



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

# **Summary of emerging and new approaches to modeling the economic case for climate action: lessons from New Climate Economy for Ministries of Finance and future model development agenda**

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**Topic:** Enhancing analytical capacity in Ministries of Finance

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## Overview

The New Climate Economy (NCE) was the flagship project of the Global Commission on the Economy and Climate, an initiative that sought to analyze and communicate the economic risks and opportunities arising from climate change.<sup>1</sup> Over the period 2013–2023 the NCE played a pivotal role in bringing together Government officials, businesses, economic leaders, and civil society organizations to enhance the global and national understanding of how climate action could drive economic, social, and development objectives. Through an innovative model based on international engagement, research, and targeted country support, the NCE helped catalyze ambitious climate action in countries such as Indonesia, Colombia, Ethiopia, South Africa, and Vietnam, as reflected in their climate action declarations, stronger greenhouse gas mitigation and adaptation commitments, and national and sectoral development plans.<sup>2</sup> Along the way, the NCE contributed empirical evidence in support of the hypothesis that increased climate ambition yielded superior socio-economic benefits relative to alternative development paradigms, a finding referred to as “The Inclusive Growth Story of the 21st Century” (Global Commission on the Economy and Climate, 2018).<sup>3</sup>

## Incorporating climate considerations into economic policy

The NCE approach offers relevant insights to Ministries of Finance (MoFs) on how to incorporate climate considerations into economic policy, based on the understanding of linkages between environmental, social, and economic domains under global warming scenarios, of the costs of inaction and the benefits of scaled-up climate ambition. As part of its international activities and country-level support, the NCE combined the use of *tools for economic policy analysis* that complemented those typically utilized for macro-monitoring and for the appraisal of the fiscal, trade, external, and real sectors with *methods of engagement and capacity-building* that sought to help overcome typical coordination and implementation problems that arise in climate policymaking.

## MoFs’ reliance on staff background and modeling

MoFs have traditionally relied on their staff’s strong technical background, and state-of-the-art models, data, and methods for macro-fiscal, monetary, sector level, poverty, and distributional impacts analyses. Their policy work is generally coordinated with other Government Agencies, conducted in consultation with (and with technical assistance from) national and international knowledge institutions. Data and methods that support policymaking are continuously refined, incorporating insights from theory and the empirical record. National, regional, and international shocks (which emerge, for instance, from conflict, commodity shocks, financial crises, and pandemics) also provide an opportunity to test and improve MoF data and empirical methods.

## Climate change challenges to policymaking

Climate change, however, has presented policymakers with a unique challenge to adequately comprehend the nature and severity of the problem, the expected macro-fiscal, welfare and distributional impacts, and the direction, timing, and strength of necessary policy responses. Such a challenge has emerged from uncertainties about warming scenarios (which are, in turn, contingent on global climate action), global and local effects, channels of transmission to environmental, social, and

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1 In its early years, the Global Commission on the Economy and Climate included 7 commissioning countries, 8 partner research institutes, 24 global leaders (ex-Presidents and Finance Ministers, major CEOs, heads of the main international economic organizations) and a panel of 14 high-level economic advisers (New Climate Economy, 2015).

2 Links to selected NCE country policy support and research documents can be found at: [www.wri.org/initiatives/new-climate-economy](http://www.wri.org/initiatives/new-climate-economy).

3 Four flagship reports were produced by NCE over the period 2013–2023: “Better Growth, Better Climate: The New Climate Economy Report” (Davis and Wyn, 2014); “Seizing the Global Opportunity: Partnerships for Better Growth and a Better Climate” (Global Commission on the Economy and Climate, 2015); “The Sustainable Infrastructure Imperative: Financing for Better Growth and Development” (Corfee-Morlot et al., 2016); and “Unlocking the Inclusive Growth Story of the 21st Century: Accelerating Climate Action in Urgent Times” (Global Commission on the Economy and Climate, 2019).

economic domains, and the costs and transitional impacts of shifting to a low-carbon, climate resilient paradigm compared with the expected global and national level benefits.

### Climate uncertainties and complexities make the tools and methods used by MoFs increasingly inadequate

Those uncertainties and the complexity of climate impacts render tools and methods used by MoFs increasingly unsuitable for policy analysis.<sup>4</sup> Such problems stem from many factors, including:<sup>5</sup>

1. Models' inability to capture nonlinear and threshold effects as countries reach and breach local and global carrying capacity constraints (often referred to as regional and planetary boundaries)
2. A failure to consider impacts of depletion and degradation of natural capital on the provision of environmental goods and services upon which socio-economic activity depends
3. An inadequate understanding of climate-related risks
4. A general disregard of the role and magnitude of externalities
5. Inadequate representation of climate damages and of the benefits of adopting low-carbon, climate resilient technologies
6. Uncertainties regarding costs of the transition.

By the same token, a continued reliance on tools and methods that fail to adequately integrate climate considerations in technical analysis leads to a misinformed policy process, resulting in delayed, insufficient climate action. The problem is exacerbated by the lack of *enhanced* coordination required by a multi-dimensional, multi-stakeholder problem and by insufficient technical capacity for climate policy analysis.

### Use of objective evidence and effective support to decision-makers

The NCE approach was guided by an understanding of the above challenges and complexities, leading to the pursuance of avenues to provide objective evidence and effective support to decision-makers. Internationally, the NCE used a demand-driven approach, seeking opportunities and global-local champions, to feed into a core policy process offering enhanced, accelerated climate ambition. At the national level, NCE support sought to overcome barriers to climate action by means of a method of engagement characterized by its embeddedness and capacity-building. The NCE engaged key institutions and individuals to identify entry points for overcoming coordination challenges, close knowledge gaps, and bring inputs into the relevant policy process. In addition, NCE support fostered the utilization of science-based empirical methods that highlighted the linkages between the environment, society, and the economy under warming scenarios; the role of externalities; a comprehensive assessment of climate risks and damages; an appraisal of the costs and benefits of climate mitigation and interventions and their macro-fiscal implications.

### The need for different tools for different factors

Regarding tools, NCE recognized that *no single model* was capable of offering the empirical inputs required to address all the policy questions and concerns of policymakers and other stakeholders. Questions at the macro-, sectoral, and micro-levels on issues such as aggregate impacts (e.g. GDP, employment, fiscal outcomes), distributional effects (by selected cohorts), spatial impacts, and impacts on sectors or activities (e.g. power generation, industries, etc.), require the utilization of different tools, each capable of shedding light on the factors that determine the dynamics of the

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<sup>4</sup> Particularly unsuitable are those models that do not include channels of transmission of climate impacts, and those that do not reflect, or misrepresent, linkages of natural capital and the provision of environmental goods and services with the socio-economy. For a discussion on the suitability of modeling approaches, including Integrated Assessment Methods see, for instance, Stern et al. (2021).  
<sup>5</sup> Stern and Stiglitz (2023) identify six key flaws in standard arguments against enhanced climate action, which are driven by assumptions and the use of "standard" models, and they provide insights on benefits from the low-carbon transition not accounted for in traditional models.

analyzed system and the effects of policies and shocks, and abstracting from elements not particularly relevant for the problem at hand. The NCE choice of tools and methods was driven by the core climate policy questions and challenges in supported countries, in many cases combining different models under the framework described next.

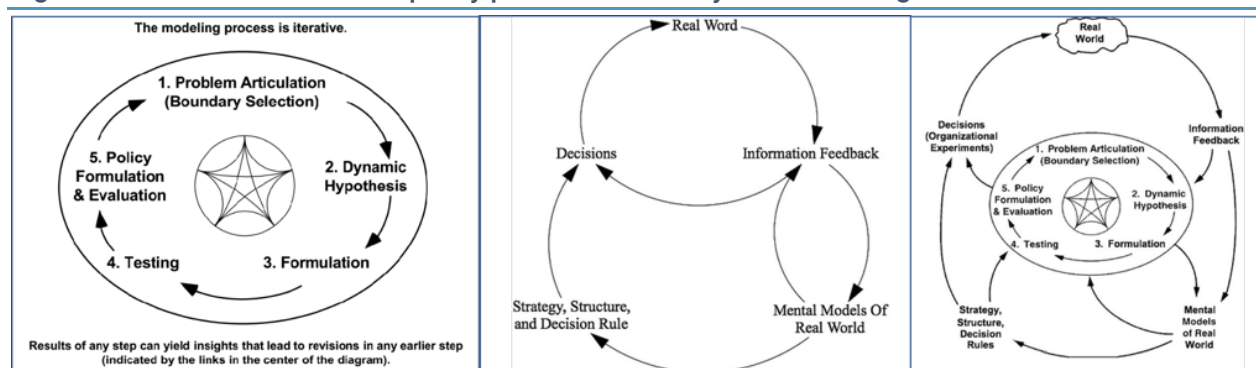
## A systems thinking-based framework

Methodologically, the NCE fostered the utilization of a *systems thinking*-based framework for policy analysis of particular relevance for MoFs. Systems thinking is a holistic approach to analysis that focuses on the way that system's constituent parts interrelate, and on how they work over time and within the context of the larger systems to which they belong. It is a way of making sense of the complexity of the world by looking at it in terms of wholes and relationships. In the context of climate policy, systems thinking allows a holistic consideration of climate, environmental, and socio-economic domains, their linkages, and an explicit representation of policies (e.g., on land, energy, waste, agriculture) including their channels of transmission, feedbacks, nonlinearities and delays. This approach enables policymakers, for instance, to explore how social and economic activities affect and are affected by climate scenarios and the environment. The framework thus allows testing of hypotheses regarding the net benefits of climate action and the costs of inaction.<sup>6</sup> It fosters the coordination of tools for a coherent, comprehensive policy analysis. It also provides a method for stakeholder engagement, and for capacity-building, bringing together key stakeholders into the decision-making process. The systems thinking framework is generally accompanied by the use of system dynamics tools, which can be integrated with other models and tools typically used by MoFs, such as computable general equilibrium (CGE) models and other integrated assessment methods (IAM), spatial models, energy optimization models, macro- and microeconomic models, and statistical analyses, in order to provide adequate climate policy support.<sup>7</sup>

### The framework accounts for feedback loops in the climate policy process

The systems thinking framework takes into consideration the iterative, feedback nature of the policy process as related to climate change (Figure 1, left). It fosters the adjustment of mental models, structures, and strategic rules that affect decision-making under evolving climate warming conditions (Figure 1, center). Combining those principles leads to the construction of models and tools that consider the complexities and feedbacks internal and external to the process (Figure 1, right). A number of country representations, referred to as *Green Economy Models*, were produced under such a framework using system dynamics tools as part of the NCE's country support (Bassi et al., 2024).

Figure 1. The iterative nature of policy process under a systems thinking framework



Source: Adapted from Sterman (2000)

<sup>6</sup> For a description of the systems thinking framework and the associated System Dynamics methods, see Sterman (2000).

<sup>7</sup> System dynamics is a method to enhance learning in complex systems. It is interdisciplinary, and thus suitable for climate-development policy analysis. It is grounded on the theory of nonlinear dynamics and feedback control developed in mathematics, physics, and engineering. It is applicable not only to physical systems (e.g., land, water, biodiversity), technical and engineering domains (e.g., power generation, the process of value addition, capital accumulation) but also to human behavior, as it is amenable to drawing inputs and incorporating representations that come from the social sciences.

## The framework enables a comparison of climate impacts under alternative global warming and national climate action scenarios

The systems thinking framework enables policymakers to integrate climate impacts under alternative global warming and national climate action scenarios, such that *baseline cases* adequately reflect climate-related societal costs, including on value addition, income, employment, and fiscal accounts. It also allows a comprehensive assessment of climate policy packages, transitional effects, costs of interventions, and medium- and long-term benefits, including monetary and non-monetary metrics of wellbeing. The latter include not only variables appraised in models typically utilized by MoFs, such as income, employment, value added, and fiscal balances but also metrics for externalities (e.g., air quality, greenhouse gas emissions and other pollutants, and the availability and quality of environmental goods and services).

## The NCE approach and system dynamics tools can address core questions in climate policymaking

The NCE approach and the associated system dynamics tools and methods help answer core questions arising in climate policymaking that are relevant for MoFs. Most importantly, they address the following:

1. What are the societal costs of inaction, and of insufficient or delayed policy response (including impacts on metrics of wellbeing typically monitored by MoF, e.g., value-added GDP, income, employment, physical and human capital, fiscal revenues, expenditures, debt, poverty, and distributional effects)?
2. What is the required policy effort on areas at the MoF's disposal (e.g., carbon market-based mechanisms, green investments, and regulations)?
3. What other actions are required by other stakeholders (e.g., on land use, the circular economy, waste reduction, and waste management)?
4. What are the financing needs to hit climate mitigation and climate resilience targets?
5. What are the other economic costs of the transition, and what are the associated socio-economic benefits (inclusive of monetary and non-monetary metrics of wellbeing associated with the alleviation of negative climate-related externalities and of positive externalities linked to climate resilient, low-carbon policies)?
6. Is the assessment of the fiscal costs of policy packages, their potential for revenue mobilization, and fiscal, debt and distributional impacts?<sup>8</sup>

Along with the above, the NCE sought to provide policymakers with criteria for policy prioritization based on an economy-wide appraisal of costs and benefits of interventions.

## Designing and implementing sound climate and development policy using NCE insights

The holistic assessment of the required policy effort, costs, financing needs, macro-fiscal, debt, and distributional implications under a common, coherent framework, along with engagement and capacity-building support, provides MoFs with insights into how to design and implement sound climate and development policy. A series of technical documents, policy reports, models and data files summarize the tools, methods, and outcomes from NCE work. The approach relies on the know-how accumulated by the NCE's host institution and technical entities that have generated tools and models for climate policy analysis.<sup>9</sup>

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<sup>8</sup> This question is of particular relevance for MoFs.

<sup>9</sup> Country programs are listed at <https://newclimateeconomy.net/>. Technical firms (including KnowlEdge) that provided tools and methods to NCE continue to offer consulting support to MoFs.

## Model ownership and data transparency

For enhanced action, the models developed under the NCE are fully owned by the client institutions to which it provided implementing support, with no copyrights involved, in alignment with Paris Agreement principles for support (Article 4), capacity-building (Article 11), and public access to information (Article 12). In order to provide transparency, these models generally incorporate publicly available and peer-reviewed data, are advanced under a consultative and rigorous research process, and fully abide by the scientific method, guaranteeing impartial, objective results. MoFs could undertake similar exercises to inform their policy processes with the support of technical entities participating in the development of the NCE framework.

## Country-specific support

The NCE's country-specific support took into consideration these countries' heterogeneous environmental, social, and economic characteristics, sources of greenhouse gas emissions, diverse institutional arrangements, and different opportunities and constraints for climate action. These were reflected in the varied set of tools and methods employed under the encompassing System Thinking framework; in the different sets of proposed climate mitigation and climate resilience interventions; and on the tailored policy documents, method for engagement and capacity-building. Table 1 below summarizes examples of country support and insights from NCE work.

**Table 1. Examples of NCE country support: policy processes and insights**

Country	Policy processes	Insights	Models/tools
Indonesia	Low-carbon Development Initiative (medium- and long-term development planning)	Socio-economic benefits of the low-carbon transition. Debunking ideas of aggregate trade-offs from climate, green policy. Incorporating climate, green considerations in development planning; and robust policy responses to COVID-19 (Build Back Better).	Green Economy Model (GEM) Indonesia; spatial models; energy and land optimization, causal loop diagrams (CLDs)
Colombia	Nationally Determined Contributions (NDC) update and 2050 Decarbonization Strategy	Supporting more ambitious NDCs and Net Zero greenhouse gas emissions by 2050, and highlighting synergies among climate resilient, low-carbon interventions.	GEM Colombia, energy optimization, CGE, spatial and land models (CLDs)
Brazil	New Economy for Brazil and New Economy for Brazilian Amazonia	Identifying direct socio-economic benefits and spillovers from a sustained exploitation of primary resources (bioeconomy).	GEM Brazil, energy optimization, global CGE, national CGE, CLDs
Vietnam	NDC update and Net Zero 2050 strategy	Supporting more ambitious NDCs and net zero greenhouse gas emissions by 2050. Identifying policy interventions, financing needs, and providing criteria for policy prioritization	GEM Vietnam, CLDs, spatial analysis, micro-level analysis
Ethiopia	NDC update and Long-Term Low Emissions Development Strategy	Identifying policies for enhanced greenhouse gas mitigation and climate resilience that deliver on the country's long-term development vision and help boost macro and fiscal accounts, while contributing to poverty reduction	GEM Ethiopia, spatial analysis, energy optimization, CLDs, micro-level analysis
India	Informing climate action via support from World Resources Institute India	Generating tools and methods for assessing policy interventions and identifying co-benefits from climate action	GEM India, Energy Policy Simulator, micro-level analysis, spatial analysis

## Three key findings

Overall, the NCE approach yields three key findings that resonate more than ever as countries fail to move onto decarbonization paths aligned to 1.5°C targets. First, the "Inclusive Growth Story of the 21st century" (Global Commission on the Economy and Climate, 2018) highlights the superior differential benefits from embarking onto climate resilient, greenhouse gas mitigation paths aligned to

global climate goals. To be sure, the switch to a low-carbon paradigm brings transitional challenges, from shifting resources away from the high-carbon sector to potential impacts on vulnerable cohorts. But, on the whole, it leads to gains in welfare and distributional outcomes, especially when accompanied by a well-designed and implemented just transition framework. Second, the NCE empirical work identified large climate financing needs (especially in emerging economies) that exceed the countries' fiscal space, highlighting not only the need for financing support from international financial institutions but also the need for country measures of green finance mobilization and for boosting revenues while providing market signals to shift resources away from high-carbon sectors. Third, the NCE experience highlighted the importance of participatory processes in climate policymaking, with a central role to be played by MoFs in enhancing coordination, building capacity, and overcoming implementation constraints.

## **Recommendations to enhance the effectiveness of MoFs in the transition**

In the modeling domain, NCE work yields a number of particularly insightful recommendations to enhance the effectiveness of MoF work in relation to climate change:

1. The need to combine tools traditionally used by MoF for macro-fiscal monitoring analysis (e.g., CGE models, IAMs, sector optimization, macro- and microeconomic models) with others that incorporate climate impacts, highlight interactions with natural capital, and incorporate a diverse set of climate mitigation and resilience policies;
2. The desirability of fostering participatory processes for modeling, bringing together experts from different disciplines (e.g., energy, land, social sciences, climate), facilitating the exchange of information, and reconciling policy questions, assumptions, data, methods, and scenarios;
3. Prioritizing capacity-building and peer exchanges to overcome knowledge constraints and increase transparency.

Of particular relevance for MoFs is the identification of policy scenarios that provide a comprehensive appraisal of the costs of inaction (baseline cases) and also offer a coherent characterization of policies that allow to MoFs to deliver on ambitious climate targets, their associated socio-economic costs and benefits, financing needs, fiscal impacts, and the financing support required to maintain fiscal sustainability (climate action cases).

## **MoFs are uniquely positioned to meet global climate goals following the principles of the Paris Agreement**

With support from international development partners and targeted initiatives, such as the Coalition of Ministries of Finance for Climate Action, MoFs are uniquely positioned to deliver on global climate goals following the principles defined by the Paris Agreement. Doing so requires a significant effort that includes boosting MoFs' technical capacity for climate policy analysis, the revision and expansion of tools and methods for integrating climate considerations in macro-fiscal frameworks, debt sustainability analyses and other technical work, and leading interministerial work and multi-stakeholder consultations for enhanced coordination, seeking to maximize the benefits from embracing climate-resilient, low-carbon technologies and to minimize the transitional and distributional impacts on vulnerable cohorts.

## Useful links and resources

Green Economy Modeling under NCE work: <https://newclimateeconomy.net/content/green-economic-modelling>

Country initiatives supported by NCE (e.g., the Indonesia Low Carbon Development Initiative: <https://lcdi-indonesia.id/>)

Modeling Consulting (KnowlEdge SRL): <https://www.ke-srl.com/>

System dynamics and the systems thinking approach: <https://systemdynamics.org/>

Green Economy Model technical documentation: <https://www.wri.org/research/national-climate-action-green-economy-model-technical-note>

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