



WORKING PAPER

Realizing net-zero emissions: Good practices in countries

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HIGHLIGHTS

- Momentum for reaching net-zero greenhouse gas (GHG) emissions, or "net zero," has increased in recent years, with many countries indicating their aspiration to reach net zero at the national level by midcentury. Some countries are also committing to making the transition justly—in ways that improve the lives and livelihoods of those impacted during the transition. Yet challenges remain around the credibility of net-zero targets and their implementation pathways.
- A just transition to net-zero emissions requires both a rapid transformation to decarbonized systems and the just and equitable management of impacts and opportunities associated with the transition.
- Although no country has found the perfect approach for reaching net-zero emissions, many have begun making foundational decisions and establishing governance measures, stakeholder engagement processes, sectoral policy interventions, and financing and investments required to move toward net-zero emissions.
- Recognizing that many challenges will need to be overcome in transitioning justly to net-zero emissions, this paper presents a "Framework for Net-Zero Climate Action."
- The framework's outcomes, enabling action areas, and actions represent key features of a holistic approach for reaching net-zero emissions. The paper also illustrates how countries are already taking actions within the framework, providing lessons for other countries.

EXECUTIVE SUMMARY

About this paper

This paper considers the growing need for frameworks that provide confidence that governments are increasing near-term climate action to reach net-zero GHG emissions targets.

National governments are already taking concrete climate action, but it is difficult to determine the extent to which current and planned future action will enable the transformations necessary to radically decarbonize economies while ensuring a just transition. To explore this challenge, we present a framework¹ showing key national climate actions for achieving a just transition to net zero. The framework was developed in consultation with an expert advisory group and country government experts on climate action contributing to a just transition to net zero.

Five country case studies were selected to showcase current experiences and lessons learned and to highlight how ongoing actions may contribute to achieving national net-zero targets.

Net-zero climate action

The Framework for Net-Zero Climate Action identifies key enabling action areas and specific actions that countries are undertaking to put their long-term net-zero targets in good stead today. As part of the framework, we examine the major transformations required to decarbonize economies (i.e., the massive changes in how we produce energy and grow food and use lands) and how to undertake these transitions in a manner that improves the lives and livelihoods of those most impacted (i.e., achieving a just transition). These two outcomes can be achieved through five interrelated enabling action areas: foundational decisions, governance, stakeholder engagement, sectoral policy, and finance and investment. The following sections explore these two critical outcomes and five enabling action areas in greater depth, discussing actions demonstrating good practices and providing country examples for each.

Five case studies are presented to demonstrate how countries are currently taking climate action to meet their net-zero targets. These case studies show how countries have been able to overcome challenges and make significant shifts toward realizing their net-zero targets through specific actions within the framework's enabling action areas.

INTRODUCTION

If the world is to stand a chance of limiting warming to below 1.5°C and avoiding increasingly catastrophic climate change impacts, immediate climate action must be implemented and guided by ambitious emissions reduction targets in line with climate science and as agreed upon in the landmark 2015 Paris Agreement (UNFCCC 2015). Driven by scientific consensus that keeping 1.5°C within reach will require reaching net-zero carbon dioxide (CO₂) emissions by the middle of this century,² a growing number of countries have committed to reaching net-zero emissions.³ Although the scope and time frame of net-zero targets vary, more than 90 countries to date, representing more than three-quarters of global greenhouse gas (GHG) emissions, have communicated their ambition to achieve net-zero emissions, whether via law, policy, or political pledge (Climate Watch 2023).⁴ At the same time, there are growing calls to reach net-zero emissions in a manner that is just and considers the livelihoods of the people most impacted by the transition (UNFCCC 2021).

Despite the many targets that have already been set, questions have been raised around the credibility of national net-zero commitments (Stabinsky et al. 2021; Hale et al. 2022). Net-zero targets are not always clearly defined or may lack political support for their implementation (Rogelj et al. 2021, 2023). There are also concerns regarding the feasibility of pathways for reaching net zero, with novel emissions reduction and CO₂ removal technologies required to reach net-zero emissions still to be developed at a commercial scale, and a lack of near-term policies aligned with net-zero goals (Kemfert 2021; UNEP 2022). Most countries' current emissions trajectories are not compatible with what is needed to meet the temperature goals of the Paris Agreement, and many net-zero targets are not backed by commensurate near-term plans (UNEP 2022; Climate Action Tracker 2023). There is also apprehension that a net-zero commitment so far into the future distracts from important near-term action and limits political accountability (Levin et al. 2023).

These credibility questions are well founded. Current global emissions levels, the inadequacy of near-term climate action, and the sheer magnitude of the task of decarbonizing the entire global economy indicates that countries have a long way to go to reach their net-zero targets (UNEP 2022). However, although no country has found the perfect approach for implementation to achieve net zero, many are already putting in place measures that can help move their economies and societies in the needed direction.

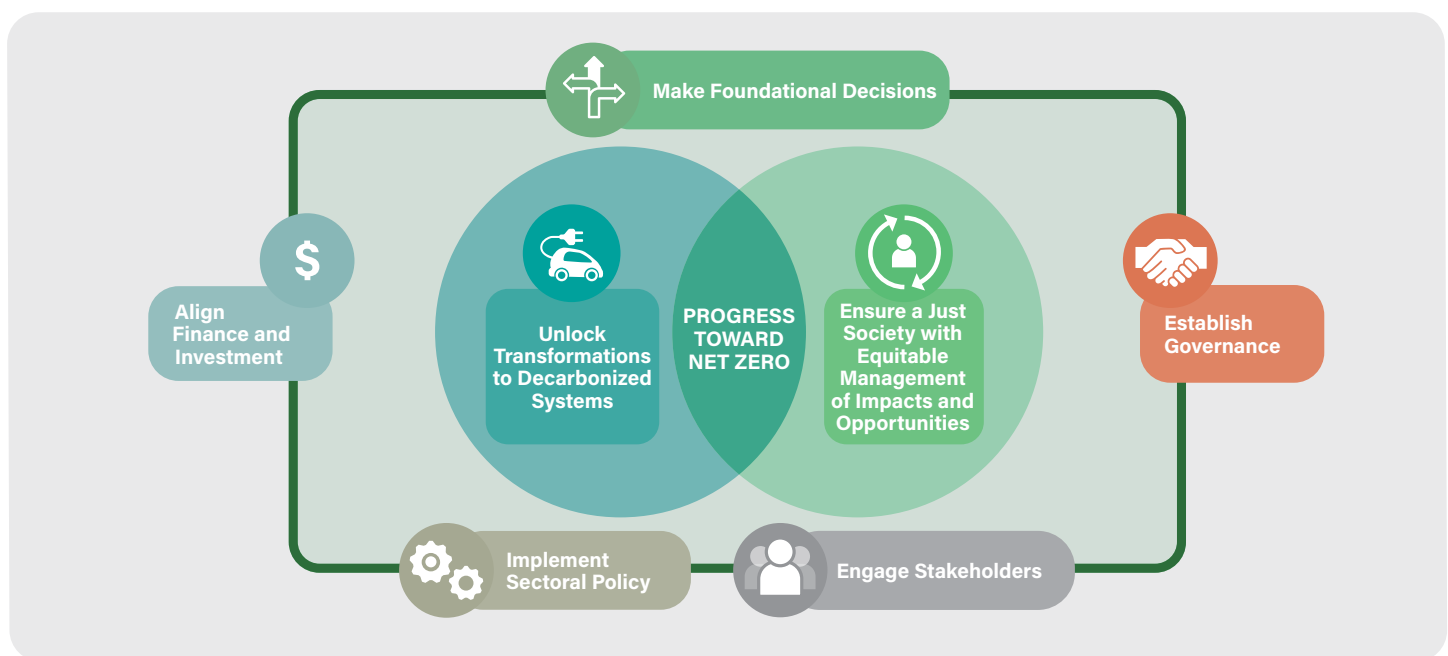
Objective

The objective of this paper is to explore real-world experiences from countries that are taking tangible steps to reach a net-zero future and to develop a framework for understanding the key features in a transition to net zero. Acknowledging that much work remains, this paper aims to inspire and encourage an acceleration of pace and scale toward implementing national net-zero targets while securing a “just transition” by showcasing good-practice examples and case studies of how countries are currently working toward their midcentury goals.

This paper establishes a framework for categorizing national efforts to move from net-zero target setting to net-zero implementation. This Framework for Net-Zero Climate Action (Figure 1) is based on program theory⁵ as a critical tool for logical program planning and evaluation—or, more specifically in this case, planning and evaluation of national government programs to realize net-zero targets (Elliott et al. 2023). It was developed in consultation with an expert advisory group and with input from country government representatives, and it illustrates the combination of priority enabling-action areas that can help translate commitment into action and unlock progress toward net zero. For details on how the framework was developed, see Appendix A.

As envisioned by the framework, **progress toward net-zero GHG emissions** will be achieved through two outcomes: **transformations to decarbonized systems** and **a just society with equitable management of the impacts and opportunities associated with the transition**. Climate action in support of these two outcomes may be categorized under five interconnected and mutually reinforcing enabling action areas.⁶ **Foundational decisions** are critical first steps that countries can take to clarify the scope of a net-zero target, formalize the target, and tie it to immediate policymaking. Countries must also undertake enabling actions in the priority areas of **governance, stakeholder engagement, sectoral policy, and finance and investment**. These actions will need to disrupt established GHG-intensive practices and unlock systemic changes that are durable and send the right signals to decision-makers across government and society. Figure 1 depicts the framework’s two outcomes and five enabling action areas.

Figure 1 | **Framework for Net-Zero Climate Action**



Note: Adapted from Carbon Neutrality Coalition 2022.

Source: Authors.

In the following sections, we present an overview of two outcomes for achieving net zero. This paper then introduces each of the five enabling action areas within the framework, examples of actions that constitute good practices within the thematic area, and brief case studies of how national governments are deploying such practices to achieve their net-zero targets.

REQUIRED OUTCOMES FOR PROGRESS TOWARD NET ZERO

To avoid overshooting⁷ 1.5°C, global CO₂ emissions must reach net zero⁸ by midcentury, with all GHGs reaching net zero thereafter (IPCC 2022). The scientific underpinning of this concept is well described in the literature, along with extensive exploration of policy options and pathways (IPCC 2022; UNEP 2022). However, identifying good practices for implementing net-zero targets in the near term is complex and cannot be limited to a discussion of GHG emissions alone, as every decision made toward net zero will have wider socioeconomic implications. Within this framework, we propose that progress toward a just transition to net zero will be supported by two critical outcomes. First, rapid, near-total transformation of our economic system away from fossil fuel dependency and other GHG-intensive practices and toward decarbonized systems (IPCC 2022; UNEP 2022), and second, the intentional management of impacts and opportunities resulting from this transformation to resolve past and avoid future injustices (Robinson and Shine 2018). These outcomes are critical for unlocking net zero while also ensuring a just future, as further explained below.

Transformations to decarbonized systems

In the context of this paper, a transformation can be understood as a fundamental change in a system's component parts that results in a sustained reconfiguration of the system by disrupting established high-emissions practices.⁹ Transformations are distinct from incremental shifts that occur within the boundaries of an existing system. However, smaller changes can help build a favorable environment for, or even trigger, transformational changes over time (Systemiq et al. 2023).

Mitigation efforts currently under way fall far short of the needed emissions trajectory, putting the world on course for a global temperature rise of 2.7°C by the end of the century, barring a shift in trajectory (UNEP 2022). Achieving the needed deep emissions reductions will require rapid, far-reaching transformations of unprecedented scale in countries across all major sectors—power; buildings; industry; transport; agriculture, for-

estry, and other land uses; and others—in a sustainable paradigm shift at the global scale. These transitions will require fundamental shifts across our systems, such as electrifying end uses coupled with decarbonizing power generation, using sustainable fuels, adopting circular economy and sustainable consumption patterns, halting deforestation and massive afforestation efforts, cutting food loss and waste, and more (DDPP 2015; Global Commons Alliance 2020; IPCC 2022; MGI 2022).

A just society with equitable management of impacts and opportunities

Any national effort to achieve net-zero emissions is set against the context of sustainable development imperatives in the spirit of Article 2 of the Paris Agreement. Moreover, there is an increasing focus in the international climate fora on the importance of a just transition—improving the livelihoods of impacted groups in the transition to net-zero emissions. Indeed, the 27th Conference of the Parties (COP27) cover decision text stresses that the pursuit of net-zero goals must be done “in a manner that is just and inclusive while minimizing negative social or economic impacts that may arise from climate action” (UNFCCC 2022).

System transformations will have significant and wide-ranging impacts on the economy, society, and workers. If not well managed, these impacts may lead to conflicts and poorer outcomes for people, particularly those most vulnerable, ultimately putting net-zero goals at risk. For example, fossil fuel subsidy reform is a notable area where well-meaning climate policy can trigger a backlash if current and future inequities are not also considered.¹⁰ Similarly, fair sharing of costs and benefits determines whether new technologies are accepted or resisted, as in the case of building new wind projects (Hall et al. 2013).

At its core, a just transition elevates concerns about social justice in the transition to net-zero GHG emissions in pursuit of a sustainable economy and society.¹¹ Although countries and regions conceptualize their own visions and definitions, at its broadest level, a just transition aims to ensure that impacted groups (oftentimes with limited resources) are protected and empowered, social and economic opportunities are maximized, and any challenges are minimized and managed (ILO n.d.). The International Trade Union Confederation (ITUC) defines the just transition as an economy-wide process that produces the plans, policies, and investments that lead to a future where all jobs are green and decent, GHG emissions are at net zero, poverty is eradicated, and communities are thriving and resilient.

The ITUC presents this action as being informed by social dialogue between workers and their unions, employers, and often governments (ITUC 2017).

A just transition is not necessarily a prerequisite for achieving net-zero emissions— whereas the former concerns the lives and livelihoods of people, the latter concerns the physical changes to how we use lands, grow food, and produce/ supply energy (among others). It is, however, the authors' view—backed by a significant body of literature—that the just transition is central to difficult transitions that lie ahead. Indeed, the just transition has been gaining traction in multiple climate fora in recent years to a point where the concept is now well situated in COP outcomes pertaining to mitigation, adaptation, climate finance, and implementation, as well as many countries' domestic discourses on climate action. The just transition imperative, coupled with the necessary transformations to decarbonize systems and economies, are therefore the core foundations (outcomes) of the framework proposed in this paper.

ENABLING ACTION AREAS

For each of the five enabling action areas¹² within the Framework for Net-Zero Climate Action, we discuss how specific actions can support the achievement of the two outcomes and ultimately net-zero emissions, identify real country examples, and provide a detailed case study (see Boxes 1–5) of how a national government is approaching implementation toward its net-zero targets.

Foundational decisions

After a national government commits to reaching net-zero emissions, it is critical that it takes immediate steps to delineate the scope of the target it has set, formalize the target, and tie it to current policymaking. Considerations for starting on a path toward implementation may include, but are not limited to, the following actions.

Define the timeline and scope of the net-zero target

It is important that countries clearly communicate the year by which they will seek to achieve net-zero emissions and define the scope of their commitment to net zero, including the GHGs and sectors they intend to cover under their target, and the extent to which they intend to rely on international offset purchases. As the strength and legitimacy of a net-zero target depends on these parameters—with the most ambitious targets aiming for earlier in this century, covering all gases and sectors, and limiting reliance on offsets—countries should clearly communicate these choices (UNEP 2021, 2022).

Although a target is insufficient on its own, Switzerland, among others, has a transparent target, clearly defining the scope of its net-zero target, explicitly committing to reach net-zero emissions by 2050 from all GHGs and in all sectors, as well as to avoid relying too heavily on international offsets to meet its target.

Set near-term and sectoral milestones

Although reaching net zero will ultimately require an economy-wide transformation, implementation will happen across multiple distinct policy areas (UNEP 2022). Countries can guide implementation by setting or identifying any existing specific interim and sectoral goals and targets, many of which may be aimed for before midcentury. Establishing interim targets across all sectors of the economy can help countries visualize how their net-zero ambitions will be realized and can provide a basis to track progress toward the net-zero target, thereby promoting accountability.

In Fiji, for instance, the government has committed to producing 100 percent renewable generated power by 2030, which will mitigate a large percentage of the country's total GHG emissions (Government of Fiji 2019). This near-term sectoral target helps to ground Fiji's long-term net-zero target in the present, adding urgency to the policy and financing measures that will be required to achieve it. In Singapore, the government has committed to phasing out all internal combustion engine vehicles by 2040 (NCCS 2020), while Costa Rica has stated its commitment to increasing forest cover to 60 percent by 2030 (Government of Costa Rica 2019).

Near-term and sectoral milestones aimed explicitly at facilitating a just transition may also be useful in helping countries outline priorities and establish goals against which they can track their progress. In the United States, for instance, the government's sectoral goal of achieving a 100 percent clean energy economy by no later than 2050 is paired with the Justice40 Initiative, which aims to direct 40 percent of the overall benefits of key federal climate investments to disadvantaged communities (Walker and Jeanty 2023).

Embed net-zero targets in law

Political turnover and exogenous or unpredictable forces have the potential to interfere with long-term decisions made today if proper mechanisms to ensure the durability of these decisions are not established (see "Stakeholder engagement" for more information about governance). Adopting a net-zero target within law, where politically feasible, is a foundational step to ensure the binding nature and long-term stability of these midcentury goals (Climate Action Tracker 2021b). Legal frameworks will vary according to unique national circumstances, but enshrining net-zero targets in law may also help to advance near-term action. For instance, pairing a net-zero target in law with mandatory near-term carbon budgets that must be met along the way to net zero can help catalyze urgent near-term government action.

Many countries have already designed and adopted legal frameworks to guide decarbonization, including the UK Climate Change Act (2008), Sweden's Integrated Climate and Energy Policy (2009), France's Law No. 2019-1147 on Energy and the Climate (2019), Germany's Federal Climate Protection Act (2019), New Zealand's Climate Change Response (Zero Carbon) Amendment Act (2019), Nigeria's Climate Change Act (2021), the Canadian Net-Zero Emissions Accountability Act (2021), and Chile's Framework Law on Climate Change (2022). The carbon budget approach, which countries such as the United Kingdom, France, New Zealand, and Nigeria have adopted, establishes legally binding interim "budgets," which restrict the total amount of GHGs that can be emitted during specific time periods. These interim targets can help to ensure a country stays on track in the decades between today and the net-zero achievement date.

Model pathways to achieve net zero

Clearly defined net-zero targets and near-term and sectoral milestones should be grounded in comprehensive modeling trajectories demonstrating how decarbonization can be achieved. Whole-of-economy pathways can be developed through quantitative approaches (such as computer-based modeling to

chart emissions reductions) and qualitative modeling (such as developing narrative future scenarios), building on any high-quality and relevant existing modeling available. Taking a whole-of-economy approach can highlight key decision points and priority actions in the near term to avoid locking in future emissions and to manage negative impacts of the transition on impacted communities.

Many countries, including Austria, Canada, Costa Rica, Fiji, Finland, Slovakia, Sweden, Tonga, and the United States, have included modeled quantitative or qualitative economy-wide scenarios within their long-term low emission development strategy (LT-LEDS). In Tonga's case, the qualitative scenarios presented within the LT-LEDS build on the country's Energy Roadmap 2021–2035 and its National Strategic Development Framework, which it had already prepared (Government of Tonga 2021).

Consider the role of carbon removal

Carbon removal includes a range of approaches¹³ that remove CO₂ directly from the atmosphere. Although the Intergovernmental Panel on Climate Change (IPCC) has stated that all pathways that limit global warming to 1.5°C will require some degree of carbon removal, some experts are concerned that actors will overly rely on nascent or impermanent carbon removal approaches rather than prioritize drastic near-term emissions reductions, increasing the risk of overshooting the Paris Agreement's 1.5°C target, which could lead to irreversible, adverse impacts (Tandon 2021). To mitigate concerns about overreliance on carbon removal, governments and companies may set ambitious gross emissions reduction targets (targets that exclude removals) alongside their net reduction target (Levin et al. 2020). Sweden, for example, states within its LT-LEDS that gross emissions must be reduced by at least 85 percent below 1990 levels by 2045 (Government Offices of Sweden 2020). The remaining emissions may be mitigated through natural or technological carbon removal approaches. By distinguishing a gross emissions reduction target from the net target, Sweden can help to ensure that appropriate market signals are sent to meet targets for both reductions and removals. Where carbon removal will be needed to compensate for hard-to-abate residual emissions, governments should establish mechanisms for ensuring that both natural and technological-based carbon removals are safe, sited with equity and justice at the forefront, and set up for long-term storage.

Develop a holistic implementation plan, outlining plans for a just transition

After setting a net-zero target, modeling possible pathways for reaching net zero, and setting interim milestones to meet, countries may consider developing an implementation plan that outlines concrete priorities and action steps for reducing emissions while promoting equitable development.

To complement its modeling exercise, the United States, for instance, plans to release a companion report, *The U.S. National Climate Strategy*, which will focus on “the immediate policies and actions that will put America on track to reduce emissions by 50–52% below 2005 levels in 2030 and put in place the technology and infrastructure necessary to achieve net-zero emissions no later than 2050” (U.S. Department of State 2021).

3.2 Governance

This enabling action area focuses on national decision-making processes that are shifting everyday government practices toward decarbonization.

Climate governance is a critical enabler of mitigation and an indispensable tool to steer whole economies and societies toward a net-zero emissions and equitable future (IPCC 2022). It can also be a significant inhibitor of climate action in countries with weak governance institutions and political instability. Climate governance can include formal policymaking and institutional frameworks (e.g., new laws and/or regulations) and informal processes (e.g., information gathering and dissemination to change behavior) (IPCC 2014; Rüdinger et al. 2018; Climate Action Tracker 2021a; Dubash 2021b). Climate governance

Box 1 | Case study: Costa Rica’s pioneering net-zero implementation plan attracts investment, withstands political changes

The Costa Rican government, supported by a team of technical experts and international funding, took several foundational steps as it committed to a midcentury net-zero emissions target in its 2019 National Decarbonization Plan.^a The target’s scope was clearly defined, covering all greenhouse gases and all sectors, excluding international shipping and aviation. Pathways to reach the target were described using a backcasting approach, which grouped the transition to net zero into three phases: foundations (2018–22), inflection (2023–30), and massive deployment (2031–50). For each phase, the plan described actions needed within each sector as well as critical cross-cutting strategies, including financing, just transition, and green tax reform. Emphasis was also placed on strategies and investments that should be avoided. The work provided assurance to government ministers, working under then-president Carlos Alvarado Quesada, that adopting a 2050 target was not delaying responsibility but rather informing near-term actions and investments. The strategy and specific priority actions allowed the government to maintain and build upon progress in electric vehicle deployment, reduce agricultural emissions, and increase the use of composting, among other areas.^b

Critically, the plan was able to withstand a major political shift when President Rodrigo Chaves took office in May 2022 after running a campaign largely focused on completely changing course from the previous administration. This continuity is due in part to the plan’s success in attracting large investments from the International

Monetary Fund and Inter-American Development Bank. Because the new administration saw the concrete value of having a strong decarbonization plan—nearly US\$1 billion in central funding they would not otherwise have had—they began their own prioritization of climate objectives rather than rejecting the plan outright.^c Costa Rica demonstrates how a robust implementation plan can withstand such shifts, even in a case where the target was not legally adopted.

It remains to be seen how Costa Rica’s current government will shape its climate agenda. Early priority action areas continue the focus on electric vehicles (in particular, the administration has prioritized operationalizing 1,000 electric buses) and agriculture, with a shift from defining the technical transition pathways to attracting large-scale finance for specific sectors.^d Banks are signaling their willingness to make low-carbon investments and provide cheaper loans when strong plans are in place. Although international investment is one aspect of potential financing, engaging local businesses and investors will also be key politically to make truly transformational change. How to generate these concrete, attractive business opportunities is the next big question for Costa Rica. The Costa Rican government has an opportunity to transform the 2050 National Decarbonization Plan of 2019 into a national investment plan that aligns with its priority areas, calculating costs and estimating needed investments locally and internationally, and making the investment case to local businesses.

Sources: a. Government of Costa Rica 2019; b. Bnamericas 2022; c, d. Pers. Comm. Araya 2023.

must also consistently take a just transition into account in decision-making (Makgetla 2021). Good-practice governance arrangements to support net-zero implementation include the examples below.

Champion political leadership

A critical enabler of climate governance is robust and sustained political leadership (Averchenkova et al. 2019; Elliott 2019). Without adequate leadership, national governments may lack the driving force or willpower to adopt new laws and policies and change or establish institutional mechanisms to support economic transformation and manage potential negative impacts of the transition.

Maintaining a high-level of political leadership on climate change can help keep the issue at the forefront of national decision-making processes. For example, many national governments, such as those of Andorra, Argentina, and France, have declared national climate emergencies to expedite policymaking and establish a sense of urgency for the challenge. South Africa's government has raised the issue of a just transition at the highest level through the Presidential Climate Commission to ensure it is a driving force in national decision-making.

Strengthen accountability through monitoring, review, and reporting

Good climate governance must obligate a country to meet a net-zero target once it has been set and establish mechanisms by which government can be held accountable. In a sense, the government must be responsible for its ambition, capable of enforcement, liable when failing to meet its goal, and empowered to shift course and realign efforts when needed. Accountability can be bolstered by reporting, monitoring, and review procedures to foster the ability to reflect on what is and is not working and create space to respond to technological advancements and other opportunities (Rüdinger et al. 2018; Elliott 2019). Although countries may be in the early stages of conceptualizing how to monitor a just transition, this must be equally integrated into accountability mechanisms and may be supported by establishing specific just transition targets and key performance indicators to be monitored over time.

Several country governments have established formal review processes to help steer government policy toward a net-zero objective. The United Kingdom and Sweden, among others, have independent review processes to evaluate how well the government's overall policy meets the country's climate goals. Iceland and New Zealand have developed review procedures to screen new government policies and projects through a climate lens prior to implementation (e.g., New Zealand's Climate Implementation of Policy Assessment and Iceland's checklist for climate). In its initial report, the Just Transition Commission of Scotland provided recommendations for a robust monitoring and evaluation framework (Just Transition Commission 2022). The governments of South Africa and Nigeria are also developing systems for tracking just transitions in partnership with the Initiative for Climate Action Transparency. Accountability can also be strengthened through due diligence and monitoring and reporting requirements of recipients of international climate finance. This may be particularly important in rolling out Just Energy Transition Partnerships¹⁴ in developing countries.

Ensure internal coordination for implementation

Implementing a net-zero agenda requires a degree of coordination and shared responsibility across the whole of government (across sectors, ministries, departments, and at all levels) to support decision-making. Although institutional structure and processes to coordinate implementation may differ from country to country, they are necessary to translate net-zero targets into action (Dubash 2021a). Intergovernmental coordination will be most effective and more durable when it is enshrined in legal form, empowered, and supported by multiple government entities. Coordination is particularly critical when managing the potential trade-offs between climate actions in different sectors of the economy.

Several countries have established institutions for coordinating climate action with variations in their design, approach, and impact. Singapore, for example, has an Inter-Ministerial Committee on Climate Change to support coordination on climate change policies. Mexico has also established an inter-ministerial committee on climate change, and the United States has established a National Climate Task Force under the Biden administration. To reach net zero, it will be critical to maintain the continuity of these coordination bodies despite political changes, for example—through legal mandate.

Box 2 | Case study: Chile's new governance structures are streamlining net-zero implementation

Chile's long-term low-emission development strategy, submitted to the United Nations Framework Convention on Climate Change in 2021, provides a road map to carbon neutrality by 2050, covering all gases and sectors excluding international shipping and aviation.^{a,b} The net-zero target was subsequently legally enshrined through Chile's Climate Change Framework Law (2022),^c which built on earlier climate policy planning efforts and reflected thousands of public comments received on the first submitted version in 2020.^d The law was spearheaded by Chile's new Environment Minister, Maisa Rojas, who took office under recently elected President Gabriel Boric. Boric's pledge to make climate a top priority of his administration has amplified recent climate action in the country and has created a supportive environment for net-zero implementation.

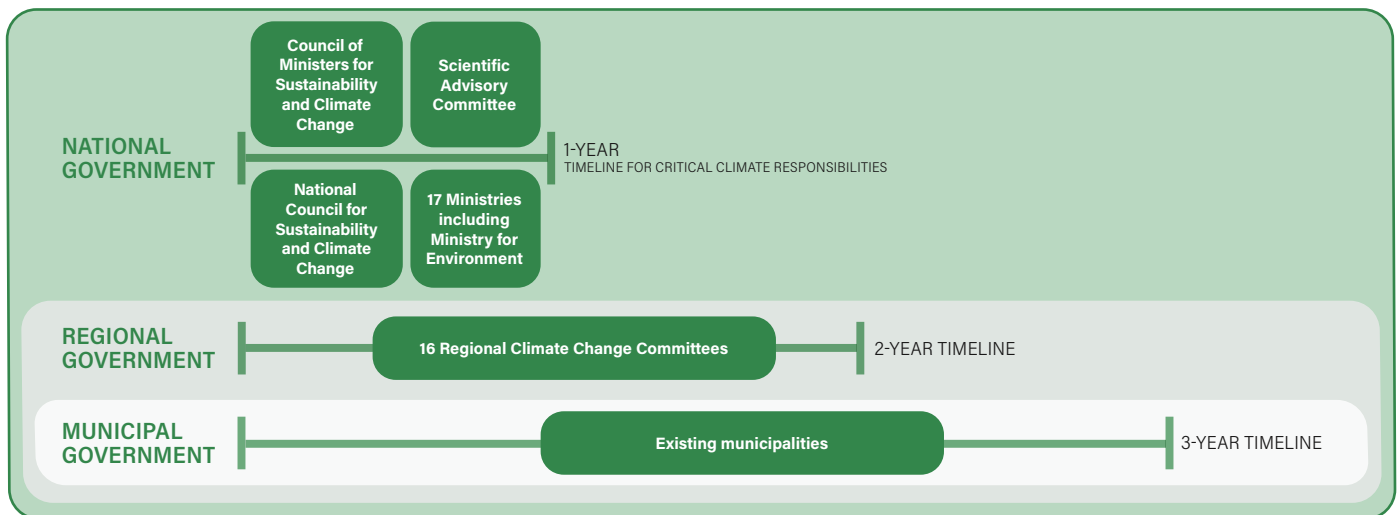
The Climate Change Framework Law completely shifted climate policy implementation in Chile, creating new governance structures from the national to local levels to accelerate net-zero implementation (see Figure B2-1).^e Previously, the responsibility for implementing climate policies was not shared across government entities, with the burden falling solely on the Ministry of the Environment, resulting in a slow policymaking process and lack of binding commitments. The Climate Act decentralized and mainstreamed net-zero implementation, assigning responsibilities to 17 government ministries, with measurable indicators to track progress, as well as to regional and municipal authorities. The act created critical new structures, including, at the national level, the Council of Ministers for Sustainability and Climate Change to vet climate policies; the Scientific Advisory Committee of independent climate policy experts to advise on policy instruments and progress toward targets; and the National Council for Sustainability and Climate Change, composed of stakeholders, to facilitate public participation and accountability. At the subnational level,

regional Climate Change Committees have been established for all 16 regions of the country to develop and implement local climate policies, and existing municipal government structures have been given authority for climate policy implementation.^f

Although the law itself was passed only recently, Chile had already begun to lay the groundwork in 2021 when it developed sectoral carbon budgets for the first time and assigned them to specific agencies. A series of sectoral policy initiatives were launched, including a coal exit initiative, a 100 percent electric vehicle pledge, and sustainable management and afforestation plans. Sectors can now be held accountable through budgetary sanctions if they do not meet their targets.^g

The shift in governance structure in Chile has already resulted in a significant increase in the amount of climate policy work that the government has been able to undertake, enabling policies to develop on short timelines.^h The national government is developing critical policy instruments over the course of one year from the law's publication (by June 2023), including procedural regulations to enact greenhouse gas emissions standards for a range of sources, potentially the basis for an emissions trading program.ⁱ Similarly, sectoral mitigation and adaptation plans must be ready within two years (by June 2025). Regional and municipal governments are each developing climate action plans over the course of three years. The Climate Change Framework Law ties regulatory instruments to Chile's international commitments, ensuring they will be reviewed and updated periodically as needed. If implementation of current policies proceeds as planned, Chile's carbon dioxide emissions may have already peaked and may be on a trajectory to meet 2030 targets compatible with a 1.5°C temperature rise in the longer term.^j

FIGURE B2-1. CHILE'S NEW GOVERNANCE STRUCTURE FOR CLIMATE POLICY IMPLEMENTATION AND NEAR-TERM TIMELINES FOR CLIMATE POLICY DEVELOPMENT



Notes and sources:

a. ICAP 2022; b. The plan describes pathways to net zero and includes national as well as sector-specific carbon budgets, with interim targets of peak emissions in 2025 and an emissions cap for 2030; c. BCN 2022; d-f. Currie Ríos 2022; g-h. Pers. Comm. Currie Ríos 2023; i. ICAP 2022; j. Climate Action Tracker 2022a.

Consider the role of judicial and executive authorities

Although the legislative branch of a government may be central to realizing net zero by establishing laws and policies, implementation will be supported by other branches of government as well. Climate litigation generally—and, more specifically, just-transition-related litigation—is on the rise, demonstrating the importance of the judicial system in holding countries and other actors accountable to their commitments and upholding policy decisions (Setzer and Higham 2021; Savaresi and Setzer 2022; Tigre et al. 2023). In Germany, the Federal Constitution Court decision that Germany’s existing climate target was “insufficient” enabled an earlier net-zero target year of 2045 to be set. There have been similar rulings in France and the Netherlands. In Canada, the Supreme Court ruled that the federal Liberal Party government’s carbon pricing regime was constitutional, paving the way for its implementation. The executive branch of government may use its own authority to move toward net-zero goals too. In the United States, for instance, where climate policy has been historically challenging to pass in Congress,¹⁵ President Biden has used existing powers granted under the U.S. Defense Production Act to drive manufacturing of solar panels and heat pumps.

Stakeholder engagement

Strategic engagement between government and stakeholders from the private sector and civil society is needed to develop informed policy solutions, generate buy-in, catalyze uptake of solutions, and ensure that a transition to a net-zero economy is just and equitable.

Stakeholder engagement is the process by which governmental actors interact with nongovernmental actors on an issue, and can include a variety of types of interactions, from one-way information sharing to collaborative consultation processes and partnerships.¹⁶ Stakeholder engagement around net zero involves soliciting nongovernmental input in decision-making on the policies and actions needed to reach net zero and/or spurring stakeholders to take the actions needed to reach net zero.

Although inclusive, proactive, and sustained stakeholder engagement can have many benefits, it is a challenging undertaking.¹⁷ The process requires time and resources, particularly in countries without existing experience or mechanisms already in place to facilitate engagement. Identifying and navigating trade-offs with affected stakeholders will require difficult conversations and decisions. Country stakeholder engagement activities have often fallen short due to a lack of sustained engagement

opportunities, failure to include traditionally marginalized groups and/or a diversity of perspectives, or limited follow-up on stakeholder input.

Below, we include a high-level description of good practices¹⁸ that countries can take to meaningfully engage stakeholders around net-zero target setting and implementation and examples of how countries have approached such engagement thus far.

Include public input in decision-making processes

Engagement of stakeholder groups representing a wide variety of perspectives, including those historically excluded, can be achieved via a variety of different formats, including the following:

- Consultation on national plans. For example, Tonga, with support from nonprofit organizations, developed its LT-LEDS through a consensus-based stakeholder engagement process grounded in Tongan culture and informed by technical analysis. Local facilitators helped identify and assemble a cross-sectoral stakeholder group representing government, industry, and civil society and conducted a series of workshops through which the group developed a long-term strategy that reflected input and had buy-in from citizens. The process itself is a model that the Tongan government considers a gold standard for policy development (Robertson 2021).
- Climate citizen assemblies to exchange ideas and make recommendations on aspects of the climate crisis (Thorman and Capstick 2022). Climate assemblies are being organized around the world, including across Australia, Europe, Ireland, and the United Kingdom, to give a greater role to the public in climate change decision-making.
- Knowledge networks, which involve collaboration between multiple actors to facilitate interactive knowledge sharing and to create or use new knowledge (Rennkamp and Boule 2018). Knowledge networks have emerged as an important mode of stakeholder collaboration in developing countries to combine development and climate objectives. For example, a regional knowledge network was created to design long-term net-zero strategies in countries in Latin America and the Caribbean as part of the Deep Decarbonization for Latin America and Caribbean Project (IDB and DDPLAC 2019).

Partnerships with nongovernmental organizations (NGOs) can help the government with resource-intensive steps, from planning through implementation. For example, the Kenyan

government was able to tailor renewable energy investments to mitigate risk and benefit local communities, as well as attract additional financing, by engaging stakeholders before developing its investment plans for international funds (CIF 2020).

Stakeholder engagement in the context of net-zero policy development must involve more than running a final plan or policy through an online public comment period where participants can tick a box. Sustained engagement builds real ownership of solutions. For example, recommendations from the French Citizens Assembly were incorporated into new regulations and into the 2021 Climate Bill through multiple iterative dialogues. Although the level of stakeholder engagement did not live up to initial promises made by the administration, follow-up between stakeholders and legislators after the passage of these laws and regulations has been credited with expanding the role of the public in climate policy and improving public buy-in (Duvic-Paoli 2022).

Strategically identify and select key stakeholders who must be engaged in the process, including historically marginalized, Indigenous, and/or particularly vulnerable groups

In principle, stakeholders can be anyone who might be directly, indirectly, positively, or negatively impacted by the resulting decisions. There is a dichotomy within engagement, with inclusivity on the one hand and targeted prioritization of the most critical stakeholders on the other. Finding the right balance depends on the country context, the specific issue or sector being considered, and the objectives of engagement.

In some country contexts, specific individuals may be able to wield outsized influence in stakeholder engagement. In countries where civil society may not have the space or intention to encourage net-zero implementation, specific individuals can act as levers. But it is also important to ensure that more influential groups do not crowd out lesser-heard perspectives and that all stakeholders feel safe and comfortable sharing their input. This points to the importance of power and influence mapping¹⁹ to ensure that marginalized groups are included as well as planning to reduce barriers to participation for any stakeholder groups (e.g., language barriers, historical marginalization, gender norms, strengthening background knowledge to encourage effective participation, and more). For a detailed example, see ICAT's (2020a) case study on stakeholder identification and mapping for a sustainable development project in Kenya.

Establish committees of independent experts to review policies and implementation plans and hold government accountable

A growing number of permanent national climate advisory bodies, or climate councils, aim to inform government decision-making through technical, science-based data and analysis (e.g., Chile, Finland, South Africa, Sweden, and the United Kingdom, among others). Countries' experiences have shown that climate advisory bodies can influence government decisions, ground policymaking in independent science, and increase public awareness of climate issues and trust around proposed solutions (Elliott et al. 2022). When given legal authority, advisory bodies can hold government accountable by publishing public reviews of policies and progress toward net-zero and interim targets. The UK Climate Change Act, for example, requires the UK Climate Change Committee to report on the government's progress toward targets, and the government is required to respond in a limited amount of time. Advisory bodies themselves represent a type of stakeholder engagement, bringing in technical expertise or perspectives from existing groups; for example, members of New Zealand's Climate Change Commission have deep technical expertise on issues relevant to the country (e.g., agricultural economics), including those from the Indigenous Maori people. At the same time, they can facilitate broader stakeholder engagement with the public or specific groups, in some cases as part of their legal mandates (e.g., Sweden, United Kingdom). The Danish Council on Climate Change, in another example, manages a dedicated mechanism for public outreach (Evans et al. 2021).

Time and resource limitations can constrain the effectiveness of national advisory bodies. Countries with limited resources may find it helpful to expand existing coordination mechanisms to include responsibilities around net-zero implementation; for example, Tonga's Joint National Action Plan Task Force was expanded to include its LT-LEDS as well as adaptation and resilience.

Conduct targeted engagement to move the private sector toward net zero

Private sector engagement may include gathering input on and support for new policies to drive private sector emissions reductions and encouraging voluntary action. For example, private sector emissions reporting and adoption of science-based targets in Japan have scaled up as a result of extensive government engagement with industry groups and individual companies around sectoral targets for carbon neutrality, government-sponsored technical support for science-based target setting, mandatory reporting requirements for larger emitters and public

disclosure of the data, and public pressure (Aden 2019). As of early 2023, about 200 business groups, including large and politically powerful industries, were part of the public-private partnership “Challenge Zero” to support the private sector in developing their own action plans to decarbonize. In Sweden, a similar initiative (Fossil Free Sweden) started by the federal government has brought together stakeholders from a variety of industries and has led to the development of road maps to decarbonization while remaining competitive for 22 industries as of late 2022 (Fossil Free Sweden n.d.).

Sectoral policy

After establishing robust net-zero targets, national policymakers must move toward establishing near-term policies and actions needed to achieve these future goals.

Given the scale of transformation required within a relatively short time period, governments will likely need to use a combination of incentives (discussed in more detail in the “Finance and investment” section) together with new or enhanced complementary sectoral regulations (e.g., renewable portfolio standards, mandatory internal combustion engine phaseouts) at multiple levels of governance to get on a trajectory to net zero (Stern and Valero 2021).

Box 3 | Case study: South Africa establishes an inclusive process toward a just transition, with broad stakeholder engagement

In 2020, South Africa’s president established the Presidential Climate Commission (PCC), with a primary mandate of overseeing and facilitating a just transition in the country.^a The PCC is unique in its position, design, and means of operation. First, the PCC is situated within The Presidency, which provides the commission with an important cross-cutting role across all government departments and plans, thus elevating the just transition imperative. Second, the PCC comprises commissioners from all major stakeholder groups—government, business, labor, civil society, and traditional leadership—which supports its approach of building consensus to advance the transition. Finally, the PCC operates transparently, with all meetings, events, and workshops broadcast to all, and with a commitment to deep, genuine, and continuous engagement with communities.

This model of operation was put into practice through the design of the Just Transition Framework, which was adopted by South Africa’s Cabinet in August 2022.^b The framework sets out a shared vision, principles, policies, and governance arrangements to give effect to the transition—all intending to bring coordination and coherence to just transition planning in the country. The speed at which the document was embraced in national policy and by all stakeholders was largely due to the inclusive process that was followed in its development, built on years of evidence and research.^c In developing the just transition framework, the PCC took the following actions:^d

- Deepened the evidence base around an effective and equitable transition and commissioned a series of policy briefs on key issues relevant to the transition

- Conducted a series of public workshops and events on these issues, incorporating views of government ministers, civil society, business, labor, traditional leadership, youth, and the research community, among others, to form a comprehensive view of the major topics for a just transition framework
- Embarked on a series of in-person community consultations to better understand the needs of communities that are being impacted in the shift away from fossil fuel-based economies, ensuring that the framework is tailored to those most impacted by the changes that lie ahead; this process included significant engagement with municipalities and traditional leaders in affected regions
- Commissioned a series of essays from experts in different fields (academia, business, labor, and civil society), exploring what it will take to achieve a just transition in South Africa
- Consulted widely with workers, communities, small businesses, and social partners in the country in 2021–22 on the framework, allowing impacted groups to discuss their own development pathways and livelihoods
- Invited written comments of the draft just transition framework, where written submissions were received from many stakeholder groups, including youth, labor, business, financial institutions, all spheres of government, nongovernmental organizations, and academia

The significant and genuine engagement in the development of the Just Transition Framework helped build support for the transition and helped improve public trust and acceptance for the difficult work and decisions that lie ahead.

Sources: a. The Presidency 2020; b. Government of South Africa 2022; c, d. PCC 2022.

A description of sectoral policies and measures that could drive transformational change is beyond the scope of this paper as there is a wealth of existing literature (see Hultman et al. 2020; Saha et al. 2021; Stern and Valero 2021; Kinter-Meyer et al. 2022). Rather, the paper is aimed at encouraging policymakers to draw on the foundational work done to plan a path toward net

zero to implement policies that are part of larger plans and strategies that have legitimacy and a high degree of political support and accelerate reductions of GHG emissions while improving outcomes for people, particularly those most disadvantaged or impacted in the transition.

Box 4 | Case study: A sustained portfolio of policies have transformed Denmark's power sector

Denmark's power sector has undergone a transformational shift over the past 30 years from coal-dominated generation to mostly renewable sources. Power generation from renewable sources rose nearly 30-fold from 1990 to 2020, from 3 percent of the generation mix to more than 80 percent.^a This has mostly been due to massive deployment of wind, which increased 24-fold over the same time period, reaching seven gigawatts of installed capacity as of January 2022.^b Solar generation has been a contributing factor more recently, doubling between 2015 and 2020 to contribute 4 percent of the power mix. Use of renewable sources for heat has also been on the rise, with renewable energy currently composing more than half of total heat generation. The scale-up of renewables has contributed to a 76 percent decline in carbon dioxide emissions from Denmark's power and heat sector from 1990 to 2020 (Figure B4.1).

This transformation has been driven by a combination of sustained, well-designed policies and actions, including the following:^c

- **Sustained investment in research and development (R&D):** Denmark began expanding wind energy in response to the 1970s oil crisis by scaling up R&D investment. Today, Denmark has one of the highest ratios of R&D spending on wind energy as a share of gross domestic product (GDP) in the world and was the top investor in the European Union in terms of R&D spending on renewable energy as a share of GDP from 2000 to 2020.^d This has made Denmark a world leader in wind energy and an exporter of wind technology.
- **Implementation and adjustment of a feed-in tariff for wind:** Denmark first introduced a feed-in tariff for wind in the 1980s and raised it in 2008 in response to a stall in development of new wind capacity. The increase reinvigorated wind development by providing developers with stable revenue to make long-term investments.
- **Institutional support for planning and installation of renewable energy:** Government support and streamlined planning processes facilitated development of onshore wind with requirements beginning in 2008 for municipalities to designate areas for onshore wind. Likewise, the Danish Energy Agency conducts mapping and site identification for offshore wind,

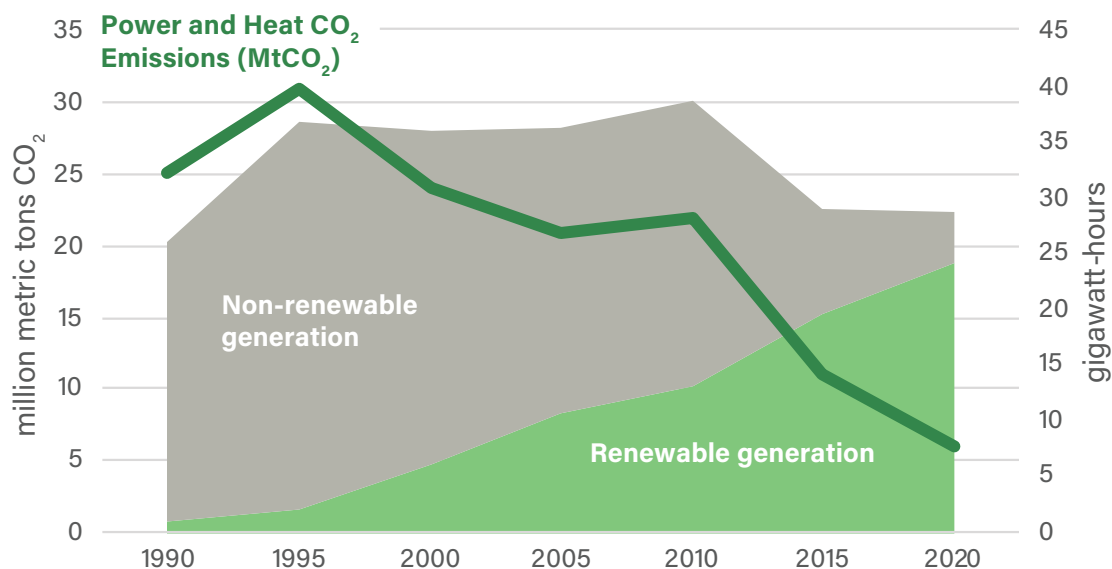
working with developers to streamline the licensing processes, which has reduced barriers and transaction costs. The Danish Energy Agency provides a single point of access for project developers through the permitting and approval process.^e

- **Strong grid interconnection:** Denmark has been a world leader in renewables integration by maintaining strong grid interconnection and market integration with other countries for export, complemented by use of combined heat and power. The transmission grid is owned by a public company under control of the government's Ministry for Climate and Energy, which finances projects and passes costs on to consumers.
- **Community ownership of renewable energy projects:** Denmark's 2008 Renewable Energy Act requires local citizens to be offered at least a 20 percent share in new wind projects and requires investment of revenues into local projects, increasing buy-in for new wind projects and helping communities share the benefits. Denmark's Samsø Island, the first to be 100 percent powered by renewable energy, illustrates a successful shared ownership model, where offshore turbines are owned by investors, municipal government, and local cooperatives.^f
- **Upgrading aging turbines:** In 2001, Denmark implemented a scrapping program to speed replacement of aging, less efficient turbines with more modern models.
- **Increasingly ambitious renewable energy targets:** Because of the interventions described above, Denmark surpassed targets set for renewables for 2011 (20 percent of Denmark's gross energy consumption) and 2020 (35 percent of final energy, 50 percent of electricity consumption). Now, the government has further increased targets for 2030 (100 percent of electricity generation, 55 percent of total energy consumption, and 90 percent of district heating [nonfossil sources]), which will continue to drive the increased scale-up.

Throughout the transition, Denmark has had ongoing dialogues with unions and employers to work toward fair sharing of costs and benefits and to support workers in fossil fuel industries. Building a strong industry for renewables has been central to Denmark's approach, paired with a robust social safety net.^g

Sources: a. IEA 2021a; b. Danish Energy Agency n.d.; c. Westphal and Thwaites 2016; d. Gasser et al. 2022; e, f. Hutchinson et al. 2021; g. Krawchenko 2022.

FIGURE B4-1. DENMARK'S POWER SECTOR TRANSFORMATION



Source: IEA 2021a.

Finance and investment

The finance and investment enabling action area covers actions that governments can take to meet financial needs and seize investment opportunities required for transitioning to a just net-zero future.

To keep 1.5°C in reach, estimates suggest that global climate finance flows will need to reach more than US\$5 trillion per year by 2030 (Boehm et al. 2022). However, total global flows of climate finance netted just \$640 billion in 2020 (Buchner et al. 2021). By comparison, global investment in fossil fuels reached \$726 billion in 2020 (IEA 2021b).

Heightened risk perceptions and high interest rates and capital costs are often attached to climate investments, which can inhibit a country's capacity to attract affordable private financing to drive the transition to net zero. Public climate finance from governments—which has traditionally been woefully inadequate for driving the large-scale transformation required to reach

net zero by midcentury—is therefore critical for driving early investments. Simultaneously, governments must increase the provision of credit enhancement support, promote derisking for low-carbon investments, and more to ensure that private finance flows increase exponentially. Transforming the global financial system will also require measuring, reporting, and managing climate risks and ending public financing for fossil fuels (Boehm et al. 2022). Key finance and investment actions include but are not limited to:

Aligning fiscal policy with net-zero target

The gap between needed climate finance and current flows suggests that the climate repercussions of financial decisions are not adequately considered during most national planning and decision-making processes. Establishing a carbon pricing program that does not regressively impact workers and consumers,²⁰ whether through emissions taxing or trading schemes, is one important step that governments can take to shift investment and consumption decisions toward net zero (Morris 2022;

Robins 2022). Ending subsidies for fossil fuels and shifting to incentivize green alternatives is also critical (IMF n.d.). Government subsidies and tax credits for clean energy, vehicles, and more, for instance, can help bring down costs and increase consumer uptake.

Many countries are already exhibiting good practices in aligning fiscal policy with their goals for reaching net zero. Andorra, Sweden, Switzerland, and Uruguay, among others, have successfully established carbon pricing programs that are driving tangible emissions reductions (World Bank 2022). France, which also prices carbon through participation in the EU Emissions Trading System and through its own carbon tax on gasoline, diesel, heating oil, and natural gas, has also established plans to end support for the financing of fossil fuels abroad. The large-scale financial subsidies for renewable projects in the state of South Australia have been credited as enabling the state to achieve 100 percent renewable generation for six consecutive months in 2021 using solar, wind, and battery storage (Boehm et al. 2022).

Increasing domestic public climate finance

Scaling up public finance is vital, particularly for areas where private finance is not well suited to meeting objectives at the speed and scale necessary (Boehm et al. 2022). Increasing domestic public finance may include integrating climate change into national budget preparation and approval processes, establishing public procurement processes that mandate low-carbon purchases, issuing green bonds, and investing in climate-related funds.

Budget tagging, whereby countries identify and track the climate-relevant expenditures in a budget system, is being used in many EU member countries to ensure expenditures take climate into account. Many countries—including South Africa, the United States, and Uruguay—have also developed green procurement processes in which governments ensure that the purchases they make meet climate standards. These requirements can have tangible effects on domestic emissions because, on average, public procurement represents between 13 percent and 20 percent of a country's GDP (Caldwell et al. 2022). Climate-related bonds, such as use-of-proceeds bonds (where the government devotes the proceeds received by the bond to earmarked projects that improve climate outcomes), are also growing in popularity: Indonesia, Mexico, Nigeria, and others have all developed programs of this nature (Caldwell et al. 2022). Simultaneously, more than 60 countries around the world are opting to expand the role of domestic public climate finance by establishing climate-related funds (Caldwell et al. 2022). By allocating set quantities of money to infrastructure projects;

research, development, and demonstration; and other causes that advance the transition to net zero, governments can play a direct role in unlocking and scaling needed solutions.

Dedicated, long-term public finance is needed to facilitate a just transition for workers and communities as well. In addition to redirecting existing government spending to deliver both climate and social goals, governments can establish dedicated just transition funds (Robins 2022). For example, the European Commission allocated nearly €20 billion toward a new Just Transition Mechanism and Fund, which members of the European Union may use to support regions negatively impacted by the transition to net zero by reskilling workers, creating new businesses, job-search assistance, and more (European Commission n.d.).

Mobilizing and supporting private climate finance

Private climate finance grew by an average of \$23 billion per year between 2016 and 2020 across a limited subset of countries (Boehm et al. 2022), but the landscape in both domestic and international climate change mitigation is still risky for many private investors. Identifying and mitigating these risks is crucial to quickly scaling private climate finance.

Supporting private climate finance and sending clear policy directives to private financiers differs across country contexts, though it may include measures to derisk low carbon investments such as lowering interest rates for green investments and establishing public-private partnerships. For instance, the United States has used collaborative partnerships between the public and the private sector to build transmission, develop public service-related projects, drive uptake of electric buses, build flood prevention channels, and more (U.S. Chamber of Commerce 2021; Caldwell et al. 2022). Regulations that mandate corporate climate risk disclosure and require companies to more deeply examine their operational and financial exposure to climate change (Kerr and Maheshwari n.d.) can also help to drive the increase in private finance in support of net zero. Indeed, these rules, which have been established by Brazil, Canada, the European Union, France, New Zealand, Singapore, the United Kingdom, and others can help such actors to “more strategically allocate capital toward lower-emissions and more resilient investments,” thus helping companies to take more responsibility for “private investment flows and their relationship to climate impacts” (Caldwell et al. 2022).

Aligning international public finance with climate goals

Domestic finance and investment measures can either be significantly improved or undermined by international finance and trade decisions. Countries must ensure that their trade policies support global climate goals. Ending international financing of coal, for instance, to which large economies such as France, Japan, and South Korea have committed, is crucial.

Countries must also follow through on commitments to contribute to funds for climate mitigation, adaptation, and compensation for irreversible impacts. Although countries such as France, Germany, and Japan have provided substantial funding (over 0.25 percent of their gross national income) in pursuit of the unfulfilled \$100 billion annual finance goal under the United Nations Framework Convention on Climate Change, for instance, much more is needed, and more developed countries—particularly those in the Group of Seven—must follow suit (Bos et al. 2021).

Box 5 | Case study: France shapes budget to increase net-zero-aligned public finance

Over the last decade, developing and deploying innovative green finance and investment tools have become priorities in France. Indeed, through pairing robust public financing interventions with a suite of tools for mobilizing increased climate finance, climate investments in the country have steadily risen.^a

On the public finance side, France has developed a strong reputation for incorporating climate considerations into its annual budgetary process. These efforts took off in 2017, when France committed to the Paris Collaborative on Green Budgeting, an Organisation for Economic Co-operation and Development initiative requiring signatories to “assess the compatibility of [their] public finance trajectories with the Paris Agreement.”^b This commitment spurred the country to prepare plans for its first “Green Budget,” which was published in 2021 after a cross-government design process. The Green Budget provides an assessment of the “green impact of all State budget expenditures,” rating all expenditures across a variety of criteria, including impact on climate, biodiversity, and local air pollution.^c More specifically,

the methodology rated State expenditures into five categories ranging from an unfavorable (-1) to a very favorable (+3) environmental impact. It used a grid covering six major environmental goals: (i) the fight against climate change, (ii) adaptation to climate change and prevention of natural disasters, (iii) the management of water resources, (iv) the circular economy, waste and the prevention of technological risks, (v) the fight against pollution, and (vi) biodiversity, and protection of agricultural, forestry and other green areas.^d

Because every governmental expenditure must now be evaluated on this scale, France’s Green Budget ensures that all government line ministries and agencies carefully consider the climate and environmental impacts of each intervention for which they are using national funds. In so doing, these departments are expected to evaluate the extent to which each decision that they make helps—or hinders—progress toward achieving net zero.

France is also exploring means by which to set standards that require minimum environmental thresholds to be met. For instance, France’s 2021 COVID-19 recovery plan required that €30 billion (30 percent of the full recovery package) be devoted to investments tagged favorably under the Green Budget methodology.^e These investments included the funding of large-scale energy efficiency and insulation projects, investments in green hydrogen development for storing and transporting energy, and more.^f

France’s Green Budget methodology and minimum requirements for national expenditures are helping to ensure an increase in domestic climate finance. Of course, future efforts must be made to evaluate the extent to which these increased climate investments are driving tangible emissions reductions, creating green development benefits, and promoting a just and equitable transition to net zero.

Sources: a. Ledez and Hainaut 2021; b. Zakhartchouk 2019; c, d. Lelong and Wendling 2020; e. Braun 2020; f. Thomas 2020.

CONCLUSION

Although no country has fully decarbonized its economy to achieve a net-zero target, there is a wealth of practical experience and examples of concrete actions being taken today from which others can learn. It is still too early to assess whether these actions are tipping points that will trigger the necessary transformation, and it is unlikely that existing efforts alone will be sufficient. However, implementation efforts under way today illustrate a growing degree of commitment and provide insights for other countries as they develop their own net-zero implementation policies.

The Framework for Net-Zero Climate Action is a practical tool for examining national climate efforts toward a just transition to net zero. This working paper provides an initial sketch of the framework's key features and highlights country examples of individual aspects of the framework. Further research is needed to build upon this foundation, including the following:

- Expanding analysis on the relationship between the pursuit of net zero and the necessity of a just transition, exploring the degree to which these concepts are intertwined
- Continued examination of country actions to build a deeper understanding of how countries are implementing their net-zero targets and how each action influences the impact, the speed, and the scale of the transition toward a just and equitable net-zero future
- Testing the Framework for Net-Zero Climate Action as a theory of change model for individual country implementation, including by articulating core assumptions and analyzing causality of country actions toward the framework's outcomes (see Elliott et al. [2023] for an examination of this subject)
- Assessing the potential relevance and applicability of the Framework for Net-Zero Climate Action to evaluate and track near-term progress toward a just transition to net zero

APPENDIX A. METHODOLOGICAL APPROACH

Guidance around net-zero target setting is defined and explored extensively in the literature, on a global scale as well as from national, subnational, and private sector perspectives.²¹ This study aims to build on this existing knowledge to explore what it may take for countries to deliver on the net-zero targets they have set.

Achieving net zero will require significant and unprecedented transformations of the global economy (IPCC 2022). No country has transitioned from carbon-intensive to fully decarbonized yet. This creates a challenge in determining whether a given climate action will definitively facilitate the ultimate achievement of net zero. In addition, what works for one country may not be applicable in another country. So, while we do not know the perfect approach for realizing net zero, this paper draws insight from the literature and expert interviews to offer a framework for countries to consider when advancing the implementation of their net-zero targets.

The Framework for Net-Zero Climate Action is based on program theory²² as a critical tool for logical program planning and evaluation—or, more specifically in this case, planning and evaluation of national government programs to realize net-zero targets (Elliott et al. 2023). Existing typologies for organizing national climate action were reviewed and adapted to inform the categories of the framework.²³

A technical advisory body, comprising experts from research and NGOs, was also consulted on an initial proposal for the framework, and the framework was revised based on feedback provided. Specific actions that may be considered “good practices” and criteria for effectiveness of these practices were also explored under each area of the framework. Presentations made during the advisory body meetings will be available from the authors upon request.

In addition, examples of national climate action were collected through desk research using Google Scholar and Ebsco Discovery Services with key search words in English. In addition, the authors conducted exchanges with the advisory body and conducted an in-person discussion workshop with government participants in June 2022. During the workshop, government experts exchanged views on specific climate actions they were taking that were perceived to contribute to meeting net-zero targets. To further understand what climate action countries are undertaking toward their net-zero targets, 10 semistructured informal interviews with national government representatives from countries of the Carbon Neutrality Coalition and nongovernment experts familiar with the country experiences. These examples are used to demonstrate how countries are implementing their net-zero targets. The collection of examples is not comprehensive, and not all action is required in every country context (indeed, some may be unsuitable in certain circumstances). To this end, the good practices that are provided within the framework compose an illustrative bank of ideas that can be expanded over time.

Selection of case studies

Although some countries may be implementing similar actions, how they are implemented is critically important. Not all actions may be relevant to other countries, and the approach, pace, and scale may differ dramatically between different countries.

A short list of country case studies was developed based on three subjective criteria: the perceived relevance or interest to other countries; the potential to impact major transformational shifts toward net-zero emissions and a just, resilient, and equitable transition; and sufficient availability of information from interviews, avoiding examples that have been overly represented in previous research. The short list of examples that met these criteria was presented to the advisory body, and the final selection was made based on their feedback.

Though there are many good practices that could have been included as case studies, one country example for each of the five enabling action areas is featured in this paper. Together, these cases illustrate different approaches, constraints, and lessons.

ABBREVIATIONS

COP	Conference of the Parties
CO ₂	carbon dioxide
GDP	gross domestic product
GHG	greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
ITUC	International Trade Union Confederation
LT-LEDS	long-term low emission development strategy
NGO	nongovernmental organization
PCC	Presidential Climate Commission
R&D	research and development

ENDNOTES

1. The Carbon Neutrality Coalition first presented a “framework for net zero targets” in November 2022 (Carbon Neutrality Coalition 2022). This paper does not represent the views of the individual country members of the Carbon Neutrality Coalition.
2. The sixth assessment report of the Intergovernmental Panel on Climate Change (IPCC) suggests that limiting warming to 1.5°C depends on CO₂ emissions reaching net zero between 2050 and 2060 (IPCC 2022). Reaching net zero earlier in that range (closer to 2050) avoids a risk of temporarily “overshooting,” or exceeding 1.5°C. Reaching net zero later (nearer to 2060) almost guarantees surpassing 1.5°C for some time before global temperature can be reduced back to safer limits through carbon removal. Importantly, the time frame for reaching net-zero emissions is different for CO₂ alone versus for CO₂ plus other greenhouse gases (GHGs) such as methane, nitrous oxide, and fluorinated gases. For non-CO₂ emissions, the net-zero date is later, in part because models assume that some of these emissions—such as methane from agricultural sources—are more difficult to phase out. However, these potent but short-lived gases will drive temperatures higher in the near term, potentially pushing temperature change past the 1.5°C threshold much earlier (Levin et al. 2023).
3. *Net-zero emissions* refers to the state reached when all GHGs released by human activities are counterbalanced by removing GHGs from the atmosphere in a process known as carbon removal (Levin et al. 2020). In other words, net-zero emissions—or net zero, for short—will be achieved at a global scale when GHG emissions are reduced to as close to zero as possible, and then any remaining or “residual” GHG emissions that have not been reduced are compensated for by equivalent amounts of carbon removal that bring the sum of additions and subtractions to zero.
4. The momentum for setting net-zero targets has been spurred by innovative collaborations such as the Carbon Neutrality Coalition (formed in 2017), the Climate Ambition Alliance (formed in 2019), the UN Secretary-General’s call for a “truly global coalition for carbon neutrality” (Guterres 2020) (beginning in 2020), and the UK Presidency’s core agenda for the 26th Conference of the Parties (COP26)—all underpinned by the landmark 2018 IPCC Special Report detailing the urgency of, and pathways for, limiting warming to 1.5°C (IPCC 2018).
5. Program theory has been extensively explored in evaluation literature (see Bickman 1987; Rogers 2004; Donaldson 2007).
6. These categories are strongly interlinked and are not mutually exclusive. Any specific climate action toward net zero may fall under more than one category.
7. Climate overshoot occurs when the globe temporarily exceeds a warming threshold, such as 1.5°C, before temperatures are reduced back to a safer limit. Exceeding the threshold, even temporarily, results in more severe and often irreversible climate impacts, as well as greater need for carbon removal, than what would be achieved by earlier emissions reductions to avoid overshoot in the first place (IPCC 2022).
8. *Net zero* refers to a balance of GHG emissions by sources and sinks at a particular point in time.
9. Modified from ICAT Transformational Change Methodology (ICAT 2020b) and State of Climate Action 2021 (Boehm et al. 2021); discussed here mainly in the context of GHG mitigation.
10. For example, the Yellow Vest riots in France in 2018, triggered by the rise in the fuel tax, were not protesting climate action but were calling for equitable fiscal policy and a fair climate transition. Climate action that does not ensure benefits for all will face significant difficulty (Bouyé and Dagnet 2018).
11. The concept of a just transition emanates from the labor movement in North America during the late 1970s, where a dual prioritization of the environment and workers emerged as a policy imperative. The narrow focus on the labor market in terms of a “just transition” has since been expanded into a proactive stance that aims to ensure that countries and regions can reduce GHG emissions and address climate change while generating benefits for most citizens. In this context, the initial and strong focus on workers has been broadened to consider impacts on workers, their surrounding communities, and businesses that are directly or indirectly linked to sectors facing impacts.
12. The five enabling action areas are not mutually exclusive. They are reinforcing and deeply interconnected, and thus, some climate action may be relevant to more than one category of action. For instance, embedding net-zero targets in law is mentioned in this paper as an example of a foundational decision because of its early chronological importance in many countries. However, this action could also be conceptualized as a governance action.

13. Familiar approaches include planting trees and increasing carbon storage in soil, which are generally referred to as “nature-based solutions” that leverage and enhance natural carbon sinks. “Technological carbon removal approaches,” or engineered solutions that accelerate natural carbon cycles or directly remove CO₂ from the atmosphere, include direct air capture, mineralization, biomass carbon removal and storage, and a suite of ocean-based carbon removal approaches.
14. Just Energy Transition Partnerships are financing cooperation mechanisms to support a country’s transition away from fossil fuels and to improve energy access.
15. In 2022, the United States passed the Inflation Reduction Act, a significant piece of climate legislation that offers funding, programs, and incentives to accelerate the transition to a clean energy economy.
16. Detailed discussions of stakeholder definitions and types of engagement are available in CIF (2020) and ICAT (2020a).
17. Stakeholder engagement can support a just and equitable transition to net zero by eliciting a diverse set of ideas and information on which to build new actions and policies; pooling resources to reduce the burden on government officials in resource-limited countries; bringing marginalized views to the fore and identifying segments of society that are particularly vulnerable to climate change impacts as well as those most likely to be impacted by the net-zero transitions; providing transparent information and generating buy-in around the far-reaching social and behavioral changes required and fostering a social mandate for net zero; generating public understanding, trust, and buy-in to facilitate widespread, rapid uptake of technological solutions (Demski 2021); and creating a mechanism to hold government accountable for climate pledges.
18. Extensive literature is available providing frameworks and guidance around stakeholder engagement in climate and other contexts; for example, ICAT’s stakeholder participation assessment guide (ICAT 2020a) and the United Nation’s Stakeholder Engagement and the 2030 Agenda (UN DESA and UNITAR 2020). These resources, among others, contain specific advice and methodologies that could be useful for countries moving toward net-zero implementation.
19. A variety of tools can be used to identify and map stakeholders (ICAT 2020a).
20. Carbon pricing (including carbon taxes or emissions trading) is a key instrument that can impact multiple sectors. There are now 70 carbon pricing instruments operational in 47 countries (World Bank 2022). China hosts the world’s largest carbon market by emissions, covering more than 30 percent of China’s total GHG emissions and 2,100 power plants. The European Union’s Emissions Trading System covers the power, industry, and aviation sectors, with proposals to extend it to the transport and buildings sectors as well (World Bank 2022). In implementing carbon pricing programs, governments should consider the potential impacts on poorer households. For example, the Canadian province of British Columbia gives back revenue generated by its carbon tax to those regressively affected by it through income tax cuts and transfers to low-income households (World Bank 2022).
21. For example, see IPCC (2018), Levin et al. (2020), UNEP (2022), and the report by the United Nations High-Level Expert Group on the Net Zero Emissions Commitments of Non-State Entities (Expert Group 2022).
22. Program theory has been extensively explored in evaluation literature. See Bickman 1987; Rogers 2004; Donaldson 2007; among many others.
23. See Elliott 2019; Climate Action Tracker 2021a.

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ABOUT WRI

World Resources Institute is a global research organization that turns big ideas into action at the nexus of environment, economic opportunity, and human well-being.

Our Challenge

Natural resources are at the foundation of economic opportunity and human well-being. But today, we are depleting Earth's resources at rates that are not sustainable, endangering economies and people's lives. People depend on clean water, fertile land, healthy forests, and a stable climate. Livable cities and clean energy are essential for a sustainable planet. We must address these urgent, global challenges this decade.

Our Vision

We envision an equitable and prosperous planet driven by the wise management of natural resources. We aspire to create a world where the actions of government, business, and communities combine to eliminate poverty and sustain the natural environment for all people.

Our Approach

COUNT IT

We start with data. We conduct independent research and draw on the latest technology to develop new insights and recommendations. Our rigorous analysis identifies risks, unveils opportunities, and informs smart strategies. We focus our efforts on influential and emerging economies where the future of sustainability will be determined.

CHANGE IT

We use our research to influence government policies, business strategies, and civil society action. We test projects with communities, companies, and government agencies to build a strong evidence base. Then, we work with partners to deliver change on the ground that alleviates poverty and strengthens society. We hold ourselves accountable to ensure our outcomes will be bold and enduring.

SCALE IT

We don't think small. Once tested, we work with partners to adopt and expand our efforts regionally and globally. We engage with decision-makers to carry out our ideas and elevate our impact. We measure success through government and business actions that improve people's lives and sustain a healthy environment.



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