Global Climate Policy Project
at Harvard and MIT

Flagship Report

Building a Climate Coalition: Aligning Carbon Pricing, Trade, and Development

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Flagship Report of the Global Climate Policy Project (GCPP) Working Group on Climate Coalitions

September 2025

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About the Project

The Global Climate Policy Project (GCPP) is a joint initiative between Harvard and MIT dedicated to identifying and advancing innovations in global climate policies and institutions. Existing frameworks, including the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement, have established an important foundation for climate action but are not sufficient to manage the risks of a changing climate. With financial support from the Salata Institute for Climate and Sustainability, Weatherhead Research Cluster on Global Climate Policy, and MIT Climate Project, GCPP puts forward ideas and policy proposals that complement the UNFCCC and address critical gaps in trade, finance, security, and other areas.

By convening leading academics, policymakers, industry experts, and members of civil society, GCPP drives research-backed policy proposals that can shape the global dialogue and accelerate urgent climate action.

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Members of the GCPP Working Group on Climate Coalitions

This flagship report reflects the deliberations of the GCPP Working Group on Climate Coalitions—a diverse group of experts from both developed and developing countries, including many of the world's major emitters. Members brought expertise from government, international financial institutions, the private sector, academia, and civil society. Over a six-month period leading up to COP30, the group met regularly and engaged with policymakers, industry representatives, and thought leaders around the world. The goal was to help governments and stakeholders envision a climate coalition centered on carbon pricing while also addressing broader objectives, including equity, development, and trade.

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All members of the Working Group serve in an individual capacity. This report does not necessarily represent the views of the institutions to which they are affiliated. Working Group members participate on a voluntary basis and do not receive financial compensation for their contributions. Members all agree with the broad thrust of the analysis and recommendations presented in the report but should not be taken as agreeing with every aspect of the proposal.

Acknowledgments

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Core authors included Catherine Wolfram, Arathi Rao, Kevin Hsu, Fanming Meng, Anna Neumann, Marilyn Pereboom, and Naomi Shimberg, with trade modeling and analysis led by Pereboom and Shimberg. Ruchee Bhatta provided research assistance. Marika Tatsutani served as editor, while Tony Tran and Kristin Caulfield supported production.

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The GCPP would like to acknowledge the generous support of the Salata Institute for Climate and Sustainability at Harvard University, the MIT Climate Project, the MIT Center for Energy and Environmental Policy Research, and the Weatherhead Center for International Affairs at Harvard University.

List of Abbreviations

AUD	Australian dollar (AU$)
BCA	border carbon adjustment
CBAM	carbon border adjustment mechanism
CO_2e	carbon dioxide equivalent
COP	Conference of the Parties (to the UNFCCC)
ETS	emissions trading system
EUR	euro (€)
GBP	Great British pound (£)
GHG	greenhouse gas
HIC	high-income country
IMF	International Monetary Fund
IP	intellectual property
JV	joint venture
LCT	low-carbon technology
LIC	low-income country
LMIC	lower-middle-income country
MDB	multilateral development bank
Mt	million metric tons
MRV	measurement, reporting, and verification
NCQG	new collective quantified goal
NDC	Nationally Determined Contribution (under the Paris Agreement)
OECD	Organization for Economic Cooperation and Development
R&D	research and development
SME	small- and medium-sized enterprise
UMIC	upper-middle-income country
UNFCCC	United Nations Framework Convention on Climate Change
USD	US dollar ($)
WTO	World Trade Organization

Executive Summary: Roadmap for a Climate Coalition

As the world heads toward COP30[1] in Brazil, the birthplace of the United Nations Framework Convention on Climate Change (UNFCCC), the need for coordinated climate action is more urgent than ever. Despite growing momentum for clean energy investment in many countries, global emissions remain far too high, and climate damages are mounting. Recent developments—including the withdrawal of the United States from the Paris Agreement—have shown that relying on global consensus to implement collective climate goals is not, by itself, enough.[2]

At the same time, global trade is increasingly intertwined with climate policy. The European Union's adoption of a carbon border adjustment mechanism (CBAM) has sparked an international debate about how to align trade and climate goals. While the CBAM has galvanized interest in carbon pricing and other emission reduction mechanisms, it has also raised concerns about fairness, particularly with respect to potential burdens on developing countries, as well as administrative complexity. The need for a coherent and trusted carbon accounting framework to underpin such measures is increasingly recognized—without such a framework, fragmented and opaque standards could undermine both climate integrity and global trade.

> In this context, action by a group of countries committed to making progress together is essential. **This report proposes one such approach: the formation of a multilateral climate coalition that brings together countries willing to coordinate on carbon pricing and related policies**. The initial focus would be on carbon-intensive industries, like iron and steel,[3] aluminum, cement, and fertilizers, which account for more than 20% of global carbon emissions. Member countries would commit to a carbon price floor—i.e., a minimum carbon price that would apply to all emissions from these target industries within their borders. To ensure that similar carbon-related costs apply, both to firms within member countries and to goods imported from firms in non-member countries, members would apply border carbon adjustments (BCAs) to imports from non-member countries.
>
> At the same time, member countries would provide positive incentives for low- and middle-income countries to join the coalition and increase their climate ambition—for example, through support for low-carbon technologies, climate finance, institutional capacity building, and preferential market access. **Over time, the coalition could expand in both membership and sectoral coverage, yielding commensurately greater emissions and economic benefits.**

A growing number of countries are turning to carbon pricing, laying the foundation for coalition building. Carbon pricing reflects the widely accepted principle that polluters should pay for their emissions, while giving countries the freedom to tailor policies to their domestic contexts. Carbon pricing in 2025 was in place across 50 jurisdictions, covering 28% of global emissions and raising more than USD 100 billion in revenue.[4] Coverage, including planned programs, is even higher—82%—for emissions from carbon-intensive, heavily traded industries. While most initiatives are concentrated in high-income countries, all large middle-income economies have either adopted or are moving toward carbon pricing.

To help develop the climate coalition proposal, the Global Climate Policy Project[5] convened a working group of global thought leaders from many of the world's major emitting countries. This flagship report, the product of their

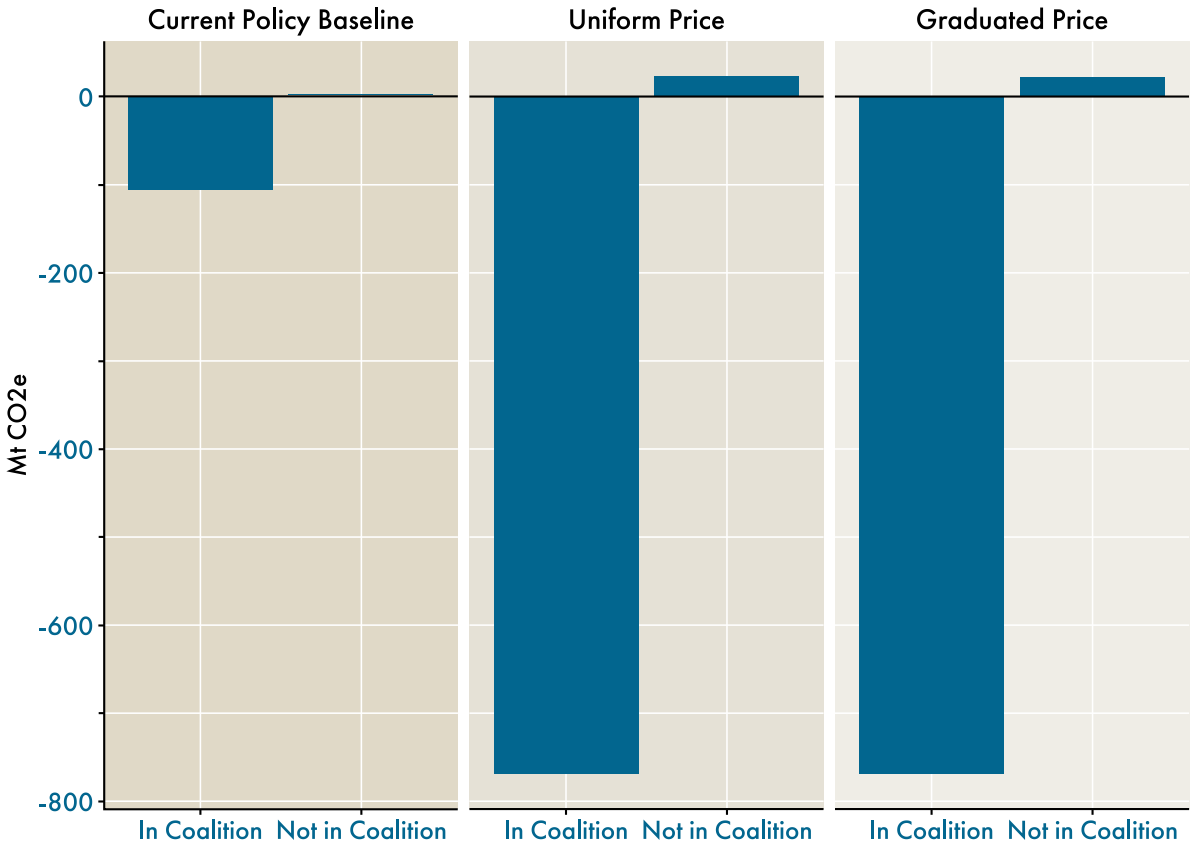
deliberations, marshals new data and modeling to evaluate the potential advantages and trade-offs of forming a coalition. (**Box ES1** describes the modeling.) It also presents concrete options and guidelines for coalition design and implementation. The aim is to help governments and other stakeholders identify practical ways in which multilateral coordination around carbon pricing could enable a range of countries—with varied domestic circumstances and capacities—advance widely held goals for climate mitigation, economic development, equity, and trade.

DESIGNING AN EFFECTIVE COALITION FOR CLIMATE, ECONOMIC DEVELOPMENT, AND COMPETITIVENESS

This report's analysis underscores that a well-designed coalition could deliver substantial climate and economic benefits:[6]

- **Far greater emissions impact.** A climate coalition delivers emissions cuts about **seven times** larger than the *Current Policy Baseline*, whether the coalition imposes a *Uniform Price* across all members or a *Graduated Price* tiered by country income groupings. These reductions represent roughly 1.5% of global annual greenhouse gas emissions (2.0% of global carbon dioxide emissions)—equivalent to the total emissions of Canada—and could help establish a strong foundation for expanding to other sectors.

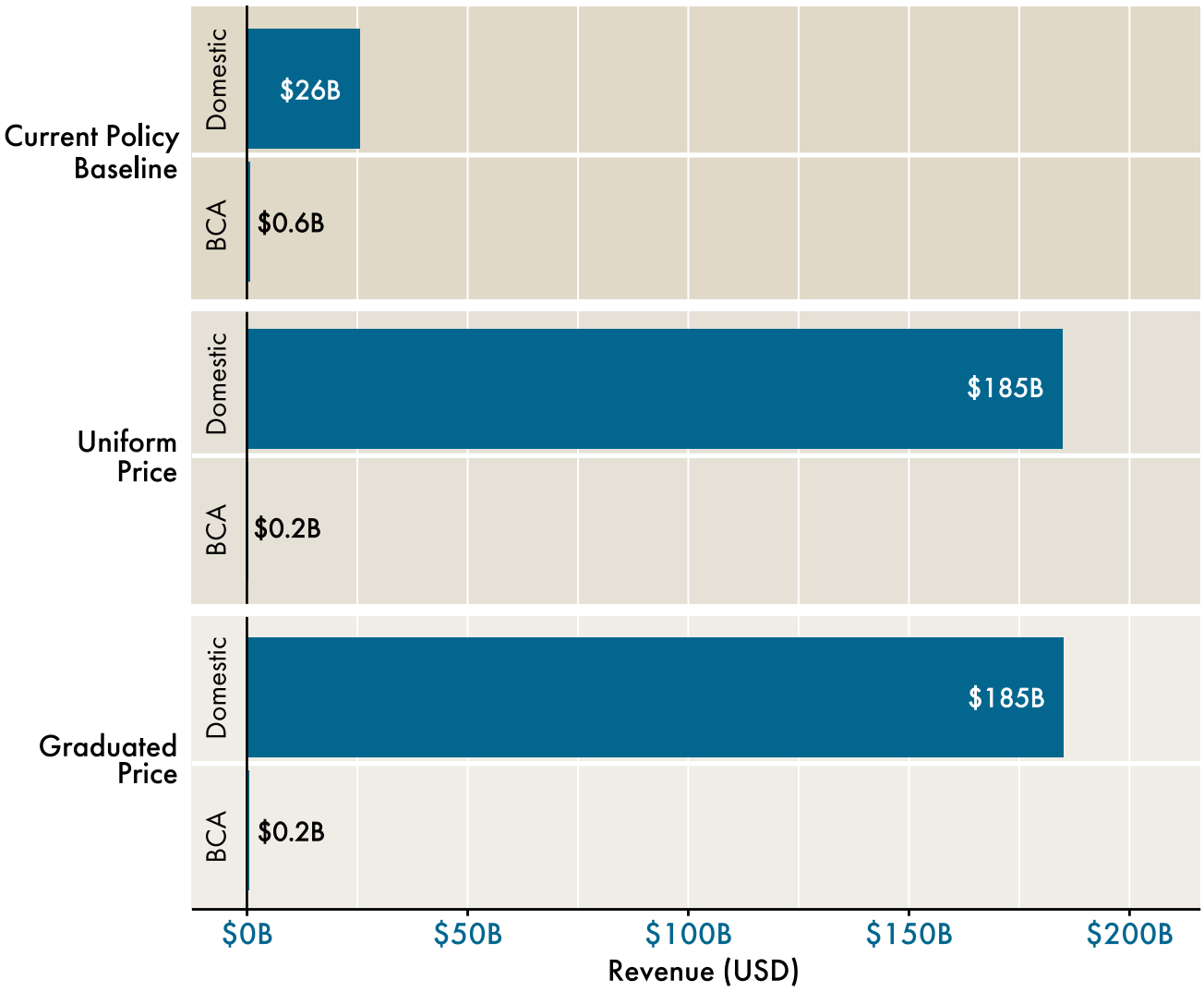
Figure ES1: A climate coalition leads to significantly greater emission reductions than the *Current Policy Baseline*.



Note: Emissions changes, given in million metric tons (Mt) carbon dioxide equivalent (CO_2e), are simulated annual reductions generated by the price floor relative to 2023 levels.

➤ **Significant new revenues.** A climate coalition raises nearly **USD 200 billion annually** for a broad set of countries. Notably, most revenue under the coalition scenarios is generated through domestic carbon pricing, not BCAs.

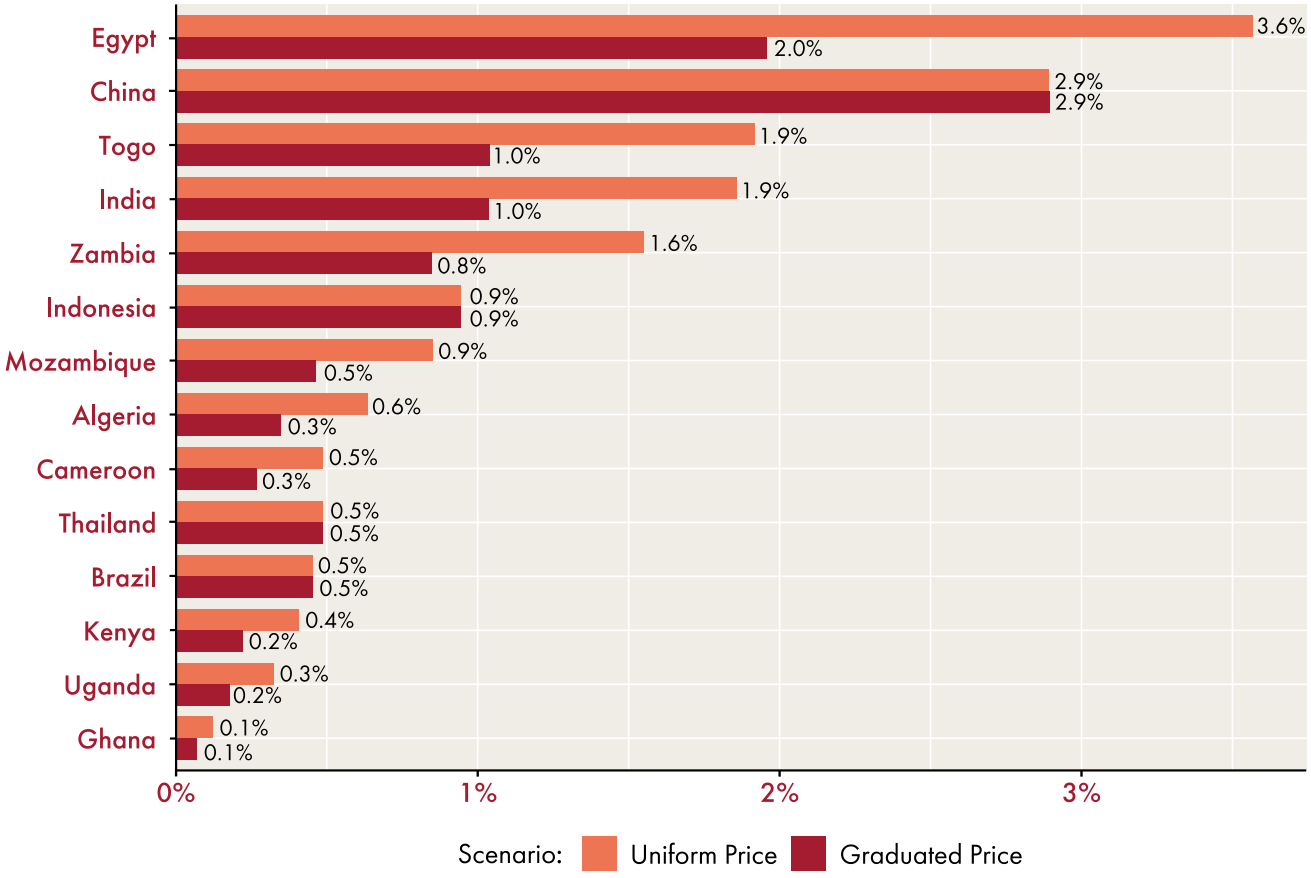
Figure ES2: A climate coalition generates substantial revenues for a broad set of countries.



Notes: Domestic revenue reflects the total domestic tax revenue generated by the price floors. BCA revenue refers to fees paid by importers to coalition countries under the BCA. The figure shows simulated annual effects with 2023 as the reference year.

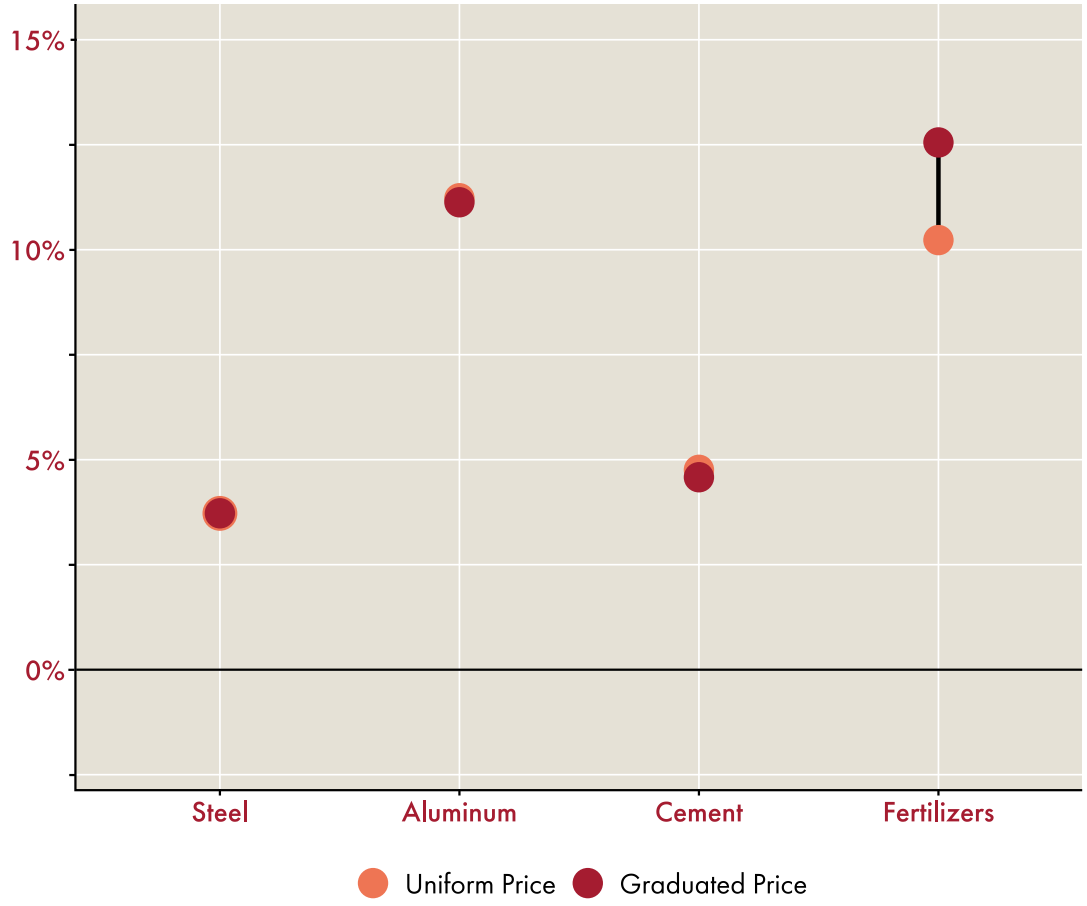
While China accounts for the largest share of overall revenues, many countries see meaningful gains. These revenues could help improve countries' fiscal positions, support social spending and climate investments, and be used to address other development needs.

Figure ES3: Both coalition scenarios generate meaningful revenue as a share of general government revenue.



➤ **Manageable price impacts.** Carbon pricing leads to a **moderate increase in commodity** prices in target industries in coalition member countries. Steel prices increase by 4%, aluminum prices increase by 11%, cement prices increase by 5%, and fertilizer prices increase by 10% to 13%, all relative to the *Current Policy Baseline*. Further, price increases in primary materials often translate into much smaller price increases for final goods purchased by consumers.

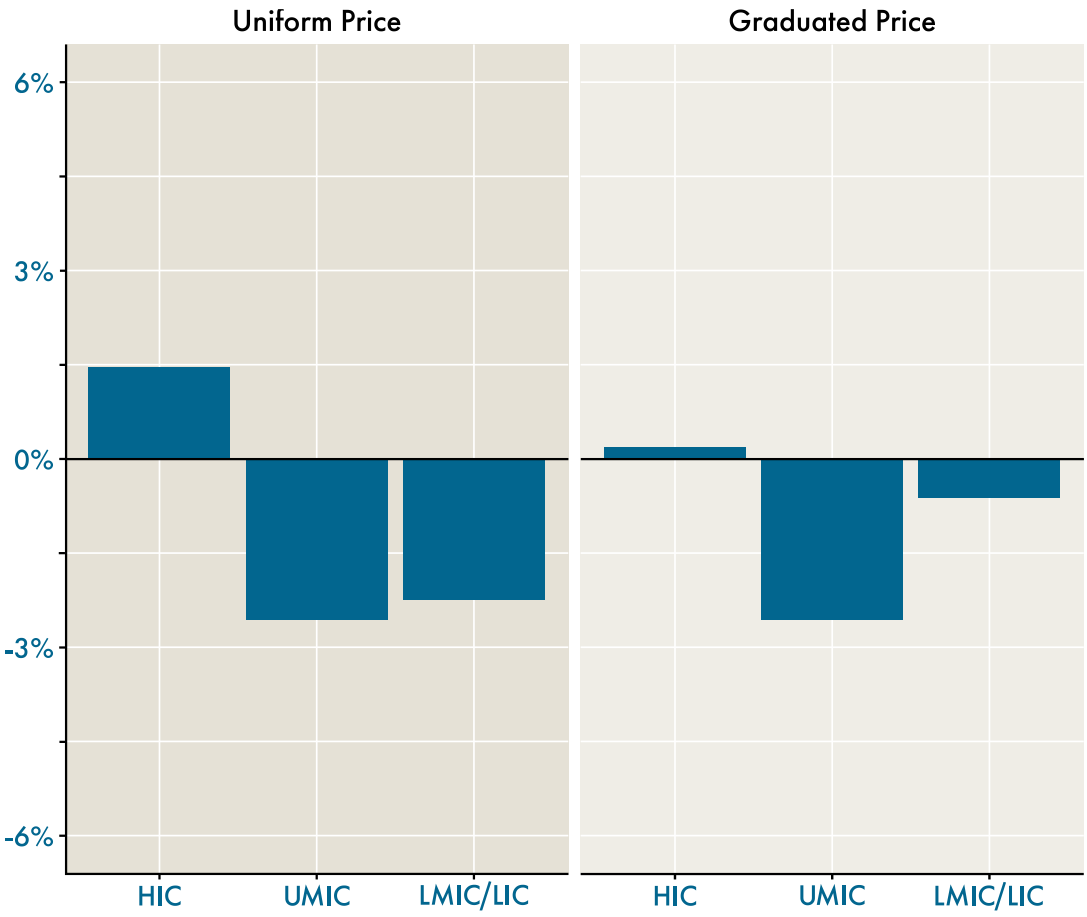
Figure ES4: Coalition members experience moderate changes in prices in target industries relative to the *Current Policy Baseline*.



Note: Simulated price changes show the difference between prices under a given coalition scenario and the *Current Policy Baseline*, using 2023 as the reference year.

➤ **Minimal output losses and carbon leakage.** Industrial producers in coalition countries do not substantially reduce output. In fact, modeled production of steel, aluminum, cement, and fertilizers falls by less than 2% for coalition participants. Compared to the *Uniform Price* scenario, more modest output losses in LMICs and LICs under the *Graduated Price* scenario suggest that the graduated price approach may better support economic growth in the poorest countries.

Figure ES5: Producers in member countries see minor output changes.



Note: Simulated output changes show the difference between production under a given coalition scenario and the *Current Policy Baseline*, using 2023 as the reference year.

BEYOND CARBON PRICING: INCENTIVIZING PARTICIPATION THROUGH COMPLEMENTARY POLICIES

As low- and middle-income countries are projected to account for the largest share of global GHG emissions this century, their participation is critical to the coalition's long-term effectiveness. Expanded membership also enhances the coalition's legitimacy, increases its market power, and amplifies network effects—making participation more attractive and ultimately accelerating global climate action.

To help ensure broad participation and enable low- and middle-income countries to raise their climate ambition, the report describes how the coalition's policy framework could include a targeted package of measures to promote the adoption of low-carbon technologies (LCTs), extend climate finance, and strengthen institutional capacity. The coalition should also consider how to integrate offsets into its policy framework.

Joining the climate coalition and agreeing to price industrial carbon emissions and apply BCAs would signal low- and middle-income countries' commitment to meaningful climate action—a commitment that the package of incentive measures is intended to reinforce:

- Accelerate LCT uptake. Coalition members could promote adoption of low-carbon technologies by reducing trade barriers on clean technologies, harmonizing technical standards, and promoting joint ventures between firms in member countries.

- Climate finance and capacity-building. A portion of the revenues from carbon pricing and border adjustments could be used to mobilize finance in support of efforts by low- and middle-income countries to transition to low-carbon economies and to expand capacity for carbon pricing and green technology adoption. For example, a portion of these revenues could be used to establish a trust fund at a multilateral development bank (MDB) to help finance, on concessional terms, projects in these countries that support investment in decarbonization, mobilize pull finance for hard-to-abate sectors, or provide sectoral or country-specific guarantees to free up additional space for MDB lending.

- Carbon offsets. A well-regulated system for recognizing high-integrity carbon offsets could broaden coalition participation, lower compliance costs, channel private investment (especially into low- and middle-income countries), and support forest conservation—provided it includes robust measurement, additionality, and strong governance safeguards.

GOVERNING AND IMPLEMENTING A CLIMATE COALITION

An agile and effective governance structure will be critical for the coalition to align incentives and harmonize trade policies. Early priorities should center on core decisions around carbon pricing—such as the price level, industry/sector coverage (e.g., steel, cement, aluminum, fertilizers), and BCAs for non-members—while establishing practical mechanisms, like mutual recognition of national systems, given institutional diversity across countries. Members will also need to develop approaches to account for the many countries that implement carbon pricing via an emissions trading system (ETS) instead of a carbon tax, as well as the different rules embedded in countries' ETSs. Assuming low- and middle-income countries are among its early members, the coalition's governance structure may be called upon to shape and approve efforts to facilitate technology

diffusion, extend climate finance, and support capacity-building. As the coalition grows, governance could expand to additional sector coverage and accession criteria for new members, supported by clear rules for representation, decision-making, and the roles of a technical secretariat, leadership, and committees.

Transparency and a strong measurement, reporting, and verification (MRV) system will be essential for effective coalition implementation. MRV will verify that members uphold their carbon pricing commitments and ensure accurate border adjustments on imports from non-members with differing climate policies. To balance integrity and practicality, non-members would provide detailed product-level data for BCA calculations, while members would submit periodic aggregate sector-level reports to an independent body—streamlining requirements for members while holding non-members to stricter reporting standards.

FROM FRAMEWORK TO ACTION: WHY NOW AND WHAT NEXT?

As the world heads to Brazil for COP30, uncertainty—both about global trade and international relationships generally, and about the future of the international climate policy regime specifically—is running high. In that context, fresh approaches, like the formation of a climate coalition, offer an opportunity to reset the conversation and focus on shared solutions.

Translating the climate coalition proposal into reality will require coordinated action from multiple stakeholders, including governments—likely led by finance and trade ministries in potential coalition countries—as well as international organizations and forums, researchers and civil society, and the private sector. High-profile support from current and future COP presidencies could be instrumental in creating the political space for constructive engagement and enabling a diverse group of countries to participate, both as potential coalition members and in deciding key design and implementation details.

Discussions among these stakeholders, including informal dialogue between like-minded countries, should begin now, in the window before the EU CBAM begins taking effect in 2026. The alternative is a fragmented patchwork of BCAs and compliance standards that complicates trade relations, increases administrative burdens for affected firms, risks undermining the integrity of individual countries' policies, and foregoes the greater climate benefits that could be achieved by a more coordinated and cooperative approach.

By advancing practical and equitable solutions, the climate coalition approach offers a promising path forward for those countries that are ready to lead. International trade, properly harnessed, can accelerate the global deployment of clean technologies, channel climate finance to where it is needed most, and create economic incentives for countries to strengthen their climate policies. The coalition approach recognizes these realities, building on existing momentum while creating practical pathways for countries to work together on climate action, even in an era of geopolitical uncertainty. This report lays out a flexible, evidence-based framework for a climate coalition rooted in effectiveness and fairness. Now, the task is to translate this framework into action.

Box ES1: Modeling a Climate Coalition

The report's analysis assumes that carbon pricing in a climate coalition initially applies to four emissions-intensive industries: steel, aluminum, cement, and fertilizers. Because these industries alone account for more than 20% of global carbon emissions, coordinating on emissions pricing—whether pricing is implemented through carbon taxes or by an emissions trading system (ETS)—could deliver substantial greenhouse gas reductions and send a strong market signal for investment in low-carbon technologies, especially if indirect emissions from electricity use are included. The coalition could consider expanding to additional industries and sectors as it matures.

To assess the impacts of a climate coalition on climate and economic outcomes, the report models two scenarios that vary the level of domestic carbon pricing and accompanying BCAs adopted by coalition members alongside a current policy baseline scenario:[7]

- *Uniform Price Climate Coalition*. In this scenario, coalition members adopt a single carbon price floor, which the report models at USD 50 per ton ($50/t) of carbon dioxide emissions for illustration purposes.

- *Graduated Price Climate Coalition*. This scenario assumes three different carbon pricing tiers for (1) lower-middle-income and low-income countries (LMIC/LIC), (2) upper-middle-income countries (UMIC), and (3) high-income countries (HIC).[8] For purposes of illustration, the analysis assumes the price tiers are $25/t, $50/t, and $75/t for LMICs/LICs, UMICs, and HICs, respectively, though these tiers and groupings would need to be deliberated and agreed upon by coalition members.

- *Current Policy Baseline*. This scenario reflects one possible trajectory of international climate policy, with the EU ETS and full EU CBAM implementation. To simplify modeling, it assumes that all countries outside the European Union, United Kingdom, and European Free Trade Association either do not implement planned carbon pricing scenarios or retain high levels of free allowances, even though many countries are undertaking important policy changes at present (including Australia, Brazil, Canada, China, India, and Indonesia). Because several countries are implementing frameworks to gradually reduce free allowances and strengthen carbon prices, the *Current Policy Baseline* may underestimate the current trajectory of emissions reductions.

While this report models the *Uniform Price Coalition* and *Graduated Price Coalition* as two distinct scenarios, in practice, they are not mutually exclusive. For example, if the coalition adopts a graduated price, it could consider embedding clear sunset provisions that gradually raise lower-tier prices so countries "graduate" into a single uniform price as their incomes grow and their capacity to decarbonize expands.

The climate coalition scenarios include large emitters with existing industrial carbon pricing mechanisms or the legal or regulatory approval to impose them in the near future. The coalition scenarios also include a bloc of African countries that produce and export large amounts of relatively clean products from the target industries, suggesting they would be poised to benefit from a climate coalition.[9] Table ES1 summarizes assumptions about coalition membership in the two coalition scenarios and the *Current Policy Baseline* scenario.

Box ES1: Modeling a Climate Coalition (continued)

Table ES1: Overview of coalition scenarios

	Current Policy Baseline	Uniform Price	Graduated Price
Country membership	European Union, United Kingdom, Iceland, Norway, Switzerland, Liechtenstein	Algeria, Australia, Brazil, Cameroon, Canada, China, Egypt, European Union, Ghana, Iceland, India, Indonesia, Kenya, Liechtenstein, Mozambique, Norway, Switzerland, Thailand, Togo, United Kingdom, Uganda, Zambia	

Executive Summary Endnotes

1 COP30 is shorthand for the 30th major meeting or "Conference of Parties" to the United Nations Framework Convention on Climate Change (UNFCCC). First adopted in 1992 and entering into force two years later, 198 countries have ratified the UNFCCC.

2 UNFCCC, *Outcome of the first global stocktake. Decision 1/CMA.5* (FCCC/PA/CMA/2023/16/Add.1), (December 13, 2023), https://unfccc.int/documents/636608.

3 The coalition proposal covers four industries: iron and steel, aluminum, cement, and fertilizers. Throughout the report, "steel" is used to denote "iron and steel."

4 World Bank, *State and Trends of Carbon Pricing 2025* (2025), https://hdl.handle.net/10986/43277.

5 The Global Climate Policy Project is a joint initiative of Harvard University and the Massachusetts Institute of Technology that is dedicated to identifying and advancing innovation in global climate policies and institutions. *See*: https://salatainstitute.harvard.edu/research-initiatives/the-global-climate-policy-project/.

6 Sources for production and emissions data by industry are as follows: Manufacturing and Industrial Processes sector – Iron & Steel Manufacturing Emissions, Climate TRACE Emissions Inventory dataset, TransitionZero, accessed December 11, 2024, https://climatetrace.org; Aluminium Smelters Asset Cost Service, proprietary dataset, Wood Mackenzie; Secondary Aluminum Production, proprietary dataset, World Bureau of Metal Statistics (WBMS) from LSEG Data and Analytics; Manufacturing and Industrial Processes sector – Cement Manufacturing Emissions, Climate TRACE Emissions Inventory dataset, TransitionZero, accessed December 11, 2024, https://climatetrace.org; Manufacturing and Industrial Processes sector – Chemicals, and Pulp and Paper Emissions, Climate TRACE Emissions Inventory dataset, TransitionZero, accessed December 11, 2024, https://climatetrace.org. We use ammonia production as a proxy for fertilizer production, since it accounts for the vast majority of emissions associated with nitrogenous fertilizers. Our focus on nitrogenous fertilizers follows the EU CBAM, which includes only nitrogen-based fertilizers, and reflects the higher emissions intensity of manufacturing nitrogenous fertilizers relative to potassium or phosphorous-based fertilizers. Sources for Figure ES3 are as follows: 2024 General Government Revenue (National Currency), World Economic Outlook database, IMF, last updated April 2025, https://www.imf.org/en/Publications/WEO/; 2024 Official Exchange Rate (LCU per US$, Period Average), World Development Indicators, World Bank, 2025, https://data.worldbank.org/indicator/PA.NUS.FCRF; Ghana Monthly Exchange Rate Indicators, Exchange Rates, Bank of Ghana, 2025, https://www.bog.gov.gh/economic-data/exchange-rate.

7 While the report employs two trade models, except for Figure ES3, the results of only one model—*Model without Trade Frictions*—are presented in the Executive Summary for simplicity. This *Model without Trade Frictions* assumes that goods are *perfect substitutes* across countries; for instance, a consumer values a ton of aluminum from the United States the same as a ton from China, regardless of where the consumer is located, all else equal. This assumption is a reasonable simplification for basic, relatively homogeneous materials such as steel, aluminum, cement, and fertilizers. Figure ES3 presents the results of the *Model with Trade Frictions*, which calculates carbon pricing revenue at the country level.

8 The graduated carbon price floor levels and income-based country groups used in our modeling follow Ian W.H. Parry, Simon Black, and James Roaf, *Proposal for an International Carbon Price Floor Among Large Emitters*, International Monetary Fund Staff Climate Notes (2021), https://www.imf.org/en/Publications/staff-climate-notes/Issues/2021/06/15/Proposal-for-an-International-Carbon-Price-Floor-Among-Large-Emitters-460468. For the *Graduated Price* scenario in this analysis, the HIC group includes Australia, Canada, the European Union (plus the EU ETS-linked countries: Iceland, Norway, Switzerland, and Liechtenstein), and the United Kingdom. The UMIC group includes Brazil, China, Indonesia, and Thailand. The LMIC/LIC group includes Algeria, Cameroon, Egypt, Ghana, India, Kenya, Mozambique, Togo, Uganda, and Zambia.

9 For this analysis, a country was included in the bloc if it exports 40% or more of its production in at least one of the target industries outside of Africa and produces with an emissions intensity equal to or lower than the global average.

1. Introduction: Why a Climate Coalition, and Why Now?

At a time when national and international commitments on climate change risk being overshadowed by domestic economic concerns, shifting geopolitical dynamics, and rising trade tensions, the need for innovative approaches to sustain and accelerate progress toward global decarbonization is more urgent than ever. A multilateral coalition, composed of countries willing to coordinate on carbon pricing and related policies, holds promise for meeting the global challenges of this moment.

As envisioned in this flagship report, coalition members would commit to a carbon price floor— i.e., a minimum carbon price that would apply to all emissions from agreed target sectors or industries within their borders. To ensure that similar carbon-related costs apply, both to firms within member countries and to goods imported from firms in non-member countries, members would apply border carbon adjustments (BCAs) to imports from non-member countries. The coalition would also implement inducements for additional countries to join, including through support for low-carbon technologies, regulatory and institutional capacity building, climate finance, and preferential market access.

This report reflects the deliberations of a diverse working group of experts from many of the world's major emitting countries. Working group members met regularly over a six-month period and also consulted with policymakers, industry representatives, and thought leaders from around the world with the aim of helping governments and other stakeholders envision a climate coalition, centered on carbon pricing, that also addresses broader goals, such as equity, development, and trade.

A coalition built around carbon pricing offers an effective, practical, and flexible foundation for international cooperation on climate mitigation. It aligns with the widely accepted principle that polluters should pay for the emissions they produce, while also giving countries the freedom to tailor policies to their domestic contexts. Carbon pricing offers a clear and measurable basis for coordination, and an agreement centered on carbon pricing fosters reciprocity.[1]

> *"[A climate coalition] aligns with the widely accepted principle that polluters should pay for the emissions they produce, while also giving countries the freedom to tailor policies to their domestic contexts."*

Border adjustments provide a principled tool to level the playing field for producers that are subject to a carbon price and, at the same time, incentivize broader participation in the carbon pricing coalition. Crucially, border adjustments also help address the free-rider problem, where countries benefit from global emission reductions without contributing proportionally to emission reduction efforts—thereby addressing competitiveness concerns that otherwise present a major obstacle to effective climate action.[2]

While carbon pricing is a core part of the climate coalition proposal, this report also describes how member countries could coordinate on a broader

suite of policies to accelerate decarbonization and support equitable participation. Coalition members could facilitate technology transfer by reducing trade barriers on clean technologies, harmonizing technical standards, and promoting joint ventures between firms in member countries. Revenues from carbon pricing and border adjustments could be used to mobilize finance in support of efforts by low- and middle-income countries to transition to low-carbon economies and to expand capacity for carbon pricing and green technology adoption. A global climate coalition could also push for standards to ensure high-integrity carbon offsets and carbon removal projects. By allowing member countries to leverage nature-based solutions and emerging carbon removal technologies without undermining the integrity of carbon pricing policies, the coalition could help broaden meaningful participation while maximizing global emission reductions.

The climate coalition proposal builds on several other recent initiatives for multilateral coordination on carbon pricing. For example, the Climate Club is an open, high-level forum, established by the *G7*, that fosters international cooperation to accelerate industrial decarbonization by sharing best practices on mitigation policies (this effort is initially focused on steel and cement production).[3] The Coalition of Finance Ministers for Climate Action, which promotes the integration of climate considerations in macroeconomic and fiscal policy, has discussed multilateral approaches to carbon pricing.[4] International organizations, like the International Monetary Fund (IMF), World Bank, World Trade Organization (WTO), and Organization for Economic Cooperation and Development (OECD), have advanced related data and methodological efforts, including convening governments and other stakeholders to find practical ways to develop compatible approaches for measuring carbon emissions.[5] Industry organizations, such as the International Emissions Trading Association, have also promoted greater linkages of carbon markets, while highlighting the private sector's interest in greater harmonization among countries' carbon pricing efforts.[6] Finally, several organizations have proposed regional carbon pricing and CBAM initiatives beyond Europe, including in the Asia-Pacific region.[7]

The sections that follow offer a roadmap for designing and implementing a climate coalition. We begin by outlining core principles for a coalition framework and document the growing global momentum behind carbon pricing. Section 3 then presents two potential scenarios for a coordinated multilateral climate coalition: one with uniform carbon pricing and one with graduated carbon pricing. We model these scenarios against a baseline scenario in which only the European Union and United Kingdom implement CBAMs to develop estimates of impact on emissions, government revenues, and output. Section 4 explores how a climate coalition can attract broader participation through technology transfer, climate finance, capacity building, and carbon offset mechanisms. We also address the governance structures needed to coordinate policies effectively and the MRV systems required to ensure credibility and compliance. The report concludes by outlining concrete next steps for policymakers and stakeholders interested in advancing the climate coalition approach ahead of COP30 and beyond.

Section 1 Endnotes

1 Historical experience shows that reciprocity has been key to the durability of other international agreements ranging from minimum corporate tax frameworks to trade and disarmament treaties [*Elinor Ostrom, Governing the Commons: The Evolution of Institutions for Collective Action* (Cambridge University Press, 1990); and David J.C. MacKay, Peter Cramton, Axel Ockenfels, and Steven Stoft, "Price Carbon—I Will If You Will," *Nature* 526 (2015): 315–16, https://doi.org/10.1038/526315a]; thus, including reciprocity in a carbon price agreement strengthens both the credibility and enforceability of climate cooperation. *See*: Kimberly Clausing and Catherine Wolfram, "Carbon Border Adjustments, Climate Clubs, and Subsidy Races When Climate Policies Vary," *Journal of Economic Perspectives* 37, no. 3 (2023): 137–62, https://doi.org/10.1257/jep.37.3.137; Peter Cramton, David J.C. MacKay, Axel Ockenfels and Steven Stoft, *Global Carbon Pricing: The Path to Climate Cooperation* (The MIT Press, 2017); and Ulrike Kornek and Ottmar Edenhofer, "The Strategic Dimension of Financing Global Public Goods," *European Economic Review* 127 (2020): 103423, https://doi.org/10.1016/j.euroecorev.2020.103423.

2 William Nordhaus, "Climate Clubs: Overcoming Free-Riding in International Climate Policy," *American Economic Review* 105, no. 4 (2015): 1339–70, https://doi.org/10.1257/aer.15000001.

3 "The Climate Club: An Inclusive and Ambitious High-Level Forum for Industry Decarbonisation," Climate Club Secretariat, accessed August 11, 2025, https://climate-club.org.

4 "About the Coalition," Coalition of Finance Ministers for Climate Action Secretariat, accessed August 11, 2025, https://www.financeministersforclimate.org.

5 IMF, OECD, UN, World Bank, and WTO, *Working Together for Better Climate Action: Carbon Pricing, Policy Spillovers, and Global Climate Goals* (2024), https://doi.org/10.1787/2b90fa2c-en; OECD, *OECD Secretary-General Report to G20 Finance Ministers and Central Bank Governors on the Work of the Inclusive Forum on Carbon Mitigation Approaches* (2025), https://doi.org/10.1787/d192d024-en; IMF and OECD, *Tax Policy and Climate Change: IMF/OECD Report for the G20* (2021), https://doi.org/10.1787/9ab5574d-en; World Bank, *State and Trends of Carbon Pricing 2025* (2025), https://hdl.handle.net/10986/43277.

6 Some harmonization efforts are in response to the EU CBAM's implementation. *See*: International Emissions Trade Association, *Evolution of Global Response to EU CBAM* (2025), https://www.ieta.org/global-reactions-to-the-eu-cbam-2025-report.

7 Matt Pollard and Tim Buckley, *A Price on Carbon: Building Towards an Asian CBAM* (Climate Energy Finance, 2025), https://climateenergyfinance.org/wp-content/uploads/2025/06/CEF_A-Price-on-Carbon-Building-Towards-an-Asian-CBAM-Report_05June2025.pdf; Dil B. Rahut, Shingle Sebastian, and Gopal K. Sarangi, *The Carbon Border Adjustment Mechanism, Article 6 Credits, and Domestic Carbon Pricing Instruments: A Proposal for Integration in Asia and the Pacific*, Asian Development Bank Institute Policy Brief (2025), https://www.adb.org/publications/the-carbon-border-adjustment-mechanism-article-6-credits-and-domestic-carbon-pricing-instruments-a-proposal-for-integration-in-asia-and-the-pacific.

2. Designing the Climate Coalition: Core Principles and Framework

This section elaborates on several core principles—self-reinforcement, efficiency, fairness, pragmatism, integrity, and credibility—that would underpin an effective climate coalition and takes stock of national efforts that could support its establishment.

2.1 CORE PRINCIPLES

One of the main challenges to international cooperation on climate change is the free-rider problem: While the benefits of reducing GHG emissions are shared globally, the costs of achieving these reductions, such as through carbon pricing, are borne by individual countries. A coalition framework guided by the core principles discussed in this section can help overcome this challenge.[1]

Self-reinforcement

The framework should be designed to ensure that it is economically beneficial for countries to join and remain in the coalition.[2] Compatibility with the different domestic political contexts of member countries is also critical for the long-term sustainability of the coalition.

Efficiency

The policy framework should embed carbon pricing to provide a durable market signal for reducing GHG emissions and encouraging clean innovation, while also generating fiscal revenues. By making higher-emission products more expensive compared to lower-emission alternatives, carbon pricing encourages decarbonization by every actor in the economy, including firms, households, and non-profit or government entities. In brief, the price mechanism rewards lower-carbon choices and investments. Coalition members would agree to a carbon price floor—i.e., a minimum carbon price that would apply to all emissions from target industries within their borders—while allowing members flexibility to impose a higher carbon price if they wish. The carbon price would apply to all direct emissions from covered entities (Scope 1 emissions), as well as indirect (Scope 2) emissions from these entities (e.g., as a result of their electricity use). Coalition members will need to decide whether to formally link any of their domestic carbon pricing systems, though this is not necessary for the coalition to function. Alternatively, they could establish a process for mutual recognition affirming that carbon pricing approaches are effective and comparable, which might be more practical at the outset given the anticipated diversity in implementation across member countries.

Fairness

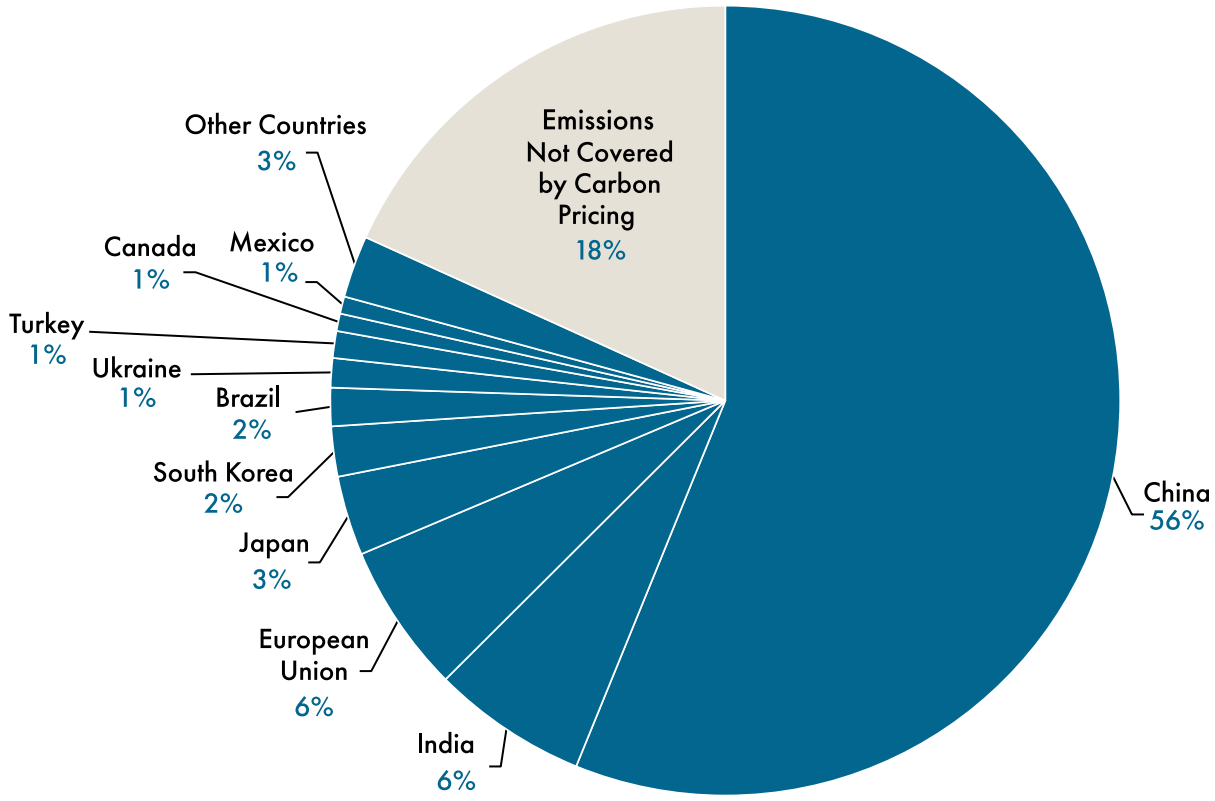
The framework should balance efficiency with the need for fairness by including incentives ("carrots") for participation by low- and middle-income countries that reflect *common but differentiated responsibilities* and help make carbon pricing more accessible. For instance, the coalition design could allow for more permissive use of free allowances[3] under a *uniform* carbon price floor or, as an alternative, permit countries to opt for a

graduated carbon price floor depending on their income level. Provisions could also be included to recognize nature-based solutions (e.g., forest preservation or restoration) and carbon removal, extend support for the adoption and diffusion of low-carbon technologies, and provide climate finance.

Pragmatism

Initially, the framework should focus on a select set of countries and sectors or industries, with a view to broadening country participation and sectoral coverage over time. Building off the European Union's CBAM, we recommend that the framework begin by covering steel, aluminum, cement, and fertilizers, which together account for more than 20% of global carbon emissions. In fact, most carbon pricing regimes introduced to date have started by covering a subset of emissions in the implementing jurisdiction. For practical enforcement and political reasons, the industrial and power sectors are often first to be subject to a carbon price. Now that China has expanded its ETS to cover heavy industry, over 80% of global emissions from steel, aluminum, cement and fertilizers are covered by carbon pricing, through either planned or existing policies (**Figure 1**). These industries are obvious candidates for early inclusion in a coalition, which could help coordinate policies and drive further ambition. Focusing on these industries, whose products tend to be further upstream in the value chain, also limits the immediate impact on consumer prices, making participation more politically feasible. Finally, structuring the coalition around *sectoral* rather than *national* emissions, helps establish a clear metric for assessing effectiveness in terms of GHG reductions within target sectors.

Figure 1: Four major industries are prime candidates for early inclusion in the coalition, as the vast majority of their global emissions are covered by carbon pricing.



Notes: Emissions data for steel, cement, and fertilizers are from Climate TRACE; data on primary aluminum is from Wood Mackenzie; data on secondary aluminum is from the World Bureau of Metal Statistics. Carbon pricing coverage information is from the World Bank's State and Trends of Carbon Pricing Dashboard.[4]

Part of the governance challenge for a climate coalition will be to establish clear processes and criteria for adding member countries and expanding coverage to additional sectors or industries over time.

Integrity

The framework should ensure that similar carbon-related costs apply, both to firms within member countries and to goods imported from firms in non-member countries. Members would agree to impose a BCA on imports of goods from covered sectors or industries in non-member countries, while not imposing a BCA on imports of these goods from other member countries. This approach would help member countries ensure a level playing field, address competitiveness concerns, avoid carbon leakage, and encourage other countries to join the coalition.

Credibility

Transparency, as well as a robust MRV regime are integral to strengthening compliance within the climate coalition. Coalition members will need to report aggregated, sector- or industry-level emissions and pricing data to build mutual trust in the system, while firms in non-member countries will need to provide more granular, product-level data to enable accurate application of BCAs and ensure climate integrity.

Box 1: What Is Carbon Pricing?[5]

By placing a cost on GHG emissions, carbon pricing creates a market incentive to encourage polluters to reduce emissions and invest in cleaner alternatives. In effect, pricing aligns economic incentives with climate goals by internalizing the environmental cost of emissions. The advantage of carbon pricing over more conventional regulatory approaches is that it gives firms greater compliance flexibility, which in turn reduces overall economic cost. There are two main types of carbon pricing instruments:

- Carbon taxes attach a fixed price to every ton of GHG emissions from covered entities, thereby providing a clear price signal to reduce emissions and generating revenue for governments. This approach is typically straightforward to implement through existing tax systems and offers price certainty for businesses.

- Emissions trading systems (ETSs) place a limit, or cap, on the overall quantity of emissions or emissions intensity (tons per unit output) of covered entities. Typically, companies must surrender allowances or permits for each ton of GHGs emitted within a compliance period (the usual denomination for such allowances or permits is one ton of CO_2 equivalent). Because allowances can be traded, their price fluctuates depending on market supply and demand. ETSs, like carbon taxes, can generate revenues for the government if they are sold or auctioned rather than allocated for free. ETSs function as carbon pricing mechanisms by placing an explicit cost on emissions, but unlike taxes, they provide emissions certainty by targeting emission levels rather than prices.[6]

2.2 GROWING MOMENTUM BEHIND CARBON PRICING

As of 2025, 80 carbon pricing instruments have been introduced across 50 jurisdictions worldwide. Collectively, these policies—which include 43 carbon taxes and 37 ETSs—cover about 28% of global GHG emissions. In 2024, carbon pricing generated more than USD 100 billion in revenue. Jurisdictions with a carbon tax or ETS represent nearly two-thirds of global GDP. While most of these systems are currently found in high-income countries, all large middle-income countries have either adopted or are actively considering carbon pricing.[7]

> *"As more countries recognize the importance of carbon pricing and begin developing systems that fit their unique economic and political situations, they are laying the groundwork for the kind of climate coalition described in this report."*

As more countries recognize the importance of carbon pricing and begin developing systems that fit their unique economic and political situations, they are laying the groundwork for the kind of climate coalition described in this report. Australia, for example, is using a credit-based system to reduce emissions from its biggest industries. Brazil has passed legislation to establish a national carbon market that includes both industrial emissions and forest-based carbon offsets. Canada's approach to carbon pricing illustrates how a flexible yet coordinated pricing framework can be implemented in a way that balances national standards with regional autonomy. China's national carbon market—the world's largest—has rapidly evolved as a key instrument for meeting the country's climate goals, leveraging a rate-based design tailored to China's economy. To match its fast-growing economy, India has launched a carbon market that sets targets based on emissions intensity rather than absolute limits. Indonesia is expanding the carbon trading system it has already implemented for its power sector and plans to link it with a carbon tax. Thailand has started with a small, revenue-neutral fuel tax and is preparing to introduce a broader carbon pricing system for industry. In African countries, experience with carbon pricing remains limited but evolving, with growing interest across the continent and significant potential to support fiscal resilience and sustainable development. The country case studies in Appendix E of this report offer evidence, both of the growing momentum behind carbon pricing generally, and of the myriad ways that pricing policies can be designed to be both effective and practical.

Section 2 Endnotes

1 This proposal shares features of the "climate club" proposal in William Nordhaus, "Climate Clubs: Overcoming Free-Riding in International Climate Policy," *American Economic Review* 105, no. 4 (2015): 1339–70, https://doi.org/10.1257/aer.15000001. One important difference is that in the Nordhaus version of a climate club, non-members are charged a punitive across-the-board tariff. In our climate coalition proposal, by contrast, non-participants would be subject to a border carbon adjustment.

2 Reciprocity in coalition design could further strengthen self-reinforcement: Linking benefits of membership—such as climate finance—to countries' climate commitments could create stronger incentives for coordinated climate action. Developing countries would receive support for implementing ambitious climate policies, which would further reduce free-riding incentives, while donor countries would gain assurance that their contributions directly enhance global emissions reductions rather than merely substitute for domestic efforts. See: Ulrike Kornek and Ottmar Edenhofer, "The Strategic Dimension of Financing Global Public Goods," *European Economic Review* 127 (2020): 103423, https://doi.org/10.1016/j.euroecorev.2020.103423.

3 Governments can choose to issue some allowances for free under an emissions trading system (See: Box 1) as a way to reduce upfront costs to companies and help them adjust to the policy or protect them from foreign competition (effectively, free allowances function as a subsidy). Even with free allowances, companies still face a market signal to reduce emissions since they can sell their unused allowances to other companies.

4 Sources for production and emissions data by industry are as follows: Manufacturing and Industrial Processes sector – Iron & Steel Manufacturing Emissions, Climate TRACE Emissions Inventory dataset, TransitionZero, accessed December 11, 2024, https://climatetrace.org; Aluminium Smelters Asset Cost Service, proprietary dataset, Wood Mackenzie; Secondary Aluminum Production, proprietary dataset, World Bureau of Metal Statistics (WBMS) from LSEG Data and Analytics; Manufacturing and Industrial Processes sector – Cement Manufacturing Emissions, Climate TRACE Emissions Inventory dataset, TransitionZero, accessed December 11, 2024, https://climatetrace.org; Manufacturing and Industrial Processes sector – Chemicals, and Pulp and Paper Emissions, Climate TRACE Emissions Inventory dataset, TransitionZero, accessed December 11, 2024, https://climatetrace.org. We use ammonia production as a proxy for fertilizer production, since it accounts for the vast majority of emissions associated with nitrogenous fertilizers. Our focus on nitrogenous fertilizers follows the EU CBAM, which includes only nitrogen-based fertilizers, and reflects the higher emissions intensity of manufacturing nitrogenous fertilizers relative to potassium or phosphorous-based fertilizers. Data on carbon pricing sectoral coverage are from the State and Trends of Carbon Pricing Dashboard, World Bank, accessed August 20, 2025, https://carbonpricingdashboard.worldbank.org/compliance/price.

5 The content in the text box is adapted from the World Bank, *State and Trends of Carbon Pricing 2025* (2025), https://hdl.handle.net/10986/43277.

6 Emissions trading systems (ETSs) are designed as quantity-based policies that control aggregate emissions through a fixed cap, allowing prices to fluctuate naturally. Within the framework of an international carbon price agreement, these systems require explicit mechanisms to adjust the cap in response to price signals in order to maintain agreed-upon price floors. Such price floor mechanisms already exist in some ETSs, such as the state of California's ETS.

7 World Bank, *State and Trends of Carbon Pricing 2025* (2025), https://hdl.handle.net/10986/43277.

3. Scenarios and Outcomes: The Case for Action

Building on the framework set forth in Section 2, this section presents two illustrative scenarios for the design of a climate coalition. The aim is to help policymakers and stakeholders evaluate the potential advantages and trade-offs of forming a coalition by estimating impacts on key climate and economic outcomes, using the current trajectory under EU CBAM implementation as the policy baseline.

The analysis employs two complementary modeling frameworks to enhance the robustness of the findings. The two models incorporate assumptions about potential coalition membership and carbon pricing structures. Potential coalition participants include major emitting countries with existing or intended industrial carbon pricing mechanisms, as well as selected lower-income countries that could derive significant benefits from coalition membership. The section concludes by considering the political and administrative implications of advancing a climate coalition relative to maintaining the current policy baseline.

3.1 MODELING SCENARIOS

Our analysis assumes that carbon pricing in a climate coalition initially applies to just four emissions-intensive industries: steel, aluminum, cement, and fertilizers. Together these industries account for more than 20% of global carbon dioxide emissions, and even more after accounting for emissions from offsite electricity production (Table 1). With the exception of cement, outputs from these industries are also heavily traded. While making up a large portion of global carbon emissions, the total economic value of these basic materials is less than 5% of global GDP. The coalition could consider expanding to additional industries and sectors as it matures.

Table 1: Industries initially targeted under a climate coalition are heavily traded and emissions-intensive.

Industry	Industry share of global trade (%)	Annual value traded (1B USD)	Share of production that is exported (%)	Share of global CO_2 emissions (%)
Steel	3.5	839	23	10
Aluminum	1.0	253	41	2
Cement	0.1	17	2	8
Fertilizers	0.5	131	60	1

Notes: Production data come from Climate TRACE for steel, WoodMac for primary aluminum, the World Bureau of Metal Statistics for secondary aluminum, the U.S. Geological Survey for cement, and the FAO for fertilizer. Trade data come from UN Comtrade. Production and trade data are from 2023. Emissions data for steel, cement, and fertilizers are from Bataille et al. (2024) and do not include emissions from electricity generated offsite. Emissions data for aluminum are from Climate TRACE and include emissions from electricity generated offsite.

We model two scenarios that vary the level of domestic carbon pricing and accompanying border carbon adjustments (BCAs) adopted by coalition members alongside a current policy baseline scenario:

- *Uniform Price Climate Coalition*. In this scenario, coalition members adopt a single carbon price floor of USD 50 per metric ton ($50/t) of carbon dioxide emissions. Coalition members would all set the BCA for non-members to $50/t.

- *Graduated Price Climate Coalition*. This scenario assumes three different carbon pricing tiers for (1) low-income and lower-middle-income countries (LMIC/LIC), (2) upper-middle-income countries (UMIC), and (3) high-income countries (HIC), as defined by the World Bank's income group classifications.[1] LMICs/LICs impose a domestic carbon price floor that is one-third of the HIC price floor, and UMICs impose a domestic carbon price floor that is two-thirds of the HIC price floor. In particular, the analysis assumes the price tiers are $25/t, $50/t, and $75/t for LMICs/LICs, UMICs, and HICs, respectively. Coalition members would commit to implementing a carbon price floor that reflects their income tier. While they would vary the level of their domestic carbon prices, all coalition members would set the BCA for non-members to the same level, $75/t.[2]

- *Current Policy Baseline*. This scenario represents one possible trajectory of international climate policy. It incorporates the EU ETS with the EU CBAM and assumes their integration with the United Kingdom and other countries already linked to the EU ETS (Iceland, Norway, Switzerland, and Liechtenstein). It extends coverage to Scope 2 (indirect) emissions for steel and aluminum (where only Scope 1 is currently regulated) and assumes no free allowances, in line with EU plans for a full phaseout by 2034.[3] To simplify modeling, it assumes that all countries outside the European Union, United Kingdom, and European Free Trade Association either do not implement planned carbon pricing scenarios or retain high levels of free allowances, even though many countries are undertaking important policy changes at present (including Australia, Brazil, Canada, China, India, and Indonesia). Because several countries are implementing frameworks to gradually reduce free allowances and strengthen carbon prices, the Current Policy Baseline may underestimate the current trajectory of emissions reductions.[4]

Table 2: Overview of coalition scenarios

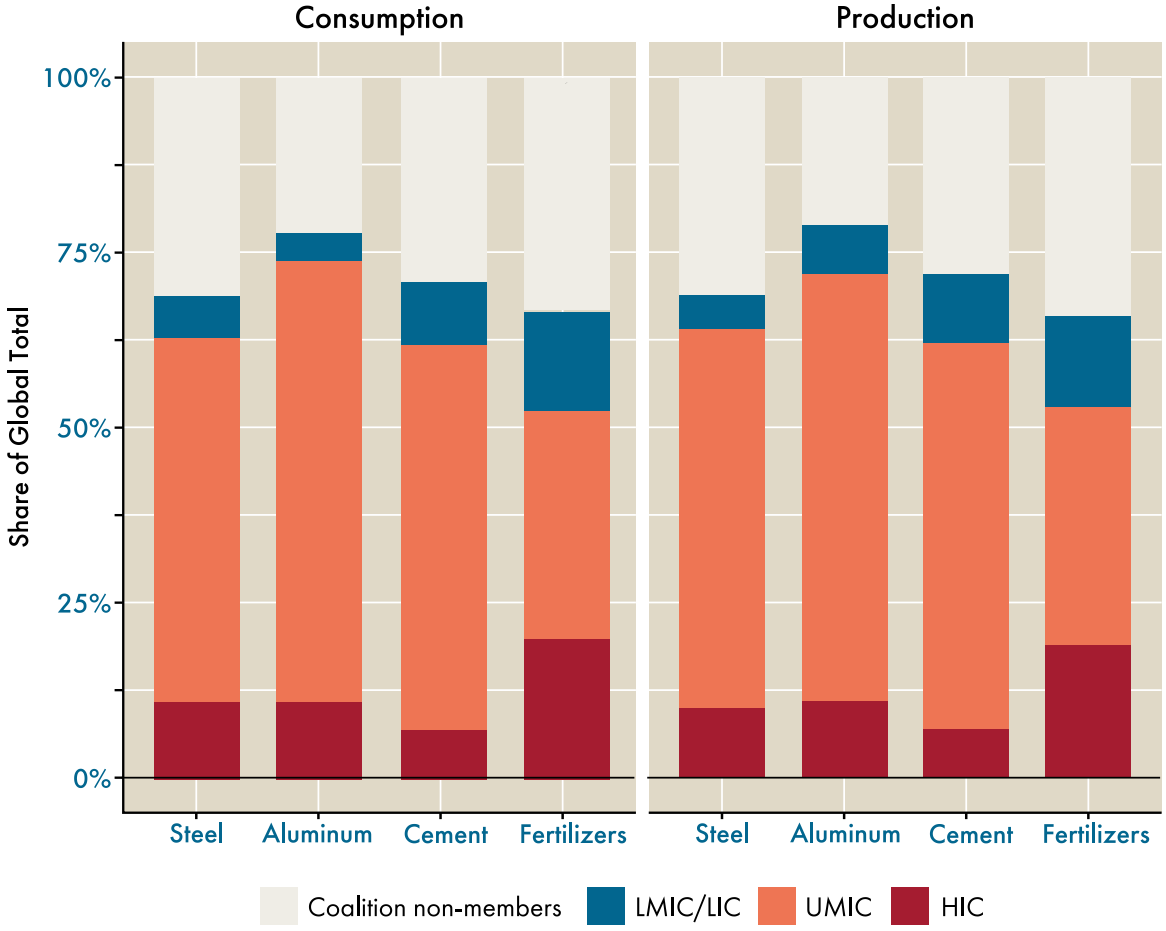
	Current Policy Baseline	Uniform Price	Graduated Price
Country membership	European Union, United Kingdom, Iceland, Norway, Switzerland, Liechtenstein	Algeria, Australia, Brazil, Cameroon, Canada, China, Egypt, European Union, Ghana, Iceland, India, Indonesia, Kenya, Liechtenstein, Mozambique, Norway, Switzerland, Thailand, Togo, United Kingdom, Uganda, Zambia	
Carbon price floor	$75/t	$50/t	HIC: $75/t UMIC: $50/t LMIC/LIC: $25/t
Border adjustment	$75/t	$50/t	$75/t
Free allowances	No	No	No

Note: In the *Graduated Price* scenario, all countries set the border adjustment to the same value, $75/t, while varying the level of their domestic carbon price.

The climate coalition scenarios include all the countries in the *Current Policy Baseline*—the European Union, United Kingdom, and non-EU countries that are currently linked to the EU ETS (Iceland, Norway, Switzerland, and Liechtenstein)—as well as a group of potential first movers, including Australia, Brazil, Canada, China, India, Indonesia, and Thailand. The first movers are generally large emitters with existing industrial carbon pricing mechanisms or political momentum to impose them in the near future.[5] The coalition also includes a bloc of African countries: Algeria, Cameroon, Egypt, Ghana, Kenya, Mozambique, Togo, Uganda, and Zambia. The bloc of African countries produces and exports large amounts of relatively clean products from the target industries, suggesting these countries would be poised to benefit from a climate coalition.[6]

The fact that coalition members collectively represent a large share of global production and consumption in each of the covered industries (i.e., steel, aluminum, cement, and fertilizers) strengthens the coalition's cumulative climate impact, economic leverage, and legitimacy. **Figure 2** shows the share of global production and consumption for HIC, UMIC, LMIC/LIC coalition members, and coalition non-members in 2023 across these four industries. The coalition is designed to be open to all countries who are willing to join, and expanding its membership increases its global impact with increased emissions reductions and revenue. For example, a broader coalition could include Turkey, Japan, and South Korea—countries with existing or planned national carbon pricing instruments.[7]

Figure 2: Climate coalition members contribute a significant share of global consumption and production in the target industries.



Note: Consumption is measured as production plus net imports.[8]

The price floors selected for the *Uniform Price* and *Graduated Price* scenarios are illustrative and set at levels that generate similar quantities of global carbon reductions in our modeling analysis. This allows for easier comparison of outcomes, holding cumulative emissions reductions roughly constant, between the two coalition pricing scenarios (uniform vs. graduated) and between those scenarios and the *Current Policy Baseline*.

Box 2: Modeling Overview

The analysis leverages two economic models to simulate the effects of carbon pricing on the four emissions-intensive industries initially targeted in the coalition scenarios. Both models draw on frameworks that are commonly used to analyze the economic effects of trade but differ in how they capture global trade responses to policy. By using two distinct frameworks, the analysis aims to show a range of possible outcomes relative to the *Current Policy Baseline*.

The first model, *Model without Trade Frictions*, is a microeconomic supply and demand model in which goods from different countries are treated as perfect substitutes.[9] In this setting, producers can freely reallocate exports across markets in response to policy changes, resulting in potentially abrupt shifts in trade flows. By contrast, the *Model with Trade Frictions* is a general-equilibrium macroeconomic model based on the assumption that goods are differentiated by country and are imperfect substitutes.[10] This introduces friction in how producers adjust their production and exports, leading to smaller shifts in trade flows in response to policy changes.

The two models can also be interpreted to reflect different time horizons: the *Model with Trade Frictions* better captures near-term constraints, such as contractual obligations, shipping limitations, and transaction costs, that may hinder the immediate reshuffling of trade. Over a longer time horizon, trade flows have time to adjust, which is more in line with the *Model without Trade Frictions*. Both models are static: they represent each policy scenario as a new equilibrium with the policy fully in place and all changes already realized. Each model uses the same 2023 data on baseline emissions and production. Using 2023 as the reference year, we compare annual outcomes in each scenario against a zero-regulation baseline with no carbon pricing. These models are designed to capture differences between counterfactual scenarios in static equilibrium states; they do not address the timeline for implementation nor how long it would take for the changes between states to take place.

Model without Trade Frictions

This model uses plant-level data to simulate global supply and demand in the four industries subject to carbon pricing in our scenarios. The data include production, capacity, marginal cost, and emissions from 2023 for 892 steel plants, 163 aluminum plants, 2,241 cement plants, and 223 ammonia plants. The model considers two markets. The first consists of coalition member countries, all of which impose carbon prices on domestic production and border carbon fees on imports from non-member trading partners. The second comprises the rest of the world, where carbon emissions are not priced. The model simulates producers' choices over which market they supply in order to maximize profits. Producers reduce their emissions intensity in response to carbon prices and reduce their capacity utilization in the face of decreased profits. In equilibrium, supply equals demand in each market and for each sector. Goods from each sector are assumed to be homogenous commodities and are treated as perfect substitutes across countries (e.g., a consumer values a ton of aluminum from the United States the same as a ton of aluminum from China, regardless of where the consumer is located, all else equal). Under these assumptions, even small changes

Box 2: Modeling Overview (continued)

in relative prices or trade costs can lead to adjustments in trade flows between countries. Producers do not face increased costs for adjusting exports across markets and can immediately redirect their production to more profitable destinations in response to policy changes.

Model with Trade Frictions

This model uses global bilateral trade data from 200 industries across 44 countries and five "rest-of-world" regions to simulate equilibrium production and trade. Unlike the *Model without Trade Frictions*, this model assumes goods are differentiated by country of origin and are imperfect substitutes (e.g., U.S. steel and Chinese steel are treated as distinct products despite identical physical properties). Consumers can substitute between products from different countries, but their willingness to do so varies for different products—for example, consumers may view steel from different countries as nearly identical but consider automobiles from different countries as quite distinct. The model captures this substitution behavior based on empirical estimates from Ossa (2015).[11] When BCAs are imposed, firms cannot freely redirect exports because consumers view products from different countries as imperfect substitutes. This feature of the model creates persistence in trade relationships for these commodities and predicts more gradual adjustments compared to the frictionless model.

The online appendix provides more detail on both modeling approaches.

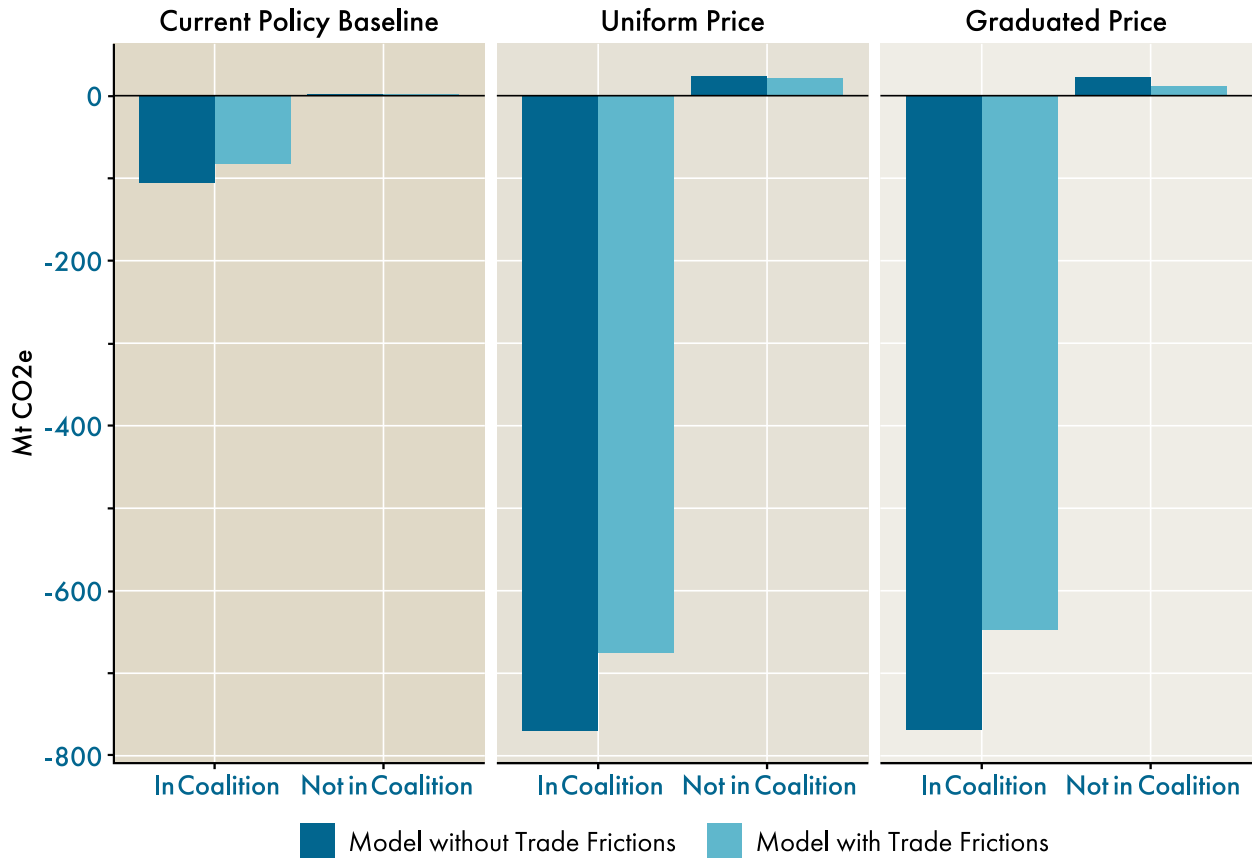
3.2 CLIMATE COALITION IMPACTS ON CLIMATE AND ECONOMIC OUTCOMES

The modeling results reveal five key findings from climate coalition formation given the levels of participation, carbon pricing floors, and industry coverage assumed in our analysis.

Key finding #1: A climate coalition leads to significantly greater emission reductions than the Current Policy Baseline

Both models estimate substantial carbon dioxide emissions reductions from the target industries—specifically, estimated annual reductions under both the *Uniform Price* and *Graduated Price* scenarios, at 650–770 million metric tons (Mt), are approximately seven times greater than under the *Current Policy Baseline* (Figure 3). These reductions represent roughly 1.0%–1.5% of global annual greenhouse gas emissions (1.7%–2.0% of global carbon dioxide emissions)—more than Canada's total annual emissions—and could help establish a strong foundation for extension to other sectors. Under the *Current Policy Baseline*, emission reductions from these industries are relatively modest: coalition members achieve between 80 and 100 Mt of reductions. Emissions reductions would increase with a broader coalition. For example, if Turkey, South Korea, and Japan were included in the coalition under the *Uniform Price* scenario, emissions reductions would increase by 50–60 Mt per year (0.1%–0.2% of global carbon dioxide emissions).[12]

Figure 3: A climate coalition leads to significantly greater emission reductions than the *Current Policy Baseline*.



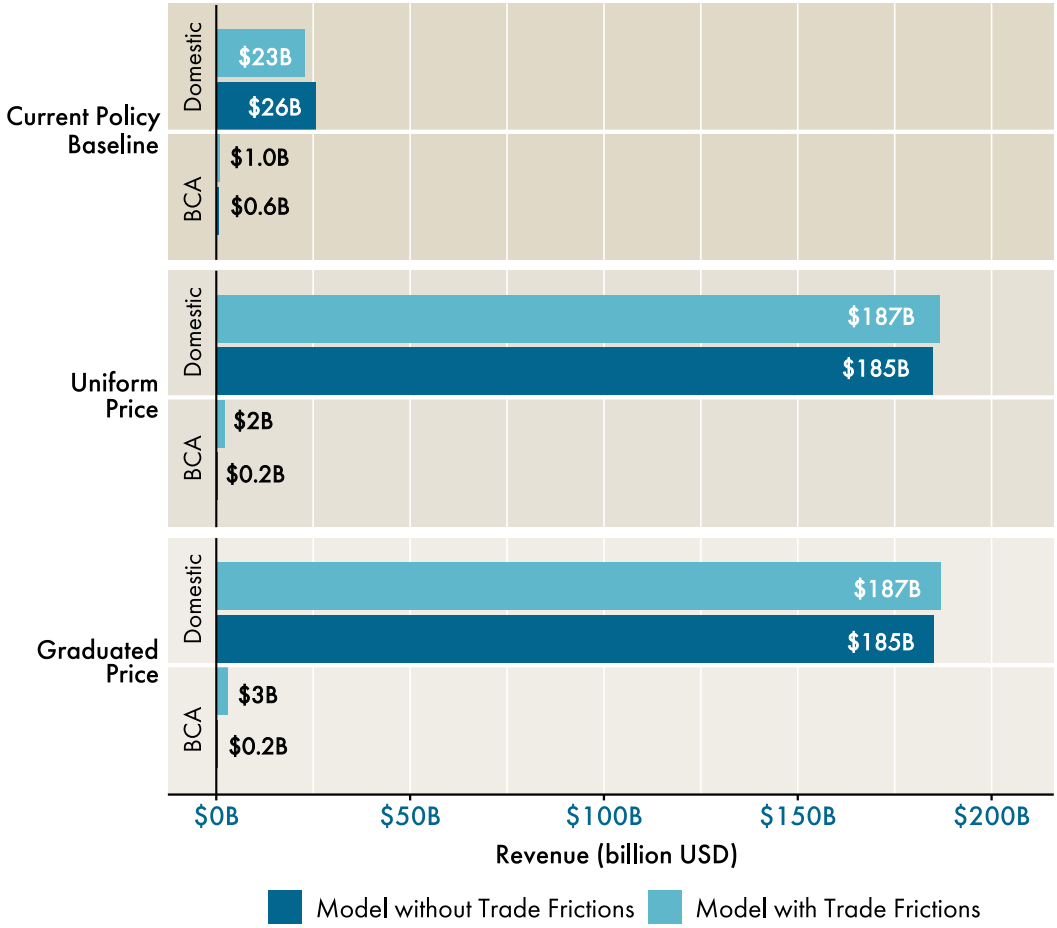
Note: Emissions changes are simulated annual reductions generated by the price floor relative to 2023 levels.

Key finding #2: A climate coalition generates substantial revenues for a broad set of countries

The coalition scenarios also generate significant domestic carbon tax revenue for a broad set of coalition members: nearly $200 billion annually (**Figure 4**). Combined revenue from domestic carbon pricing and BCAs is more than eight times greater in the *Uniform Price* and *Graduated Price* scenarios than under the *Current Policy Baseline*. Modeled levels of revenue generation can make a meaningful contribution to national budgets and fiscal sustainability for many coalition members. Specifically, carbon pricing generates more than 1% of general government revenue for five countries in the *Uniform Price* scenario and four countries in the *Graduated Price* scenario (**Figure 5**). These revenues could help improve countries' fiscal positions, support social spending and climate investments, and be used to address other development needs (**Box 3** describes a case study on Mozambique). A portion of revenues from carbon pricing could potentially also be directed toward the diffusion of low-carbon technologies, climate finance, and capacity building in low- and middle-income member countries (see Section 4).

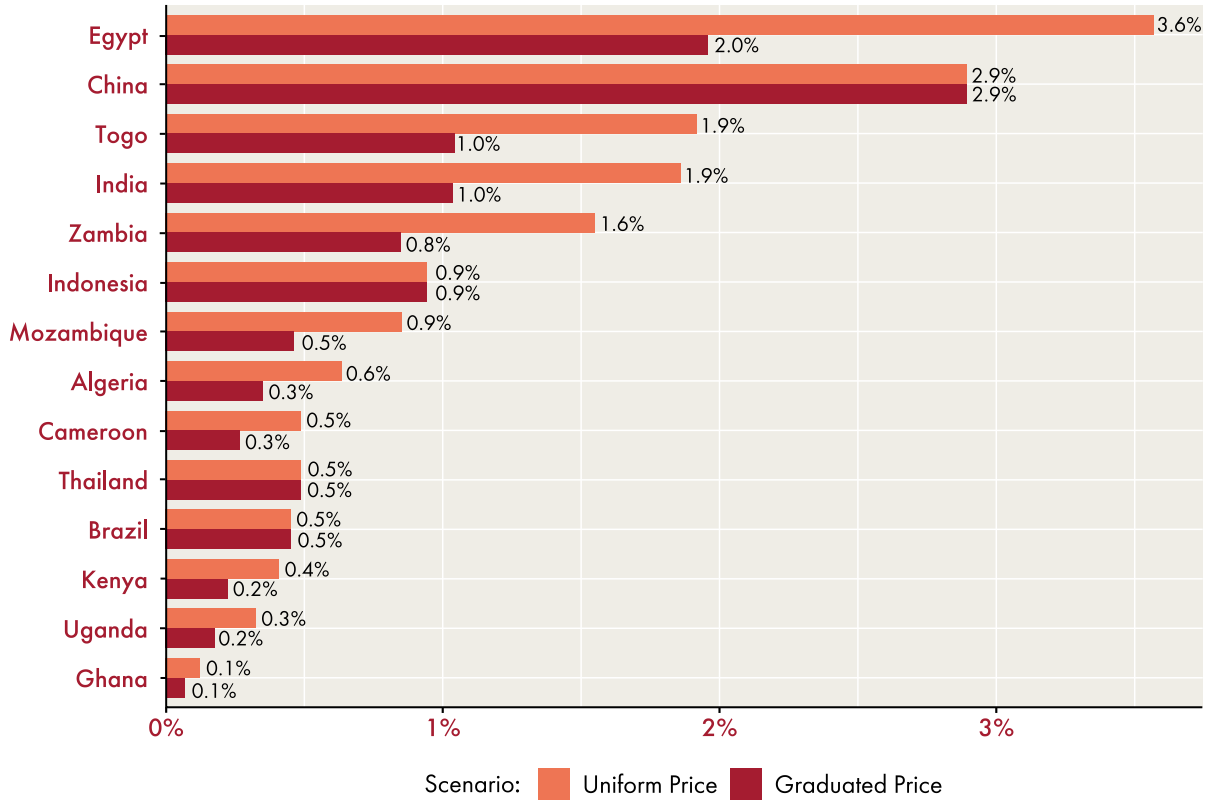
Notably, most revenue under the coalition scenarios is generated through domestic carbon pricing, not BCAs. In the *Uniform Price* scenario, BCA revenues range from $0.2 billion to $2 billion. In the *Graduated Price* scenario, the range is $0.2–$3 billion, where the ranges reflect different modeling assumptions.[13]

Figure 4: A climate coalition generates substantial revenues for a broad set of countries.



Notes: Domestic revenue reflects the total domestic tax revenue generated by the price floors. BCA revenue refers to fees paid by importers to coalition countries under the border carbon adjustment. These results represent simulated annual effects with 2023 as the reference year.

Figure 5: Both coalition scenarios generate meaningful revenue as a share of general government revenue.



Note: Domestic revenue is from the *Model without Trade Frictions*, which calculates carbon pricing revenue at the country level.[14]

Box 3: Benefits of a Climate Coalition for Clean Producers in Low-income Countries: The Case of Mozambique

Mozambique demonstrates how low-income countries with relatively clean industrial production could benefit from a climate coalition centered on carbon pricing. Mozambique exports over 98% of the aluminum it produces, and Europe has historically been a major export destination. Aluminum production is relatively clean in Mozambique, especially once Scope 2 emissions are included, because of the high proportion of electricity production that comes from the country's hydropower resources. This makes aluminum produced in Mozambique less expensive than 90% of aluminum from competitor countries in the *Uniform Price* scenario. Mozambique's comparative advantage in clean aluminum production is rewarded in a carbon pricing coalition that captures this "green premium" by imposing higher BCAs on more carbon-intensive aluminum. At the same time, introducing a domestic carbon price would generate domestic revenues, creating new fiscal resources for Mozambique to direct to its own development and climate goals. Under the *Current Policy Baseline*, by contrast, Mozambique does not implement carbon pricing and aluminum exports from Mozambique to the European Union incur BCAs.

Awareness of these benefits may be growing in countries like Mozambique, where a recent article in a major newspaper ran under the headline: "Either We Tax, or They Tax: How Mozambique Can Get Out of the Fiscal Crisis with the CBAM (EU)."[15]

Key finding #3: Coalition members experience a moderate increase in prices

In the coalition scenarios, carbon pricing policies generate moderate price increases, relative to the *Current Policy Baseline*, for steel, aluminum, cement, and fertilizers in member countries. In coalition member countries, steel prices increase 4%–6%; aluminum prices increase 11%–15%; and fertilizer prices increase 10%–13%, all relative to the *Current Policy Baseline* (Table 3). In the *Current Policy Baseline*, price increases for coalition members range from -1% to 9%, on average, relative to actual 2023 global prices. Domestic carbon prices drive slightly larger price increases in these products for coalition members compared to non-members, reflecting a green premium for clean production. Not surprisingly, estimated price impacts are larger in the *Model with Trade Frictions* because this model limits substitution across markets. When consumers do not readily shift to cheaper imports and producers cannot immediately redirect exports to more profitable (higher-priced) markets, goods prices reflect a larger share of the carbon price. In essence, the *Model without Trade Frictions* allows for thorough global adjustment, which in turn helps to absorb policy shocks, while rigidities in the *Model with Trade Frictions* mean that carbon costs get passed through more directly to commodity prices.

Table 3: A climate coalition generates small to moderate price changes relative to the *Current Policy Baseline*.

	Price Change (%)							
	Steel		Aluminum		Cement		Fertilizer	
	No frictions	Frictions	No frictions	Frictions	No frictions	Frictions	No frictions	Frictions
Uniform Price								
Members	4	5	11	15	5	21	10	12
Non-members	3	1	10	3	6	1	-2	-0.01
Graduated Price								
Members	4	6	11	15	5	23	13	13
Non-members	4	1	9	3	5	1	-6	0.2

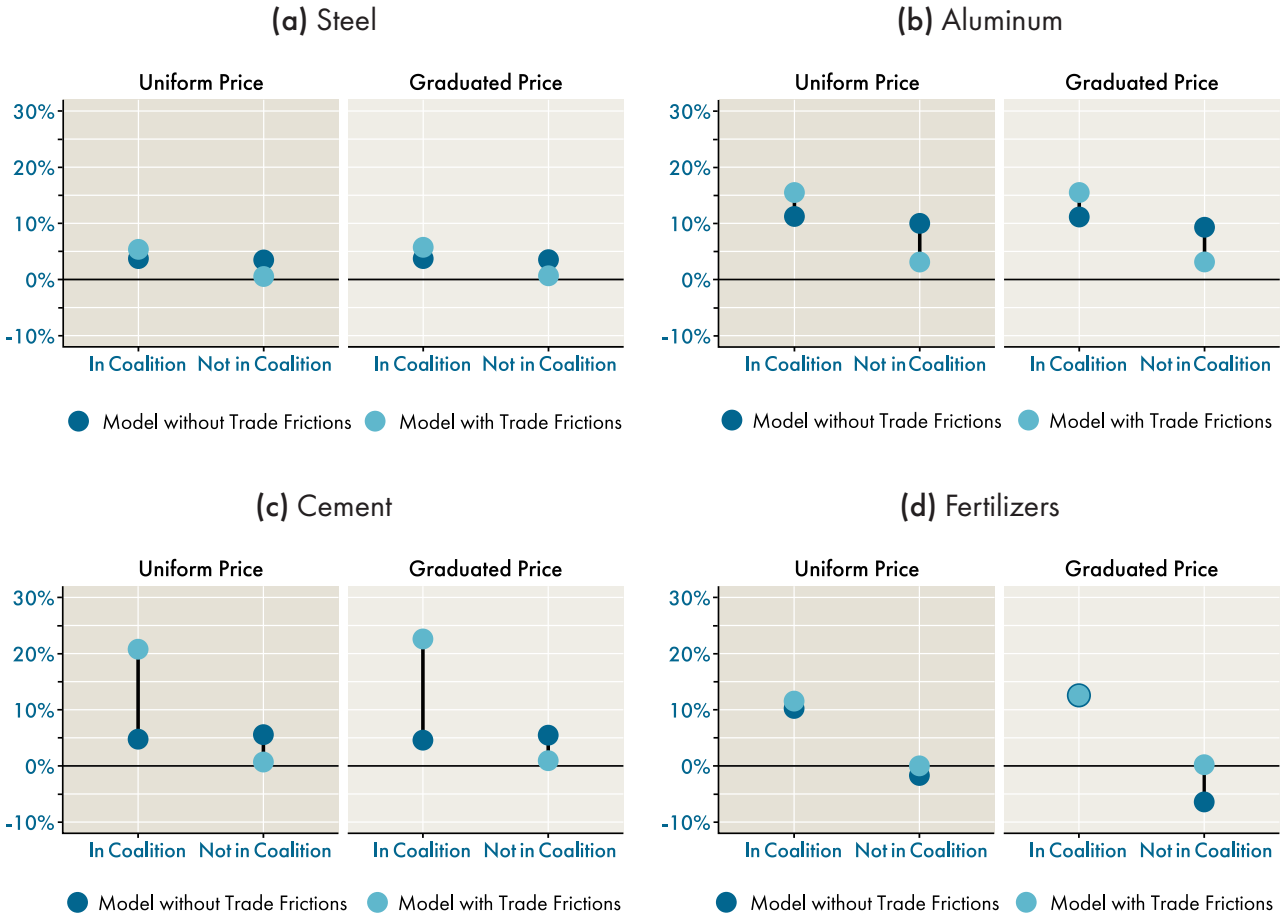
Note: Simulated price changes are relative to the *Current Policy Baseline*, with 2023 as the reference year.

The models predict a wider range of price increases for cement, where member countries see an increase of 5%–23% in the coalition scenarios. This is because carbon prices constitute a far larger share of the cement costs, which in turn drives large price increases in the *Model with Trade Frictions*. For example, the average global price for cement was $76 per metric ton in 2023 and the average emissions intensity of cement production globally was 0.6 tons of CO_2-equivalent emissions per ton cement. This means that a $50/t price on carbon dioxide emissions would add roughly 40% to the global average cost of cement in 2023. Applying the same logic to average 2023 global baseline prices and average 2023 global carbon intensities in other sectors, the impact of pricing carbon dioxide at $50/t—in terms of increased global average cost—is approximately 30% for fertilizer, 20% for aluminum, and 10% for steel. In other words, a $50/t or $75/t carbon price levied on cement reflects a larger share of input costs for cement than it does for steel or aluminum (see Annex Figures A1 and A2 for prices and emissions intensities).

Price increases in emissions-intensive industrial products would be passed on to downstream markets, but the impact would be minimal: since basic materials represent only a small share of the cost of cars, buildings, and

even food, even full pass-through of carbon costs would translate into a small increase in final prices.[16] Over time, these price increases would also be expected to incentivize innovation and accelerate the deployment of green steel, cement, and aluminum, as well as low-carbon agricultural practices.

Figure 6: Coalition members experience moderate changes in prices relative to the *Current Policy Baseline*.



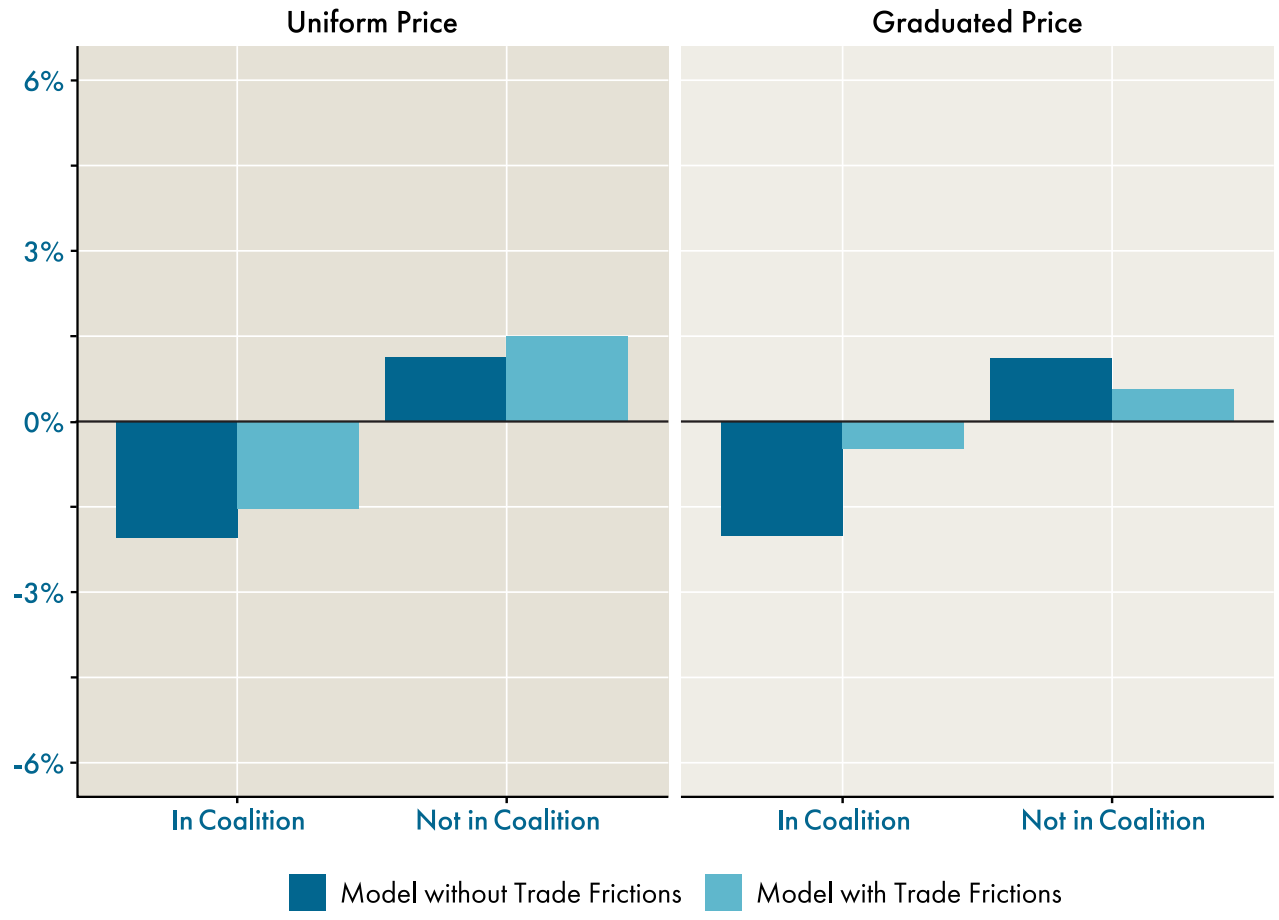
Note: Simulated price changes show the difference between prices under a given coalition scenario and the *Current Policy Baseline*, using 2023 as the reference year.

> *"Price increases in emissions-intensive industrial products would be passed on to downstream markets, but the impact would be minimal."*

Key finding #4: Industrial producers in coalition countries do not substantially reduce output, suggesting emissions leakage will be minimal

Both models project minimal impacts on aluminum, cement, fertilizer, and steel production in coalition countries and similarly small gains in output from these industries for non-members relative to the *Current Policy Baseline* (Figure 7). Under the *Uniform Price* scenario, on average, producers in coalition countries constrict their output by 2% while producers in non-member countries increase output by 1%–2%, relative to the *Current Policy Baseline*. Under the *Graduated Price* scenario, production in these industries falls 1%–2% on average in coalition member countries, while non-member production increases 0.5%–1%, relative to the *Current Policy Baseline*. Reductions in output are more than offset by increases in prices. These results also suggest that (1) producers are not severely disadvantaged in markets where other domestic production is facing the same carbon tax and (2) consumers of the target industrial products are not extremely responsive to price changes.

Figure 7: Producers in member countries see minor output changes.



Note: Simulated output changes show the difference between production under a given coalition scenario and the *Current Policy Baseline*, using 2023 as the reference year.

Key finding #5: A climate coalition with graduated pricing may better support economic growth in the poorest countries

Under the *Uniform Price* scenario (where the LMIC/LIC price floor is $50/t), domestic carbon pricing for the four target industries generates an additional $8 billion of revenue for LMICs/LICs and achieves 40–50 Mt of additional carbon dioxide reductions compared to the *Graduated Price* scenario (where the LMIC/LIC price floor is $25/t) (**Figure 8a and 8b**). However, modeling results for the *Graduated Price* scenario show slightly more modest output reductions for LMICs/LICs (**Figure 8c**). In fact, the *Model with Trade Frictions* projects that LMIC/LIC output from these industries increases under the *Graduated Price* scenario relative to the *Current Policy Baseline*, as LMIC/LIC producers become more cost competitive with HIC and UMIC producers.[17] The *Model with Trade Frictions* also projects much lower price increases in LMICs/LICs in the *Graduated Price* scenario (2% averaged across all four industries, weighted by revenue generated in each industry) compared to the *Uniform Price* scenario (5% averaged across all four industries, weighted by revenue generated in each industry) (**Figure 8d**). Differing impacts on producers in LMICs/LICs under the *Uniform Price* and *Graduated Price* scenarios point to key tradeoffs; these tradeoffs are explored further in the next section.

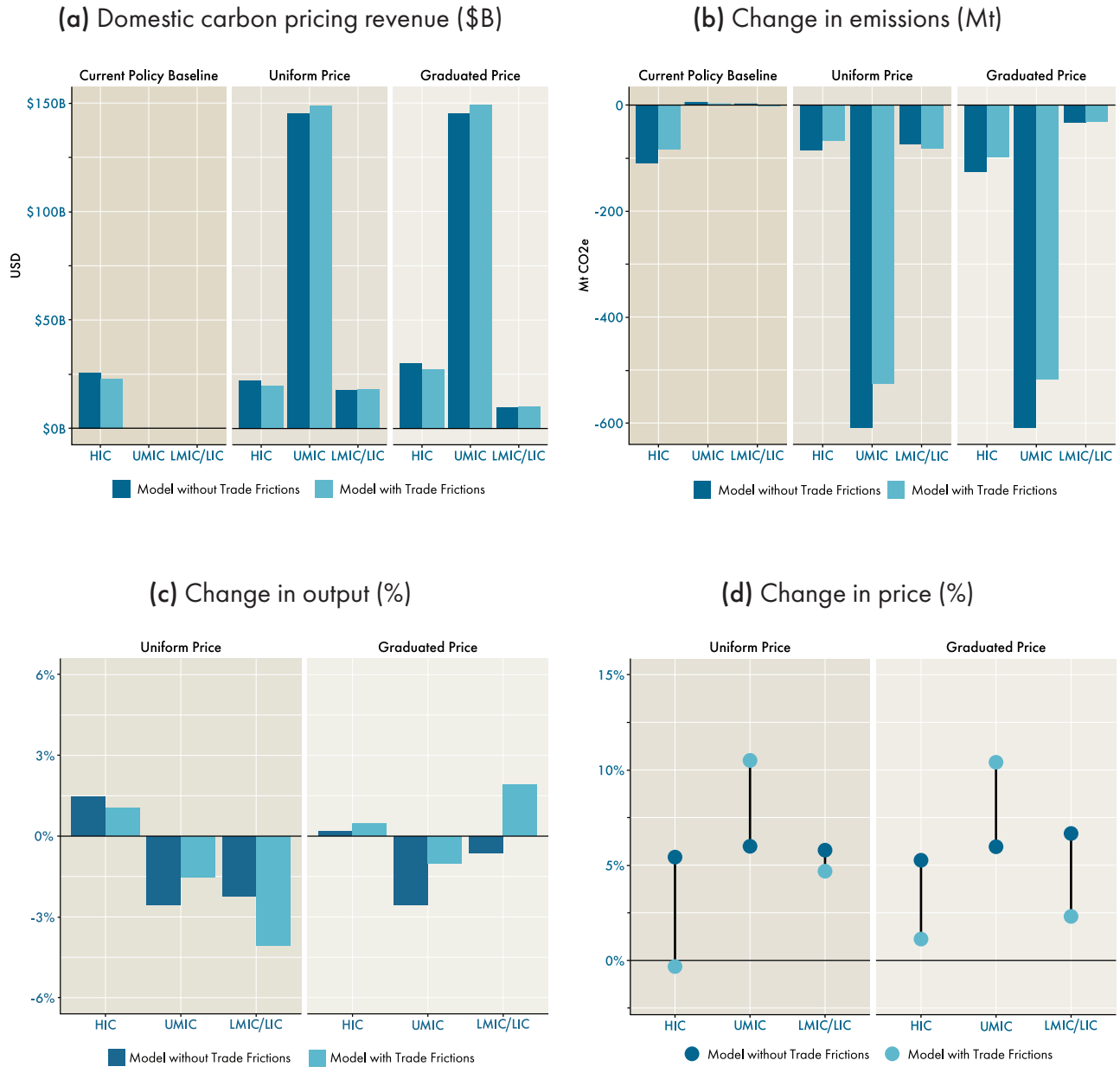
Table 4 summarizes our modeling results for coalition members and non-members. Appendix **Tables A1 and A2** further break down results by country income group and sector.

Table 4: A climate coalition generates large revenues, significant emissions reductions, and small production changes.

	Carbon pricing revenue ($B)		Emissions change (Mt)		Output change (%)	
	No frictions	Frictions	No frictions	Frictions	No frictions	Frictions
Uniform Price						
Members	185	187	-769	-676	-2	-2
Non-members	0	0	23	21	1	2
Graduated Price						
Members	185	187	-769	-647	-2	-0.5
Non-members	0	0	22	11	1	1

Notes: Carbon pricing revenue captures the full extent of domestic tax generated by the price floors annually. Emissions changes are annual reductions generated by the price floor relative to 2023 levels. Simulated output changes are relative to the *Current Policy Baseline* with 2023 as the reference year and reflect an average across industries, weighted by metric tons of production.

Figure 8: A climate coalition with graduated pricing may better support economic growth in the poorest countries.



Notes: Carbon pricing revenue captures the full extent of domestic tax generated by the price floors annually. Emissions changes are annual reductions generated by the price floor relative to 2023 levels. Simulated output and price changes show the difference between a given coalition scenario and the *Current Policy Baseline*, using 2023 as the reference year.

3.3 POLITICAL AND ADMINISTRATIVE FEASIBILITY

Our modeling analysis shows that a broad climate coalition centered on pricing carbon from key emissions-intensive industries could deliver substantial emission reductions and revenues for member countries, relative to the *Current Policy Baseline*. It also indicates that impacts on production and prices, while expected to vary by industry and region, will be moderate overall. In considering whether to pursue the climate coalition approach, policymakers must weigh climate and economic benefits against the political feasibility of participating and the administrative complexity required to make carbon pricing work, both domestically and internationally. An initial discussion of these considerations follows. Section 4 explores additional incentives for low- and middle-income countries to join a climate coalition, offering potential strategies to address some of these challenges.

Political Feasibility

Elements of the EU CBAM, which we have reflected in the *Current Policy Baseline*, have been criticized by low- and middle-income countries, which argue that the EU CBAM was developed without sufficient consultation and may impose external standards on their domestic industries. These critiques have been echoed in the press.[18] An objection to the *Uniform Price* scenario may be that it fails to adequately recognize equity concerns, as expressed in the UNFCCC principle that countries have "common but differentiated responsibilities" to address climate change given that poorer countries are less responsible for historic emissions and have limited capacity to transition to low-carbon production.

The *Graduated Price* scenario better reflects this principle and may be politically easier for policymakers in low- and middle-income countries to agree to. It also serves to acknowledge that there may be more low-cost emission mitigation opportunities in low- and middle-income countries.[19] On the other hand, firms in HICs may raise concerns about carbon leakage and competitiveness, particularly vis-a-vis firms in MICs in the *Graduated Price* scenario, though our modeling results suggest that carbon leakage may be limited. The negotiations needed to reach consensus on pricing tiers and levels in the *Graduated Price* scenario can be expected to be complex, given that governments will need to navigate a tension between fairness and maintaining competitiveness.

Implementation design choices can further bolster the legitimacy and durability of either pricing approach. If the coalition adopts a graduated price, it could consider embedding clear sunset provisions that gradually raise lower-tier prices so countries "graduate" into a single uniform price as their incomes grow and their capacity to decarbonize expands. Or, the coalition could treat exporting firms in LICs and MICs differently from firms that sell into the domestic market. For example, LICs and MICs could be allowed into the coalition as long as their domestic carbon price is at the level set by the *Graduated Price* scenario but the carbon price on their exports to other coalition members could be raised to match the importing member's domestic price.[20] Our models project that this change would lead to minimal changes to the *Graduated Price* scenario, with output and prices only slightly lower in coalition LMICs/LICs, and output and prices slightly higher in HICs. (changes less than 1%). Conversely, if the coalition evolves to a fully integrated carbon market, equity concerns could be addressed by allowing certain lower-income members to allocate a limited amount of free allowances to emit greenhouse gases. These free allowances could be authorized in a manner that reflected countries' income levels, as indicated by World Bank income group classification, for example, or per capita emissions.

While our modeling results suggest that the effect of coalition membership on consumer prices will be modest overall, distributional impacts could still be a concern for member countries. These concerns could be alleviated

by returning some of the revenues from carbon pricing to households in the form of lump-sum dividends. For example, Canada's carbon rebate was designed to produce net gains for most lower-income households.[21]

Administrative Practicality

Developing and applying a measurement, reporting, and verification (MRV) regime to imports of carbon-intensive industrial products from non-member countries could prove challenging in either coalition scenario. As Section 5 highlights, however, coalition member countries will need to report only aggregated, sector- or industry-level emissions and carbon pricing data to build mutual trust in the system, whereas more granular, firm-level MRV requirements would apply only to individual firms in non-member countries. Of course, even industry-level reporting could be challenging for some low- and middle-income coalition members given capacity constraints on building the requisite monitoring and reporting infrastructure. Administrative challenges, it should be noted, also exist in the *Current Policy Baseline*, where the proliferation of BCAs means that countries have to administer, and firms have to comply with, myriad different reporting standards and requirements across jurisdictions.

The use of a uniform carbon price in the *Uniform Price* scenario would be consistent with WTO principles regarding non-discriminatory trade measures; different carbon pricing levels in the *Graduated Price* scenario, by contrast, could be challenged under WTO rules. A uniform carbon price, once countries reach agreement on the appropriate level of that price, could facilitate the full integration of carbon markets, moving beyond mutual recognition.

Section 3 Endnotes

1 The graduated carbon price floor levels and income-based country groups in our modeling follow Ian W.H. Parry, Simon Black, and James Roaf, *Proposal for an International Carbon Price Floor Among Large Emitters*, International Monetary Fund Staff Climate Notes (2021), https://www.imf.org/en/Publications/staff-climate-notes/Issues/2021/06/15/Proposal-for-an-International-Carbon-Price-Floor-Among-Large-Emitters-460468. For the *Graduated Price* scenario in this analysis, the HIC group includes Australia, Canada, the European Union (plus the EU ETS-linked countries: Iceland, Norway, Switzerland, and Liechtenstein), and the United Kingdom. The UMIC group includes Brazil, China, Indonesia, and Thailand. The LMIC/LIC group includes Algeria, Cameroon, Egypt, Ghana, India, Kenya, Mozambique, Togo, Uganda, and Zambia.

2 These price floor levels are illustrative for the purposes of modeling. Coalition member countries would need to negotiate and reach agreement on any price floors.

3 European Parliament - Press Service, *Climate Change: Deal on a More Ambitious Emissions Trading System (ETS)*, press release, December 18, 2022, https://www.europarl.europa.eu/news/en/press-room/20221212IPR64527/climate-change-deal-on-a-more-ambitious-emissions-trading-system-ets.

4 The modeling simply assumes a carbon price and does not take a position on whether the price is achieved through an emissions trading system or a carbon tax; it also assumes there are no free allowances and no lower-cost offsets.

5 The United States is not included in the modeling since it does not have a national industrial carbon pricing mechanism. That said, the proposed coalition design does not preclude U.S. participation, and U.S. firms in targeted industries may face incentives to engage should their international competitors and principal export markets become members of the coalition.

6 For this analysis, a country was included in the bloc if it exports 40% or more of its production in at least one of the target industries outside of Africa and produces with an emissions intensity equal to or lower than the global average. Recent analysis suggests that low-income countries could benefit from the EU CBAM and imposing a domestic carbon tax. *See*: Kimberly Clausing, Jonathan Colmer, Allan Hsiao, and Catherine Wolfram, *Rethinking the EU's Carbon Border Adjustment Mechanism: What it means for low-income countries*, International Growth Centre Policy Brief (2025), https://www.theigc.org/publications/rethinking-eus-carbon-border-adjustment-mechanism-what-it-means-low-income-countries.

7 Turkey's cabinet recently published draft legislation for a national-level ETS regulating heavy industry, with rollout planned for 2026; Japan currently operates a voluntary national ETS, which is set to become mandatory in 2026 for large emitters in certain emissions-intensive industries; and South Korea has an established national ETS that covers approximately three-quarters of the country's emissions. *See*: Republic of Türkiye, Ministry of Environment, Urbanization, and Climate Change, *Draft Regulation on the Turkish Emissions Trading System Published*, news release, July 22, 2025, https://iklim.gov.tr/turkiye-emisyon-ticaret-sistemi-yonetmeligi-taslagi-yayimlandi-haber-4519; "GX: Green Transformation Policy: Emissions Trading System (ETS)," International Energy Agency, last updated February 7, 2025, https://www.iea.org/policies/19963-gx-green-transformation-policy-emissions-trading-system-ets; and Himanshu Chauhan, "South Korea Expands ETS to Enhance Market Effectiveness, May Cancel Feb Auction to Curb Oversupply," *S&P Global Commodity Insights*, February 7, 2025, https://www.spglobal.com/commodity-insights/en/news-research/latest-news/energy-transition/020725-south-korea-expands-ets-to-enhance-market-effectiveness-may-cancel-feb-auction-to-curb-oversupply.

8 Trade data are from UN Comtrade. The HS codes for steel are those that are targeted by the EU CBAM: HS codes 7201, 720211, 720219, 720241, 720249, 720260, 7303, and 7205 through 7220. The HS code for aluminum is 7601, "Aluminum; unwrought." The HS code for cement is 2523, and for ammonia is 2814. Production data on primary aluminum are from Wood Mackenzie; data on secondary aluminum are from the World Bureau of Metal Statistics; data on steel, cement, and fertilizer are from Climate TRACE. We use ammonia production as a proxy for fertilizers due to data limitations and because ammonia production accounts for the vast majority of carbon dioxide emissions associated with manufacturing nitrogenous fertilizer. Production and trade data are from 2023. *See also*: Endnote 4 in Section 2.

9 Modeling draws from Kimberly Clausing, Jonathan Colmer, Allan Hsiao, and Catherine Wolfram, *The Global Effects of Carbon Border Adjustment Mechanisms*, NBER Working Paper No. 33723 (National Bureau of Economic Research, 2025), https://doi.org/10.3386/w33723.

10 A recent application of these modeling assumptions to analyze climate and trade policies is Gregory Casey, Jonathan Dingel, Kyle Meng, and Ivan Rudik, "Are Carbon Tariffs Climate Policy?," (working paper, forthcoming).

11 Ralph Ossa, "Why Trade Matters After All," *Journal of International Economics* 97, no. 2 (2015): 266–277, https://doi.org/10.1016/j.jinteco.2015.07.002.

12 If Turkey, South Korea, and Japan were included in the coalition under the *Uniform Price* scenario, these countries together would generate $16 billion in domestic carbon tax revenue.

13 These differences stem from how each model predicts trade will respond to carbon pricing policies. Under the *Current Policy Baseline*, non-member countries export 8%–10% of their production to coalition members, while coalition countries consume 80%–90% of their own production and export the rest to non-member countries. Under the coalition, the *Model without Trade Frictions* predicts a sharp shift: non-member exports to coalition countries fall to 0.2% in the *Uniform Price* scenario and 0.1% in the *Graduated Price* scenario, while coalition countries trade 99.6% of their output within the coalition and export just 0.4% to non-members in both cases. By contrast, the *Model with Trade Frictions* projects very small shifts. For example, non-member countries continue to export about 8% of their production to coalition members under both scenarios.

14 Sources for Figure 5 are as follows: 2024 General Government Revenue (National Currency), World Economic Outlook database, IMF, last updated April 2025, https://www.imf.org/en/Publications/WEO/; 2024 Official Exchange Rate (LCU per US$, Period Average), World Development Indicators, World Bank, 2025, https://data.worldbank.org/indicator/PA.NUS.FCRF; Ghana Monthly Exchange Rate Indicators, Exchange Rates, Bank of Ghana, 2025, https://www.bog.gov.gh/economic-data/exchange-rate.

15 Alberto da Cruz, "Ou Tributamos Nós, ou Tributam Eles: Como Moçambique Pode Sair da Crise Fiscal com o CBAM (UE)," *O País*, July 7, 2025, https://opais.co.mz/ou-tributamos-nos-ou-tributam-eles-como-mocambique-pode-sair-da-crise-fiscal-com-o-cbam-ue/.

16 A recent analysis finds that, even under full pass-through of carbon costs, downstream price effects in housing, wheat, and wind-farm construction are less than one-tenth of the price effect on their upstream inputs (steel, cement, and ammonia-based fertilizer). *See*: Government of Australia, Department of Climate Change, Energy, the Environment, and Water, *Carbon Leakage Review – Consultation Paper 2* (November 2024), https://storage.googleapis.com/files-au-climate/climate-au/p/prj2f030fe5577e16a3ffbb9/page/Carbon_Leakage_Review_Consultation_Paper_2_November_2024.pdf.

17 In the *Graduated Price* scenario, the *Model with Trade Frictions* predicts some cases where the higher price floor raises the price in higher-income export markets more than the lower price floor raises local production costs for LMICs/LICs; LMICs/LICs may increase production in response.

18 Graham Lanktree and Camille Gijs, "India Eyes Retaliation against EU, UK Carbon Border Taxes," *Politico*, June 18, 2025, https://www.politico.eu/article/india-eu-uk-carbon-border-taxes-cbam-products; Eleni Courea, "India Seeks UK Carbon Tax Exemption in Free Trade Deal Talks," *The Guardian*, April 19, 2024, https://www.theguardian.com/politics/2024/apr/19/india-seeks-uk-carbon-tax-exemption-in-free-trade-deal-talks; Khulekani Magubane, "Current EU Carbon Tax Cannot Be Just: Global Energy Researcher," *TimesLIVE*, November 10, 2024, https://www.timeslive.co.za/sunday-times-daily/news/2024-11-10-current-eu-carbon-tax-cannot-be-just-global-energy-researcher.

19 Rachel Glennerster and Seema Jayachandran, "Think Globally, Act Globally: Opportunities to Mitigate Greenhouse Gas Emissions in Low- and Middle-Income Countries," *Journal of Economic Perspectives* 37, no. 3 (2023): 111–35, https://doi.org/10.1257/jep.37.3.111.

20 Milan Elkerbout, Katarina Nehrkorn, and David Kleimann, *For Climate-and-Trade Policies, the Principle of 'Common but Differentiated Responsibilities' Cuts Both Ways*, Resources for the Future Issue Brief (2025), https://www.rff.org/publications/issue-briefs/for-climate-and-trade-policies-the-principle-of-common-but-differentiated-responsibilities-cuts-both-ways.

21 "Canada Carbon Rebate for Individuals: How much the payment amounts were," Government of Canada, Canada Revenue Agency, last modified July 30, 2025, https://www.canada.ca/en/revenue-agency/services/child-family-benefits/canada-carbon-rebate/how-much.html; David Klenert, Linus Mattauch, Emmanuel Combet, Ottmar Edenhofer, Cameron Hepburn, Ryan Rafaty, and Nicholas Stern, "Making Carbon Pricing Work for Citizens," *Nature Climate Change* 8 (2018): 669–77, https://doi.org/10.1038/s41558-018-0201-2.

4. Making Coalition Membership More Attractive: Incentives for Joining and Raising Ambition

As low- and middle-income countries are projected to account for the largest share of global GHG emissions this century, their participation is critical to the coalition's long-term effectiveness.[1] Expanded membership also enhances the coalition's legitimacy, increases its market power, and amplifies network effects—making participation more attractive relative to non-membership and ultimately accelerating global climate action.

To help ensure broad participation and enable low- and middle-income countries to raise their climate ambition, the coalition's policy framework should include a targeted package of measures to promote the adoption of low-carbon technologies (LCTs), extend climate finance, and strengthen institutional capacity. The coalition should also consider how to integrate offsets into its policy framework. Joining the climate coalition and agreeing to price industrial carbon emissions and apply BCAs would signal low- and middle-income countries' commitment to meaningful climate action—a commitment that the package of incentive measures is intended to reinforce and facilitate.

This section presents several options that could encourage low- and middle-income countries to join the coalition and support them in raising their climate ambition. These options are grounded in evidence and designed to be administratively practical and financially sustainable.

4.1 ACCELERATING CLEAN TECHNOLOGY UPTAKE

"Expanded membership also enhances the coalition's legitimacy, increases its market power, and amplifies network effects—making participation more attractive relative to non-membership and ultimately accelerating global climate action."

Meeting the global decarbonization challenge depends on the development and diffusion of proven LCTs, particularly in the energy sector and in high-emission industries such as steel, cement, aluminum, and fertilizer production. A climate coalition centered on industrial carbon pricing can help promote LCT innovation and diffusion in member countries by establishing durable market signals that incentivize LCT research and development, investment, and deployment.[2] Currently, LCT development remains highly concentrated in high-income countries and China, which together account for roughly 90% of patents in clean technologies and 90% of LCT exports.[3] Meanwhile, many low- and middle-income countries face not only rapidly rising emissions, but myriad technical, legal, financial, and market barriers to decarbonizing their industrial sectors.[4] These barriers

present a key challenge to collective progress toward sustainable development and effective climate action.[5]

Improving access to LCTs—through the physical transfer of technologies as well as through complementary support for knowledge-sharing, training, and demonstration[6]—can lower the cost of reducing emissions and make decarbonization more economically and politically feasible. Coalition members can consider several possible mechanisms to accelerate LCT diffusion to low- and middle-income countries,[7] including:

- Reduce tariffs and non-tariff barriers on LCTs. A climate coalition could lower tariffs for a sector-specific list of LCTs and inputs and simplify import procedures among members as a way to reduce costs and improve access in developing markets.[8] The WTO's *Environmental Goods Agreement (EGA)*, which proposes to eliminate tariffs on more than 300 low-carbon products, laid valuable groundwork for this approach, though it did not produce consensus on a final list of products.[9] A climate coalition could build on the EGA and seek to negotiate tariff reductions in a similar way, with the flexibility to move either more or less ambitiously, depending on the appetite of coalition members.

- Coordinate research, development, demonstration, and technical standards. A climate coalition could establish a joint R&D agenda, harmonize technical standards, and support demonstration projects in low- and middle-income countries, all of which would improve the efficiency of R&D spending, accelerate learning curves, and facilitate LCT uptake. Leveraging the work of *Mission Innovation*,[10] the coalition could pool public research, development, and demonstration (RD&D) funding across members and channel it toward shared priorities in coalition-relevant sectors—this could be one of several productive ways to reinvest revenues from carbon pricing. Like the *G7*'s *Climate Club*, the coalition could integrate peer learning, technical benchmarking, and finance matchmaking for industry decarbonization.[11] By harmonizing standards, for example in the steel sector, coalition members could reduce uncertainty, lower transaction costs, and prevent trade frictions.[12]

- Promote technology diffusion via intellectual property (IP) policies. A climate coalition could support voluntary licensing for key technologies, develop standard contracts to facilitate low- and middle-income country access to these technologies, and establish coalition-level IP exchanges or advisory groups to lower legal and financial barriers to LCT deployment. Building on proposals to the United Nations' *Climate Technology Centre and Network*, the coalition could develop model licenses for low-income countries and an IP exchange platform to facilitate transparent, royalty-free transactions.[13] Complementary tools like standardized contracts, trademarks, and flexible IP sharing tools, tailored to local capacities and sector needs, could further support LCT diffusion in low- and middle-income countries.[14]

- Advancing joint ventures. A climate coalition could promote joint ventures (JVs) between firms in member countries to co-develop and deploy LCTs, thereby sharing risk, lowering costs, and expanding market access, particularly in low- and middle-income countries. JVs enable firms to pool financial, technical, and operational resources. To replicate such models while addressing concerns about uneven benefits, limited absorptive capacity, or loss of proprietary know-how, the coalition could provide standard JV frameworks with partner matching and provisions for technology sharing, workforce training, and fair risk allocation. Experience shows that public and political support for technology transfer is stronger if it is

delivered through collaboration, as involvement by both donor and recipient country firms is perceived to help balance practical benefits with fairness and shared responsibility.[15]

Coalition countries can also address innovation market failures through national policies that support LCT uptake. Domestic deployment subsidies, such as feed-in tariffs, tax credits, or low-carbon procurement mandates, can help bridge the cost gap for early-stage technologies. Where fiscal resources are limited, revenue-neutral tools like feebates, which tax high-carbon products to fund rebates for cleaner alternatives, offer a viable alternative. A climate coalition could help mainstream such approaches by offering technical assistance in designing effective incentive schemes or by helping members benchmark their policy interventions. Coalition members will also have to address the competitiveness effects of asymmetric LCT deployment incentives.

4.2 MOBILIZING FINANCE FOR COLLECTIVE CLIMATE ACTION

Many low- and middle-income countries face real fiscal constraints—high debt burdens, rising interest costs, and pressures to meet development needs—that may limit their ability to invest in industrial decarbonization or broader climate mitigation and adaptation efforts.[16] Although carbon pricing can generate new revenues for governments, these countries will likely need additional financial assistance to advance the coalition's overall objectives and sustain domestic political support for participation. Such assistance will also increase support for coalition membership among affected firms and industries in low- and middle-income countries.

In this context, coalition members could agree to allocate a portion of revenues from BCAs and carbon pricing to help meet the climate finance needs of low- and middle-income member countries. The modeling results discussed in Section 3 suggest that our coalition proposal could generate as much as USD 170 billion in combined carbon price revenues in high-income countries and China. Mechanisms for sharing these revenues could draw on recent precedents from the European Union, which uses some revenues from its ETS to support an Innovation Fund (approximately EUR 40 billion from 2020 to 2030, or 4% of expected ETS revenues during this period), a Modernization Fund (approximately EUR 57 billion from 2021 to 2030, or 6% of expected ETS revenues during this period), and a Social Climate Fund (expected to mobilize at least EUR 87 billion from 2026 to 2032).[17] These funds provide grants to EU member states to support breakthrough low-carbon technologies, modernize energy systems, and help mitigate the distributional impacts of carbon pricing through income support and investments in energy efficiency, clean heating, and sustainable transport.

In the context of multiple competing domestic demands for these resources, coalition members will need to prioritize international finance approaches that offer scale and leverage, and are closely aligned with recipient countries' broader climate and development strategies, to ensure maximum impact. Coalition members will need to agree on eligibility criteria and contribution guidelines, with donor countries maintaining sovereign control over the allocation of domestic pricing revenues. Country climate and development platforms could help to align any climate finance provided through the coalition with the recipient country's growth and development plans.[18] If implemented, coalition resources could contribute to the United Nations' "new collective quantified goal" (NCQG), adopted as part of the 2015 Paris Agreement, of delivering USD 300 billion per year to support climate action in developing countries by 2035, with a broader aspiration of mobilizing USD 1.3 trillion in international climate finance over the same timeframe.[19]

Several options exist for extending climate finance to low- and middle-income coalition members. For example, a portion of BCA and carbon pricing revenues, subject to the discretion of contributing member countries, could

be used to establish a trust fund at a multilateral development bank (MDB) to support, on concessional terms, projects in these countries. Partnering with an MDB could help the coalition leverage its resources to greater effect through alignment with national priorities, expanded access to technical expertise, ability to co-finance projects, and robust monitoring and evaluation systems. At the same time, a trust fund would ensure that coalition resources are targeted to member countries. Assistance could be delivered to member countries in several ways:

- Co-finance LCT investment projects and budget support for decarbonization policies. Support for industrial decarbonization in many countries has stalled in recent years, pointing to a need for stronger policy frameworks and concessional finance.[20] Building on the model of the Climate Investment Fund's Industry Decarbonization Program, the coalition could deploy concessional finance to advance innovation in LCTs and support clean energy and electrification projects for industrial emission sources.[21] The coalition could also provide support for policy reforms designed to catalyze broader market responses, such as introducing carbon pricing, removing or reducing fossil fuel subsidies, or repurposing agricultural subsidies.[22] These reforms would provide policy certainty and could help unlock new financial flows into climate-aligned investments.

- Mobilize pull finance for hard-to-abate industrial sectors. Pull mechanisms, such as advance market commitments, help deliver low-cost, climate-friendly solutions by linking payments to verified outcomes. These types of mechanisms can help incentivize the private sector to undertake the technology innovations needed to decarbonize industrial processes, like cement production, in low- and middle-income countries and facilitate a market shift to scale up the production and adoption of these innovations.[23] A leading example is the UK government's Climate Innovation Pull Facility (CIPF), which will allocate at least GBP 150 million over five years, primarily through grants, to support a portfolio of climate pull projects.[24] The CIPF aims to drive innovation, scale-up, and market creation for mitigation technologies in developing countries, with a strong emphasis on industrial decarbonization.

- Co-finance investment projects, budget support, and results-based programs that help countries adapt to climate impacts. For example, the coalition could co-finance MDB projects that help low-income countries manage climate risks through a comprehensive, tiered approach—including direct cash transfers to vulnerable poor households, community-level block grants (which function like insurance), and sovereign disaster insurance for governments.[25] Strengthening social safety nets in this way could also help cushion vulnerable households from the cost impacts of carbon pricing, such as any change in food costs due to an increase in fertilizer prices. To help ensure financial sustainability, eligibility and targeting will need to be developed in close partnership with MDB staff.

- Support country or portfolio guarantees to free up additional space for climate lending by MDBs. To stretch its resources, the coalition could explore MDB donor guarantee mechanisms, like country-based guarantees or sectoral portfolio guarantees. Backstopping a portion of an MDB's lending portfolio with donor commitments can enable an MDB to assume more risk and extend additional lending headroom to borrowing countries without requiring new paid-in capital. This approach enables the Asian Development Bank's IF-CAP Program and the World Bank Guarantee Platform, for example, to be highly leveraged. The Asian Development Bank has estimated that $3 billion in donor guarantees could unlock $15

billion in additional climate lending, with the actual budgetary cost to donors expected to come in well below the full value of the guarantees.[26]

To enhance the credibility of climate finance commitments, the coalition could adopt an approach similar to the Multilateral Fund, which supports the implementation of the Montreal Protocol in developing countries.[27] Under that model, a portion of donor country contributions can be delivered through bilateral cooperation projects, allowing donor countries (in this case, higher-income coalition members) to take a more active role in implementation while still fulfilling multilateral obligations. Similar mechanisms—such as partnerships between firms from donor and recipient countries to implement projects—can likewise increase political support and foster a sense of ownership in low- and middle-income countries.[28]

4.3 BUILDING CAPACITY

To help low- and middle-income countries prepare for coalition membership and undertake related policy commitments, the coalition can also support capacity-building efforts. This could include providing technical assistance to help finance, economy, and other relevant sectoral ministries select, design, and implement carbon pricing instruments suited to their institutional frameworks, ministerial capacity, and political context, while also meeting coalition standards. Technical assistance could also help governments assess the revenue and emissions reduction benefits of coalition membership, and understand and mitigate any distributional consequences from carbon pricing.[29] Similarly, the coalition could help these countries build capacity to implement MRV systems: by investing in tailored training for the existing pool of financial auditors, for example, the coalition can address the shortage of qualified verifiers.[30] Capacity building is also needed in the private sector to support the decarbonization of target industries. By sponsoring training, apprenticeships, and related programs, the coalition can help develop local workforce opportunities in clean energy and manufacturing facilities.

The World Bank (including through its Partnership for Market Implementation), the IMF, various regional MDBs, the Coalition of Finance Ministers for Climate Action, and the C3A Coalition for Capacity on Climate Action are some of the multilateral initiatives that already provide training and capacity development in these and related areas. Coalition members could explore options to build on these efforts; they could also look for opportunities to support capacity development on a bilateral basis.

4.4 CONSIDERING THE POTENTIAL ROLE OF OFFSETS

A well-regulated system for recognizing carbon offsets could help the coalition incentivize broader participation and channel private investment into climate action.[31] Such a system would also need to address concerns over the integrity and effectiveness of offsets. How offsets could enhance climate impact, what provisions are needed to assure offset quality and policy integrity, and what types of credits are accepted will all be key considerations for integrating offsets in coalition design.

Recognizing offsets—for instance, by agreeing that steel, aluminum, cement, and fertilizer producers in member countries could buy high-integrity, verified carbon offsets from approved projects in other member countries, especially low- and middle-income countries, to cover a predefined share of their emissions instead of paying the carbon price—could create powerful incentives for a broader range of countries to join the coalition. Alternatively, importers in a member country could be allowed to offset a predefined share of their BCA liability

with high-integrity, verified carbon offsets from similar projects.[32] However, coalition members would need to establish clear limits around the use of carbon offsets to protect the integrity of carbon pricing and other market-based tools, while supporting continued investment in low-carbon technologies.

For countries like Brazil[33] and Indonesia that have significant forest stocks, offsets offer a way to leverage cost-effective domestic climate abatement opportunities, effectively monetizing these natural assets while also generating funds for some forest conservation and restoration efforts. In this way, offsets provide a potential mechanism for channeling much-needed private investment to cost-effective mitigation opportunities in low- and middle-income member countries, complementing the role of traditional public climate finance.

Previous experience with offsets programs, however, underscores the challenges of designing programs that deliver these benefits without compromising the effectiveness and integrity of the broader climate policy. Coalition members will need to work in partnership with a broader set of stakeholders to ensure that any system for including offsets has the following features:

- Provides for robust measurement of emission reductions. Measuring how much carbon a forest can absorb over its lifetime and understanding how much of this carbon remains stored over the long term, for instance, presents complex technical and practical challenges. Unfortunately, the reliable emissions monitoring systems and consistent accounting methods needed to overcome these challenges are not yet widely in place.[34] Developing universal standards for methodologies and measurements would be a first step toward more credible quantification of emission reductions.[35]

- Ensures that claimed reductions are "additional" to business-as-usual. If offsets are granted for carbon reductions that would have happened anyway, and if these offsets are then used to reduce an entity's obligations under a carbon pricing system, the larger policy objective is undermined. Establishing additionality, which is core to the integrity of an offsets program, requires comparing specific projects to hypothetical scenarios of what would have happened without these projects—comparisons that are inherently difficult to verify, highly sensitive to input assumptions, and prone to inconsistency. Recent innovations in social science research techniques, such as the use of randomized control trials, could help to validate claims of additionality.[36] Recent work also indicates that additionality issues vary by removal technology.

- Enhances institutional governance. Third-party certifiers and auditors for offset projects may face perverse incentives because they are often paid by the project sponsor. Since certifiers' earnings are based on issuing offsets and since auditors are usually hired by the project developer, strong incentives exist to approve projects even if the offsets are not high quality. Reforming current relationships between developers and certifiers and between certifiers and auditors—for example, by removing direct payments—could reduce some of these perverse incentives and strengthen overall governance.[37]

Given the breadth of reforms necessary to assure offset quality, the integration of offsets into the coalition framework should depend on these issues being resolved, and the role of offsets should be commensurate with their demonstrated quality. Member countries could consider engaging key stakeholders—including project developers, standard-setting and certification bodies, integrity councils, and offset purchasers—to address concerns about offsets and identify priorities for reform. Such efforts could lay the groundwork for eventually

establishing a well-regulated offsets market as part of the coalition structure, akin to offset provisions in existing emissions trading and pricing systems and with sufficiently robust safeguards to maintain trust and credibility.[38]

Until offsets are fully integrated, the coalition will need to decide how to recognize national emissions trading systems that allow offsets. If carbon prices in these markets are low, member countries may need to add carbon taxes to achieve a carbon price level that is consistent with coalition membership.

Section 4 Endnotes

1 Patrick Bolton, Alissa M. Kleinnijenhuis, and Jeromin Zettelmeyer, *The Economic Case for Climate Finance at Scale*, Bruegel Policy Brief No. 9 (2024), https://www.bruegel.org/system/files/2024-06/PB%2009%202024.pdf; Patrick Bolton and Alissa M. Kleinnijenhuis, "Chapter 5. International climate finance as a win-win: The economic case for coalitions of disposed developed countries to fund decarbonization in developing countries" in *Global Action without Global Governance: Building Coalitions for Climate Transition and Nature Restoration*, ed. Jean Pisani-Ferry, Beatrice Weder di Mauro, and Jeromin Zettelmeyer (Centre for Economic Policy Research Press, 2025), https://cepr.org/publications/books-and-reports/paris-report-3-global-action-without-global-governance-building.

2 Evidence from the EU ETS shows that during its first phase (2005–2008), patenting of low-carbon innovations increased by 9.1% on average among regulated firms, without reducing innovation in other areas or among unregulated firms. Similarly, China's regional ETS pilots increased intercity patent transfers by 8.7% between 2008 and 2018, particularly in innovation-intensive cities. *See*: Raphael Calel and Antoine Dechezleprêtre, "Environmental Policy and Directed Technological Change: Evidence from the European Carbon Market," *Review of Economics and Statistics* 98, no. 1 (2016): 173–91, https://doi.org/10.1162/REST_a_00470; Hechang Cai, Zilong Wang, Zhiwen Shang, and Xiaodi Xu, "Carbon Emission Trading Schemes Induces Technology Transfer: Evidence from China," *Energy Policy* 178 (2023): 113595, https://doi.org/10.1016/j.enpol.2023.113595.

3 Based on our own calculations using 2023 trade data from the International Monetary Fund. *See*: Trade in Low Carbon Technology Products, Climate Change Indicators Dashboard, International Monetary Fund, last updated November 28, 2024, https://climatedata.imf.org/datasets/1d33174e9e46429d9e570d539556f66a_0/explore.

4 OECD/Climate Club, *Mapping Financial and Technical Assistance for Industry Decarbonisation in Emerging Markets and Developing Economies* (OECD Publishing, 2024), https://doi.org/10.1787/7ecda2b7-en; Bernard Colas, "Transfer of Clean Technologies from North to South: Legal Barriers and Mitigations," Centre for International Governance Innovation Policy Brief No. 91 (2016), https://www.cigionline.org/static/documents/documents/PB%20No.91.pdf.

5 Vicente Paolo Yu, "Addressing the Climate Technology Gap in Developing Countries Through Effective Technology Transfer," *TESS Forum on Trade, Environment and the SDGs*, December 13, 2023, https://tessforum.org/latest/addressing-the-climate-technology-gap-in-developing-countries-through-effective-technology-transfer.

6 David Popp, "International Technology Transfer, Climate Change, and the Clean Development Mechanism," *Review of Environmental Economics and Policy* 5, no. 1 (2011): 131–52, https://doi.org/10.1093/reep/req018.

7 Simon Black, Ian W.H. Parry, and Karlygash Zhunussova, *Is the Paris Agreement Working? A Stocktake of Global Climate Mitigation*, International Monetary Fund Staff Climate Notes (2023), https://doi.org/10.5089/9798400257889.066.

8 Chad P. Bown and Kimberly Clausing, "How Trade Cooperation by the United States, the European Union, and China Can Fight Climate Change," in *The Green Frontier: Assessing the Economic Implications of Climate Action*, ed. Jean Pisani-Ferry and Adam S. Posen (Peterson Institute for International Economics, 2024), https://www.piie.com/bookstore/2024/green-frontier-assessing-economic-implications-climate-action.

9 EGA negotiations, which took place over the period 2014–2016, collapsed due to unresolved disagreements over the final product list, differing definitions of green goods, sectoral sensitivities, and concerns about EGA participants needing to offer the tariff concessions to all WTO members on a Most-Favoured-Nation (MFN) basis. *See*: "Environmental Goods Agreement (EGA)," WTO, accessed July 7, 2025, https://www.wto.org/english/tratop_e/envir_e/ega_e.htm; Jana Titievskaia, "Plurilateral Environmental Goods Agreement (EGA)," *European Parliament Members' Research Service*, 2014, https://www.europarl.europa.eu/legislative-train/theme-a-global-europe-leveraging-our-power-and-partnerships/file-environmental-goods-agreement-(ega).

10 "Mission Innovation," Mission Innovation Secretariat, accessed July 7, 2025, https://mission-innovation.net.

11 "The Climate Club: An Inclusive and Ambitious High-Level Forum for Industry Decarbonisation," Climate Club Secretariat, accessed July 7, 2025, https://climate-club.org.

12 WTO, *Decarbonization Standards and the Iron and Steel Sector: How Can the WTO Support Greater Coherence?*, Trade and Climate Change - Information Brief No. 7 (2023), https://www.wto.org/english/tratop_e/envir_e/trade-climate-change_info_brief_no7_e.pdf; WTO, "Cooperation on Standards at WTO Could Speed up Steel Sector Decarbonization: Trade Forum," news item, March 9, 2023, https://www.wto.org/english/news_e/news23_e/clim_09mar23_e.htm; Chad P. Bown and Kimberly Clausing, "How Trade Cooperation by the United States, the European Union, and China Can Fight Climate Change," in *The Green Frontier: Assessing the Economic Implications of Climate Action*, ed. Jean Pisani-Ferry and Adam S. Posen (Peterson Institute for International Economics, 2024), https://www.piie.com/bookstore/2024/green-frontier-assessing-economic-implications-climate-action.

13 Climate Action Network (CAN) International, *Tackling the Intellectual Property Elements of an Enabling Environment for Technology Transfer: CAN Submission to the Technology Executive Committee Meeting* (2012), https://climatenetwork.org/wp-content/uploads/2021/02/CAN_technology_Submission_28July2012.pdf.

14 Su Jung Jee, Kerstin Hötte, Caoimhe Ring, and Robert Burrell, "Making Intellectual Property Rights Work for Climate Technology Transfer and Innovation in Developing Countries," preprint, December 17, 2024, http://dx.doi.org/10.2139/ssrn.5060271.

15 Nikhar Gaikwad, Federica Genovese, and Dustin Tingley, "Climate Action from Abroad: Assessing Mass Support for Cross-Border Climate Transfers," *International Organization* 79, no. 1 (2025): 146–72, https://doi.org/10.1017/S0020818324000365.

16 IMF, "Macroeconomic Developments and Prospects in Low-Income Countries – 2025," *IMF Policy Papers* (2025), https://doi.org/10.5089/9798229004701.007.

17 "What Is the Innovation Fund?," European Commission, Directorate-General for Climate Action, last accessed August 1, 2025, https://climate.ec.europa.eu/eu-action/eu-funding-climate-action/innovation-fund/what-innovation-fund_en; "Modernisation Fund," European Commission, Directorate-General for Climate Action, last accessed August 1, 2025, https://climate.ec.europa.eu/eu-action/eu-funding-climate-action/modernisation-fund_en; "Social Climate Fund," European Commission, Directorate-General for Climate Action, last accessed August 1, 2025, https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/social-climate-fund_en.

18 Melanie Robinson and Crispian Olver, *Are 'Country Platforms' the Key to Delivering Green Growth at Scale?*, World Resources Institute Technical Perspectives (2025), https://files.wri.org/d8/s3fs-public/2025-02/technical-perspective-country-platforms-delivering-green-growth-scale.pdf.

19 The Baku to Belém Roadmap, an initiative of the COP29 and COP30 Presidencies, endeavors to set a realistic course to scale climate finance to USD 1.3 trillion by 2035.

20 Climate Policy Initiative, *Global Landscape of Climate Finance 2025* (2025), https://www.climatepolicyinitiative.org/publication/global-landscape-ofclimate-finance-2025.

21 Climate Investment Funds (CIF), *Industry Decarbonization: Program and Partner Countries Overview* (2025), https://www.cif.org/sites/cif_enc/files/knowledge-documents/industry-brochure.pdf.

22 Valerie Hickey, Debbie Palmer, and Ian Mitchell, "New Finance Goals and Political Realities: How to Deliver on Climate and Development," June 24, 2025, Center for Global Development Talks, https://www.cgdev.org/event/new-finance-goals-and-political-realities-how-deliver-climate-and-development.

23 Benjamin Stephens, Sebastián Chaskel, Mariana Noguera, Maria del Mar Oyola, Lucía Pérez, and Mateo Zárate, *Catalyzing Climate Results with Pull Finance*, Center for Global Development Policy Paper (2022), https://www.cgdev.org/publication/catalyzing-climate-results-pull-finance.

24 Government of the United Kingdom, Department for Energy Security and Net Zero, *Climate Innovation Pull Facility (CIPF) – Facility Manager – Invitation to Submit Initial Tenders*, February 12, 2025, Contract Notice F02, Notice Identifier 2025/S 000-004832, https://www.find-tender.service.gov.uk/Notice/004832-2025.

25 Abhijit Banerjee, Esther Duflo, and Michael Greenstone, *A Grand Bargain for Climate Mitigation, Adaptation and Compensation* (forthcoming).

26 Rakan Aboneaaj and Clemence Landers, "Three Questions About the World Bank's New Portfolio Guarantee Program," *Center For Global Development Blog*, July 27, 2023, https://www.cgdev.org/blog/three-questions-about-world-banks-new-portfolio-guarantee-program.

27 "Governance," Multilateral Fund for the Implementation of the Montreal Protocol Secretariat, accessed August 1, 2025, https://www.multilateralfund.org/about/governance.

28 Nikhar Gaikwad, Federica Genovese, and Dustin Tingley, "Climate Action from Abroad: Assessing Mass Support for Cross-Border Climate Transfers," *International Organization* 79, no. 1 (2025): 146–72, https://doi.org/10.1017/S0020818324000365; Helen V. Milner and Dustin Tingley, *Sailing the Water's Edge: The Domestic Politics of American Foreign Policy* (Princeton University Press, 2015), https://doi.org/10.2307/j.ctt1dgn6j9.

29 Hipolito Talbot-Wright, Raul Delgado, Adrien Vogt-Schilb, Jose Miguel Alvarado, Daniela Buchuk, Daniela Torres Palaez, and Rudy Loo-Kung, *Expectations of Economy and Finance Ministries on Carbon Pricing and Evidence of Their Effectiveness* (Inter-American Development Bank, 2024), https://doi.org/10.18235/0012852.

30 Robert S. Kaplan and Karthik Ramanna, "Accounting for Climate Change," *Harvard Business Review*, November-December 2021, https://hbr.org/2021/11/accounting-for-climate-change.

31 Global efforts to formalize the role of high-integrity carbon offsets markets in meeting climate goals are advancing. At COP29 in November 2024, countries finalized technical guidance for Article 6.4 of the Paris Agreement, which facilitates the use of international carbon offset credits. Initiatives like the Tropical Forest Finance Facility (TFFF), LEAF Coalition, and World Bank's Forest Carbon Partnership Facility (FCPF) provide credible protocols and verification mechanisms that the coalition can align with. The European Commission on July 1, 2025, proposed an EU climate target for 2040 that will allow countries to use carbon offsets from developing nations to meet a limited share of their emissions goal starting from 2036. See: European Commission, Directorate-General for Communication, *EU's Climate Law Presents a New Way to Get to 2040*, press release, July 1, 2025, https://ec.europa.eu/commission/presscorner/detail/en/ip_25_1687.

32 Ely Sandler and Daniel Schrag, "Carbon Tax Assets for Carbon Tax Liabilities: Using CBAM to Increase Climate Finance," *Climate Policy*, August (2025): 1-11, https://doi.org/10.1080/14693062.2025.2543096.

33 One of the notable features of the newly proposed Brazilian Greenhouse Gas Emissions Trading System (SBCE) is that it allows offset credits (CRVEs) from eligible projects—including forest-based initiatives—for compliance purposes. See Brazil case study in the appendix for more details.

34 Robert S. Kaplan, Karthik Ramanna, and Marc Roston, "Accounting for Carbon Offsets," *Harvard Business Review*, July-August 2023, https://hbr.org/2023/07/accounting-for-carbon-offsets.

35 Rohini Pande, "Fixing Forest Carbon Credits," *Science* 383, no. 6679 (2024): eadn4923, https://doi.org/10.1126/science.adn4923.

36 Ibid.

37 Ibid.

38 The coalition could consider supporting an autonomous central body to implement standardized measurement, accounting, risk mitigation, and verification for this market in line with the proposed MARVIN in Rohini Pande, Robin Burgess, Maryam Farboodi, and Lucy Page, *A Credible and Fair International Carbon Market: Core Requirements, Institutions, and Market Design* (forthcoming).

5. Governance and Implementation: Initial Considerations for a Climate Coalition

An agile, effective governance structure will be essential to enable the coalition to align economic incentives and harmonize trade policies in a timely manner. At the outset, the focus should be on core decisions critical to coordinated carbon pricing, with the intention of gradually taking on broader responsibilities as the coalition grows in scope and membership. This section provides initial considerations for designing an effective governance structure, drawing on relevant models and examples.

5.1 INSTITUTIONAL ARCHITECTURE AND A ROADMAP FOR IMPLEMENTATION

Because the coalition will include countries with diverse economies, common governance rules are needed to coordinate climate action, ensure all members do their part to uphold their commitments, and preserve the smooth functioning of markets. From the beginning, members must incorporate the core features needed for a coalition to function. At a minimum, they will need to agree on the appropriate level of carbon pricing across coalition members, the sectors or industries that should be covered by carbon pricing (e.g., steel, cement, aluminum, and fertilizers), and what level of BCA will be imposed on non-members.

> *"At the outset, the focus should be on core decisions critical to coordinated carbon pricing, with the intention of gradually taking on broader responsibilities as the coalition grows in scope and membership."*

As part of this process, coalition members will need to decide what types of national actions will be recognized as valid forms of carbon pricing and border adjustment, and whether to formally link domestic carbon pricing systems versus establish a process for mutual recognition.[1] Given wide diversity in institutional arrangements across member countries, mutual recognition may be more practical at the outset. Members will also need to develop approaches to account for the many countries that implement carbon pricing via an ETS instead of a carbon tax. Price floors are more difficult to enforce in an ETS; in addition, the specific design elements of these systems can vary from country to country, with some governments offering free allowances and others tying payments to emissions intensity. As mentioned in the preceding section, until offsets are fully integrated into the coalition framework, members will also need to decide how to recognize national ETSs that allow offsets.

Mechanisms are also needed to verify that coalition members implement the requisite regulatory and trade measures. This requires a common methodology for accounting and the ability to compare policies across countries (described in Section 6).[2] Should countries fail to uphold their coalition commitments, they would be

held accountable through dispute resolution mechanisms that impose costs, or deny membership benefits, for non-compliance.

Assuming low- and middle-income countries are among its early members, the coalition's governance structure may be called upon to shape and approve efforts to facilitate technology diffusion, extend climate finance, and support capacity-building.

As the coalition matures, its governance structure could assume additional responsibilities, such as reviewing and updating the policy regime for measurement, reporting, and verification (MRV). The coalition could also elect to expand carbon pricing to additional sectors. And if other countries seek to join, conditions for accession and membership will need to be defined.

Finally, like other multilateral organizations, the coalition will need to define how members are represented and how decisions are made, while also clarifying the roles of a technical secretariat, leadership positions, and key committees in supporting coalition goals.

5.2 KEY CONSIDERATIONS IN SHAPING A COALITION GOVERNANCE STRUCTURE

To deliver on its goals, the coalition's approach to governance should be guided by several key considerations:

- Climate ambition. To maintain ambition in the long run, the coalition must set and maintain high standards that will also induce countries seeking membership to rise to the coalition's level of performance. The coalition could consider including incentives for rapid emission reductions in its governance design. Examples could include giving greater voice and decision-making weight to countries that have committed to more ambitious policy goals (in the form of higher carbon prices or larger GHG reductions in covered sectors, for example) or to low-income countries that are willing to commit to sustaining a low-carbon growth path.

    ➤ Lessons from the Montreal Protocol. Widely regarded as one of the most successful examples of international collaboration on an environmental challenge,[3] the Montreal Protocol on Substances that Deplete the Ozone Layer (1987) aimed to phase out the production and consumption of ozone-depleting substances (ODS). The legally binding treaty targeted an initial subset of the most damaging chemicals, later expanding to cover other categories in subsequent amendments. As phase-down measures proved increasingly feasible and commercial alternatives emerged, timetables for progress were further accelerated. An Implementation Committee serves as an enforcement mechanism: receiving and reporting information, conducting periodic review, and identifying the underlying causes of countries' non-compliance with targets.[4] Learning from the Montreal Protocol example, a climate coalition could accompany carbon pricing and BCAs with a process for review, enforcement, and assistance (see Sections 4 and 6). Coalition members could seek to strengthen measures over time (e.g., allowing carbon prices to rise on a faster timetable; covering additional industrial sectors). Unlike the Montreal Protocol, a climate coalition would not rely on a binding international

treaty but simply coordinate domestic regulatory action among several countries in ways that can be verifiably and quantifiably codified into each member's national laws. The coalition would also not focus on "emission reductions" per se, but on ensuring that each member country implements a comparable pricing mechanism that motivates mitigation action by domestic producers (see Section 6).

➤ **Lessons from EU membership.** Although the climate coalition will want to be more agile and integrate members more quickly, it can still look to the process of applying for EU membership for a relevant example of maintaining ambition while expanding participation. Prospective EU members must meet robust accession criteria to begin membership negotiations—these criteria include adopting established EU law, preparing to apply and enforce those laws, and implementing a suite of judicial, administrative, and economic reforms that can be assessed objectively.[5] Similarly, a country interested in joining the climate coalition would need to signal its suitability by implementing domestic carbon prices, developing MRV capabilities for covered sectors, and preparing to levy border adjustments. Only after receiving approval in all domains and the acquiescence of existing members would a country be permitted to join. Candidate status or other forms of associate membership could offer a stepping stone for countries that are interested in joining but still require further capacity building before they can assume the commitments of full membership.

- **Transparency.** To build trust among members, all parties to the coalition should be allowed to establish and verify other parties' claims of action. A strong technical secretariat could conduct impartial analyses to inform the coalition's overarching policy decisions, thereby helping to ensure that political negotiations proceed constructively and remain grounded in evidence.

  ➤ **Lessons from the Montreal Protocol.** The Montreal Protocol is a strong precedent for effective multilateral cooperation on a global environmental and economic challenge.[6] In addition to the Montreal Protocol's annual Meeting of Parties, an open-ended working group addresses policy issues, while several advisory bodies (including a Scientific Assessment Panel, Environmental Effects Panel, and Technology and Economic Assessment Panel, as well as a variety of technical options committees) provide guidance on specific technical matters. Similar sector-specific technical committees could provide relevant advice and document best practices to be shared among member countries in a global climate coalition. An expert panel could also compare carbon prices across jurisdictions, with careful attention to different rules for items such as allowance allocation and offsets. Reliable, transparent information would drive improvements in domestic policies and build trust in coalition procedures.

- **Adaptability.** To maintain legitimacy and relevance, the climate coalition must have the ability to cope with an uncertain future, as national circumstances change or new knowledge emerges. The extension of carbon pricing to additional sectors, the accession of new members, or the advent of technologies that enable more ambitious climate policy are all issues that the coalition is likely to confront and that call for adaptability. *Review periods* and

regular assessments could help member countries respond to new information about the ever-evolving landscape of climate and trade. *Escape clauses* that allow a country to suspend or modify its obligations on a temporary basis could be helpful in coping with unexpected economic or political shocks, making it easier for countries to join and make high-ambition commitments in the first place.[7] Other flexibility mechanisms, not triggered by crises, could include *periodic review and updating of standards and benchmarks to reflect technological progress*—approaches that have also been adopted by the EU ETS.[8]

- ➤ **Lessons from existing trade agreements.** Article XIX in the 1984 General Agreement on Tariffs and Trade (GATT) and a similar provision in Article 801 of the North American Free Trade Agreement (NAFTA) describe "emergency actions" that are designed to offer a temporary reprieve from coalition requirements. The World Trade Organization (WTO) Agreement on Safeguards builds on the GATT approach.[9] A distinct "Special Safeguard Mechanism" in the WTO Agreement on Agriculture also softens unexpected disruptions; it is designed to trigger automatically based on price levels to avoid dependence on leaders' political judgments.[10] The Treaty of Asunción that established MERCOSUR in 1991 also permitted safeguard actions, but *only in a transitional period* of regional integration. The climate coalition could negotiate review periods to assess the case for expanding to new sectors or reset the target carbon price floor, or to review the need for escape clauses as an urgent response to economic shocks. Regularly revisiting standards and benchmarks would also improve the coalition's ability to raise the carbon price floor, increase ambition, and target assistance and investments to where they are most effective.

- **Equity.** The coalition's governance structure needs to acknowledge diverse national circumstances and sectoral capabilities, while still maintaining effectiveness. More tailored and dynamic country groupings within the coalition, which would evolve as countries develop and decarbonize, could support more equitable governance. This evolution could extend to working groups that focus on sectoral performance. As outlined in the preceding section, the coalition may also consider additional mechanisms for supporting technological innovation, providing climate finance, and strengthening member countries' institutional capacity.

  - ➤ **Lessons from the EU ETS on the issue of solidarity.** As Section 4 notes, the design of the EU ETS—as a cap-and-trade system with universal provisions that also provides for special funds and mechanisms to promote solidarity—reflects both equity and effectiveness considerations. The same ETS rules apply to all EU members, but a "solidarity adjustment mechanism" recognizes that national factors—such as diverging mitigation capabilities, the relative importance of carbon-intensive sectors to each member's economy, and the national energy mix—may make decarbonization more difficult for some EU members than others. Measures are in place to assist lower-income EU member states and limit regressive impacts.[11] A EUR 57 billion Modernization Fund bankrolled by ETS revenues supports energy system and energy efficiency upgrades in 13 lower-income EU member states. From 2021 to 2030, the Fund will help these states achieve climate targets and implement the European Green Deal.[12] ETS governance also relies on sectoral approaches. Under ETS rules, a limited set of

free allowances can be provided to certain industries, particularly those that are at significant risk of carbon leakage, or in the ETS's most recent iteration, in sectors that are most at risk for relocating production outside the EU, or are growing quickly.[13]

- ➤ Lessons from the European Union on the issue of candidacy. Another example for addressing equity considerations comes from the European Union, which developed "special rules" to enable the eventual candidacy of countries in the Western Balkans. These rules empowered several countries to progressively meet demanding EU requirements for rule of law, democracy, and standards while providing support through trade concessions and economic assistance.

These examples illustrate how integrating preparatory capacity building into the framework of the climate coalition can support candidacy and eventual accession to full membership among a broader set of countries. Instead of lowering its standards, the coalition can actively work to help potential candidate countries elevate their policy approaches to the coalition's own high standards.

5.3 BUILDING A CLIMATE COALITION ALIGNED WITH EXISTING INTERNATIONAL CLIMATE AND TRADE REGIMES

Member countries should strive for broad consistency with the United Nations Framework Convention on Climate Change (UNFCCC) and the WTO as they negotiate and implement the climate coalition framework. As envisaged in this report, a climate coalition complements the UNFCCC's efforts on climate mitigation as well as its emphasis on transparency and fairness: Countries continue to fulfill their responsibilities under the Paris Agreement, but coalition membership—and, for low- and middle-income countries, access to coalition incentives—will likely accelerate the timeframe for countries to achieve their Nationally Determined Contributions (NDCs) under the Paris Agreement, as stronger market signals influence domestic industries to reduce emissions more quickly. Existing WTO rules may allow members, in certain cases, to adopt trade-related environmental measures provided these measures "meet conditions that prevent misuse for protectionist purposes"[14] or are even designed to advantage developing countries.[15] Modest revisions to the UNFCCC and WTO may enable these treaties to better achieve their underlying goals in the context of a changing climate and global economy.

Section 5 Endnotes

1 Effective mutual recognition may require institutional mechanisms to assess whether countries are complying with coalition commitments. This could include expert reviews, akin to the WTO's Trade Policy Review Mechanism or the IMF's Article IV consultations. Similar processes could also support transparency on technology transfer and international climate finance.

2 Another term for verifying that countries are implementing the climate policies they claim are in force is "policy surveillance." Joseph E. Aldy and William A. Pizer, "Alternative Metrics for Comparing Domestic Climate Change Mitigation Efforts and the Emerging International Climate Policy Architecture," *Review of Environmental Economics and Policy* 10, no. 1 (2016): 3–24, https://doi.org/10.1093/reep/rev013; Joseph E. Aldy, "The Crucial Role of Policy Surveillance in International Climate Policy," *Climatic Change* 126, nos. 3–4 (2014): 279–92, https://doi.org/10.1007/s10584-014-1238-5.

3 "About Montreal Protocol," UN Environment Programme OzonAction, accessed August 1, 2025, https://www.unep.org/ozonaction/index.php/who-we-are/about-montreal-protocol.

4 "Implementation Committee," UN Environment Programme Ozone Secretariat, accessed August 1, 2025, https://ozone.unep.org/taxonomy/term/523; Eleri Philipps, "Building Upon the Montreal Protocol's Legacy of Collaboration," *Carbon Containment Lab Blog*, June 12, 2023, https://carboncontainmentlab.org/updates/posts/building-upon-the-montreal-protocol. The aim is to get countries on track, including through assistance (data collection, technical assistance, technology transfer, and financial support, training) and issuing cautions, with penalties for non-compliance, such as suspension of privileges under the Protocol as a last resort. *See also*: UN Environment Programme Ozone Secretariat, *The Montreal Protocol on Substances that Deplete the Ozone Layer, Annex II: Non-Compliance Procedure (1998) - Tenth Meeting of the Parties*, https://ozone.unep.org/node/2078; Legal Response Initiative, *Sanctions and Penalties in Environmental Treaties* (2010), https://legalresponse.org/legaladvice/sanctions-and-penalties-in-environmental-treaties.

5 "Steps towards Joining," European Union, Directorate-General for Enlargement and Eastern Neighborhood, accessed August 1, 2025, https://enlargement.ec.europa.eu/enlargement-policy/steps-towards-joining_en; European Union (2025), "EU Enlargement," European Union, Directorate-General for Communication, accessed August 1, 2025, https://european-union.europa.eu/principles-countries-history/eu-enlargement_en.

6 Transparency International Australia, *Transparency, Accountability and Integrity Assessment of the Montreal Protocol and the Multilateral Fund* (2024), https://transparency.org.au/reports/the-montreal-protocol-and-the-multilateral-fund.

7 Mostafa Beshkar and Eric W.Bond, "Chapter 2 - The Escape Clause in Trade Agreements," in *Handbook of Commercial Policy*, vol. 1, ed. Kyle Bagwell and Robert W. Staiger (North Holland, 2016), https://doi.org/10.1016/bs.hescop.2016.04.007; Mostafa Beshkar and Eric W.Bond, "Cap and Escape in Trade Agreements," *American Economic Journal: Microeconomics* 9, no. 4 (2017): 171–202, https://doi.org/10.1257/mic.20160218.

8 "Allocation to Industrial Installations," European Commission, Directorate-General for Climate Action, accessed August 1, 2025, https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/free-allocation/allocation-industrial-installations_en.

9 However, safeguard actions have not consistently survived when actions have been brought in WTO Dispute Settlement Mechanism cases.

10 Beshkar and Bond, "Chapter 2 - The Escape Clause in Trade Agreements."

11 Of the ETS allowances that are auctioned, 90% are distributed among all member states, while 10% are distributed as a cushion to only 16 lower-income member states, "for the purpose of solidarity." (The lower-income states are Bulgaria, Czechia, Estonia, Greece, Spain, Croatia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Portugal, Romania, Slovenia, and Slovakia.) Most ETS revenues are disbursed to member states, primarily to fund other domestic decarbonization measures (public transport, building energy efficiency, cleaner energy supply, storage and transmission), or to support international climate finance to vulnerable third countries. *See*: "Auctioning of Allowances," European Commission, Directorate-General for Climate Action, accessed August 1, 2025, https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/auctioning-allowances_en; "Use of Auctioning Revenues Generated under the EU Emissions Trading System," European Environment Agency, last modified December 19, 2024, https://www.eea.europa.eu/en/analysis/indicators/use-of-auctioning-revenues-generated; Andrew Lilico and Deborah Drury, *The EU Emissions Trading System: Method and Effects of Free Allowance Allocation*, Report for the EU Parliament's Committee on Budgetary Control (2023), https://www.europarl.europa.eu/RegData/etudes/IDAN/2023/755098/IPOL_IDA(2023)755098_EN.pdf.

12 The 13 beneficiary member states of the Modernisation Fund are Bulgaria, Czechia, Estonia, Greece, Croatia, Latvia, Lithuania, Hungary, Poland, Portugal, Romania, Slovenia and Slovakia. *See*: "Modernisation Fund," European Commission, Directorate-General for Climate Action, accessed August 1, 2025, https://climate.ec.europa.eu/eu-action/eu-funding-climate-action/modernisation-fund_en.

13 "Allocation to Industrial Installations," European Commission, Directorate-General for Climate Action, accessed August 1, 2025, https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/free-allocation/allocation-industrial-installations_en. Some free allowances were allocated to specific industries, as well as to the power sector and aviation. In Phase 3 of the ETS (2005–2020), emitters in sectors exposed to "significant risk of carbon leakage" could receive a number of free allowances. (Sectors not on the carbon leakage list have already experienced a drawdown of free allowances, to only 30% in 2020.) In Phase 4 of the ETS (2021–2030), a number of free allowances are being allocated to sectors at the "highest risk" of relocating production outside the EU and to certain "new and growing installations."

14 See the introduction and the section on GATT exceptions in "WTO Rules and Environmental Policies," WTO Secretariat, accessed August 1, 2025, https://www.wto.org/english/tratop_e/envir_e/envt_rules_intro_e.htm. GATT Article XX states that environmental measures cannot be applied in a manner that would constitute "a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail." A GATT enabling clause ("Decision on Differential and More Favourable Treatment, Reciprocity and Fuller Participation of Developing Countries"), adopted in 1979, "enables developed members to give differential and more favourable treatment to developing countries." For more on this clause, see: "Special and Differential Treatment Provisions - WTO Agreement," WTO Secretariat, accessed August 1, 2025, https://www.wto.org/english/tratop_e/devel_e/dev_special_differential_provisions_e.htm.

15 Chris Aylett et al., *Guidance on Border Carbon Adjustment: Results of the Global Stakeholder Dialogues*, International Institute for Sustainable Development Report (2025), https://www.iisd.org/publications/report/border-carbon-adjustment-guidance.

6. Ensuring Credible Implementation: The Role of Measurement, Reporting, and Verification (MRV)

Transparency, together with a robust measurement, reporting, and verification (MRV) regime, will be integral to ensuring effective implementation of coalition policies. The coalition's MRV regime will serve a dual purpose: assessing the credibility of carbon pricing systems in member countries to ensure they uphold their carbon pricing commitments, and accurately applying border adjustments on the carbon emissions embodied in imports from non-member countries, which may employ different climate mitigation policies. This section explores how a well-designed MRV regime can incentivize coalition membership, reduce compliance costs, and ensure climate integrity across borders.

6.1 BUILDING MUTUAL TRUST THROUGH THE MRV FRAMEWORK FOR COALITION MEMBERS

Coalition members could commit to regular, transparent reporting using standardized, agreed upon methodologies:

- Carbon Pricing Equivalence. Recognizing that members may use different carbon pricing policies (e.g., carbon taxes, ETSs) with different design features, the coalition will need to develop conversion factors to calculate comparable effective carbon prices across member countries. In doing so, the impact of other fiscal measures (e.g., tax adjustments or subsidies) and non-price policies on the effective carbon price will need to be considered. Coalition members will also need to decide on a consistent methodology for converting local currencies for comparison.[1]

- Emissions Reporting. Members will need to report aggregate emissions data for target sectors or industries (e.g., steel, aluminum, cement, fertilizers) to help validate that the carbon pricing system is credible. A common methodology, including consistent system boundaries, would enable comparability and prevent leakage or double counting. The coalition could leverage new technologies that dramatically improve emissions data timeliness and accuracy. Satellite imagery combined with machine learning, for example, can provide near-real-time carbon intensity metrics at the industry or sector level.[2]

Rather than conduct real-time audits, data on pricing and emissions could be subject to periodic review by an independent technical body, as a way to reduce administrative burdens while preserving accountability. Expert review (by independent experts) and peer review (between member countries) would improve the quality of the fact-finding process, helping to enhance transparency and ensure that compliance vs. non-compliance can be accurately detected.

"A streamlined system aimed at building mutual trust would reflect the coalition's commitment to collaboration, transparency, and equitable participation, while reducing unnecessary burdens on member governments and firms."

In designing an effective MRV regime, the climate coalition can look to lessons from the fact-finding mechanisms employed by other multilateral organizations, like the International Monetary Fund (IMF). In particular, the IMF's Article IV consultations, which are the main vehicle for the Fund's economic surveillance of member countries, offer an instructive model for transparency.[3] IMF staff monitor economic and financial conditions to promote stability for member countries and the global financial system.[4] As part of Article IV surveillance, IMF staff periodically visit member countries and meet with government authorities to discuss economic conditions and policies; they also consult with representatives from civil society and the private sector. If they identify risks, IMF staff make non-binding recommendations for policy adjustment.[5] Staff compile their analysis and recommendations in a report, which is discussed and approved by the IMF's Executive Board. The IMF emphasizes "independent analysis, candid discussions, and peer review" as the basis of its Article IV surveillance.

A climate coalition could use a similar process to verify the credibility of carbon pricing regimes and other related policies, with periodic visits to consult energy and environmental regulators, tax and customs authorities, and representatives from industry, labor, and civil society. A formal report, subject to peer or expert review, would address the validity of carbon pricing and progress on emissions reductions. It could also highlight best practices, and identify gaps or weak points (e.g., in carbon pricing or border adjustment schemes). A strong technical secretariat is needed to carry out impartial surveillance and generate confidence in findings.

A streamlined system aimed at building mutual trust would reflect the coalition's commitment to collaboration, transparency, and equitable participation, while reducing unnecessary burdens on member governments and firms.

6.2 A DATA-FOCUSED MRV FRAMEWORK FOR NON-MEMBERS

BCAs on imports from non-member countries help level the playing field for producers in member countries while also encouraging non-members to join the coalition. To achieve these goals, the coalition must ensure strong and consistent enforcement while maintaining fairness in its enforcement approach. A high default carbon value—similar to that used in the EU CBAM—can strengthen incentives for non-members to participate.

To calculate BCAs, the coalition will need to require exporters from non-member countries to report detailed, product-level emissions data to importers, along with any carbon price already paid in the country of origin. The coalition may choose to take a cautious approach to recognizing foreign carbon prices, prioritizing the collection of reliable, high-quality emissions data. Standardizing these reporting requirements reduces the need for individual member countries to develop specific guidelines themselves. Several key challenges must be addressed to enable successful implementation of the BCA system, including:

- Data Quality and Sharing. Computing carbon intensity involves complex trade-offs between data coverage, timeliness, accuracy, and cost.[6] Moreover, legal and technical barriers currently inhibit cross-border data sharing. Non-member countries that opt not to share data could be assessed BCAs based on default values.

- Fragmented Standards. Data collection methods and methodologies for allocating emissions to different outputs of complex production processes are likely to vary across countries. This fragmentation creates opportunities for strategic manipulation, for example, to reduce the emissions allocated to export products that are subject to carbon border tariffs.[7] The use of inconsistent system boundaries under different reporting standards can further undermine comparability.

- Limited Capacity. A multiplicity of reporting requirements can strain the resources of importing small and medium sized enterprises (SMEs), which often lack the capacity to meet divergent demands from regulators, financiers, and supply chain partners.[8] To ensure fairness, the coalition may wish to take a more targeted or flexible approach so as not to unduly burden SMEs in member countries, particularly given their importance to employment in low- and middle-income countries. For example, large importers that are already capable of collecting high-quality data could be required to provide detailed reporting, while reporting requirements for smaller businesses could be simplified. The European Union's recent simplification of its CBAM rules, for instance, is expected to exempt 90% of importers—most of which are SMEs and occasional importers—while still covering 99% of targeted emissions.[9]

6.3 LEVERAGING MRV FOR TRANSPARENCY, FAIRNESS, AND CLIMATE AMBITION

Credible carbon pricing and emissions data improve transparency, enhance trust, and strengthen coalition cohesion, making it easier to achieve the coalition's climate ambitions. Moreover, the coalition would apply different reporting requirements: whereas non-members would be required to report the detailed, product-level data needed to calculate BCAs, requirements for members would be limited to periodic reporting of aggregate, industry- or sector-level data to an independent body as a way to verify member commitments while also addressing data privacy and cross-border sharing concerns. Asymmetric reporting reflects the coalition's architecture: members benefit from streamlined requirements, while non-members must provide higher-resolution data to ensure climate integrity and a level playing field.

Section 6 Endnotes

1 Joseph E. Aldy, William A. Pizer, and Keigo Akimoto, "Comparing Emissions Mitigation Efforts across Countries," *Climate Policy* 17, no. 4 (2017): 501–15, https://doi.org/10.1080/14693062.2015.1119098. The coalition may want to leverage but not rely exclusively on other organizations, such as the World Bank, that collect information on carbon pricing.

2 OECD, *Towards More Accurate, Timely, and Granular Product-Level Carbon Intensity Metrics: Challenges and Potential Solutions: An IFCMA Report*, Inclusive Forum on Carbon Mitigation Approaches (IFCMA) Papers (2024), https://doi.org/10.1787/87bbd6bf-en.

3 Bilateral surveillance (of the member state) is most relevant, but the IMF also conducts surveillance at the multilateral (regional and global) levels. The IMF itself notes that its Articles of Agreement provide the legal basis for Fund surveillance. *See: Articles of Agreement of the International Monetary Fund* (July 22, 1944), https://www.imf.org/external/pubs/ft/aa; Ambroise Fahrner, "IMF Surveillance as a Non-Compliance Mechanism," in *International Courts versus Non-Compliance Mechanisms: Comparative Advantages in Strengthening Treaty Implementation*, ed. Caroline Foster and Christina Voigt (Cambridge University Press, 2024), https://doi.org/10.1017/9781009373913.015.

4 IMF, "Guidance Note for Surveillance Under Article IV Consultations," *IMF Policy Papers* (2022), https://doi.org/10.5089/9798400211522.007. As part of surveillance, IMF staff also make non-binding suggestions for policy measures to mitigate those risks to the global economy.

5 IMF, "Guidance Note for Surveillance Under Article IV Consultations," *IMF Policy Papers* (2022), https://doi.org/10.5089/9798400211522.007.

6 OECD, *Towards More Accurate, Timely, and Granular Product-Level Carbon Intensity Metrics: Challenges and Potential Solutions: An IFCMA Report*, Inclusive Forum on Carbon Mitigation Approaches (IFCMA) Papers (2024), https://doi.org/10.1787/87bbd6bf-en.

7 Ibid.

8 OECD, *Implementing Sustainability Reporting Requirements That Work for SMEs: Draft Policy Note* (2024), https://g20sfwg.org/wp-content/uploads/2024/06/P3-G20-SFWG-OECD-Implementing-sustainability-reporting-that-works-for-SMEs.pdf.

9 European Parliament – Press Service, "CBAM: Deal with Council to Simplify EU Carbon Leakage Instrument," press release, June 18, 2025, https://www.europarl.europa.eu/news/en/press-room/20250613IPR28918/cbam-deal-with-council-to-simplify-eu-carbon-leakage-instrument.

7. From Framework to Action: What Comes Next

The global nature of the climate crisis requires countries to move beyond individual actions and coordinate to take concrete steps together. This report sets out one such approach: the formation of a multilateral climate coalition centered on carbon pricing for key emissions-intensive industries or sectors, and complementary policies. Member countries would commit to a carbon price floor— i.e., a minimum carbon price that would apply to all emissions from these key industries within their borders. To ensure that similar carbon-related costs apply, both to firms within member countries and to goods imported from firms in non-member countries, members would apply border carbon adjustments to imports from non-member countries.

The coalition's initial focus is targeted and practical in that it focuses on emissions from four industries that are already covered by carbon pricing policies in most countries. It also has the potential for extraordinary impact. These industries alone account for more than 20% of global carbon dioxide emissions, and greater ambition in reducing them would spur wider decarbonization of the electricity sector, broadening the coalition's impact. Beyond its initial members, the existence of the coalition will send strong signals to global markets to invest in low-carbon technologies. As it grows, both in terms of membership and sectoral coverage, the coalition can deliver greater emission reductions.

The coalition concept also offers countries a compelling alternative to going it alone on climate action. Rather than implementing carbon pricing or border adjustments in isolation, countries can leverage strength in numbers to amplify their climate impact and create mutual support for ambitious policies, thereby helping to transform the political narrative around climate action. Instead of framing carbon pricing as a unilateral burden that disadvantages domestic industry, governments can present coalition membership as a way to secure fair market access, ensuring that domestic producers compete on a level playing field with firms in other countries and that trade partners face similar carbon costs and support one another's decarbonization efforts. A coordinated approach also reduces the risk that any single country will bear disproportionate economic costs or face retaliation for climate leadership. By acting together, member countries can drive deeper emission reductions while protecting their economic interests and demonstrating that effective climate action strengthens rather than weakens competitiveness.

The good news is that there is time to begin these conversations. The European Union's CBAM will not impose financial obligations until 2026 and will phase in gradually, creating a window for countries to shape an alternative, cooperative framework (see Appendix C, Figure C1). A coalition approach can recenter the global dialogue on carbon pricing and border adjustments around climate effectiveness, equity, and practicality. Rather than reacting to unilateral measures with bilateral pushback, countries have the opportunity to design a shared solution that addresses the free-rider problem while upholding fairness and transparency.

Translating this vision into reality will require coordinated action from multiple stakeholders.

Finance ministries in potential coalition member countries should take the lead and, working in partnership with trade ministries, express support for forming a coalition through multilateral forums, such as the Coalition of Finance Ministers for Climate Action, and by committing staff time and resources to develop the governance

structure and technical underpinnings of the coalition. Early steps could include convening informal dialogues with like-minded countries, scoping out design options for mutual recognition of carbon pricing systems, and identifying feasible approaches to border adjustments and revenue sharing. Regional groups, including the Regional Climate Platform of Ministries of Economy and Finance for Latin American and Caribbean Countries and the Asia-Pacific's Regional Comprehensive Economic Partnership, can host more targeted conversations about how a region's countries might help mold the coalition to meet specific regional needs.

International organizations and forums can play a catalytic role by continuing to collect and disseminate high-quality data on emissions and carbon pricing regimes and by providing technical assistance to support coalition formation. International financial institutions, including the IMF, World Bank, and regional development banks, could work in partnership with interested member countries to develop capacity for implementing carbon pricing and undertaking related climate policy reforms. The OECD's Inclusive Forum on Carbon Mitigation Approaches could continue to pioneer the development of measurement, reporting, and verification systems that are compatible across jurisdictions.

> *"Translating this vision into reality will require coordinated action from multiple stakeholders."*

Researchers and civil society will play a critical role in addressing technical challenges and engaging stakeholders in the coalition's design. For example, academics and researchers could help governments understand how to compare emissions trading systems despite differences in how these systems are structured (e.g., whether they offer free allowances, are based on emissions quantity versus emissions intensity, and recognize offsets). Appendix D describes a comprehensive research agenda. Civil society can help ensure that the interests of key groups are reflected in the design of the coalition framework. Rigorous research and engagement with key stakeholders will help the coalition gain acceptance as a vehicle to drive emission reductions and make the concept underlying the coalition credible and implementable.

The private sector, including industrial producers, trade associations, and major purchasers of low-carbon materials, could also be involved in shaping the coalition's design and ensuring that its implementation is practicable. With much to gain from harmonized frameworks under a climate coalition, early industry support can be helpful in developing workable standards, accelerating decarbonization investments, and building broad-based legitimacy.

Finally, the political viability of a climate coalition would be greatly enhanced by support from current and future COP presidencies. These leaders can give the idea a high-profile platform, helping shift the global conversation from fragmented, reactive policies to a proactive and cooperative strategy. By advancing the coalition as a model for international cooperation on carbon pricing and trade, COP presidencies can help create the political space for constructive engagement and ensure that countries, especially those with fewer resources, are supported in their transitions.

The path forward will require persistence, coordination, and political will, but it is within reach. This report has laid out a flexible, evidence-based framework for a climate coalition rooted in effectiveness and fairness. Now, the task is to translate this framework into action—starting with dialogue and concrete commitments from a wide range of actors.

A. Coalition Modeling Data and Additional Results

Tables A1 and **A2** show climate coalition modeling results by country income group and industry.

Table A1: Climate coalition results by country income group

	Carbon pricing revenue ($B)		Emissions change (Mt)		Output change (%)	
	No frictions	Frictions	No frictions	Frictions	No frictions	Frictions
Uniform Price Scenario						
HIC	22	20	-86	-67	1	1
UMIC	145	149	-610	-526	-3	-2
LMIC/LIC	18	18	-74	-83	-2	-4
Graduated Price Scenario						
HIC	30	27	-127	-98	0.2	0.5
UMIC	145	149	-609	-518	-3	-1
LMIC/LIC	10	10	-34	-31	-1	2

Notes: Carbon pricing revenue captures the full extent of domestic tax generated by the price floors annually. Emissions changes are annual reductions generated by the price floor relative to 2023 levels. Output changes are relative to the *Current Policy Baseline* with 2023 as the reference year.

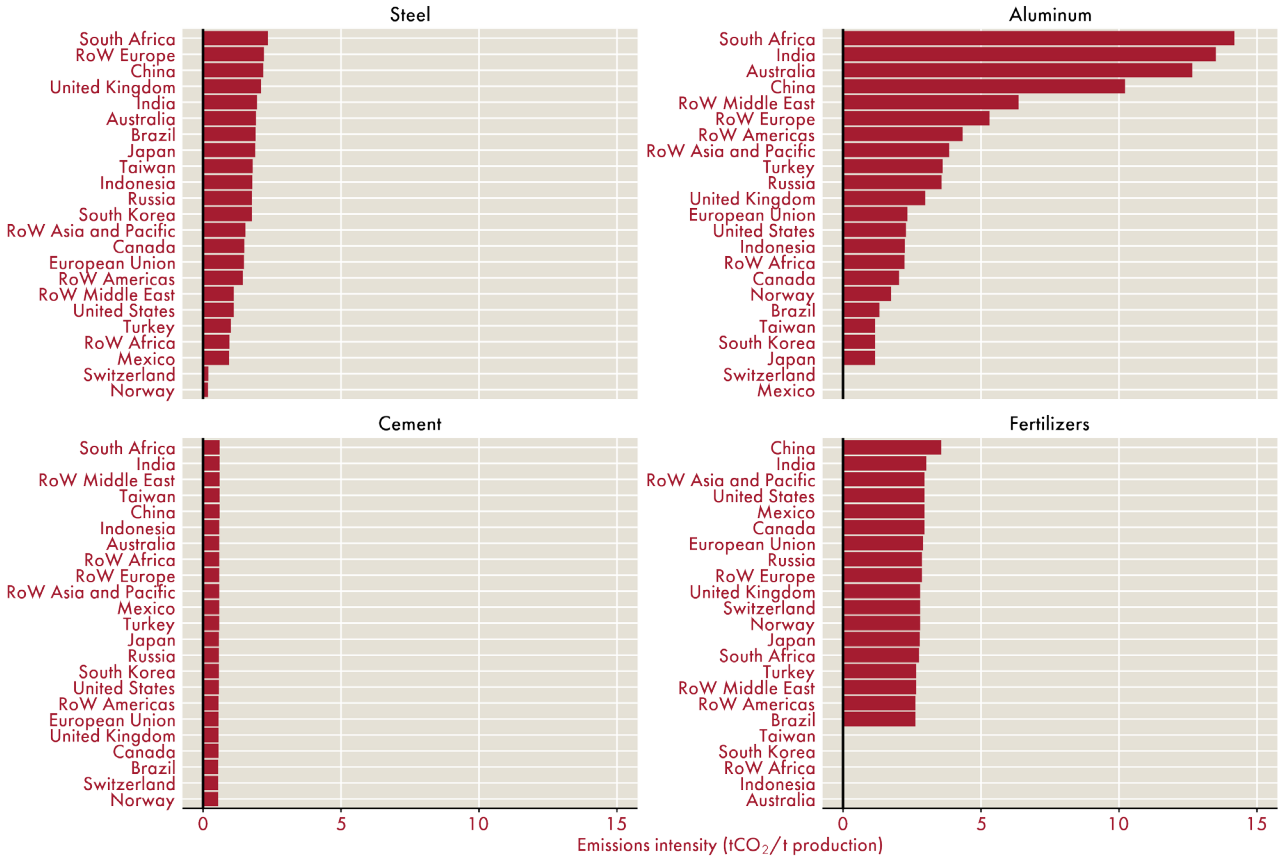
Table A2: Climate coalition results by industry

	Carbon pricing revenue ($B)		Emissions change (Mt)		Output change (%)	
	No frictions	Frictions	No frictions	Frictions	No frictions	Frictions
Uniform Price Scenario						
Steel	101	101	-409	-352	-2	-1
Aluminum	24	25	-131	-103	-4	-3
Cement	51	51	-189	-190	-2	-2
Fertilizers	10	9	-40	-31	-2	-1
Graduated Price Scenario						
Steel	102	102	-417	-352	-2	-0.4
Aluminum	23	25	-127	-95	-4	-2
Cement	49	50	-184	-167	-2	-0.5
Fertilizers	10	10	-40	-33	-2	-0.4

Notes: Carbon pricing revenue captures the full extent of domestic tax generated by the price floors annually. Emissions changes are annual reductions generated by the price floor relative to 2023 levels. Output changes are relative to the *Current Policy Baseline* with 2023 as the reference year.

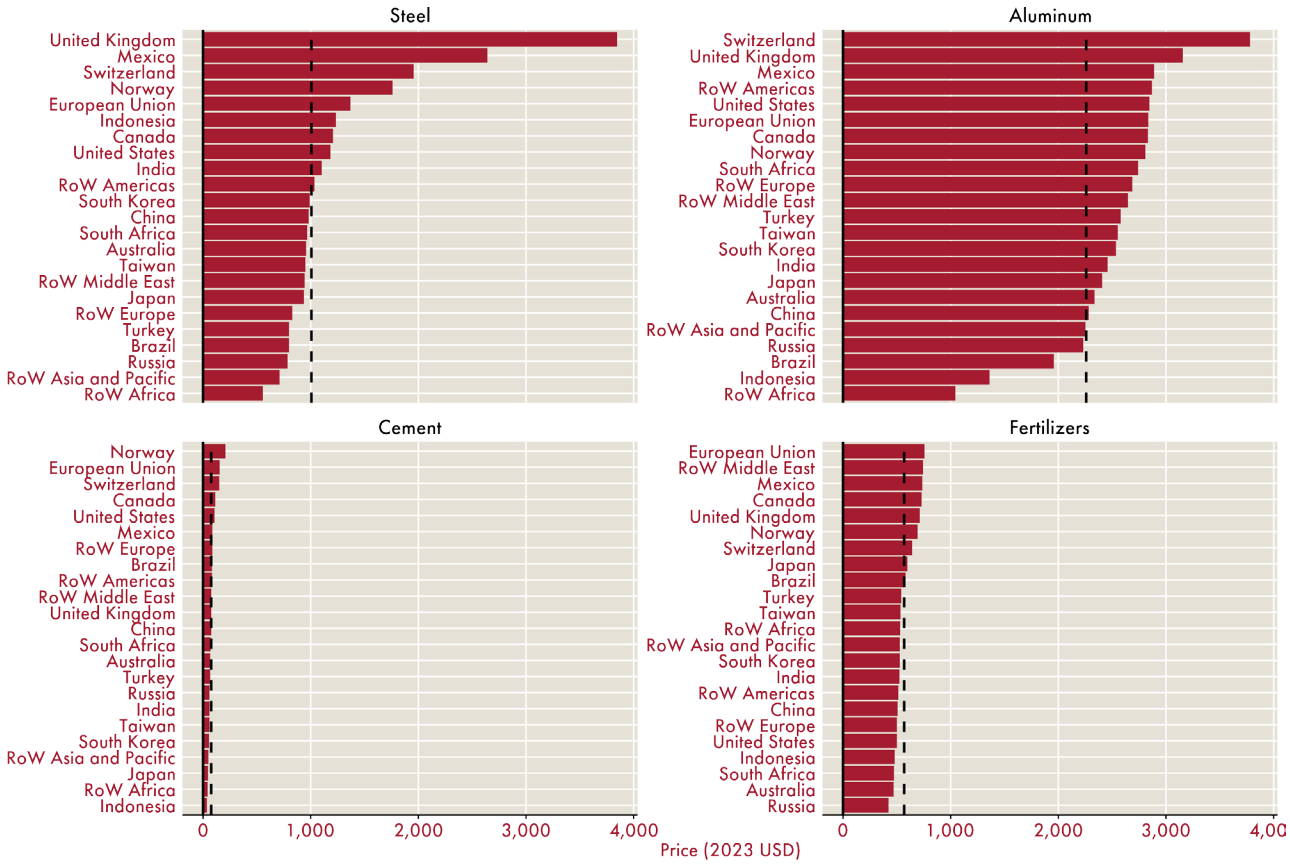
Figures A1, A2, and **A3** show input data used in both models.

Figure A1: Emissions intensity of production (t CO_2/t production)



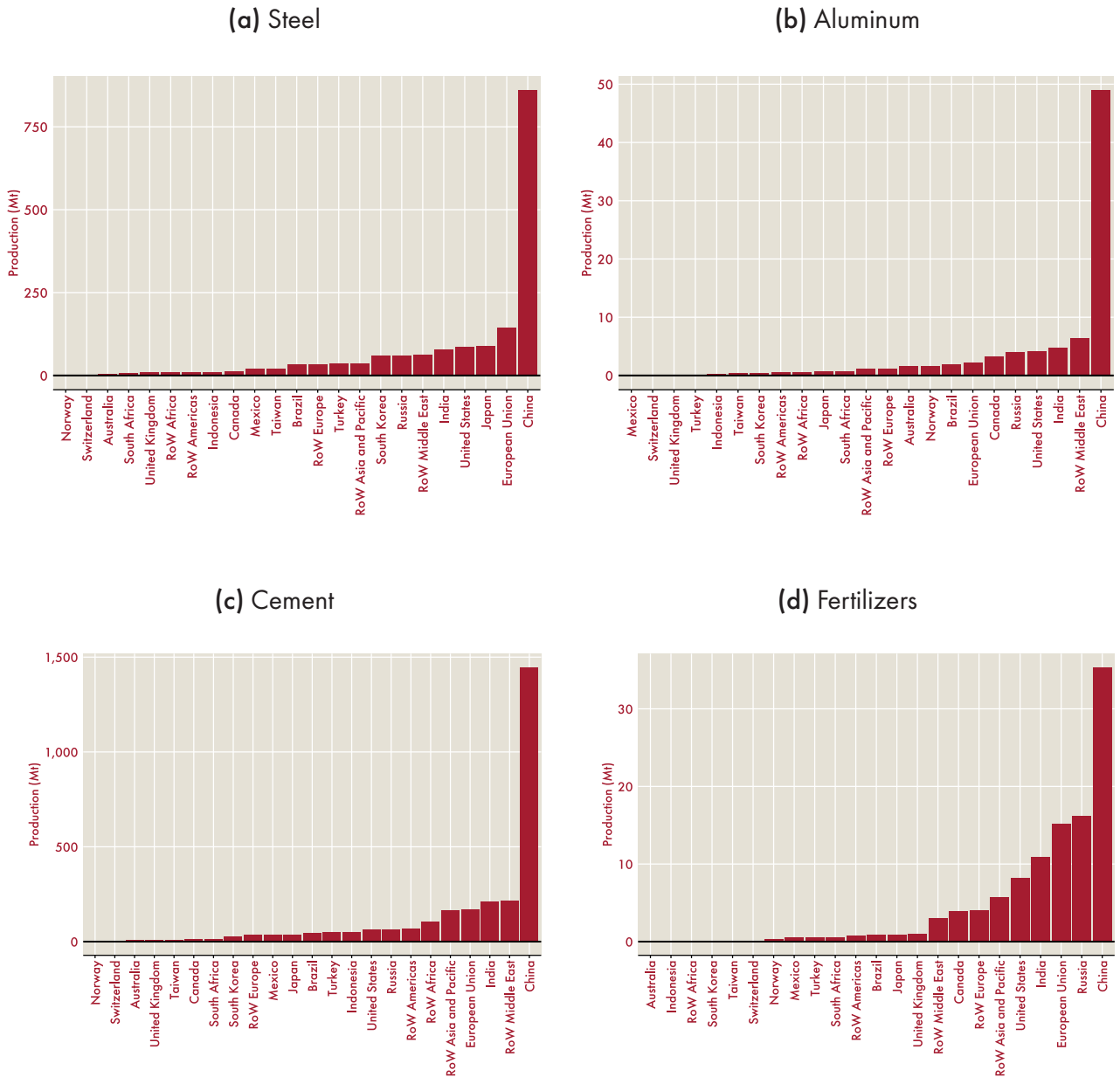
Notes: Emissions intensity includes direct emissions (Scope 1) and emissions from electricity used in production (Scope 2). Emissions data for primary aluminum is from Wood Mackenzie and secondary aluminum is from World Bureau of Metal Statistics. Emissions data for steel, cement, and fertilizers is from Climate TRACE. Fertilizer emissions include only emissions from ammonia production. Countries without data in the above figure are Exiobase regions for which there is no production in our data. (Production data on primary aluminum and secondary aluminum are from Wood Mackenzie and the World Bureau of Metal Statistics, respectively; production data on steel, cement, and fertilizers are from Climate TRACE. We use data on ammonia production as a proxy for fertilizer production.)

Figure A2: Prices (2023 USD)



Notes: The *Model with Trade Frictions* takes in Exiobase-region-level prices that are calculated as the average of the import/export price, weighted by the quantity traded. The *Model without Trade Frictions* takes in global average prices, marked with black dashed lines in the figure. Trade data are from UN Comtrade for the year 2023, except for Russia, where the data are from 2021. The HS codes for steel are those targeted by the EU CBAM: HS codes 7201, 720211, 720219, 720241, 720249, 720260, 7303, and 7205 through 7220. The HS code for aluminum is 7601, "Aluminum; unwrought." The HS code for cement is 2523 and for ammonia is 2814. Countries without data in the above figure are Exiobase regions for which we do not have production data. (Data on primary and secondary aluminum production are from Wood Mackenzie and the World Bureau of Metal Statistics, respectively; data on steel, cement, and fertilizer production are from Climate TRACE. We use production data for ammonia as a proxy for fertilizer production.)

Figure A3: Annual Production (Mt) in 2023



Notes: Production data for primary aluminum are from Wood Mackenzie; production data for secondary aluminum are from the World Bureau of Metal Statistics; production for steel, cement, and fertilizers are from Climate TRACE. Ammonia production is shown as a proxy for fertilizer production. Countries without data in the above figure are Exiobase regions for which we have no production data.

B. Mapping Existing Carbon Pricing Systems

This table provides an overview of emissions trading systems in place across several potential coalition countries, highlighting sectoral coverage, market design features, carbon prices, and associated government revenues.

Country	Coalition Industries Covered	Year of Operation[1]	Status[2]	Offset Credits[3]	Allocation[4]	Carbon Price (in USD), April 2025[5]	Share of Jurisdiction's GHG Emissions Covered[6]	Government Revenue (2024)[7]
EU	Power, Steel, Aluminum, Cement, Fertilizer[8]	2025, 2023 (Aluminum)	In force	Not allowed	Auctioning, free allocation (fixed benchmarking)	70.37	40%	USD 41,703 million
Iceland		2008 (Linked to EU ETS)						
Liechtenstein		2008 (Linked to EU ETS)						
Norway		2005, 2008 (Linked to EU ETS)[9]						
Switzerland	Power, Steel, Aluminum, Cement, Fertilizer[10]	2008	In force	Not allowed	Auctioning, free allocation (fixed benchmarking)	64.75	13%	USD 50 million
United Kingdom	Power, Steel, Aluminum, Cement, Fertilizer[11]	2021	In force	Not allowed	Auctioning, free allocation (fixed benchmarking)	57.23	27%	USD 3,250 million
Canada	Power, Steel, Aluminum, Cement, Fertilizer[12]	2019	In force	Domestic	Free allocation (output-based benchmarking)	66.21	3%	USD 2.2 million (2013)[13]

Country	Coalition Industries Covered	Year of Operation[1]	Status[2]	Offset Credits[3]	Allocation[4]	Carbon Price (in USD), April 2025[5]	Share of Jurisdiction's GHG Emissions Covered[6]	Government Revenue (2024)[7]
Australia	Power, Steel, Aluminum, Cement, Fertilizer[14]	2023	In force	Domestic	Free allocation (output-based benchmarking)	21.82	26%	
China	Power, Steel, Aluminum, Cement[15]	2021, 2025 (Steel, Aluminum, Cement)	In force	Domestic[16]	Free allocation (output-based benchmarking)	11.76	51%	
Indonesia	Power[17]	2023	In force	Domestic	Free allocation (output-based benchmarking)	0.72	24%	
Brazil	Power, Steel, Aluminum, Cement, Fertilizer[18]	2030	Under development	Domestic	Free allocation			
India	Steel, Aluminum, Cement, Fertilizer[19]	2026	Under development		Free allocation (output-based benchmarking)			
Thailand	Thailand's ETS is under development as part of the draft Climate Change Act, with public hearings held in 2024 and cabinet submission expected in 2025 for implementation by 2026-2027.[20]							
Ghana	Ghana has developed a comprehensive regulatory framework for voluntary carbon markets, outlined in its Framework on International Carbon Markets and Non-Market Approaches in 2022,[21] and established the voluntary Ghana Carbon Registry (GCR),[22] but does not have an ETS yet.							

Country	Coalition Industries Covered	Year of Operation[1]	Status[2]	Offset Credits[3]	Allocation[4]	Carbon Price (in USD), April 2025[5]	Share of Jurisdiction's GHG Emissions Covered[6]	Government Revenue (2024)[7]
Cameroon	Cameroon is actively exploring carbon pricing instruments to reduce GHG emissions and mobilize climate finance. The UNFCCC Regional Collaboration Centre for West Africa conducted a capacity-building and stakeholder consultation workshop in September 2024,[23] followed by a feasibility study and report presentation in July 2025.[24] Cameroon does not have an ETS yet.							
Egypt	Egypt launched its first voluntary carbon credit trading market in August 2024, enabling companies to register, issue, and trade carbon credits through the Egyptian Stock Exchange, but does not have an ETS yet.[25]							
Mozambique	Mozambique engages with voluntary carbon markets, REDD+ programs,[26] and the Africa Carbon Market Initiative (ACMI),[27] which will allow them to generate carbon credits for international markets. Mozambique does not have an ETS yet.							

Appendix B Endnotes

1 International Carbon Action Partnership (ICAP), *Emissions Trading Worldwide: ICAP Status Report 2025* (2025), https://icapcarbonaction.com/en/publications/emissions-trading-worldwide-icap-status-report-2025.

2 Under development: A government is actively working toward the implementation of a specific carbon pricing instrument (for example, a mandate may have been established, but regulated entities do not yet face compliance obligations, or no credits have been issued) and this has been formally confirmed by official government sources. In force: The instrument is in full operation. For a compliance instrument, the carbon pricing instrument has been formally adopted through legislation and compliance obligations are in force and enforced.

World Bank, *State and Trends of Carbon Pricing 2025* (2025), https://hdl.handle.net/10986/43277; ICAP, *Emissions Trading Worldwide: ICAP Status Report 2025* (2025).

3 ICAP, *Emissions Trading Worldwide: ICAP Status Report 2025* (2025).

4 Auctioning means companies must buy emissions allowances through competitive bidding, generating revenue for governments. Free allowances are distributed at no cost, often to protect industries from international competition or carbon leakage risks. Fixed benchmarking gives companies a set number of emissions allowances no matter how much they produce whereas output-based benchmarking adjusts the allowances based on actual production. *See*: ICAP, *Emissions Trading Worldwide: ICAP Status Report 2025* (2025).

5 State and Trends of Carbon Pricing Dashboard, World Bank, accessed August 1, 2025, https://carbonpricingdashboard.worldbank.org/compliance/price.

6 Ibid.

7 Ibid.

8 *Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 Establishing a System for Greenhouse Gas Emission Allowance Trading within the Union and Amending Council Directive 96/61/EC*, Official Journal of the European Union 275 (25.10.2023): 32, https://eur-lex.europa.eu/eli/dir/2003/87/2024-03-01/eng.

9 Environmental Defense Fund and International Emissions Trading Association, *Norway – The World's Carbon Markets: A Case Study Guide to Emissions Trading* (2013), https://www.edf.org/sites/default/files/EDF_IETA_Norway_Case_Study_May_2013.pdf.

10 Swiss Federal Council, *Ordinance on the Reduction of Carbon Emissions (CO_2 Ordinance)* (November 30, 2012), https://www.fedlex.admin.ch/filestore/fedlex.data.admin.ch/eli/cc/2012/856/20250101/en/pdf-a/fedlex-data-admin-ch-eli-cc-2012-856-20250101-en-pdf-a-2.pdf.

11 *The Greenhouse Gas Emissions Trading Scheme Order 2020*, Statutory Instrument 2020/1265 (UK), Schedule 2, https://www.legislation.gov.uk/uksi/2020/1265/schedule/2.

12 *Output-Based Pricing System Regulations*, Statutory Instrument SOR/2019-266 (Canada), https://laws-lois.justice.gc.ca/eng/regulations/SOR-2019-266/page-11.html.

13 Government of Canada, Statistics Canada, Environmental Tax Collected from Different Economic Sectors by Geographic Region, last updated December 10, 2024, https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3610067801.

14 "Safeguard Mechanism," Government of Australia, Clean Energy Regulator, last updated August 1, 2025, https://cer.gov.au/schemes/safeguard-mechanism.

15 ICAP, "China Officially Expands National ETS to Cement, Steel and Aluminum Sectors," *ICAP ETS-News*, April 10, 2025, https://icapcarbonaction.com/en/news/china-officially-expands-national-ets-cement-steel-and-aluminum-sectors.

16 Jingwei Jia and Mervyn Tang, "Analysis: How China's National Emissions Trading Scheme Will Work," *Paulson Institute Green Scene Blog*, June 18, 2021, https://www.paulsoninstitute.org/green-finance/green-scene/analysis-how-chinas-national-emissions-trading-scheme-will-work. The initial ETS allows 5% of verified emissions to be offset through China Certified Emissions Reduction (CCER) credits; one unit of CCER can be used to offset one equivalent of CO_2 emissions.

17 ICAP, "Indonesia Launches Emissions Trading System for Power Generation Sector," *ICAP ETS-News*, February 27, 2023, https://icapcarbonaction.com/en/news/indonesia-launches-emissions-trading-system-power-generation-sector.

18 Mattos Filho, *Law No. 15,042/2024 Brazilian Greenhouse Gas Emissions Trading System* (2024), https://www.mattosfilho.com.br/wp-content/uploads/2024/12/241212-livreto-en-law-150422024-1.pdf.

19 Government of India, Bureau of Energy Efficiency, *Detailed Procedure for Compliance Mechanism under the Indian Carbon Market* (July 2024), https://beeindia.gov.in/sites/default/files/Detailed%20Procedure%20for%20Compliance%20Procedure%20under%20CCTS.pdf.

20 Tilleke and Gibbins, "Thailand's Draft Climate Change Act: Key Business," *Insights*, March 21, 2025, https://www.tilleke.com/insights/thailands-draft-climate-change-act-key-business-considerations.

21 Ghana Carbon Market Office, *Ghana's Framework on International Carbon Markets and Non-Market Approaches* (2022), https://cmo.epa.gov.gh/wp-content/uploads/2022/12/Ghana-Carbon-Market-Framework-For-Public-Release_15122022.pdf.

22 "Ghana Carbon Registry," Government of Ghana, accessed August 14, 2025, https://gcr.epa.gov.gh.

23 UNFCCC Regional Collaboration Centre - West and Central Africa, "Feasibility of Carbon Pricing Instruments and Article 6 Arrangements in Cameroon," September 2024, https://unfccc.int/event/feasibility-of-carbon-pricing-instruments-and-article-6-arrangements-in-cameroon.

24 UNFCCC Regional Collaboration Centre - West and Central Africa, *Validation Workshop of the Study Report on the Assessment of the Potential and Feasibility of Carbon Pricing, and the Inception Workshop of the Design and Implementation Phase of a Pilot Carbon Pricing Tool in Cameroon: Concept Note* (2025), https://unfccc.int/documents/648430.

25 Government of Egypt, Ministry of Planning, Economic Development & International Cooperation, "H.E. Dr. Rania A. Al-Mashat at the Launch of Egypt's First Carbon Credit Trading Market: 'Establishing the First Carbon Market Marks a Step Towards Economic and Environmental Sustainability in Egypt,'" press release, August 13, 2024, https://moic.gov.eg/news/1609.

26 World Bank, "Mozambique Becomes First Country to Receive Emission Reductions Payments from Forest Carbon Partnership Facility," press release, August 15, 2021, https://www.worldbank.org/en/news/press-release/2021/10/15/mozambique-becomes-first-country-to-receive-emission-reductions-payments-from-forest-carbon-partnership-facility.

27 Africa Carbon Markets Initiative, Africa Carbon Markets Initiative (ACMI) Status and Outlook Report 2024-25 (2024), https://africacarbonmarkets.org/wp-content/uploads/2024/07/ACMI_Status-and-Outlook-Report-2024.pdf.

C. Understanding the EU CBAM: Scope and Implications

The EU carbon border adjustment mechanism (CBAM) is a landmark climate policy designed by the European Union to prevent carbon leakage in response to EU-imposed carbon pricing. Carbon leakage refers to the possibility that EU production could move to countries with less stringent climate policies to avoid a carbon price, or to the possibility that EU products would simply be replaced by more carbon-intensive imports.[1] Either way, the effect would be to undermine the intent of the EU's carbon pricing policy and diminish the carbon reductions achieved by that policy (hence the term "leakage").

The EU CBAM is being implemented in two phases:

- Transitional Phase (October 1, 2023 to December 31, 2025), when importers will be required to report embedded emissions of goods but will not face financial obligations.

- Definitive Phase (January 1, 2026 and onwards), when the financial implications of CBAM come into full effect.

While the CBAM addresses carbon leakage by regulating imports, the European Commission has recently announced plans to support EU *exporters* in CBAM-affected sectors to address the potential for carbon leakage if EU producers are disadvantaged and lose market share in other countries because their competitors do not face a similar carbon price. The proposal is expected by the end of 2025 and will be in place for an initial period, with the expectation that it will then be reviewed after the new 2026 ETS reform is approved.[2]

Goods Covered by the CBAM

Importers of certain goods (steel, aluminum, cement, fertilizers, hydrogen, and electricity) must declare the embedded carbon emissions of their goods and surrender a corresponding number of CBAM certificates.

A recent *de minimis* exemption for importers of less than 50 tons of specific CBAM goods (e.g., steel, aluminum, cement, and fertilizers) per calendar year replaces the previous consignment value-based exemption of EUR 150. This exemption is expected to significantly reduce the administrative burden for approximately 90% of importers (mainly SMEs) while still covering 99% of relevant emissions.[3]

Calculation of Embedded Emissions

The CBAM distinguishes between two categories of emissions: direct emissions (from the production process) and indirect emissions (from electricity consumed in production).

For goods where EU producers receive compensation for electricity costs (including steel, aluminum, and hydrogen), the "embedded emissions" calculation considers direct emissions only. For other CBAM goods, both direct and indirect emissions are counted.

CBAM Certificates

The CBAM allows for a reduction in the number of certificates to be surrendered if a carbon price has already been paid in the country of origin. The European Commission will prepare, before the end of the transition period in 2025, an implementing act that sets out additional details for the deduction of the carbon price effectively paid in the country of origin. The price of CBAM certificates is directly linked to the weekly average auction price of EU ETS allowances.

Harmonizing the EU CBAM and the EU ETS

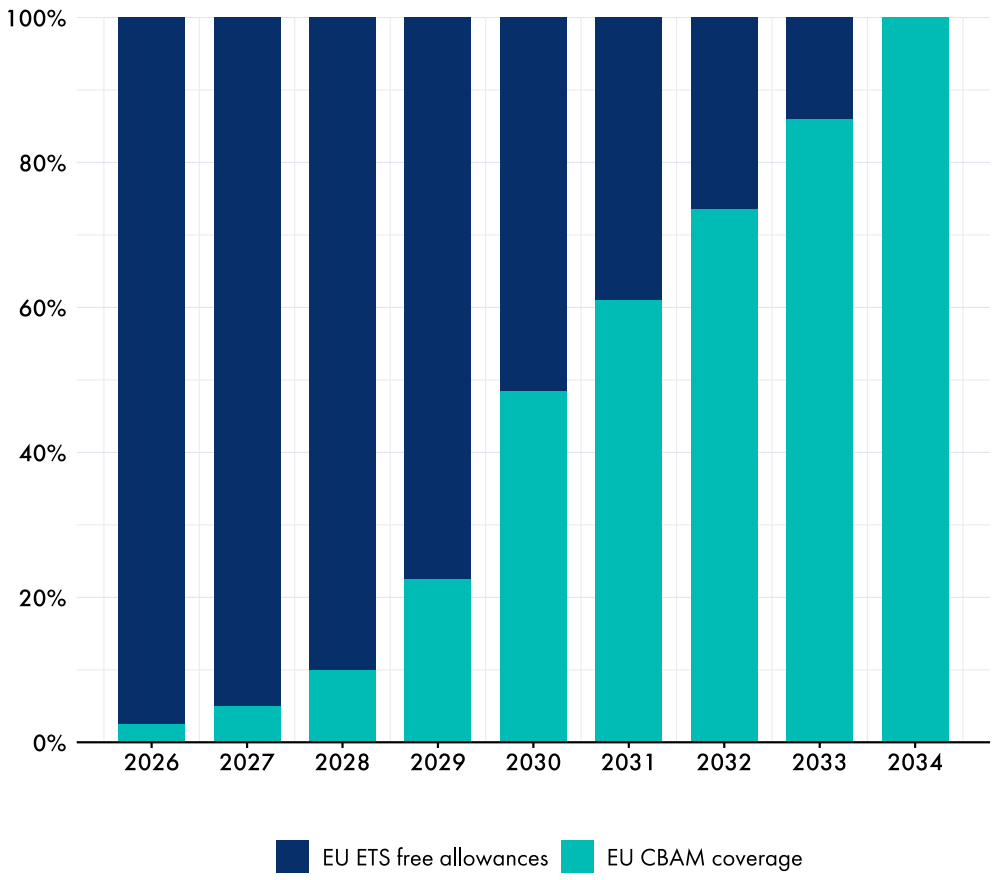
The EU CBAM and EU ETS are intrinsically linked given their common goal of providing a market signal for carbon reductions and preventing carbon leakage. The EU ETS has traditionally used two key mechanisms to protect trade-exposed industries:

- Free allocation of allowances to at-risk sectors (including all CBAM-covered goods except electricity); free allowances will be gradually phased out by 2034.

- State aid to highly electricity-intensive industries (including steel, aluminum, and hydrogen among CBAM-covered goods) to compensate for increased electricity costs due to the EU ETS.

The CBAM is being implemented in a way that aims to ensure a level playing field between EU-produced goods and imports. For each year until 2034, importers need only surrender enough CBAM certificates to cover a gradually increasing percentage of reported emissions. This CBAM phase-in schedule corresponds to the EU ETS free allowance phase-out schedule, as shown in the figure.[4]

Figure C1: The Phase-in of the EU CBAM Corresponds to the Phase-out of EU ETS Free Allowances



Note: The schedule is based on *Directive (EU) 2023/959 Amending ETS Directive 2003/87/EC.*

Similarly, indirect emissions for goods in highly electricity-intensive industries that already receive compensation for ETS-related electricity costs are not included in the CBAM "embedded emissions" calculation.

Appendix C Endnotes

1 *Regulation (EU) 2023/956 of the European Parliament and of the Council of 10 May 2023 Establishing a Carbon Border Adjustment Mechanism*, Official Journal of the European Union 130 (16.5.2023): 52–104, http://data.europa.eu/eli/reg/2023/956/oj/eng.

2 European Commission, Directorate-General for Taxation and Customs Union, "CBAM: Commission Announces Plan to Mitigate Carbon Leakage Risk for Exporters," news item, July 3, 2025, https://taxation-customs.ec.europa.eu/news/cbam-commission-announces-plan-mitigate-carbon-leakage-risk-exporters-2025-07-03_en.

3 European Parliament – Press Service, *Parliament Supports Proposals to Simplify EU Carbon Leakage Instrument*, press release, May 22, 2025, https://www.europarl.europa.eu/news/en/press-room/20250515IPR28461/parliament-supports-proposals-to-simplify-eu-carbon-leakage-instrument.

4 *Directive (EU) 2023/959 of the European Parliament and of the Council of 10 May 2023 Amending Directive 2003/87/EC Establishing a System for Greenhouse Gas Emission Allowance Trading Within the Union and Decision (EU) 2015/1814 Concerning the Establishment and Operation of a Market Stability Reserve for the Union Greenhouse Gas Emission Trading System*, Official Journal of the European Union 130 (16.5.2023): 134-202, https://eur-lex.europa.eu/eli/dir/2023/959/oj/eng.

D. Coalition Dialogue and Agreement: A Possible Roadmap and Supportive Research Agenda

As Section 7 makes clear, by acting together, member countries can drive deeper emission reductions while protecting their economic interests and demonstrating that effective climate action does not have to come at the cost of competitiveness. There is time for interested countries to launch technical discussions and negotiations around a climate coalition: financial obligations under the EU CBAM will not be imposed until 2026 and will phase in gradually (see Figure C1), creating a window for countries to shape a more inclusive and cooperative framework. A coalition approach can recenter the global dialogue on carbon pricing and border adjustments around climate effectiveness, equity, and practicality.

Possible Roadmap for Negotiation and Agreement

Using this flagship report as a foundation, interested member countries could begin to articulate their **strategic positions** on joining a climate coalition. This process likely requires within-government, cross-ministerial coordination (e.g., among finance, foreign affairs, trade, and environmental ministries) to develop a unified government position.

As part of this effort, interested countries should consider the following issues:

- Assess the implications of coalition membership, including potential climate, macroeconomic, trade, and development impacts.
- Define national goals and priorities for coalition design (e.g., carbon price floors, target industries) to ensure alignment with national development strategies and NDC commitments.
- Evaluate potential distributional impacts and identify strategies to mitigate any adverse effects.

Interested countries could then **coordinate early with other potential members**, especially large emitters. These initial discussions could enable countries to identify shared interests such as avoiding the proliferation of BCAs, ensuring a level playing field for exporters, and achieving meaningful emission reductions.

A bloc of interested countries could then **structure a negotiation process** comprising two tracks:

- **Political track**—via, ministerial dialogues on the margins of the COP, the IMF/World Bank Spring and Annual Meetings, and regional gatherings.
- **Legal-technical track**—using working groups to address carbon pricing coordination, specific issues pertaining to target industries, incentives (like technology transfer and climate finance), and MRV. This track could also address core governance responsibilities and institutional

design, compliance with WTO rules and the Paris Agreement, and how to implement a coalition in a phased manner.

Supportive Research Agenda

Researchers in academia and civil society have a critical role to play in providing information to policymakers to better understand climate and economic outcomes under a range of coalition scenarios as well as distributional and sectoral effects. To facilitate agreement, researchers could also help address technical challenges related to coalition design. The following questions provide a starting point for **a research agenda to support more intensive negotiations** toward the formation of a climate coalition:

- **Principles for mutual recognition across carbon markets**. How should countries negotiating a climate coalition compare emissions trading systems that vary widely in structure (for example, systems that offer free allowances versus those based on emissions intensity or systems that allow offsets), and what factors should underpin mutual recognition across different emissions trading systems?

- **Sector-specific challenges**. What policy features could enable a climate coalition to facilitate deeper carbon reductions in target sectors or industries (e.g., steel, aluminum, cement, fertilizers)? How do marginal abatement costs vary across sectors and countries and affect the level of carbon pricing needed to provide sufficient incentives for deep decarbonization?

- **Coalition expansion**. How could policymakers extend the coalition to other sectors or other greenhouse gases, including methane?

- **Offsets**. How can offset systems be strengthened to ensure their integrity and quality—for example, through credible measurement, robust tests of additionality, and enhanced governance—and integrated into a coalition framework?

- **MRV**. How could policymakers use the latest technologies and accounting models to measure sectoral emissions? How should policymakers coordinate and share techniques and processes for transparent measurement and enforcement that recognize differing institutional capacities?

- **Country impacts**. How should policymakers understand the domestic distributional impacts of joining a climate coalition, and how can they design policies that help to mitigate these impacts?

- **Coalition architecture**. What lessons for the formation of a climate coalition should policymakers draw from analogous efforts to coordinate national policies for mutual benefit, such as the Global Tax Agreement? How should a climate coalition interact with the Paris Agreement and the WTO?

E. Country and Regional Perspectives on Carbon Pricing

E.1 Australia's Safeguard Mechanism: Industry Emissions Pricing in a Politically Complex Landscape

Contributed by: Frank Jotzo (*Professor, Australian National University*)

Context and Motivation

Australia is a resource-intensive economy with an ample endowment of coal and gas and abundant renewable energy potential. Coal-fired electricity generation used to be the largest source of emissions and is rapidly being replaced by solar and wind power. Emissions are spread across industry, transport, electricity, and agriculture. Land-use change and forestry (LUCF) were a major source of emissions until the early 2010s, but are now counted as a net emissions sink. The national target is a 43% emissions reduction at 2030 relative to 2005; this would be met largely through reductions in LUCF and electricity sector emissions. There is a commitment to net zero by 2050. Climate change policy and targets have been heavily contested by political parties for at least two decades.

Australia has reintroduced emissions pricing for industry through the Safeguard Mechanism, which covers roughly 30% of national emissions. After a decade of political volatility on carbon policy—including the repeal of a national carbon price in 2014—the Safeguard Mechanism, reformed in 2023, now serves as a key instrument for industrial decarbonization. The country's resource-intensive economy and trade exposure, particularly in sectors like steel and cement, have raised concerns about competitiveness, prompting debate over complementary measures such as a BCA.

Policy Design and Implementation Experience

> *"After a decade of political volatility on carbon policy—including the repeal of a national carbon price in 2014—the Safeguard Mechanism, reformed in 2023, now serves as a key instrument for industrial decarbonization."*

The Safeguard Mechanism is a 'baseline-and-credit' emissions pricing scheme that applies to industrial facilities emitting over 100,000 tons carbon-dioxide equivalent (tCO_2e) per year—approximately 220 sites responsible for 136 MtCO2e in 2023–2024. It covers only scope 1 emissions, with major sources including coal mining, gas processing, and heavy industries.

Each facility is allocated a baseline emissions intensity based on output, product- and facility-specific emissions intensity, and a default decline rate of 4.9% annually through 2030 (3.3% per year thereafter). Facilities emitting below their baseline in a given year earn tradable credits for the difference. Those exceeding it must acquire credits from other facilities or purchase Australian Carbon Credit Units (ACCUs)—linking the scheme to the national offset market.

Over the period 2023–2024, emissions across Safeguard facilities fell by around 3 million metric tons (Mt) or 2%. Around 7 Mt of ACCU credits were surrendered by covered facilities, with credit trading prices averaging around AUD 35/tCO_2e ($23/$tCO_2e$).[1] Credit prices are expected to rise over time with rapidly falling baselines in the industry sector, and ACCU supply likely constrained. A price cap of AUD 75/tCO_2e (rising at 2% annually) helps to contain costs.

The Safeguard scheme generates no direct government revenue, as credits are neither sold nor auctioned by the government.

Reform Priorities and Political Considerations

The mechanism's introduction followed a highly politicized history of carbon pricing, with the 2012 national carbon price repealed in 2014. The Safeguard Mechanism represents a pragmatic compromise—reinstating emissions pricing in industry while avoiding direct costs to households.

Producers of trade-exposed manufacturing goods such as steel and cement have voiced concerns about import competition from producers that are not subject to similar emissions obligations. Such exposure is set to rise over time with falling baselines. A BCA has been put forward as a possible solution.

In response, the Australian government commissioned the Carbon Leakage Review,[2] which found that a small set of commodities is subject to material carbon leakage concerns over time; that a well-designed BCA mechanism for imports could be a suitable policy approach; and that BCAs should be designed to provide a level playing field, impose low administrative burdens, and be consistent with Australia's support of an open trading system and trade law obligations.[3] As of July 2025, the Review's findings are with the government for decision.

Notably, decarbonization in Australia's electricity sector has advanced outside of carbon pricing, on the basis of relative cost-competitiveness and aided by government underwriting of renewable energy and energy storage investment.

Australian governments and stakeholders see economic opportunities in establishing low-emission export industries—for example, green iron, ammonia, and e-fuels—based on Australia's abundant renewable energy potential and resource industry base.

Key Lessons

- Sequencing matters: Australia's approach demonstrates that reintroducing carbon pricing after political backlash requires careful design and incremental approaches.
- Sectoral focus and market linkage: A 'baseline-and-credit' scheme tied to an offsets market can drive emissions reductions while offering compliance flexibility.
- Competitiveness concerns must be addressed early: A well-designed BCA for imports may be necessary to complement industrial emissions pricing.
- Opportunities for complementary industrial strategy: Australia sees long-term opportunities in exporting low-carbon commodities like green iron and e-fuels, leveraging its renewable energy base.

E.2 Brazil's Carbon Market: Political Pragmatism and Regulatory Challenges

Contributed by: Marcelo Medeiros (*Founding Partner at Lanx Capital, Chairperson and Co-Founder of re.green*) and Candido Bracher (*Board Member at Itaú Unibanco and Mastercard, Climate Policy Advocate*)

Context and Motivation

Brazil's gross GHG emissions totaled approximately 2,300 Mt of CO_2e in 2023, placing the country among the world's top six emitters. A distinctive feature of Brazil's emissions profile is that nearly 45% of emissions stem from land-use change and deforestation (gross emissions, not accounting for carbon removals from forest regeneration), and 28% stem from agriculture, together accounting for over 72% of the national total. Industrial process emissions contribute less than 5% and energy-related emissions remain comparatively low, due to Brazil's predominantly renewable electricity mix. Under its most recent Nationally Determined Contribution (NDC), submitted in late 2024, Brazil has committed to reducing net emissions 59%–67% below 2005 levels by 2035, with the goal of achieving climate neutrality by 2050.[4]

Policy Design and Implementation Experience

In December 2024, Brazil enacted Law No. 15.042, establishing the Brazilian Greenhouse Gas Emissions Trading System (SBCE). The final text, the result of 15 years of legislative debate and political negotiation, creates a roadmap for carbon pricing in one of the world's largest emerging economies. The SBCE introduces a cap-and-trade regime for entities emitting over 25,000 tons of CO_2 equivalent annually, while establishing a market for verified mitigation and removal credits.

> *"By incentivizing ecosystem preservation and restoration, the SBCE positions Brazil as a key player in the carbon dioxide removal (CDR) market."*

Notably, primary agriculture—including livestock—is excluded from the emissions cap. This exemption reflects not only the political influence of Brazil's most dynamic economic sector but also the well-known lack of robust, standardized methodologies for measuring agricultural and livestock-related emissions. These same limitations have been used to justify a similar exclusion in the EU ETS.

The law's most distinctive feature, however, is that it allows offset credits (CRVEs) from eligible projects—including forest-based initiatives—for compliance purposes. This design reflects Brazil's unique emissions profile: while the country maintains a clean energy grid (approximately 90% from sustainable sources with extremely low per capita energy-related emissions), and industrial emissions represent less than 5% of total emissions, land-use change remains the largest source of CO_2 emissions. By incentivizing ecosystem preservation and restoration, the SBCE positions Brazil as a key player in the carbon dioxide removal (CDR) market.

To deal with the complex challenge of balancing economic development with environmental imperatives in a country where forests represent both significant carbon reserves and economic opportunities, Brazilian lawmakers settled on a phased approach that allows ample space for negotiations and adjustments.

- **Phase 1** (12–24 months): Regulatory framework development, managing body creation, and sector definition.

- **Phase 2** (12 months): Operationalization of MRV systems for standardized emissions reporting.

- **Phase 3** (24 months): Mandatory emissions reporting and monitoring plans to inform the first National Allocation Plan (NAP).

- **Phase 4**: CBE (Cotas Brasileiras de Emissão, or Brazilian emissions quotas) allocation cycle initiation and first auctions, with NAP publication defining quota distribution rules.

- **Phase 5**: Full market implementation, including secondary trading between companies.

Key Lessons

Brazil's pragmatic design—combining energy and industrial emissions caps with forest-based offsets—offers a template for other economies seeking to reconcile climate ambitions with development needs and country particularities. The SBCE framework can be adjusted during the regulation phase to integrate into multilateral systems, promoting greater efficiency and global reach.

E.3 Canada's Carbon Pricing Journey: Subnational Leadership, Federal Standards, and the Path Ahead

Contributed by: Jennifer Winter (*Professor, University of Calgary and Departmental Science Advisor, Environment and Climate Change Canada*)[5]

Context and Motivation

Canada is a decentralized federation, with the federal, provincial and territorial governments holding joint responsibility for the environment and emissions. In contrast, provinces and territories have full authority over resource development and electricity production, creating tensions over environmental and climate policy. Canada's GHG emissions account for about 1.5% of global emissions, and in 2023 totaled 694 million metric tons.[6] The majority of Canada's emissions are from energy use in stationary combustion (43%) and transport (28%). While emissions have decreased by only 8.5% since 2005, the emissions intensity of GDP has declined by 34%, driven primarily by electricity sector decarbonization. This decline has been offset by increases in emissions from oil and gas extraction.[7] Canada's experience provides lessons for global action to price emissions and, in particular, for the challenge of cooperatively addressing emissions mitigation while maintaining competitiveness.

Policy Design and Implementation Experience

> *"Industrial emissions pricing remains in effect and is 'one of the most important greenhouse gas emission reduction policies' for meeting Canada's 2030 target."*

Canada has a long history with different forms of emissions pricing: the province of Alberta implemented pricing on large industrial emitters in 2007, followed by a carbon tax in British Columbia in 2008, Quebec's cap-and-trade system in 2012, and Canada-wide pricing on large industrial emitters and fossil fuel combustion in 2019.[8] With the exception of Quebec (which has a cap-and-trade system) and British Columbia (which implemented an economy-wide carbon tax in 2008), carbon pricing has taken the form of a two-part system: a price on fuels (e.g., gasoline, natural gas) and a carbon price on large industrial emitters.[9] Canada-wide pricing is enforced via a federal minimum standard for both the price level and types of emissions and economic activity covered, allowing provinces and territories flexibility in design with compliance reviews every few years.[10] Provinces and territories that do not meet the federal minimum standard are subject to a federal 'backstop'; for large industrial emitters the backstop is an output-based allocation system with tradeable credits.[11] This flexibility has led to a fragmented policy landscape, with "differential treatment, policy instruments, emissions coverage, and marginal and average prices" across the country.[12] These differences are in part due to economic circumstances and in part due to deliberate policy design.

Canada's provinces and territories differ substantially in population, economic size, energy systems, and emissions profiles. In 2025, Canada's total population is 41.5 million, with the smallest territory (Nunavut) home to just over 41,400 people and the most populous province (Ontario) home to slightly below 16.2 million people.[13] Economic size and production also differ; for example, while Quebec's population is 9.1 million people, its economy is half the size of Ontario's.[14] Similarly, while Alberta's population is only 30% of Ontario's, its economy is 40% of Ontario's.[15]

For industrial emissions and facility point sources, cross-country variation is even more stark. Of Canada's 1,694 industrial facilities with annual emissions of 10,000 metric tons CO_2e and above in 2023, 43% are in Alberta, followed by 20% in Ontario, 12% in British Columbia, 10% in Quebec, and 8% in Saskatchewan, with very small proportions in the remaining provinces and territories. The distribution of industrial emissions follows a slightly different pattern: 53% in Alberta, 17% in Ontario, 10% in Saskatchewan, 8% in Quebec, and 6% in British Columbia. While there is variation in the number of facilities, facility size (measured by annual emissions), and the thresholds for facilities to be subject to emissions pricing, the majority of emissions from Canada's large industrial emitters are subject to a carbon price.[16]

Key Lessons and Reform Priorities

Most recently, cost-of-living and affordability concerns have made carbon pricing deeply unpopular.[17] In April 2025, the national government eliminated the requirement for consumer-facing carbon pricing, leading to its removal across the country.[18] Industrial emissions pricing remains in effect and is "one of the most important greenhouse gas emission reduction policies" for meeting Canada's 2030 target.[19] Canada's remaining challenges include achieving further emissions reductions, linking markets (including for offsets), and continuing to manage competitiveness.

E.4 Building the World's Largest Carbon Market: Lessons from China's Emissions Trading System

Contributed by: Xiliang Zhang (*Professor, Tsinghua University*)

Context and Motivation

China's national carbon market has been in development for over a decade, evolving from seven regional pilots launched in 2011 to a national program that commenced in 2021. The national system initially covered the power sector, chosen for its high emissions and established data foundations. In 2025, its sectoral coverage was extended to key industrial sectors such as iron and steel, aluminum, and cement. As the world's largest ETS, it currently regulates approximately 8 billion tons of CO_2e, covering approximately 60% of the nation's total emissions. The market is a crucial instrument for China to achieve its goals of peaking CO_2 emissions before 2030 and reaching carbon neutrality by 2060, offering a distinct model tailored to its national context.

Policy Design and Implementation Experience

> *"The market is a crucial instrument for China to achieve its goals of peaking CO_2 emissions before 2030 and carbon neutrality by 2060..."*

A key institutional feature of China's national carbon market is its rate-based design, which functions as a multi-sector tradable performance standard. Unlike the mass-based, fixed-cap systems adopted in Europe and California, this approach was chosen to accommodate China's rapid economic growth and its near-term goal of reducing emissions intensity rather than setting an absolute cap.

Under this system, allowances are currently allocated for free based on emitters' actual output and sector-specific intensity benchmarks. This design therefore effectively serves as a tax on carbon-intensive emitters and a subsidy for more efficient ones, incentivizing efficiency improvements while allowing the total emissions cap to adjust dynamically with economic output.

Additionally, the system regulates indirect emissions from electricity and heat—both in the regional pilot markets and during the national program's first two compliance cycles. This approach is designed to incentivize consumer-side decarbonization efforts, as China's highly regulated energy prices prevent producers from passing on carbon costs.

Notably, in January 2024, the State Council issued the market's first top-level administrative regulation, providing a critical legal foundation and introducing significantly stricter penalties. For example, failure to surrender the required allowances is subject to a minimum fine equal to five times the average market price of the allowance, and the violation can be recorded in the national credit system.

Key Lessons and Reform Priorities

The market has demonstrated notable early success, achieving a compliance rate of over 99.5%. From 2021 to 2024, trading prices rose significantly—from an initial 50 Chinese yuan (CNY, or~7 USD) per ton to over 100

CNY (~14 USD) per ton—with an average price of 66 CNY (~9 USD). Supporting this performance is a robust framework, including a multi-level legal system, a three-tiered "national-provincial-municipal" administrative mechanism for supervision, and interconnected platforms for registration, trading, and data management.

Looking ahead, future plans include expanding sectoral coverage, gradually introducing allowance auctioning, strengthening data supervision, and pursuing the long-term goal of transitioning from the current rate-based system to a mass-based system.

E.5 India's Carbon Credit Trading Scheme: Designing a Carbon Market for a Growing Economy

Contributed by: E. Somanathan (*Professor, Economics & Planning Unit of the Indian Statistical Institute in Delhi*) and Vaibhav Chaturvedi (*Senior Fellow, Council on Energy, Environment and Water (CEEW)*)

Context and Motivation

India's per capita emissions are only about 40% of the global average and far below those of other countries with large shares of world emissions. However, due to its large size, India accounts for over 7% of world emissions, behind only China (35%) and the United States (12%). Between 2014 and 2024, the Indian economy grew at an annual rate of 5.8% while carbon emissions grew by about 4% annually. Due to India's high rate of economic growth, which is expected to continue, its emissions will also grow quickly, unless emissions intensity declines rapidly. India has announced a target of reaching net-zero emissions by 2070, and a near-term target of reducing the carbon intensity of GDP by 45% from the 2005 level by 2030.

Policy Design and Implementation Experience

> *"The setting up of the Indian carbon market is seen as a pathbreaking step in India's journey towards its 2070 net-zero goal."*

India's parliament approved the framework for an Indian carbon market in 2023, under which two mechanisms––a Carbon Credit Trading Scheme (CCTS) and CCTS offsets––have been set up. India's approach to CCTS compliance is different from that of cap-and-trade systems like the EU ETS or the California ETS. To begin with, targets within this scheme are based on emissions intensity rather than on an absolute emissions cap. This is logical for a fast-growing economy where projecting growth in greenhouse gas emissions is challenging; India's ETS is like the Chinese ETS in this respect. Borrowing heavily from the design of India's existing Perform-Achieve-Trade (PAT) scheme, it is based on what is called a 'baseline and credit' system, with 2023–2024 emissions intensity as the baseline and entity-level targets given for 2025–2026 and 2026–2027 in the first phase. In this system, carbon credits will be issued 'ex-post' based on estimated emission reductions relative to the baseline, as against other emission trading systems where emission allowances are issued 'ex-ante.' Firms that exceed their emission intensity targets will receive credits, which can then be sold to those firms that fall short—creating demand for credits without relying on fixed allowances. Consequently, carbon credit trading will start from 2025–2026.

In the first phase, the scheme focuses on nine industrial sectors. The power sector has been excluded owing to concerns related to the impact of the carbon market on power prices, distribution companies' revenues, and coal assets deemed critical for electricity reliability and security. However, a portion of electricity generation emissions is covered as Scope 2 emissions from industrial entities. Most other emission trading systems, including that of China, include direct emissions from the power sector in their ambit. As of now, financial players are not allowed in the CCTS, which could impact the efficiency and effectiveness of the carbon price discovery process.

Along with the compliance mechanism, a CCTS offset mechanism has also been established to enable businesses, industries, and organisations, particularly those not covered under the compliance mechanism, to participate in climate action. As of now, eight methodologies have been approved under the offset mechanism, including

methodologies for renewable energy (including hydro and pumped storage), green hydrogen production, industrial energy efficiency, landfill methane recovery, and mangrove afforestation and reforestation.

Implementation and Governance

India's CCTS is governed by a National Steering Committee on Indian Carbon Market (NSCICM), which includes senior representatives from all relevant Government of India ministries. Operationally, the CCTS is managed and implemented by the Bureau of Energy Efficiency (BEE) within the Ministry of Power. BEE also implemented the PAT scheme, which has influenced the design of India's CCTS compliance mechanism. The setting up of the Indian carbon market is seen as a pathbreaking step in India's journey towards its 2070 net-zero goal.

E.6 Phasing In Carbon Pricing: Indonesia's Emissions Trading System

Contributed by: Ardhi Wardhana (*Senior Assistant to the Presidential Special Envoy for International Trade & Multilateral Cooperation and Member of Carbon Revision Task Force, Republic of Indonesia; Researcher at the Department of Economics, CSIS, Indonesia*) and Mari Elka Pangestu (*Presidential Special Envoy for International Trade & Multilateral Cooperation, Vice Chair of National Economic Council, Chief of Carbon Revision Task Force, Republic of Indonesia*)[20]

Context and Motivation

Indonesia is the world's eighth-largest greenhouse gas emitter, with 55% of its emissions coming from the energy sector and 22.5% from forestry and land-use activities. This fourth-most populous country in the world has committed to reducing its emissions by 31.9% unconditionally and up to 43.2% with international support by 2030. Despite these commitments, Indonesia remains highly vulnerable to the impacts of climate change, including sea-level rise, extreme weather events, and shifting rainfall patterns, which threaten coastal communities, agriculture, and biodiversity. Balancing economic growth with environmental sustainability remains a central challenge for the country.

> *"Balancing economic growth with environmental sustainability remains a central challenge for [Indonesia]."*

Policy Design and Implementation Experience

Indonesia's Economic Value of Carbon (Nilai Ekonomi Karbon—NEK) is an emissions trading system (ETS) regulated under Presidential Regulation 98/2021. Launched in February 2023, it covers the power sector, particularly coal-fired power plants. The Indonesian government, through the Ministry of Energy & Mineral Resources (MOEMR), set Technical Emissions Ceiling Approvals (Persetujuan Teknis Batas Atas Emisi––PTBAE) that determine the number of free allowances allocated to each plant per megawatt-hour (MWh) of electricity produced.

Indonesia's ETS has three phases of development spanning from 2023 to 2030. In the first phase (2023–2024), the ETS targeted coal-fired power plants with a capacity of 25 MW or more connected to the state-owned power company (Perusahaan Listrik Negara––PLN) grid. In 2023, the system covered 99 coal-fired power plants with a combined 33.669 MW of capacity and emissions totaling 7.07 Mt CO_2e; the total value of the transaction was USD 5.5 million.[21] The number of facilities covered in 2024 increased to 146 units totaling 38.310 MW with covered emissions of 7.85 Mt CO_2e, and a total value of USD 5.39 million.[22]

In the second phase (2025–2027), the facilities covered will significantly increase to 620 units, totaling 82.908 MW, due to expanded coverage to power plants that are outside the PLN grid and do not use coal. The ETS will cover all power plants in the last phase (2028–2030).

Along with Law 7/2021 on the Harmonization of Tax Regulation, the Indonesian ETS is expected to evolve into a hybrid 'tax-cap-and-trade' system, operating alongside a carbon tax. Facilities that fail to meet their ETS obligations will be subject to the carbon tax, with the rate aligned to the price in the domestic carbon market,

and a minimum price of approximately USD 2 per ton CO2e. The carbon tax, which was scheduled to be implemented in 2022, was postponed due to COVID-19 and is now being considered to start later in 2025 or 2026.

Reform Priorities

Some improvements are being debated in the ongoing revision of carbon pricing regulations. First, sectoral coverage should be expanded to include other commodities covered by the BCA, which has been implemented or is being considered by several countries. Second, a more stringent cap should be considered to increase the low average carbon price of USD 0.78 per metric ton CO_2e in 2023 and USD 0.68 per ton in 2024. Third, high fossil fuel subsidies, USD 24.3 billion in 2025, should be reallocated to decarbonization programs to align with carbon pricing. Fourth, MOEMR's or other future technical ministries' emission trading platforms should be more interoperable with the central one managed by the Ministry of Environment. These improvements are expected to create a robust market that can incentivize low-emission technology and, at the same time, keep up with the country's economic growth needs.

E.7 Thailand's Carbon Pricing Experience: Navigating Global Pressures and Political Realities

Contributed by: Athiphat Muthitacharoen (*Professor, Chulalongkorn University*)

Context and Motivation

Thailand is highly vulnerable to climate change, ranked 9th globally in the Global Climate Risk Index (2000–2019). Despite contributing just 0.5% to global GDP, the country accounted for 0.8% of global greenhouse gas emissions in 2023—an indicator of high carbon intensity. The country has pledged to achieve carbon neutrality by 2050 and net-zero emissions by 2065. With exports comprising 70% of GDP, Thailand is particularly exposed to international climate policies, especially the EU's CBAM. This has elevated carbon pricing from an environmental initiative to an economic necessity.

Policy Design and Implementation Experience

Thailand's carbon pricing architecture remains in its early stages. In March 2025, the government introduced an upstream fuel-based carbon tax on gasoline and diesel, with rates linked to CO_2 emission factors. Yet the initial rate—200 baht (approximately USD 5.50) per ton of CO_2—was offset by a reduction in the existing excise tax, resulting in no net increase in retail fuel prices. This revenue-neutral approach prioritized public and political acceptability over emissions impact, reflecting sensitivity to policies that raise consumer costs.

Looking ahead, Thailand plans to expand carbon pricing through an ETS and an industrial carbon tax by 2031. However, the ETS is seen as administratively complex and costly, requiring detailed data and strong regulatory capacity. A sector-specific industrial carbon tax is viewed as a more feasible near-term option. Key implementation challenges include improving emissions reporting at the factory level and developing consistent methods to calculate embedded emissions in Thai exports—essential for CBAM compliance and for preserving trade competitiveness.

Key Lessons

Thailand's experience offers several lessons. First, in export-oriented economies, carbon pricing is as much about maintaining access to international markets as it is about environmental goals. Second, political constraints demand gradual, carefully framed implementation—Thailand's revenue-neutral fuel tax is a case in point. Finally, ensuring fairness is critical. To build lasting support, carbon pricing must be part of a broader 'just transition' agenda—channeling revenues to assist vulnerable households, support green industrial upgrades, and enhance resilience in affected communities.

> *"With exports comprising 70% of GDP, Thailand is particularly exposed to international climate policies, especially the EU's CBAM. This has elevated carbon pricing from an environmental initiative to an economic necessity."*

E.8 Africa's Experience with Carbon Pricing: Challenges and Opportunities

Contributed by: Daouda Sembene (*Managing Partner, Africatalyst*)

Context and Motivation

Africa's experience with carbon pricing is still at a nascent stage, with limited implementation across the continent. South Africa remains the only African country with an active carbon tax, having introduced its scheme, which targets CO_2 emissions from large industrial, power, and transport businesses, in 2019. Since then, several other countries—including Côte d'Ivoire, Gabon, Morocco, Nigeria, and Senegal—have shown interest in adopting carbon pricing mechanisms such as carbon taxes or emissions trading systems.[23]

Policy Design and Implementation Experience

> *"At a time when many countries ... face limited fiscal space, the revenues potentially generated by carbon pricing can be used to advance various priorities, including expanding public investment in health, education, and clean energy."*

Although no country on the continent has yet operationalized an ETS, both South Africa and Morocco have initiated groundwork to explore such systems.[24] At the regional level, discussions on coordinated approaches to carbon pricing have also been launched by the African Union and the African Development Bank. In parallel, many countries are engaging in voluntary carbon markets, participating in reforestation, renewable energy, and methane abatement projects. Kenya, Ghana, and Rwanda are particularly active in these markets. However, despite increasing demand, Africa accounts for only about 16% of global carbon credit supply and faces numerous barriers to scale.[25]

Beyond explicit carbon pricing, a number of African countries have implemented indirect or implicit pricing mechanisms. These include fuel taxes, subsidy reforms, and pollution charges—as seen in Senegal and Mauritius.

Key Lessons and Reform Priorities

African countries confront a variety of obstacles that hinder the implementation of carbon pricing instruments. These include:

- **Institutional and technical capacity constraints.** Limited expertise and institutional readiness have typically constrained the design and enforcement of carbon pricing mechanisms.
- **Social and political resistance.** Widespread concern over the impact of carbon taxes on poverty, energy affordability, and livelihoods often sparks opposition to carbon pricing.[26]
- **Data and MRV limitations.** Many countries lack reliable data on emissions and face challenges in establishing robust MRV systems, undermining policy effectiveness.[27]

- **Limited mitigation incentives.** With Africa's small emissions footprint, carbon pricing alone may not be seen as an effective mitigation strategy.[28]

Despite Africa's small contribution to global GHG emissions—accounting for less than 4% of the global total[29]—carbon pricing remains a potentially important policy tool for African countries. In addition to helping implement their commitments under the Paris Agreement, recourse to carbon pricing instruments can offer the following benefits for these countries:

- **Revenue mobilization.** The potential for carbon pricing to generate revenue is well evidenced.[30] At a time when many countries across the continent face limited fiscal space, the revenues potentially generated by carbon pricing can be used to advance various priorities, including expanding public investment in health, education, and clean energy.

- **Access to climate finance**. Carbon pricing can catalyze access to climate finance through its role in blended finance structures and its potential to build partnerships with bilateral and multilateral organizations and green investors.

- **Support for green growth.** If well-designed, carbon pricing—combined with strategic use of revenues—can promote green industrialization, finance climate-resilient infrastructure, and support energy transitions.[31]

- **Strategic leverage of CBAM.** Research suggests that African exporters could benefit from the EU CBAM by introducing carbon pricing in export sectors and capitalizing on their low carbon intensity.[32]

While carbon pricing in Africa remains limited in scope and scale, it holds promise as a tool for fiscal resilience, climate finance mobilization, and sustainable development. Realizing this potential will require overcoming institutional and technical barriers, addressing public concerns through targeted social policies, and strengthening MRV frameworks to ensure policy credibility and impact.

Appendix E Endnotes

1 CORE Markets, "The ACCU Market in 2024: A Review of the Biggest Volume Year in the Scheme's History," *Insights*, April 3, 2025, https://coremarkets.co/insights/accu-market-in-2024-review-of-biggest-volume-year-in-scheme-history.

2 "Australia's Carbon Leakage Review," Government of Australia, Department of Climate Change, Energy, the Environment and Water, last updated February 19, 2025, https://www.dcceew.gov.au/climate-change/emissions-reduction/review-carbon-leakage.

3 Government of Australia, Department of Climate Change, Energy, the Environment, and Water, *Carbon Leakage Review – Consultation Paper 2* (November 2024), https://storage.googleapis.com/files-au-climate/climate-au/p/prj2f030fe5577e16a3ffbb9/page/Carbon_Leakage_Review_Consultation_Paper_2_November_2024.pdf.

4 SEEG – Sistema de Estimativas de Emissões e Remoções de Gases de Efeito Estufa, SEEG Brazil, accessed August 14, 2025, https://plataforma.seeg.eco.br.

5 Winter is the Departmental Science Advisor at Environment and Climate Change Canada but did not write this appendix in that capacity. The views expressed here are those of the author and do not reflect the views of the Government of Canada or Environment and Climate Change Canada.

6 Government of Canada, Environment and Climate Change Canada (ECCC), Greenhouse Gas Division, *National inventory report: greenhouse gas sources and sinks in Canada* (2024), https://publications.gc.ca/pub?id=9.506002&sl=0.

7 This sector is also an important source of economic activity and growth, particularly in the provinces of Alberta and Saskatchewan.

8 Jennifer Winter, "Carbon Pricing in a Federal State: The Case of Canada," *Ifo DICE Report* 18, no. 1 (2020): 13–19, https://www.ifo.de/en/publications/2020/article-journal/carbon-pricing-federal-state-case-canada.

9 Ross Linden-Fraser, Dave Sawyer, Sam Harrison, and Seton Stiebert, 2024 *Independent Assessment of Carbon Pricing Systems* (Canadian Climate Institute, 2025), https://climateinstitute.ca/wp-content/uploads/2025/02/2024-Independent-expert-assessment-carbon-pricing.pdf.

10 Jennifer Winter, "Exploring the Landscape of Canadian Climate Policy," *Canadian Public Policy* 50, no. S1 (2024), https://doi.org/10.3138/cpp.2023-055.

11 "How Carbon Pricing Works," Government of Canada, Environment and Climate Change Canada, last modified January 13, 2025, https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/putting-price-on-carbon-pollution/industry.html.

12 Jennifer Winter, "Exploring the Landscape of Canadian Climate Policy," *Canadian Public Policy* 50, no. S1 (2024), https://doi.org/10.3138/cpp.2023-055; Sarah Dobson, Jenniver Winter and Brendan Boyd, "The Greenhouse Gas Emissions Coverage of Carbon Pricing Instruments for Canadian Provinces," *The School of Public Policy Publications* (February 2019), https://doi.org/10.11575/sppp.v12i0.53155; Kathryn Harrison "Climate Governance and Federalism in Canada" in ed. Alan Fenna, Sebastien Jodoin, and Joana Setzer, *Climate Governance and Federalism: A Forum of Federations Comparative Policy Analysis* (Cambridge University Press, 2023), https://doi.org/10.1017/9781009249676.005; Government of Canada, Environment and Climate Change Canada, 2020 *Expert Assessment of Carbon Pricing Systems / A Report Prepared by the Canadian Institute for Climate Choices* (2021), https://publications.gc.ca/site/eng/9.900084/publication.html; Ross Linden-Fraser, Dave Sawyer, Sam Harrison, and Seton Stiebert, 2024 *Independent Assessment of Carbon Pricing Systems* (Canadian Climate Institute, 2025), https://climateinstitute.ca/wp-content/uploads/2025/02/2024-Independent-expert-assessment-carbon-pricing.pdf.

13 Government of Canada, Environment and Climate Change Canada (2021).

14 Population Estimates, Quarterly, Government of Canada, Statistics Canada, last updated June 18, 2025, https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1710000901; Gross Domestic Product (GDP) at Basic Prices, by Industry, Provinces and Territories, Government of Canada, Statistics Canada, last updated May 1, 2025, https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3610040201.

15 Ibid.

16 Ross Linden-Fraser, Dave Sawyer, Sam Harrison, and Seton Stiebert, 2024 *Independent Assessment of Carbon Pricing Systems* (Canadian Climate Institute, 2025), https://climateinstitute.ca/wp-content/uploads/2025/02/2024-Independent-expert-assessment-carbon-pricing.pdf.

17 Trevor Tombe and Jennifer Winter, *Does Emissions Pricing Hurt Affordability? Quantifying the Effects on Canadian Households* (Institute for Research on Public Policy, 2024), https://irpp.org/research-studies/does-emissions-pricing-hurt-affordability.

18 Government of Canada, Department of Finance Canada, "Removing the consumer carbon price, effective April 1, 2025," news release, March 22, 2025, https://www.canada.ca/en/department-finance/news/2025/03/removing-the-consumer-carbon-price-effective-april-1-2025.html.

19 Ibid.

20 Mari Elka Pangestu is the Presidential Special Envoy for International Trade & Multilateral Cooperation and Vice Chair of the National Economic Council of the Republic of Indonesia, but did not write this appendix in that capacity. The views expressed here are those of the author and do not reflect the views of the Government of the Republic of Indonesia.

21 Average currency rate in 2023: $1 = Rp 15,263.

22 Average currency rate in 2024: $1 = Rp 15,850.

23 World Bank, *State and Trends of Carbon Pricing 2023* (2023), https://openknowledge.worldbank.org/handle/10986/39796.

24 ICAP, *Emissions Trading Worldwide – Status Report 2022* (2022), https://icapcarbonaction.com/system/files/document/220408_icap_report_rz_web.pdf.

25 Africa Carbon Markets Initiative, *Africa Carbon Markets Initiative (ACMI) Status and Outlook Report 2024-25* (2024), https://africacarbonmarkets.org/wp-content/uploads/2024/07/ACMI_Status-and-Outlook-Report-2024.pdf.

26 High-Level Commission on Carbon Prices, *Report of the High-Level Commission on Carbon Prices* (World Bank, 2017), https://doi.org/10.7916/d8-w2nc-4103.

27 African Development Bank, Climate Change and Green Growth Department, *Climate Change and Green Growth at the African Development Bank—2022 Annual Report of the Climate Change and Green Growth Department* (2024), https://www.afdb.org/fr/documents/climate-change-and-green-growth-2022-annual-report.

28 Paul Collier and Anthony Venables, "Closing Coal: Economic and Moral Incentives," *Oxford Review of Economic Policy* 30, no. 3 (2014): 492–512, https://doi.org/10.1093/oxrep/gru024.

29 International Energy Agency, *Africa Energy Outlook 2022* (2022), https://www.iea.org/reports/africa-energy-outlook-2022.

30 IMF, "Fiscal Policies for Paris Climate Strategies—From Principle to Practice," *IMF Policy Papers* (2019), https://doi.org/10.5089/9781498311717.007.

31 Isaak Mengesha and Debraj Roy, "Carbon Pricing Drives Critical Transition to Green Growth," *Nature Communications* 16, no. 1 (2025): 1321, https://doi.org/10.1038/s41467-025-56540-3.

32 Kimberly Clausing, Jonathan Colmer, Allan Hsiao, and Catherine Wolfram, *Rethinking the EU's Carbon Border Adjustment Mechanism: What it means for low-income countries*, International Growth Centre Policy Brief (2025), https://www.theigc.org/publications/rethinking-eus-carbon-border-adjustment-mechanism-what-it-means-low-income-countries.

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