] However, it is important to acknowledge that while modifying existing models can be the pragmatic way forward, it may not always yield the most suitable or innovative solutions. Equally, it is important for MoFs to be aware of the limits to adaptation that may pertain to some aspects of climate action such as capturing the dynamics of uncertainty or climate tipping points and which might well require complementary tools.

Not an either/or question

Ultimately, the choice between old and new models is not a binary one. Both types of approaches can be useful in the right circumstances and can often be used together. To effectively navigate today's policy landscape, and where resources allow, MoFs should aspire to access a diverse toolkit—ranging from simple to complex, and incorporating both traditional and emerging approaches, and spanning both internal and externally developed models (see also Box 4.3). This will require both of the approaches outlined above and demand close collaboration among MoFs, academia, and international organizations, with the latter playing a critical role in ensuring that a broad range of modeling options is available, accessible, and responsive to country needs.

[4] See also 'Summary of emerging and new approaches to modeling the economic case for climate action: lessons from the New Climate Economy for Ministries of Finance and future model development agenda', contribution from an independent contributor, and 'Methodological recommendations for Finance Ministries on climate change risk assessment and the enhancement of damage functions', contribution from the University of East Anglia to the HP4 Compendium of Practice.

[5] See also 'Methodological recommendations for Finance Ministries on climate change risk assessment and the enhancement of damage functions' (op. cit.), and 'Time series models for forecasting technological change, particularly for energy technologies: approaches relevant to Ministries of Finance', contribution from the Oxford Institute of New Economic Thinking to the HP4 Compendium of Practice

[6] See also 'The GreenREFORM model', contribution from the Danish Research Institute for Economic Analysis and Modelling (DREAM) to the HP4 Compendium of Practice.

[7] See 'Finance Canada CGE model', contribution from Finance Canada, and 'Estimating the impact of selected physical climate risks on the Australian economy', contribution from the Australian Treasury to the HP4 Compendium of Practice.

2. Leadership and governance for effective economic analysis and modeling for climate action

Strong leadership and political will within the Ministries of Finance will be essential for making use of economic analysis and modeling to address climate-related policy challenges. Building dedicated climate economic modeling capabilities requires improving governance mechanisms and coordination, new skills, and better resources. Such changes are not possible without high-level buy-in and strong ownership by senior leadership. In fact, several MoFs interviewed for this report highlighted how a change of administration and a new finance minister that prioritize both climate action and data-driven policymaking were crucial for strengthening capabilities.

This section explores three facets of leadership—MoFs' mandates for climate action, climate strategies, and institutional setup—before discussing how to generate and sustain the political support needed to implement such reforms.

Mandate and strategy

Accelerating climate action to drive the green and resilient transition is essential for MoFs to be able to deliver on their core objectives around growth and development, the responsible management of public finances, and macroeconomic stability. Dealing with the physical and transition risks of climate change and embracing the opportunities for action are necessary components of sound fiscal management in the 21st century (CFMCA, 2023). This macro-criticality of climate change means MoFs have an implicit mandate to act on climate change and build the capabilities required to do so.

Seeking out an *explicit* mandate for MoFs to engage in climate action can, in some circumstances, provide an added boost to institutionalizing understanding throughout all levels of the MoF of the deep connection between climate action and delivering on its core economic mandate. This can pay dividends in helping to secure the support and resources needed to enhance analytical capabilities. An explicit mandate on climate action can help MoFs secure internal buy-in to the agenda, drive collaboration, and strengthen the required expertise, resourcing, and institutional setup (CFMCA, 2023). A mandate usually comes from the government—for instance through a government program or legislation that specifies the role of the MoF—but it can also be initiated internally, such as through an organizational strategy (ibid.).

To date, many MoFs do not have an explicit mandate on climate action (CFMCA, 2023). The HP4 Global Survey revealed that only around one-third of MoFs surveyed consider climate action a "core economic issue and central to [their] mandate," despite 89% considering climate action a priority.[8] The absence of explicit mandates, and linked to this, the lack of sustained engagement by many MoFs in developing national climate policies' strategies has translated into a "lack of knowhow and ownership in developing climate assessment frameworks and macro-modeling practices."[9] This has been the case in **Finland**, where, despite a tradition of conducting large, multidisciplinary ex-ante impact assessments on long- and mid-term climate strategies by research institutions, the MoF has had a limited role in these climate policy analyses. This is aggravated by a lack of models and

[8] While the survey question does not ask whether a MoF has a formal/explicit mandate, this nevertheless indicates a mismatch between the importance of climate action and the MoF's perceived role.

[9] See 'Strengthening capabilities to undertake economic impact assessments of climate strategies and impacts: the Finnish experience', contribution from the Finnish Prime Minister's Office to the HP4 Compendium of Practice.

expertise to analyze all relevant questions, such as fiscal impacts of climate change and short-term transition impacts (ibid.).

One country that has demonstrated the catalytical role of mandate reform is Denmark. In 2019, a new government, and a new finance minister, placed climate firmly within the responsibility of the MoF, which resulted in an increase in capacity and the development of an in-house model.[10] Similarly, in **Australia**, a change of government has resulted in a clear role on climate for the Treasury—with immediate consequences for its modeling capabilities (see Box 2.1). In other countries, climate targets that have been enshrined in law, or institutionalized in long-term ministerial strategies, have helped to make the internal case for building analytical capabilities in a more sustained way (CFMCA, 2023).[11] By contrast, MoFs that have struggled to obtain an explicit mandate and have had to deal with fluctuating government commitment for climate action have failed to build out capabilities, as the HP4 Global Survey shows.

However, given the macro-criticality of climate change, the lack of an explicit mandate for climate action is not an excuse for inaction. At the same time, securing a mandate for climate action is not a panacea. For instance, one MoF interviewed described that while it has a strong mandate to act on climate, there are only a handful of staff in the MoF working part time on climate–economy analysis, who frequently get pulled into other work as the MoF's priorities change. This example highlights that while an explicit mandate can play a catalytic role, it needs to be accompanied by other measures—such as ministerial strategies, institutional reforms, and staff and skill expansions (discussed below).

One measure that can complement an explicit mandate is a ministerial (climate) strategy. Such strategies can help MoFs operationalize their overall mandate into a set of concrete objectives and actions required to support them (CFMCA, 2023). Importantly, in addition to policy and strategic priorities, ministerial strategies can also contain an assessment of required and existing skills and capacity and identify a plan for augmenting capacity. They can thereby serve as documents that demonstrate commitment to expanding analytical capability—both internally and externally. For instance, the **U.S**. Treasury's 2022–2026 Strategic Plan under the Biden-Harris Administration contained plans to "leverage the use of analytics to improve quantification and mitigation of climate-related financial risks" and to "identify and attract the skills needed to support climate incentive and investment activity as needed." Government-wide climate strategies, and dedicated climate finance strategies (see e.g., Jaramillo et al., 2024), can similarly serve as a basis for setting and communicating clear objectives around strengthening the climate analytical capabilities needed in MoFs to implement these strategies.

Institutions

The right institutional setup in the MoF can set clear responsibilities and secure dedicated capacity—and its continuity over time—to drive climate action. In recent years, many MoFs have set up dedicated climate units, or climate finance units. While the exact function of climate units differs from one MoF to the next (and they may not necessarily be in charge of climate analysis and modeling), they have proven valuable in coordinating and driving climate policy development and strengthening climate expertise (CFMCA, 2023; NDC Partnership and Center for Access to Climate Finance, 2025). Other MoFs have decided to mainstream climate capabilities directly into existing functions and units. This approach, too, has benefits: given that climate features in a cross-cutting manner and is assessed in relation to other priorities, such as energy security, price stability, competitiveness, economic growth, and debt sustainability, it can help efforts to mainstream climate actions into all critical decision-making processes. A third option taken has been to set up a smaller climate hub (such as

[10] See also 'The GreenREFORM model' (op. cit.).

[11] The consultations that MoFs have with the IMF under Article IV, effectively the IMF's regular health check of members' economies which should cover climate-related policies wherever climate change triggers macro-critical policy challenges, are another important entry point (e.g., IEO, 2024). Given countries' obligation under Article IV, inclusion of climate change would give MoFs a strong mandate to act.

the U.S. Treasury's under the Biden-Harris Administration), tasked to coordinate the substantive climate work happening in different units across the MoF.[12]

Climate-related economic modeling and analytical capacity tends to be more decentralized, even in MoFs that have established dedicated climate units. In most countries, climate analytical staff are either housed in a general modeling unit or study department or spread across relevant units. One exception is **Australia**, where, in 2023, the decision was taken to restore the Treasury's role in modeling climate risks, opportunities, and policy options for the Australian economy after a period of absence from climate policymaking. Around 30 staff are now responsible for providing evidence for policies to support the climate and energy transition (see Box 2.1). For most MoFs, a dedicated climate analytics unit is not a feasible solution. In fact, in most countries, climate analytical staff are located in a dedicated macroeconomic modeling or economic analysis division. In yet others, climate analytical capacity is spread across different divisions, with staff often working part time on climate-related analysis.

Effective coordination and communication across the different divisions within the MoF, are key, regardless of the institutional setup. The coordination of different analytical staff/teams working across MoF core functions (e.g., economic strategy, fiscal policy, budget management) is essential for exchanging information, avoiding duplication of efforts, and ensuring coherence. Successfully addressing climate-related challenges requires a comprehensive vision that breaks down silos within MoFs—and government more widely. The latter is particularly important when the majority of climate analysis is undertaken in line ministries (e.g., Ministry of Environment) and input from the MoF needs to be coordinated. In MoFs where modeling is decentralized, a climate unit or hub can serve to do this, while also being a focal point to communicate and coordinate externally. Where such a unit does not exist, regular communication between staff working on different aspects of climate-related economic modeling can be useful for ad hoc coordination. In many countries, inter-ministerial macroeconomic working groups play a key role in coordinating analytical teams across key economic departments.

The best organizational structure ultimately depends on the priorities, preferences, and resources available in each MoF. Several considerations can inform a decision:

- Research on the institutional setup for general modeling in MoFs suggests that decentralization and centralization both have advantages and disadvantages (Murphy, 2017). On the one hand, dedicated (climate) modeling units risk misalignment with departmental needs and decision-making processes—effectively becoming a think tank within the MoF that is not sufficiently responsive to departmental needs. On the other hand, centralization improves communication and collaboration, enabling synergies and economies of scale by gathering all modeling expertise in one area (ibid.).
- An MoF that is prioritizing mainstreaming climate variables into existing macroeconomic models will likely benefit from climate expertise being directly integrated into an existing modeling unit. By contrast, an MoF that is focused on determining solutions to specific policy challenges, or that is even building dedicated climate–economy models, might choose to set up a dedicated climate-modeling team working in close collaboration with their climate policy counterparts (see also the HP4 Tools report).
- Institutional needs depend on the maturity of climate action: as the case for considering climate policy as macroeconomic policy grows (e.g., Pisani-Ferry, 2024), in the long term, MoFs might benefit from mainstreaming climate analytical expertise. In the meantime, for MoFs at the beginning of their journey, a degree of pragmatism can be useful, including by building onto, and slowly expanding, existing institutional structures—e.g., existing climate teams, modeling units, or study departments.
- Whichever structure is chosen, it should facilitate coherence across the MoF (and the wider government), including through ongoing review and adjustment of policies and institutional setups as circumstances evolve, ensuring analytical work remains relevant to changing climate realities and across the MoF.

[12] See also 'Economic impact assessment of the Inflation Reduction Act (IRA)', contribution from the U.S. Department of the Treasury under the Biden-Harris Administration to the HP4 Compendium of Practice.

Box 2.1. Re-establishing the Australian Treasury's climate modeling capability

In 2023, the Australian Treasury returned to playing a lead role in modeling climate risks and opportunities for the Australian economy. This coincided with a step up in the Government's climate change agenda. Central to this agenda are more stringent emissions reduction targets and major policy reforms focusing on some of the largest emitting sectors.

The capability uplift

In response to these developments, the Government positioned the Australian Treasury to take a leading role in modeling climate risks and opportunities. Long-term funding was allocated to rebuild the Treasury's modeling capability and expertise, recognizing its critical role in providing a whole-of-economy perspective on the global climate and energy transition. The evolving policy landscape and increasing demand for a broad range of analytical tools to inform decision-making led to the establishment of a Climate and Industry modeling team, consisting of around 30 professionals—the first such team within the Treasury since 2011.

The creation of this team required a comprehensive hiring process to create three integrated units—global, domestic, and industry. Due to the long pause since the last dedicated climate modeling team was active within the Treasury, much of the institutional knowledge had been lost. Apart from the domestic unit, it was necessary to rebuild capabilities from the ground up to meet the unique challenges of climate modeling.

A multi-staged approach was adopted, with phases defined as Build (2023), Refine (2023/24), and Mature (2025+). These were aligned with major planned modeling exercises, with the overarching aim of developing a flexible, sustainable, and credible modeling capability. Additionally, it involved establishing new relationships and acting as the central nexus between government agencies engaged in climate analysis, ensuring cohesive and integrated efforts across the public sector.

Lessons and challenges

Following the inception of the Treasury's new climate modeling capability, the primary challenge was to balance the development of models and capability with the need to meet the immediate analytical demands of the Government's climate agenda. This balancing act required strategic prioritization of model building and development in tandem with analytical outputs. Additionally, the integration of new methodologies such as bottom-up sectoral insights and ensuring the models remain adaptable to evolving policy landscapes presented both a challenge and an opportunity—often requiring more time and resources, but resulting in a more sophisticated and robust outcome. The new function also had to navigate the complexities of inter-agency and industry collaboration to ensure that data sources and analytical approaches were harmonized to produce coherent and actionable insights.

Finally, as with any modeling capability, the long-term sustainability of the function is an ongoing challenge. Expertise in climate and economic modeling often requires longer lead times to acquire specialist knowledge, and staff retention and development remain a priority. Despite these challenges, strong institutional support, combined with an openness to collaboration and continuous learning and development have been instrumental in re-building the Treasury's role in modeling climate risks and opportunities for the Australian economy.

To maintain the Treasury's capability and role it is necessary to continue to refine and expand the analytical framework, both to address known limitations and future changes in the structure of the Australian economy, technological change, and the evolving policy environment. There is work underway across the Treasury's suite of models to better capture developments in industries that are likely to see significant changes to production processes as countries transition to net zero. This includes improving the ability to capture available technology options and the interlinkages with other economic sectors.

Source: Adapted from 'Re-establishing the Australian Treasury's climate modeling capability' contribution from the Australian Treasury to the HP4 Compendium of Practice.

Informing decision-making

A disconnect between analysts and decision-makers is a common feature within many MoFs. Policymakers might lack the capacity to understand modeling outcomes and translate them into policymaking. They might not be aware that tools exist that could provide sophisticated analysis to aid their decision-making or might not be convinced that investing in modeling projects and capabilities to tackle climate-related policy questions is good value for money. Or they might lack the time to engage with and fully understand analytics, especially when responding to urgent developments. One MoF consulted for this initiative pointed out that it is not the modeling itself they find challenging, but the lack of partnership between analysts and decision-makers. The HP4 Global

Survey suggests that while MoFs generally declared their governance mechanisms to be moderately effective in delivering climate-related analysis to decision-makers, significant variation between countries exists and AEs more commonly than EMDEs have clear mechanisms to ensure climate-related analysis reaches decision-makers in a timely manner.

There are steps analysts can take to establish and maintain high-level support for climate-related economic analysis and to ensure that any analysis conducted can feed into decision-making:

- **Securing high-level buy-in:** High-level buy-in is key for any economic analysis projects and should be secured before the project begins. During the project, regular updates to high-level officials can foster a common understanding and cooperation.[13]
- **Establishing channels for continuous input:** The best analysis is done jointly by decision-makers and analysts. To ensure that they, as well as external experts and other stakeholders, consider models accurate and useful, it is crucial to remain open to external input and establish channels for receiving such input. For example, holding hearings where analytical decisions are presented and experts can provide feedback can be effective (OECD, 2021). Chile, where the MoF is currently leading on a natural capital assessment pilot project, is an example of a country where decision-makers are actively involved in the co-development of models. This also helps the MoF build internal capacities to better understand models, how to use them, and later build them in-house (see Box 3.4).
- **Involving a wide range of stakeholders:** Involving local and international experts can raise awareness among government institutions and policymakers. For instance, the German development agency GIZ found that when working with Vietnam to implement a model, regular seminars and workshops with multiple stakeholders created opportunities for mutual understanding and exchange.[14]
- **Choosing relevant variables and prioritizing accessibility:** Such feedback channels can also help identify the applicable data, variables, level of granularity, and scenarios most useful to policy officials and make the analysis responsive to the questions faced by decision-makers. Clearly written reports that contain accessible visual data—e.g., in the form of graphs, charts, and figures—can also relay key messages to policymakers (AfDB, 2023).
- **Communicating purpose and limitations:** Clearly communicating the purpose and limitations of a model is essential to avoid unrealistic expectations and misinterpretation of results. Communicating the uncertainty of modeling results to decision-makers is a key challenge for modelers. In fact, policymakers need to recognize that economic modeling is a tool for debate rather than a comprehensive answer to complex and multifaceted questions, and that "model results have to be understood as insights on how policy measures affect key economic outcomes based on certain assumptions rather than interpreting the quantitative results as predictions" (OECD, 2021) (see also Box 2.2). Ensuring that decision-making teams, not just modelers, have the capacity to read and understand models presented, and subsequently translate them into policy, is essential.
- **Considering approaching a problem from different angles:** Conducting or procuring two or three modeling exercises that aim to answer the same policy question, rather than a single assessment, can be an important learning opportunity that explores strengths and weaknesses of different modeling approaches and their implications for policymaking, and can also engage staff coming from different schools of thought.
- **Finding the right outlet:** Having an outlet to publish analytical work can in some cases be important to ensure it reaches both decision-makers and the wider community. Medium-term fiscal frameworks/strategies and fiscal sustainability reports have become a tool that some MoFs—such as Switzerland's (discussed below)—use to inform decision-makers about the medium- and long-term impacts of climate change on public finances. With fiscal sustainability reports often being mandated by law, they are also a good way to enable climate modeling efforts to continue to have an outlet even when governments, or their political priorities, change.

[13] Adapted from 'Modeling climate-resilient economic development: GIZ's approach to supporting sustainable economic growth', contribution from GIZ to the HP4 Compendium of Practice.

[14] Ibid.

Where strong support among decision-makers for climate–economy analysis is not in place, securing political support is key—including by coordinating efforts across government departments and agencies to effectively communicate and demonstrate the value of economic modeling work (OECD, 2021). Performing pilot studies on policy priorities can be one way to build high-level support for analytical exercises. Pilot studies or models can be easier to produce, smaller in scope, and/or externally commissioned where internal capacity does not yet exist. They can show that analysis produced on a topic is not just of academic value but also important for decision-makers. Once this case has successfully been made, the pilot can then be expanded or turned into a standard exercise. In **Switzerland**, the MoF has made use of pilots to introduce new topics into its quadrennial fiscal sustainability report. The 2024 edition contains, for the first time, a pilot study analyzing the long-term impact of achieving the Swiss net zero target on public finances.[15] The 2008 edition of the report had introduced a focus on population aging, which has since become a standard exercise to assess how public finances could evolve as a result of the aging population, including in relation to the old-age pension, health, long-term care, and education.

Box 2.2. Communicating results

Quantitative results clearly help in understanding the relative importance of various climate and climate policy impacts and contribute to informed decision-making. However, it is important to remember that models can create a false sense of precision and certainty if their results are presented as facts. To avoid making decisions based on potentially incomplete information and overinterpretation of results, it is especially helpful to clearly communicate critical assumptions and uncertainties alongside model results. This can include communicating which assumptions drive model results and illustrating how results vary under different assumptions based on the results of sensitivity analysis. The data sources used and associated limitations and gaps are also useful to highlight.

While the purpose of such transparency is informed decision-making, highlighting contingencies and gaps can indicate areas for future research. Hence, integrity in communication can lead to improved and more informative results down the line. Complementary analytical perspectives that consider elements not reflected in the model(s) used can further corroborate results or highlight areas for further analysis.

Source: Adapted from the HP4 Tools Report

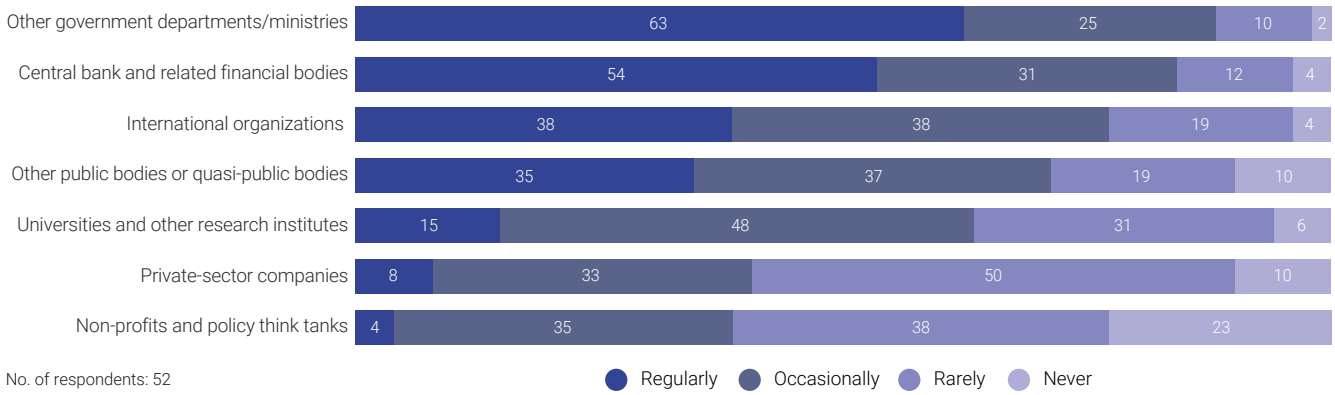
[15] See 'Modeling the fiscal impacts of the net zero target within fiscal sustainability analysis', contribution from the Swiss Federal Department of Finance to the HP4 Compendium of Practice.

3. Collaboration and coordination

The cross-cutting nature of climate change, the nature of policymaking processes, the increasing complexity of climate–analytical needs and the diverse input it requires, and the resource constraints faced by most Ministries of Finance, all necessitate strong collaboration between MoFs, other government agencies, and external stakeholders. Climate change affects a range of government functions across sectors and industries, requiring policymaking that is coordinated across departments and levels of authority to align efforts with national climate goals (CFMCA, 2023). Such collaboration also helps maximize mutual capacities, build on joint expertise, and improve access to models and data.

In practice, there is significant divergence in the extent to which MoFs collaborate and interact within government, and externally at the national and international levels on economic analysis. While the majority of MoFs surveyed as part of the HP4 Global Survey state that they partner 'regularly' with other government departments and central banks as part of their economic analysis and modeling (63% and 54% respectively) there is less regular collaboration with universities and other research organizations (15%), the private sector (8%), and non-profits (4%) (see Figure 3.1). This is despite several MoFs pointing out how useful these collaborations have been for enhancing analytical capabilities, as the case studies in this section highlight.

Figure 3.1. How regularly does the Ministry of Finance collaborate with external parties as part of its economic analysis and modeling? (%)



Source: CFMCA (2025a)

Investment in partnerships could therefore be a priority for any MoF wishing to enhance its analytical capabilities. For MoFs at the early stage of strengthening their climate modeling expertise, a mapping of relevant governmental and non-governmental stakeholders, and their models, data, and expertise can be a helpful way of gaining an overview of the resources that already exist within government or of those partners might hold. While not normally considered an essential part of a modeler's skillset, stakeholder management skills can be an important asset for analytical staff (see also Section 4).

Model transparency—where compatible with national security policies—can facilitate collaboration. Not only will transparency around models, data, and assumptions used make it easier to learn from other countries' experiences, within the same country, different line ministries may use a wide range of analytical approaches to assess specific policy proposals. Intra-agency transparency around the design and calibration of those analytical tools makes it essential for MoFs to assess and challenge such policy proposals. At the same time, making source codes publicly available allows third parties to reproduce model results, which can increase trust in outcomes (OECD, 2021). Similarly, providers of models, tools, and data could make more of their material available open source or for free to enhance access, knowledge sharing, and comparability.

Collaboration within government

With different government agencies involved in designing and implementing climate-related policies, inter-agency collaboration is vital to promote policy coherence, avoid duplications, and leverage multidisciplinary expertise. While the nature of the MoF's involvement in the policymaking process depends on both the MoF's responsibilities and the nature of a policy, MoF involvement is likely concentrated at later stages. However, when an MoF is only a 'gatekeeper' that signs off on proposals but is not involved in their development, they can be perceived as obstructive rather than as a partner (CFMCA, 2023). Collaboration from early in the policymaking process is therefore essential (see Box 3.1).

A whole-of-government approach to climate action can be useful for encouraging comprehensive coordination across all government entities. In the **U.S.**, under the Biden-Harris Administration, the government issued a series of executive orders to achieve its national climate target. This led to the establishment of an inter-agency technical working group to strengthen analytical capabilities on climate-energy-macroeconomic issues across relevant federal agencies.[16] Meanwhile, issue-specific engagement with experts from other line ministries is important when tasked with analyzing the impact of specific regulation or policies that sit outside of the expertise of MoFs.

Strategic coordination and partnerships with key ministries and agencies can be as important—and can also be established where there is no whole-of-government approach. Several case studies highlight the importance of inter-agency coordination. In **Denmark**, the MoF works closely with experts at Statistics Denmark, the Danish Energy Agency, and multiple other ministries, agencies, and institutions "to ensure data structures and technology catalogues are compatible with the model and that the data and modeling are generally reliable and accurate" (OECD, 2021).[17] The case of **Rwanda** highlights how, for a small country with limited resources and a small labor market, both inter-agency coordination and external partnerships are essential to overcome at least some of the MoF's capacity challenges. For instance, a partnership between the Ministry of Finance and Economic Planning (MINECOFIN) and the Bank of Rwanda has been crucial for facilitating direct knowledge transfer and allowing the development of crucial synergies given limited human resources. Moving forward, both parties plan to use the World Bank's MANAGE model to increase consistency and hence comparability in the government's analytical work.[18]

A variety of government agencies can be key partners for MoFs. Statistical offices and environmental and disaster management agencies may provide data, scenarios, and assumptions that feed into models used in the MoF (see Box 3.2). Meanwhile, working closely with central banks and financial institutions allows MoFs to tap into their expertise on economic modeling and forecasting—as is the case in **Rwanda**, where the National Bank of Rwanda and MINECOFIN, who use similar but different models tailored to their specific needs, collaborate on sharing model insights and plan to cooperate more on computable general equilibrium (CGE) modeling. Both agencies also plan to use the World Bank's MANAGE model to increase consistency and hence comparability in the government's analytical work.[19] Such relationships can often be established quickly—one modeler interviewed for this report described how within two months, their team went from having no contact with the central bank, to openly exchanging with bank researchers about models and data.[20]

[16] See 'The United States' efforts to account for climate-related financial risk to the federal budget', contribution from CEA, OMB, and EOP under the Biden-Harris Administration to the HP4 Compendium of Practice.
[17] See also 'The GreenREFORM model' (op. cit.).
[18] See 'The use of climate–economy models in Rwanda's Ministry of Finance and public institutions: the challenges in building analytical capability', contribution from the International Growth Centre (IGC) to the HP4 Compendium of Practice.
[19] Ibid.
[20] However, in many cases the capabilities of key partner agencies will also need strengthening to allow for fruitful collaboration. For instance, dedicated initiatives to support central banks, such as the NDC Partnership's 'Readiness Support for Greening Central Banks programme', will ultimately also benefit the MoF.

Establishing regular updates and feedback mechanisms between the MoF and relevant line ministries and agencies is essential. Such updates could include progress reports on the modeling process, preliminary findings, and discussions on how the results can be applied to policy. This enables ongoing alignment with the MoF's objectives and helps in refining the models to better serve policy needs. More broadly, regular inter-ministerial meetings and workshops, or the establishment of an inter-ministerial working group, can facilitate the exchange of knowledge and ensure that the models reflect the priorities of multiple stakeholders.[21]

Box 3.1. Lessons for collaboration between Ministries of Finance, Environment, Energy, and other line ministries

To drive climate action as part of a whole-of-government approach, MoFs need to collaborate closely with Ministries of Environment and Energy, who typically hold strong environmental expertise and often lead the intergovernmental climate agenda. As MoFs take a more active role in climate action and become increasingly involved in the development and implementation of Nationally Determined Contributions (NDCs) and Long-Term Low Emission Development Strategy (LT-LEDS), difficulties in the relationship between Ministries of Finance, Environment, and other line ministries often come to the fore. This can be due to an overlap in competencies (whether perceived or real), competition for resources, and a lack of coordination, common 'language' and objectives.

Collaboration challenges arise particularly when developing economic analysis and incentives for tackling climate-related issues. MoFs are often brought into processes late on, rather than being involved from the beginning. By contrast, some Ministries of Environment find that MoFs do not want to engage in processes until they involve discussions around budgets—which is often in the later stages of proposal development processes—and lack continuity of engagement. This leads to situations where MoFs are perceived by Ministries of Environment as blocking climate policy proposals. MoFs should therefore be involved earlier in the development of the climate agenda to gain a deeper understanding of the mechanisms behind climate policies, beyond just their costs. The development of NDCs and long-term strategies can be a particularly important early entry point (CFMCA, 2024).

Developing collaborative relationships with Ministries of Environment and Planning should be a priority action for MoFs. Formal inter-agency collaboration mechanisms are key to establishing sustainable modes of collaboration. Further steps MoFs can take to improve collaboration with line ministries include:

- Adapting their mandate to explicitly include climate action and develop an internal climate change strategy (see above) to provide clarity on roles and responsibilities with respect to other departments and identify areas where collaboration is essential. This can help bring ministries closer by default, by providing a common ground and incentives to align their respective work.
- Establishing dedicated focal points in the MoF and relevant line ministries, so that staff have clear points of contact.
- Ensuring early communication and information sharing, and continuity of engagement, for instance through weekly exchanges. This also enables working relationships to be built between staff.
- Recognizing differences in backgrounds, relative strengths, and constraints. This can help MoFs to improve collaboration with Ministries of Environment.
- Hiring former Ministry of Environment staff, or staff with a background in environmental economics, ecology, or similar can help translate between the different 'languages'.
- Holding joint seminars, training, or informal discussions is a way to share latest developments on the relevant policy instruments or learning from past projects and to bridge potential differences in expertise, which can facilitate future joint work.

Source: Adapted from CFMCA (2023)

[21] See 'The use of climate–economy models in Rwanda's Ministry of Finance and public institutions: the challenges in building analytical capability' (op. cit.).

Box 3.2. Improving data access through collaboration with national statistical agencies

The quality and availability of climate-related data are crucial for successful analysis. In many countries, national statistical offices play a major role in this process. The HP4 Global Survey reveals that they are the second most frequently reported source of climate data for MOFs, with approximately 67% of MoFs receiving data from them. However, successful collaboration with statistical offices on climate-related modeling and analysis is not always a given. In many countries, especially in Africa, statistical offices are not yet set up to collect climate-related data (CFMCA, 2026b, forthcoming).

In other cases, they might not be able to provide the granularity of data required by the MoF. This was the case in Denmark, where the GreenREFORM model relies heavily on data from Statistics Denmark, the Danish national statistical office. However, initially, the office was hesitant to construct the new database required to run the model, due to the scale of the task and concerns about data quality. It was eventually persuaded to develop a preliminary dataset "with a focus on internal consistency rather than absolute accuracy" (Sand Kirk et al., 2024), which was sufficient to provide a basis for the project to proceed. Statistics Denmark now receives permanent funding to update the required data annually, with the Danish Research Institute for Economic Analysis and Modelling (DREAM) responsible for running the model, noting that "[o]utsourcing the collection and processing of data, and dedicating resources to it, has been crucial to the success of GreenREFORM" (ibid.).

This case highlights the importance of resourcing statistical offices, so they are able to provide data of sufficient quality and granularity that is of use to MoFs.

Source: Author's compilation

Collaboration outside government

Collaboration with non-governmental stakeholders, such as civil society, the private sector, and the international finance and expert community is critical for improving capacity for and the quality of analysis. While all MoFs rely on such collaboration, those in smaller countries with limited capacity to develop and maintain in-house models have a greater need for partnerships and collaborations with external organizations (see also Section 4). However, the interviews and surveys conducted for the HP4 initiative show that even relatively well-resourced MoFs rely on external expertise to keep up with the latest developments on modeling approaches, debates, and best practices. In the words of one modeler from an advanced economy: "Looking at our university landscape … looking at our agencies, there's a whole load of capabilities and a whole lot of fantastic people in them … [We] cannot do everything in house, or at least at the moment we cannot. The types of skills that we need … we just can't build them up fast enough and so we need to collaborate with the academic community … that has those skills."

The World Bank, IMF, OECD, and other international organizations such as the regional development banks have developed a number of models they make available to MoFs. The World Bank, for instance, has two CGE and two macro-econometric models that can be accessed by MoFs, alongside technical support. Additionally, multiple macroeconomic models are publicly available online. These can usually be customized and come with detailed documentation and user manuals. A more detailed and comprehensive overview of available macroeconomic models (covering over 45 models from international organizations and academic institutions) is available in the HP4 Tools Report. **Ethiopia**, for instance, has adapted the World Resources Institute's (WRI) Green Economy Model (GEM) (see Box 3.3). The **Rwandan** MINECOFIN now uses the IMF's Q-CRAFT model, which has helped it to mainstream climate change as a key component of fiscal risk analysis, as well as the World Bank's more short-term-focused MANAGE model to inform short-term spending decisions.[22] However, as with all models, these models also have limitations, that can lead to misleading results if not well understood, some of which are further discussed in the HP4 Tools Report and in contributions to the HP4 Compendium of Practice.

Universities and research institutes can also be key partners for many MoFs—valued because they can provide both analytical support and data. In **Italy**, the MoF's General Equilibrium Environmental Model (GEEM) was co-developed with a range of universities, which allowed the MoF to leverage its expertise in economic modeling and environmental policy.[23] In **Chile**, a collaboration supported by Stanford University and the Inter-American

[22] Ibid.

[23] See 'The Italian Ministry of Economy and Finance climate-related modeling tools: how to build a flexible suite of models serving different purposes', contribution from the Italian Ministry of Economy and Finance to the HP4 Compendium of Practice.

Development Bank (IDB), designed in a way to also enhance capacity of local universities, is currently conducting a pilot project to quantify the benefits of natural capital in southern Chile (see Box 3.4). Yet, according to the HP4 Global Survey, less than a quarter of MoFs collaborate 'regularly' with universities and research institutes, while over one-third do so 'never' or 'rarely'. Unfortunately, universities often suffer from the same problem as governments, in the sense that knowledge and expertise are siloed. In addition, in many countries, academic researchers lack either the climate expertise needed to effectively collaborate with MoFs or struggle to understand what economic questions policy officials need to answer. Recognizing this shortfall, the Resilience and Adaptation Mainstreaming Program (RAMP) partners with universities in Asia and Africa to improve the capacity of governments to manage climate change risks and access adaptation finance (see Box 3.5). For those MoFs interested in working at the forefront of knowledge, collaborating with smaller research centers and consultancies can sometimes be more rewarding, as these nimbler organizations can innovate more easily.

Box 3.3. Ethiopia: using macro-modeling to inform the 10-year transformation plan, NDC, and LT-LEDS

Between 2020 and 2022, the Ethiopian government enhanced its cross-government climate macroeconomic modeling capability, enabling it to inform the development of key national planning instruments. This work was supported, at different stages, by the WRI, World Bank, and Global Green Growth Institute (GGGI).

To inform its 10-year national development plan (NDP), updated NDC, and Long-Term Low Emission Development Strategy (LT-LEDS), the Government adopted the Green Economy Model (GEM) (Bassi et al., 2024). GEM offers a multi-sector representation that includes indicators of relevance to Ethiopia's development, in alignment with the 10-year plan, and medium- to long-term simulation capabilities, as needed for the LT-LEDS.

GEM was customized to Ethiopia's circumstances via a co-creation, multi-stakeholder approach, parametrized with national data, and used to forecast the multi-dimensional outcomes of the NDP to 2030. To determine the impacts of climate action and the corresponding investment needs for the NDC and LT-LEDS, GEM was further supplemented with sectoral models and intervention options, including on energy sector and agricultural interventions, and the results were integrated into the GEM to enable the creation of a detailed and consistent macroeconomic and nationwide cost–benefit analysis.

Building the model was a collaborative process, both between government departments—who worked to create a shared understanding of the main dynamics of change in the country—and between the government and external researchers who supported the creation of sectoral models, as well as their integration in GEM. For the LT-LEDS, led by the Ministry for Planning and Development, five sectoral and two cross-sectoral technical working groups were established to analyze the sectoral and economy-wide emission pathways, and provide inputs on the ambition of sectoral interventions and technical validation. The MoF supported the estimation of implementation costs, analyzed cost allocation across economic actors, and reviewed and validated results related to impacts on fiscal balance and economic growth. Frequent interactions between the working groups resulted in country ownership of the process and the models utilized, strengthened capacity of experts and institutions involved in the process, co-creation of the socioeconomic development and emission pathways, and horizontal alignment and integration on long-term climate action. Capacity development was further supported by training sessions spanning four months and involving around 30 participants from over 10 ministries.

The work resulted in a shared investment pipeline aligned with national development targets and the ambition for economic transformation to 2030 and 2050. With the support of the cost–benefit analysis that estimated the financial and economic impacts of climate action, this led to the preparation of a financing strategy, that combined public funding sources, private sector participation, and international climate finance support.

The case of Ethiopia can be considered successful for several reasons:

- It started with a co-creation, multi-stakeholder exercise that allowed all parties to collaborate on a locally-owned model
- It resulted in several simulations, that could be analyzed by local stakeholders, increasing their ownership
- Capacity was strengthened by timing specific modeling exercises, which helped to keep the group of local experts together and encouraged further collaborating on the model
- It has already supported several steps of the decision-making process, offering useful inputs to key stakeholders, from agenda and target setting to socioeconomic and environmental impacts, and on loss and damage and the financing strategy for implementation
- All key stakeholders have had an opportunity to contribute to the process and make use of its results. This has generated new knowledge, facilitated the exchange of information, and brought coherence to the analysis for the preparation of an NDP, NDC, and LT-LEDS.

Source: Andrea M. Bassi, based on work performed by KnowlEdge Srl in collaboration with the WRI and the GGGI in Ethiopia

Box 3.4. Collaborating locally and internally to protect, restore, and enhance the country's natural capital in Chile

Chile's recent experience with integrating natural capital into decision-making illustrates how MoFs can begin building capacities to apply analytical tools for informed policy development. In 2023, Chile established a Presidential Advisory Committee to guide and propose actions for measuring, assessing, valuing, protecting, restoring, and enhancing the country's natural capital. The aim is to place ecosystems and their services at the heart of public policy, financial, and investment decisions. The committee is chaired by the Ministry of the Environment, with the Ministry of Finance serving as the Technical Secretariat, the Ministry of Economy as a member, and the Central Bank of Chile and the Council for Science, Technology, Knowledge, and Innovation acting as permanent technical advisors.

Supported by Stanford University and the IDB, the committee developed a pilot project to quantify the benefits of natural capital in the Rio Bueno Basin in southern Chile through a rapid approach for Natural Capital Assessment and Accounting (NCAA). This pilot utilizes 'InVEST'—a software model that maps goods and services from nature—to measure biophysical flows for selected ecosystem services. The results are then assessed through various methodologies for each ecosystem service, enabling a comprehensive evaluation of nature's benefits.

The project aims to demonstrate the economic value of nature and how analytical tools like InVEST can assess the impact of policies and projects. It aims to integrate these results within the public policy cycle by identifying barriers and opportunities for policymaking on key identified ecosystem services. By providing robust, data-driven results, the project seeks to foster interest in the economic benefits of nature within key ministries, particularly Finance and Economy, and encourage the mainstream adoption of such tools in decision-making processes. Furthermore, the project has helped to identify 'hotspots', specific areas of high value in terms of potential for ecosystem services, where targeted protection or restoration could have higher benefits.

An important technical challenge identified during the project was the absence of public policy instruments with clear territorial projections that could serve as a foundation for constructing alternative future scenarios. Recognizing this gap proved to be a valuable insight. As a next step, the work will focus on exploring how specific public policy proposals could be implemented by applying the analytical approach used in the pilot, with the goal of assessing potential territorial impacts and identifying priority areas for action. This finding also opens up a new line of work aimed at better aligning analytical tools with policy instruments and enhancing scenario planning for nature-based interventions.

Another key aspect of the project is the committee's collaborative approach, focused on enhancing institutional engagement as multiple government entities co-develop the project, ensuring that the models and policy recommendations are tailored to each institution's needs and capacities. Key government institutions included the Environment Ministry, Central Bank, the National Statistical Institute (INE), National Forest Corporation (CONAF), General Water Directorate (DGA), and the Center of Natural Resources Information (CIREN). This integration facilitates the practical inclusion of natural capital in public policies. Additionally, the project and committee worked closely with institutional partners, including Stanford University, the IDB, Universidad San Sebastián—a local university—and local policy experts.

This collaboration fostered a strong link between analytical tools and decision-making by bringing together experts, policymakers, and local stakeholders. It also facilitated the transfer of technical knowledge to government staff, strengthening institutional capacity for future applications.

The project showcases how strong institutional collaboration and coordination, with the support of an existing national and international analytical ecosystem, can allow the government to quickly adopt new analytical tools to answer key policy questions. Furthermore, it highlights the value of pilot projects in developing initial capacities for using analytical tools in policymaking. Pilots provide early exposure to key methodologies, demonstrate the benefits of data-driven decision-making, and generate lessons that inform future efforts. By starting with a targeted initiative, governments can progressively build expertise and integrate these tools into broader policy frameworks.

Source: Jaime Tramon, Chilean Ministry of Finance; see also Angarita et al. (2024)

Exchanging experience and skills with other MoFs that have similar priorities and face similar challenges has been shown to have a 'catalytic' role in the improvement of capacities.[24] Many MoFs have already benefited from the lessons learned from the Danish GreenREFORM model (OECD, 2021), whose modelers have undertaken several bilateral visits to share their experience and expertise. DREAM is also engaged in a project under the EU's Technical Support Instrument (TSI) program that provides tailormade technical expertise to EU Member States to design and implement reforms. This includes developing a 'workhorse' version of the GreenREFORM model for institutions in other EU countries to enhance their ability to identify, assess, and select the most efficient and effective policies and investments for the green transition. This project can also serve as a blueprint for other countries to develop their own customized models based on their specific data and needs.

[24] See 'Unpacking options for Ministries of Finance to leverage modeling and economic analysis to accelerate climate action', contribution from NDC Partnership to the HP4 Compendium of Practice.

As pointed out by several modelers interviewed for this workstream, the Coalition's seminars on modeling and economic analysis are a popular offering for modelers to learn from other countries' experiences. Yet, more experience sharing is needed: over 70% of surveyed MoFs report that better access to country case studies would help enhance their climate-related analytical capabilities. Many modelers would like to see the peer learning go further and see regular networking across MoFs, as well as systematic overviews of the models and tools and policies employed by different MoFs (see also Box 4.5). While networks already exist for some locations or types of models, the Community of Practice that has been created as part of the HP4 initiative, and particularly the Annual Forum on the Macroeconomics of Green and Resilient Transition, is designed to further facilitate such exchanges.

Box 3.5. Resilience Adaptation Mainstreaming Program (RAMP): building capacities at Ministries of Finance through local universities

To address climate change, MoFs need to have a thorough understanding of the challenges and how these can be addressed. However, their capacity to do so is often constrained. MoFs often lack the data, models, and skills to make decisions in a climate-informed manner.

This is where RAMP comes in. RAMP leverages leading universities, research institutes, and international technical partners to build the capacity of MoFs in vulnerable countries to better manage climate change risks. The focus of RAMP is building local capacities and expertise. This is why RAMP partners with local universities. Through its University Network, which currently has 20 members in Africa, Asia, and the Caribbean and continues to expand, RAMP promotes multidisciplinary academic teaching and research in areas important for strengthening macro-financial resilience to climate change. All member universities are committed to building capacities to carry out relevant high-quality teaching and research, not only to educate the next generations of leaders in their degree programs, but also to work with MoFs and other relevant ministries and support them through professional training.

The RAMP University Network develops curricula and course materials to enable universities in climate-vulnerable countries to offer high-quality graduate-level teaching and professional training. This will enable future and current leaders to effectively address climate-related macro-financial risks and vulnerabilities that threaten public finances, financial and macroeconomic stability, and economic development. It will empower them to better address climate risks and vulnerabilities and integrate them into decision-making and planning. Through such capacity-building, the RAMP University Network contributes to systemic change in public financial management, public policy for climate finance, central banking, and financial markets in climate-vulnerable countries.

One important area where MoFs around the world need support and capacities is macroeconomic modeling. The current suit of macroeconomic models is largely unfit to properly assess climate risks and impacts. In response, the RAMP University Network started to provide teacher training on macroeconomic modeling and integrated some macroeconomic simulations in practitioner courses for government officials. For instance, in July 2024 RAMP organized its first in-depth, three-day online workshop on the IMF's DIGNAD (Debt-Investment-Growth and Natural Disasters) model. DIGNAD has become a workhorse model in the IMF for studying the effects of climate risk due to natural disasters and how investments in adaptation infrastructure can help mitigate these risks. Learning to apply and further develop the model, and to fit it to a local country context, is a way of supporting MoF officials in better understanding an important tool used by the IMF. Besides integrating DIGNAD into different foundation and advanced courses, RAMP is working to develop a new course centered on ecological stock-flow consistent modeling that can be used by MoFs and other public authorities for tailored country-specific scenario analysis.

RAMP also supports member universities through research grants, contributing to the development of country-specific knowledge that will support better policymaking. As such, the RAMP member universities act as strategic and knowledge partners of MoFs and other government departments. RAMP is a strategic partner of the Coalition of Finance Ministers for Climate Action and works in close partnership with the IMF, World Bank, United Nations Development Programme, regional development banks, and other stakeholders. RAMP's secretariat is hosted by the WRI. The RAMP University Network is managed by a Secretariat, hosted by the Centre for Sustainable Finance at SOAS, University of London.

Source: Adapted from 'Resilience Adaptation Mainstreaming Program (RAMP): building capacities at ministries of finance through local universities', contribution from WRI/SOAS to the HP4 Compendium of Practice

Businesses and non-governmental organizations (NGOs) that understand real-world challenges can also be a useful source of perspectives, data, and expertise. In the interviews conducted for this report, some MoFs highlighted the benefits of consulting and engaging with these stakeholders to support analytical tasks. Setting up joint committees or collaboration with the financial and insurance industries—as done by the **U.S.** Treasury during the Biden-Harris Administration through the Financial Stability Oversight Council (FSOC) and its Climate-related Financial Risk Advisory Committee—can provide a powerful collaboration to understand market sentiment and collect valuable data. However, such engagement can take up significant resources from MoFs, so it is important to consider the trade-offs. For instance, one analyst interviewed for this initiative pointed out that relying on stakeholder input (e.g., self-reported industry data) may provide a biased picture and should always be contextualized by engagement with a broad set of stakeholders with different perspectives. Lastly, private consultancies can also be engaged to provide specific modeling solutions. Box 3.6 describes some of the considerations that determined the **Swiss** MoF's decision to outsource the development of its model for its Fiscal Sustainability Report to such a business.

Collaboration between MoFs and external stakeholders will need to be reformed to provide more value for MoFs. While many MoFs rely on external partners to develop and maintain models, especially where capacity is low, there are also downsides to this approach. Many MoFs struggle with their external models' assumptions and find that they do not accurately capture the economic realities in their country. In interviews for this workstream, several MoFs suggested that external partners need to place far greater emphasis on coordinating closely with MoFs in the model (co-)development process, and ensure that MoFs have the ability and the capacity to maintain and adjust models moving forward. This includes providing more support on developing internal capabilities rather than merely providing models, and ensuring that any models provided are translated into the national context.[25] An example from **Sierra Leone** highlights why reliance on external models can be problematic: "[T]he Ministry can only use the [Macrostructural Standalone Model, developed by the World Bank]; but can't make necessary adjustments to the model when required. We didn't develop the model, neither were we part of developing it. This definitely will result in future challenges in using the model if there are any structural changes in the model. Also, how the variables are interlinked, the formulae of the model, etc. … are not fully understood."[26] This issue is discussed in more detail in Section 4.

Box 3.6. Switzerland's experience—lessons learned from the 2024 Fiscal Sustainability Report

Based on its work on the 2024 Fiscal Sustainability Report, the Swiss Federal Department of Finance has concluded that there are three important and concurrent steps to consider when starting the modeling exercise:

- **First**, a review of available internal resources, including medium-term planning to carry out a pilot project. Based on the Swiss experience, MoFs should plan for a project duration of at least two to three years.
- **Second**, it should be determined whether the necessary modeling resources are available in-house or whether the modeling should be outsourced. Outsourcing modeling efforts to consulting firms or academic institutions can be a practical first-step solution. The Swiss Federal Department of Finance opted for an outsourcing solution to the consulting firm Ecoplan, while closely monitoring and advising on the progress of the pilot study. Ecoplan was chosen for two reasons. First, it developed one of the few CGE models representing the Swiss economy, including a detailed description of the energy and mobility sector as well as using a rich set of information drawn from bottom-up energy models. Second, it used this model in the past among others to assess the economic cost of the climate and energy strategy for the Department of Environment, Transport, Energy and Communication (Energy Perspectives 2050+). However, it is also important to gradually build up in-house knowledge and closely follow progress in climate–economic modeling at national and international levels to improve climate impact assessments on the economy and public finances.
- **Third**, it is critical to inquire with Ministries of the Environment and Energy about the availability and accessibility of various detailed emission and energy data sources. Access to comprehensive and accurate data is fundamental to any modeling effort.

These steps should be done in parallel rather than sequentially.

Source: Adapted from 'Modeling the fiscal impacts of the net zero target within fiscal sustainability analysis' contribution from the Swiss Federal Department of Finance to the HP4 Compendium of Practice

[25] See 'Unpacking options for Ministries of Finance to leverage modeling and economic analysis to accelerate climate action' (op. cit.).
[26] See 'Climate policy priorities in Sierra Leone', contribution from the Sierra Leone Ministry of Finance to the HP4 Compendium of Practice.

4. Skills and expertise

Building skills and expertise

To varying extents, most Ministries of Finance lack the analytical skills and expertise to conduct or commission the analysis they need to answer pressing climate policy questions. In the HP4 Global Survey, when asked about barriers to the integration of climate into analytics, 'staffing and skill constraints' was the most commonly selected option, selected by 70% of respondents. The lack of staff, particularly adequately trained staff, and low capacity to hire and retain staff, means MoFs struggle to (i) integrate climate into their standard macroeconomic toolkit; (ii) develop, use, or update sophisticated dedicated models; (iii) commission fit-for-purpose external modeling and studies and interpret results; and (iv) successfully communicate results to decision-makers. Even MoFs that are relatively well-resourced struggle with time pressure and competing priorities. As one modeler interviewed pointed out: "My experience is that when you are modeling something, you really need a lot of time to devote to something and just focusing on that and not being distract[ed] [by] many other things." Indeed, modelers from inside and outside government interviewed for a previous Coalition report (Tamminen et al., 2022) made a strong recommendation to MoFs to "hire and maintain people who comprehend the required methods and modeling tools within ministries".[27]

Successful climate–economy analytics and modeling require a range of specialist technical, economic, and environmental skills. The exact nature of skills required will depend on the mandate and responsibilities of each MoF—but as a baseline, MoFs need staff that can (i) identify suitable models and analytical approaches, (ii) either run models themselves or externally commission them, and (iii) communicate their results, and any limitations, to decision-makers. For general macroeconomic modeling, Murphy (2017) recommends the following range of skills: (i) modeling system concepts and software; (ii) mathematical economics; (iii) econometrics; (iv) an understanding of relevant data; (v) macroeconomic or microeconomic theory, depending on the nature of the model; (vi) an appreciation of the uses of the model, typically a specific area of forecasting or policy analysis; and (vii) the ability to communicate modeling results to non-modeling audiences (see also Box 2.2). For climate analytics, a range of additional skills are relevant, including climate, energy, and environmental expertise, as well as expertise on gender equality and social inclusion (e.g., CFMCA, 2023; NDC Partnership and Center for Access to Climate Finance, 2025).

A successful analytical team will bring the full range of required skills together. Team sizes of at least four to five people have been identified as preferable for some more complex projects (Tamminen et al., 2022).[28] The more diversified the team is, the better its position to address complex issues, consider different angles, and also bring soft skills like communication and stakeholder management.[29] By contrast, smaller teams can struggle to efficiently distribute work, as has been the case in **Rwanda**: "[Due to] limited team size, each team member needs to be able to perform each (analytical) task. There is a limited scope for specialization. This, in turn, limits the time and capacity for a more in-depth dedication of some team members to develop a deeper understanding of the integration of climate change in the existing and new analytical tools."[30] While a climate analytical team requires significant resources, for developing countries, multilateral development banks (MDBs) are often able to directly finance the hiring of analysts, or even entire analytical teams, within MoFs (see also Box 4.1).

[27] That said, the lack of staff for modeling is not just a climate issue. As one report assessing modeling capacity in Africa points out: "The allocation of resources to macroeconomic modeling is not considered a priority amongst competing needs" (AfDB, 2023). The need to build sustainable analytical capacity—on climate and beyond—should be a key priority for MoFs.

[28] It is worth noting that such a team can also be assembled consisting of staff from different ministries as long as a strong mandate and the required infrastructure (e.g., an office available for joint work) are in place. Where no such expertise currently exists, MoFs should take care to involve external experts in any hiring and selection processes that can accurately assess candidates' skill levels.

[29] Where exactly the team is located in the MoF is another important factor, discussed in Section 2.

[30] See 'The use of climate–economy models in Rwanda's Ministry of Finance and public institutions: the challenges in building analytical capability' (op. cit.).

Not every MoF will need to immediately develop the skills to perform economic analysis and modeling themselves. In some cases, other ministries and government agencies will be better placed to conduct analysis. However, all MoFs will need to understand enough about analytical approaches and modeling to make informed choices about commissioning analytical exercises—including selecting appropriate models—and appreciating, interpreting, and communicating modeling results. For those MoFs still at the beginning of their journey, there are multiple entry points for starting to incorporate analytical tools into climate-related decision-making (see Box 4.1).

Model development requires significant resources and a range of different skills. As GIZ points out, "Model builders need a higher level of economic modeling knowledge and may require more intensive training in the technical aspects of economic modeling, while model users should understand implications of model outputs for fiscal policy, climate adaptation, and long-term financial planning."[31] Tamminen et al. (2022) argues that "It takes time to develop the models, the modeling capacities, and the required data resources within research organizations or ministries running their own models. So, it is essential to resource the model development work and continuity in modeling skills within research organizations and ministries with a long-term focus." Experience suggests that developing a model from scratch requires two full-time employees for one year (Murphy, 2017); and more if the team is less experienced, or if the model is particularly sophisticated. For example, the **Danish** GreenREFORM model began as a research project in 2017 at the University of Copenhagen and Aarhus University. In 2019, the project received funding from the Danish Ministry of Finance for a team of four dedicated model developers at DREAM. The MoF also dedicated significant in-house resources to work on the GreenREFORM project to build capacity for integrating the model as an instrument for policy assessment available to both the MoF and other ministries. The first real-world application of the model by the Danish government as the analytical foundation for policy proposals and negotiations was in 2024 (OECD, 2021; Sand Kirk et al., 2024).

Staff retention is at least as important as training as part of this sustained effort. High staff turnover due to wage disparities between the public and private sectors is a problem in many countries, significantly reducing the impact of training and capacity-building initiatives. This can lead to perpetual capacity gaps, where MoFs continuously train new staff without building institutional knowledge or analytical momentum. In **Rwanda**, for example, the high value of climate analysis-related skills and the value these skills have in local labor markets have been a "non-trivial barrier to the development of sustained in-house capacity", as staff are trained in the public sector, only to accept more attractive offers from the private sector.[32] While this is not a problem that can be fixed easily, there are some steps MoFs can take, including by providing non-monetary in addition to monetary incentives and putting a continuous focus on individual career development to improve job satisfaction and macroeconomic modeling outcomes (AfDB, 2023). **Zambia** has made progress on this front by improving the conditions of service of the MoF's staff (CFMCA, 2026b, forthcoming). In general, there is a need to be innovative and find measures that work to incentivize analysts to remain in post. Murphy (2017) recommends the following initiatives to support career development for modelers, that could provide incentives to stay: (i) clear career paths for modelers; (ii) training in models and model software; (iii) coaching; (iv) rotation between modeling areas; (v) modeling secondments outside the MoF; (vi) briefer non-modeling secondments to broaden skills; (vii) study courses at local universities; (viii) collaboration with modeling academics; (ix) allowing time for self-development, e.g., reading recent journal articles related to modeling responsibilities or learning new modeling software; and (x) identifying modeling mentors.

MoFs will need to combine several measures to build and strengthen skills and expertise. While in some cases it might make sense to rely on external partners, especially for MoFs at the early stages of developing their climate analytical capabilities, or those seeking support for a specific project, reliance on external experts can prevent MoFs from building the required in-house expertise (Mazzucato and Collington, 2023). The Coalition's 'Guide' (CFMCA, 2023) provides a detailed overview of the options available to MoFs, including some of their limitations. These include investing in internal training and capacity-building programs, hiring specialist staff, engaging in peer-to-peer learning and knowledge networks, improving collaboration with external knowledge providers including universities, think tanks and international organizations, leveraging expertise from other

[31] See 'Modeling climate-resilient economic development: GIZ's approach to supporting sustainable economic growth' (op. cit).
[32] See 'The use of climate–economy models in Rwanda's Ministry of Finance and public institutions: the challenges in building analytical capability' (op. cit.).

government agencies and line ministries, and hiring consultancies. In addition, MoFs can consider supporting graduate-level training and working with universities to build customized curricula to enhance climate economic analysis and modeling, as is being done by the RAMP program (see Box 3.5). Box 4.4 provides an overview of technical assistance targeted at MoFs, aimed at strengthening skills and other capabilities.

Human capacity is further hampered by resource constraints that limit access to software and data. 'Data challenges', for instance, were reported by 78% of MoFs that responded to the HP4 Global Survey. One middle-income country interviewed for this workstream highlights that resource constraints mean they have to rely on second best data and open-source models. The **Mexican** MoF describes how major issues regarding data availability and accuracy "act as an impediment to policy implementation".[33] **Sierra Leone** is currently receiving support from the UN Food and Agricultural Organization (FAO) to update its National Forest Inventory, which was last updated in 1975.[34] MoFs that are serious about strengthening their modeling capabilities will need to invest not just in the people, but also in the data and tools they need to successfully conduct analyses. The case of **Rwanda** highlights how intergovernmental collaboration can facilitate data access. A joint working group consisting of MINECOFIN, the National Bank of Rwanda, the Ministry of Agriculture (MINAGRI), and the Rwanda Agricultural Board (RAB) meets monthly to exchange insights and data on the agricultural sector.[35] Where national data is not available—or of high enough quality—international data sources might provide an alternative. A World Bank contribution to the HP4 Compendium of Practice contains an overview of data sources that can be used for macro-modeling of climate.[36] In the near future, the expansion of artificial intelligence (AI) and machine learning are likely to reduce some of the barriers around data and create new opportunities for climate macroeconomic analysis, and climate action more broadly (see Box 4.2).

Box 4.1. Beginning the journey toward enhancing climate analytics

MoFs have **multiple entry points** for starting to incorporate analytical tools into climate-related decision-making. Initial approaches help MoFs explore the subject, identify their needs, and begin building expertise. Collaboration in these early stages is crucial. MoFs can partner with other government institutions, such as Ministries of Environment, disaster risk offices, and central banks, which often have relevant data and expertise in climate analysis. Establishing working groups can also facilitate knowledge sharing and ensure broad institutional involvement. For example, **Chile** established the Natural Capital Committee, a presidential advisory body comprising multiple government institutions, including the MoF, to guide and propose actions on measuring, valuing, and protecting the country's natural capital (see Box 3.4).

Starting simple is key—MoFs can leverage existing technical skills and gradually expand their analytical capabilities. For instance, if an MoF lacks macro-modeling capacity but has experience in project evaluation, it can begin by applying cost–benefit analysis to assess climate-related investments before advancing to more complex modeling approaches.

Pilot studies on policy priorities are one way to start building both high-level support for analytical exercises and analytical expertise (see Section 2). MoFs can also consider carrying out **qualitative stocktaking analysis** that helps to introduce the topic, spark interest from the national economic policy community, and serve as a valuable starting point for understanding the effect channels between climate, the economy, and public finances, as done in **Switzerland** and the **UK**. This can be informed by international expert cycles and in cooperation with international institutions (Baur et al., 2021; OECD, 2021).

External support can accelerate capacity-building by providing technical expertise and initial analytical outputs. This support may include direct financial assistance for hiring in-house analytical teams within MoFs or by engaging external collaborators. For instance, the IDB has helped several Latin American governments enhance their analytical capabilities by connecting them with national and international universities and technical institutions and financing initial analytical reviews. Although not necessarily targeted at MoFs, these collaborations have enabled governments in **Peru**, **Costa Rica**, and **Chile** to assess the economic implications of their NDCs while simultaneously strengthening local analytical capacities for future policymaking (see e.g., Quiros-Tortos et. al., 2021).

Source: Author's compilation

[33] See 'Assessing the fiscal risks of physical climate change', contribution from the Mexican Ministry of Finance to the HP4 Compendium of Practice.
[34] See 'Climate policy priorities in Sierra Leone' (op. cit.).
[35] See 'The use of climate–economy models in Rwanda's Ministry of Finance and public institutions: the challenges in building analytical capability' (op. cit.).
[36] See 'Data sources for the macro-modeling of climate', contribution from the World Bank to the HP4 Compendium of Practice.

Box 4.2. The role of artificial intelligence in climate analytics and policymaking

A recent study highlights how the development of AI applications can be effective in supporting the climate transition, particularly across five areas: (i) transforming complex systems; (ii) accelerating technology discovery; (iii) influencing behavior; (iv) modeling climate systems and policy interventions; and (v) enhancing adaptation and resilience (Stern et al., 2025).

Decarbonizing the global economy requires radical systemic and structural changes in all key complex systems, including cities, land, transport, industry, and energy. Redesigning and transforming such complex systems and running them effectively and efficiently (e.g., based on live data) can be greatly facilitated by AI. In the energy sector, for example, AI can enhance the stability and efficiency of renewable energy integration into power grids. DeepMind has shown that AI applications can improve wind energy's economic value by 20% by reducing reliance on standby power sources.

With regard to modeling climate systems and policy interventions, AI's capacity to process vast datasets and run complex simulations in real-time makes it a valuable tool for improving the accuracy of climate models. For example, the British Antarctic Survey and the Alan Turing Institute developed IceNet, an AI-powered tool that uses satellite data to forecast sea ice levels at a higher accuracy than state-of-the-art dynamical models.

AI models can also be applied to better design and implement public policies for climate action, by generating insights and predictions around complex climate policy scenarios and efficiently monitoring the effectiveness of policy implementation. For example, Climate Policy Radar has created an open-source AI tool that helps policymakers design best-practice climate policies. A recent study used machine learning to analyze roughly 1,500 climate policies implemented between 1998 and 2022 across 41 countries, to identify those that were able to drastically reduce carbon emissions (Stechemesser et al., 2024).

Additionally, Stern et al. (2025) show that the emissions reduction potential of AI applications would outweigh increases from global power consumption of data centers and AI: specifically, they show that AI advancements in power, transport, and food consumption could reduce global emissions by 3.2 to 5.4 gigatonnes of carbon dioxide equivalent annually by 2035. However, market forces alone are unlikely to successfully drive AI's application toward climate action and there are multiple risks that will need to be dealt with, including risks of AI exacerbating global inequalities, and increasing greenhouse gas emissions from data centers. Governments, tech companies, and energy companies must play an active role in ensuring AI is used intentionally, equitably, and sustainably.

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The difficulties of building and maintaining capacity have caused many MoFs to rely on external capacity, which comes with important trade-offs (see also Section 3). While external models or the commissioning of modeling to external experts to conduct modeling exercises is often the only way for MoFs to obtain the results needed, it can also add more challenges for resource-constrained MoFs, as work done by consultants is time-intensive to monitor and interpret, the monitoring and interpretation still require a high level of expertise, and the modeling performed may not always be suited to domestic needs. As Tamminen et al. (2022) put it: "There is little value in [commissioning] modeling exercises without the capacities and skills to use the results obtained and communicate them to the policy makers in a clear and accessible way." Even MoFs that rely heavily on external models and support therefore need a baseline of capacity within the MoF to be able to commission external modeling, manage the process, interpret the results critically, and communicate them to decision-makers. Box 4.3 discusses a range of criteria and skills to consider when deciding whether to outsource modeling or opt for an in-house approach.

Box 4.3. In-house versus external climate modeling and analysis

MoFs need to carefully consider whether to develop climate models and tools in-house or outsource them to external partners. The decision hinges on factors such as internal capacity, the frequency of updates needed, and the long-term sustainability of model use.

Outsourcing modeling development to external experts can provide sophisticated models that MoFs may lack the capacity to develop independently. This can be particularly beneficial for one-time or infrequently updated analyses, such as assessing the fiscal implications of long-term strategies (LT-LEDS). External models can also provide quick initial results that can help MoFs to incorporate analytics on climate change-related issues for the first time. This can help MoFs understand their analytical needs in order to strengthen internal capacities.

Models that are externally provided, such as **Rwanda's** MANAGE model, developed by the World Bank, have the benefit of being easy to use with limited input from MoF. In Rwanda's case, the MoF benefits not only from central updating and maintenance by the World Bank but also from ease of use as the model can be accessed via a digital platform.[37] However, such models come with less flexibility for further in-house development to address country-specific needs. **Sierra Leone's** experience highlights the challenges of using externally developed models without full understanding of all underlying assumptions and limited ability to make necessary adjustments.[38] Ultimately, models that are built externally but in collaboration with government officials have higher chances of being effectively institutionalized and sustained over time compared with those that are exclusively built by external experts.[39]

In-house model development can therefore be preferable for models requiring frequent adaptation. Finance **Canada's** experience with its climate CGE model demonstrates the advantages of an internally developed tool—allowing quick adjustments for evolving policy needs.[40] While internal models can be less complex than comparable externally developed ones (such as in the case of the Canadian CGE model), they ensure flexibility and rapid responsiveness. However, maintaining expertise to run and adapt internal models requires consistent investment in training and knowledge transfer, as seen in Canada's approach to sustaining CGE modeling capabilities.

A phased approach can also be an effective compromise that allows a country to build analytical capability over time. Countries like **Switzerland** have outsourced initial pilot studies while gradually building in-house expertise for long-term sustainability.[41] Some models developed externally to MoFs are later **internalized** and incorporated into their analytical toolkit. **Georgia's** experiences underscore that such ownership transfer can be successful, where external support is paired with local capacity-building to ensure models remain useful beyond initial development.[42]

Skill requirements for developing in-house models, outsourcing models, and internalizing external models

In the case of outsourcing, MoFs must at a minimum have the capacity to understand the underlying assumptions of the models, recognize their limitations, and interpret their results in ways that can be translated into actionable policy recommendations. In the case of in-house development, beyond these analytical capacities, a deeper technical knowledge of modeling as a discipline is needed, including understanding critical model parameters and mastering the statistical or computational tools used to run and adjust the models.

The internalization of these models requires a specific set of capabilities that combines elements of both outsourcing and in-house model development. When internalizing, or embedding external models, the minimum required capabilities include not only understanding the model's structural logic and its update protocols but also being able to process input data, calibrate and adapt the model to the national economic and climate context, and incorporate new information as it becomes available. Additionally, teams must be trained to periodically validate and adjust the model's parameters and assumptions to ensure its ongoing relevance. Thus, internalization demands critical analysis skills, data management capabilities, technical modeling expertise, and the establishment of internal processes to ensure the continuous updating and maintenance of the model within the institution.

Ultimately, MoFs are likely to need to draw on a range of different models, both internal and external ones. Technical assistance providers and international organizations can play a key role in both supporting MoFs with the skills required to draw on these models and with providing a diversity of models for MoFs to use (see also Sharpe et al., 2025; Box 4.4).

Source: Author's compilation, with contributions from Marcio Alvarenga and Raul Delgado (IDB)

[37] See 'The use of climate–economy models in Rwanda's Ministry of Finance and public institutions: the challenges in building analytical capability' (op. cit.).
[38] See 'Climate policy priorities in Sierra Leone' (op. cit.).
[39] Ibid.
[40] See 'Finance Canada CGE model' (op. cit.).
[41] See 'Modeling the fiscal impacts of the net zero target within fiscal sustainability analysis' (op. cit.).
[42] See 'Modeling climate-resilient economic development: GIZ's approach to supporting sustainable economic growth' (op. cit.).

Box 4.4. Overview of capacity-building offers

Coalition for Capacity on Climate Action (C3A): Founded in June 2023 and hosted by the World Bank, the C3A provides MoFs with access to networks (peer-to-peer and research-to-policy) and technical assistance on nature and climate. C3A's work is demand-driven and caters to needs expressed by MoFs, with the overarching goal of capacity-building and knowledge-exchange on analytical tools and models to support decision-making.[43]

Environment for Development (EfD): EfD comprises 12 environmental economics research centers based at universities in low- and middle-income countries, focusing on the economic, environmental, distributional, and social effects of climate policies. It is coordinated and funded by the EfD Global Hub at the University of Gothenburg, Sweden, and the Swedish International Development Cooperation Agency (Sida), respectively. Through knowledge-exchange between academia and senior civil servants, it helps build capacity for evidence-based policymaking.[44]

International Monetary Fund (IMF): The IMF supports member countries vulnerable to climate change in developing capacity to mainstream climate-related risks and opportunities in their macroeconomic and financial policy development. For example, MoFs can request the Climate Policy Assessment Tool (CPAT), a spreadsheet-based model that enables rapid estimation of the effects of climate mitigation policies.[45]

NDC Partnership: The NDC Partnership is a global coalition of more than 130 countries and more than 100 institutional members to create and deliver ambitious NDCs that help achieve the Paris Agreement and the Sustainable Development Goals. Through the Partnership, member countries can request tailormade modeling and economic analysis support to aid the development and implementation of their NDCs and LT-LEDS. Technical support is provided by over 100 institutions and associate members, such as development banks, and international agencies, and NGOs.[46]

Resilience and Adaptation Mainstreaming Program (RAMP): Through its University Network for Strengthening Macrofinancial Resilience to Climate and Environmental Change, RAMP supports academic research and teaching at 18 partner universities across Africa, Asia, and the Caribbean. This includes professional training for MoFs, to support them in integrating climate risks and vulnerabilities into decision-making and planning.[47]

World Bank: The World Bank maintains a suite of macroeconomic models with varying degrees of complexity with which emission and development scenarios can be analyzed. This includes MFMod, a semi-structural model used in two-thirds of the World Bank's Country, Climate, and Development Reports (CCDRs). Models and scenarios can be made available to MoFs and the World Bank has programs for building country-specific versions of models that include training on how to use, maintain, and refine them.[48]

World Resources Institute (WRI): The WRI provides technical assistance to MoFs on climate- and nature-aware modeling. It implements a range of models, ranging from Integrated Assessment Models (IAMs), microeconomic models, input–output models, and applied system models, to Geographic Information Systems (GIS)-based models, including in cooperation with government officers to tailor models to the country-specific context and application, build capacity, and increase the likelihood that models with be consistently maintained and used.[49]

Regional Development Banks: Several regional development banks are stepping up their efforts to support MoFs.

- The **IDB's** Regional Climate Change Platform of Economy and Finance Ministers seeks to build a network to provide technical support for implementing climate and development objectives. Areas of work include macro-fiscal management (including macroeconomic modeling), public spending, tax revenues, green financing, and the financial sector.
- The **Asian Development Bank (ADB)** recently launched the ASEAN Climate Finance Policy Platform, to help MoFs strengthen their role in climate action and incorporate climate risks into financial planning and management. The platform will build the Coalition's work by deepening discussions of climate-related issues specific to Southeast Asia and disseminating examples of best practice.
- The fourth pillar of the **African Development Bank's (AfDB)** Africa Adaptation Acceleration Program, the Innovative Financial Initiatives for Africa pillar, includes a technical assistance program to build countries' capacity for adaptation finance planning and decision-making and strengthen direct access to funds.
- The **Islamic Development Bank (IsDB)** works with member countries to build national capacity and support the preparation and implementation of national climate change plans and NDCs, leveraging its own expertise and mobilizing that of other private, national, bilateral, and multilateral development partners.

Source: Author's compilation based partially on the HP4 Compendium of Practice

[43] See also 'Financing the transition: how can Ministries of Finance build sustainable financial strategies and what analytical tools do they need?', contribution from the Coalition for Capacity on Climate Action (C3A) to the HP4 Compendium of Practice.

[44] See also 'EfD—a global research network combining research, academic training, training of civil servants and advisory to inform policy', contribution from the Environment for Development Initiative to the HP4 Compendium of Practice.

[45] See for example 'The Climate Policy Assessment Tool (CPAT)' (op. cit.).

[46] See also 'Unpacking options for Ministries of Finance to leverage modelling and economic analysis to accelerate climate action' (op. cit.).

[47] See also 'Resilience Adaptation Mainstreaming Program (RAMP): building capacities at Ministries of Finance through local universities', contribution from WRI/SOAS to the HP4 Compendium of Practice.

[48] See also the various contributions by the World Bank to the HP4 Compendium of Practice.

[49] See also 'Informing economic modeling approaches for effective climate transitions', contribution from the WRI to the HP4 Compendium of Practice.

The international support ecosystem

International organizations will need to pursue a major effort to improve the technical assistance they provide. Despite numerous and long-running efforts to enhance skills and human capacity, and technical support received from many organizations, severe skill and capacity gaps remain in most MoFs. Even in highly developed economies, where capacity can sometimes be built up quickly, long-term sustainability can remain a challenge (as discussed relating to the Australian MoF in Box 2.1).

In fact, several MoFs interviewed or surveyed for this workstream have pointed out the limits of the assistance they have received from technical assistance providers. Assistance is often piecemeal and lacks coordination across different providers. Training sessions provided by multilateral organizations tend to be relatively brief and do not sufficiently empower the participants to conduct independent research and analysis. Staff at the MoF in **Sierra Leone**, for instance, discuss their experience with a training provided by the World Bank to roll out the country's first climate economy model. They point out that "only five days [were] allocated for the training. [Given] the nature of the model, five days is far from enough to understand the model in detail. More trainings are required if the model is to be understood in detail."[50] Others, too, point out the value of regular training sessions over crash courses.[51]

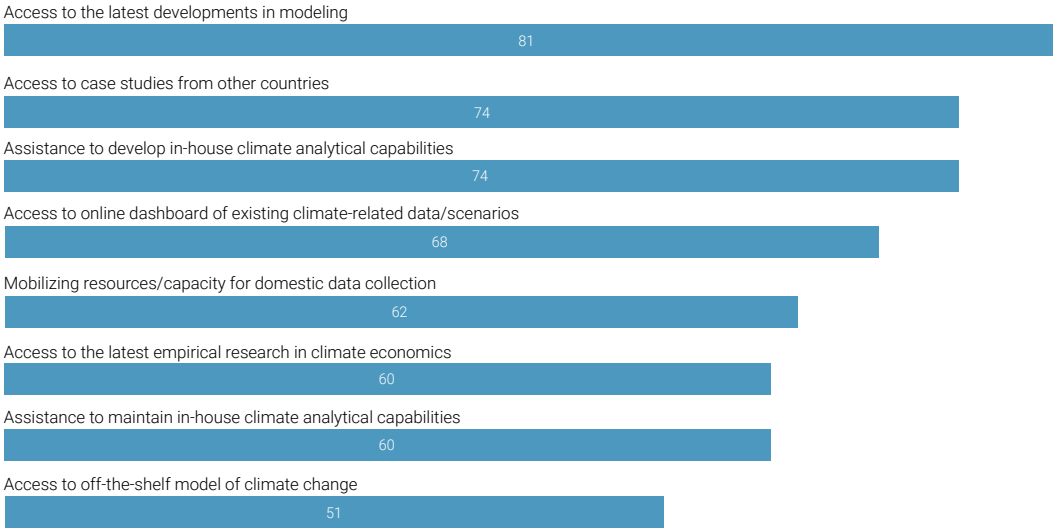
More bespoke, long-term assistance has been more successful. For instance, in 2021, the NDC Partnership launched the Economic Advisory Initiative, which embeds economic and finance advisors directly into MoFs, addressing short-term capacity gaps and building long-term capacities within national institutions. These advisors provide continuous and long-term (one year or more) capacity-building and support to mainstream climate and mobilize climate finance. In **Jordan**, for instance, embedded economic advisors provided by the World Bank have supported macroeconomic and social impact assessments and made recommendations for green recovery strategies and policies.[52]

A sustained effort by both MoFs and the international community is therefore needed to build climate analytical skills. Figure 4.1 highlights which types of support MoFs that participated in the HP4 Global Survey value the most to enhance their climate-related analytical capabilities. MoFs across all income levels prioritized access to the latest climate–economy modeling developments (81%), followed by technical assistance for in-house capacity-building (74%) and case studies from other countries (74%). EMDEs in particular indicated a need for support to develop and maintain in-house climate-analytical capabilities (selected by 92% and 80% respectively), access to the latest developments in modeling (84%), and case studies (80%), and to mobilize resources for domestic data collection (76%). Box 4.5 contains further recommendations from MoFs to improve capacity-building collected during the interviews and surveys conducted for this project.

Support will need to be designed with a focus on long-term sustainability and the wider national ecosystem. Technical assistance providers, and those supporting or funding capacity-building should focus not only on helping MoFs develop and maintain their own internal capabilities, but also on strengthening the national and international ecosystems of universities, research institutions, and partners across government needed to build and sustain them. This includes providing sustained training, co-developing models, and embedding experts where needed—as well as fostering local communities of practice, where professionals can regularly engage with peers, exchange knowledge, and learn from practical experience. This not only strengthens capacity within MoFs themselves but also empowers national think tanks, research institutions, and consultants. A particular focus also needs to be put on addressing problems around staff retention (as discussed above). Where possible, technical assistance providers should design programs assuming some turnover will occur and focusing on institutionalizing knowledge rather than developing individual expertise.

[50] See 'Climate policy priorities in Sierra Leone' (op. cit.).
[51] See e.g. 'Modeling climate-resilient economic development: GIZ's approach to supporting sustainable economic growth' (op. cit.).
[52] The economic advisors also provided technical support to the Department of Statistics in data quality assurance and to ensure that the National Statistical Strategy being developed addresses the data gaps in NDC indicators.

Figure 4.1. What types of additional support would enable the Ministry of Finance to enhance its climate-related analytical capabilities? (%)



No. of respondents: 47

Source: CFMCA (2025a)

Country platforms can be an avenue to align national priorities and coordinate external assistance to address specific barriers. These platforms, loosely defined as "voluntary country-level mechanisms, set out by governments and designed to foster collaboration among development partners, based on a shared strategic vision and priorities" (G20, 2020), are increasingly being established to accelerate and improve the coordination of investment in the green transition and development priorities (Tanaka et al., 2024). They provide a coordinated framework for international support, including (but not limited to) loans and technical assistance from MDBs. By aligning resources under a common strategy, these platforms can enable countries to design and implement technical assistance and investment programs more effectively while also creating valuable feedback loops for ongoing improvement. Investing in internal analytical capacities can be a stepping stone toward achieving the aims of a country, enhancing government decision-making in the long term, and improving the ability to assess policy and investment options within the country platform (e.g., Bedossa et al., 2025).

Last but not least, the academic and research community can also take steps to better support MoFs. Researchers should focus not only on developing technically sophisticated models, but also on designing tools that are accessible, adaptable, and directly relevant to policy decisions, including by working directly with MoF analysts and policymakers, and involving them early in tool development through co-design, testing, and training. This also helps transfer skills and foster long-term relationships that strengthen analytical capabilities on both sides.

Box 4.5. What Ministries of Finance need to enhance their analytical and modeling capabilities—takeaways for the Coalition of Finance Ministers for Climate Action and technical assistance providers

The international community can play an important role in supporting the strengthening of the domestic analytical capabilities MoFs need to navigate the complexities of climate policy. In the HP4 Global Survey, MoFs identified several ways the Coalition could support the strengthening of their climate-related analytical capabilities. Key priorities include access to the latest climate–economy modeling developments and technical assistance for in-house capacity-building as well as better access to resources and data, collaboration, and information exchange in direct targeted efforts to build a community of practice that fosters the development of best practice and common approaches.

MoFs in EMDEs additionally underscored the need for the international community to focus on support that builds sustainable capacity and enables their staff to design and operate their own tools. They highlighted the need for technical support, training on modeling, developing tools, and integrating climate into policymaking and improved access to data and tools. They also highlighted the need for collaboration with institutional partners, finance institutions from developed country members, and MDBs through expert exchanges, best practice, and guides (e.g., on integrating climate concepts into MoFs' planning).

AEs highlighted the need for platforms for collaboration, feedback, exchange, and standard-setting, while both AEs and EMDEs stressed the need for the Coalition to continue to champion the importance of the net zero transition and the role of MoFs in climate action.

5. Conclusion and recommendations

Ministries of Finance from around the world urgently need to invest in their capabilities to conduct climate-related economic analysis and modeling. This report has reviewed existing literature, along with case studies, contributions, and insights from interviews and a survey conducted for the HP4 initiative on 'Economic Analysis for Green and Resilient Transitions', to discuss the climate analytics capability challenges MoFs are facing and present strategies and lessons learned to boost their capabilities. It underscores that analytical capability is about more than having access to suitable tools and models: it is about being able to identify, use or commission, and maintain these tools and models to answer relevant policy questions, and being able to communicate results—and their limitations—and ensure their integration into decision-making processes. This requires sustained investment to secure leadership buy-in, strengthen governance, improve coordination and collaboration, and build and sustain a wide range of skills and expertise.

The survey and interviews conducted for the initiative have shown that MoFs have vastly different levels of analytical capabilities. This has a substantial impact on (i) the type of analysis that could be most suitable and worth investing in and (ii) the priorities and next steps for further strengthening capabilities for each MoF. The summary below draws together the report's lessons and makes recommendations to guide MoFs in determining suitable analytical approaches and steps to take to strengthen capabilities further, based on their existing capabilities.

Getting started

MoFs with little to no climate analytical capabilities should follow a pragmatic approach that builds upon existing, including general analytical, capabilities. Key steps can include:

- **Determine priority policy questions:** Start by considering the most urgent and/or important climate policy questions the MoF is facing—whether that is, for example, setting targets, designing taxes, or protecting vulnerable communities. The overview of pressing policy questions compiled in the HP4 Global Survey can be a useful starting point.
- **Determine analytical priorities:** Determine the type and granularity of information needed and which tools are suitable to provide this information and inform decision-making (e.g., a sophisticated model to inform policy design versus a simple tool that supplies rough figures that can inform prioritization) (see also the forthcoming Step-by-Step Guide). Consult the thematic reports, including on the fiscal challenges (CFMCA, 2025d) and Adaptation (CFMCA, 2025e), for an overview of tools and datasets that can be used as starting points.
- **Start simple and be pragmatic:** Start with what is available and do not waste time waiting for more expertise to arrive. Get started with a simple analysis or an off-the-shelf model that is in line with existing capabilities. For instance, if analytical staff are already using spreadsheet-based models, consider using a spreadsheet-based model. If macroeconomic modeling capabilities are limited but there are strong program evaluation skills, consider conducting a cost–benefit analysis. Then refine the analysis and build in initial lessons learned as the project matures.
- **Secure an explicit mandate and high-level buy-in:** Build strong collaboration between policymakers and analysts from the beginning and ensure that the MoF has an explicit mandate to drive climate action, which can serve as a basis for expanding capabilities.

- **Use a pilot study:** Perform a pilot study or a qualitative stocktaking exercise on one policy priority to build high-level support for analytical exercises. Once the usefulness of an analytical exercise has been demonstrated, the pilot can then be expanded or turned into a standard exercise.
- **Get support:** Work with MDBs, local universities, and technical assistance providers. Coalitions such as the NDC Partnership support countries in accessing country-driven and coordinated support from a wide range of institutions, with the possibility of submitting new requests as the work progresses. A quick way to build additional capacity is through embedded advisors or hiring technical staff with the support of MDBs. Alternatively, consider using country platforms to coordinate assistance.

Making progress

MoFs with more established climate analytical capabilities can work toward mainstreaming climate analytics across relevant functions and divisions. Key steps can include:

- **Map skills:** Conduct a mapping of existing and required skills and expertise. Consider using the Coalition's Capability Assessment Framework[53] for a wider mapping of the MoF's climate capabilities and to determine priorities for action.
- **Invest in in-house capacity:**Build diverse teams that cover a wide range of skills including economics/ quantitative skills, but also sectoral expertise, communication, and stakeholder management skills.
- **Consider the institutional setup:** Determine an institutional structure/home for climate analytical staff that facilitates effective coordination and communication across the different divisions within the MoF, and links analysts, modelers, policymakers, and relevant government agencies, fits the MoF's analytical priorities, and can evolve with progress and in line with policy needs. For instance, if the MoF's priority is answering specific policy questions, build a unit. If it is mainstreaming climate across the MoF, allocate analytical staff to key departments.
- **Strengthen collaboration:** Promote and strengthen collaboration both within government and beyond (including environment ministries, statistical agencies, central banks, universities) to create synergies and obtain access to models, data, or expertise. Inside government, regular interdisciplinary meetings can facilitate the exchange of knowledge and ensure that the models and tools reflect the priorities of multiple stakeholders. Outside government, joint projects with local universities and research institutes can strengthen capacity in the wider ecosystem.
- **Map stakeholders:**Consider conducting a mapping of potential partners and invest in stakeholder management.
- **Start mainstreaming:** Once climate gains traction in the MoF, work with the relevant division to incorporate climate variables into existing models and tools.
- **Share the experience:** Use peer-to-peer exchanges and platforms like the Coalition of Finance Ministers for Climate Action to share experience to help countries in similar circumstances benefit from lessons learned, enabling others to make better-informed choices.

[53] See 'Capability Assessment Framework (CAF): a new self-assessment tool to empower Ministries of Finance to build capabilities to mainstream and drive climate action', contribution from the Coalition of Finance Ministers for Climate Action to the HP4 Compendium of Practice.

MoFs cannot solve their capability shortcomings alone. They need support from the wider ecosystem, including:

- **Heads of government** that are able to drive climate action and strengthen national climate analytical capabilities across key government agencies.
- **Line ministries and government agencies** that are committed to collaborating, sharing models, experience, and data with MoFs.
- **Universities and research institutes** that have the climate expertise needed to effectively collaborate with MoFs and train the modelers and decision-makers of tomorrow.
- **Technical assistance providers** and the wider international community including philanthropic foundations and development institutions that are attuned to MoFs' needs and can provide both a diverse range of suitable tools and models and the bespoke, long-term assistance that allows MoFs to build and sustain analytical capability design and operate their own tools.

More research is needed to effectively support MoFs in strengthening their climate analytical capabilities. Researchers and technical assistance providers can support MoFs by providing guidance, case studies, and lessons learned, including on the following topics:

- How to sustainably build analytical capabilities, including by addressing high staff turnover and changing political priorities that lead to a de-emphasis of climate action
- How to work effectively with sub-national agencies (e.g., state ministries) on matters of regional importance, particularly in federally organized countries
- How to determine and build 'minimal viable modeling capabilities' needed in a MoF
- How to build models from scratch versus how to adapt models, and the trade-offs between the two approaches
- How to effectively communicate modeling results to policymakers and the wider public.

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