Net-Zero Advisory Body 3rd Annual Report

Securing Canada's Net-Zero Future in this Critical Decade

December 2025

Prepared by the Net-Zero Advisory Body

Net-Zero Advisory Body

Groupe consultatif pour la carboneutralité

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Public Information Centre
Place Vincent Massey building
351 St-Joseph Boulevard
Gatineau, Quebec K1A 0H3

Toll free: 1 800 668-6767
Email: enviroinfo@ec.gc.ca

Acknowledgments

This report was developed by current and past members of the Net-Zero Advisory Body (NZAB), who collectively reside on the territories of Treaty 2 and Treaty 13, the traditional territories of the Mississaugas of the Credit, the Anishinaabeg, the Cree, the Dakota, the Oji-Cree Nation, the Chippewa, the Haudenosaunee and the Wendat Nations, the homeland of the Métis Nation, the unceded traditional territories of the xʷməθkʷəy̓əm (Musqueam), Sḵwx̱wú7mesh (Squamish), and səlilwətaɬ (Tsleil-Waututh), Passamaquoddy, Wolastoqiyik (Maliseet), and Mi'kmaq nations, and a territory with a long history of meeting and exchange among many nations (Montréal).

Our advice has been strengthened by the contributions of the many individuals and organizations, including Indigenous partners, who generously shared their time and insights. We are deeply grateful to all who supported this work through their knowledge, experience, and collaboration.

Message to the Minister of Environment, Climate Change and Nature

Dear Minister Dabrusin,

We are pleased to submit the third annual report of the Net-Zero Advisory Body, as required under the *Canadian Net-Zero Emissions Accountability Act*.

This is an important moment for Canada. Geopolitical events are threatening our livelihoods and our sovereignty. The present-day economic challenges are also creating pressure to backslide on climate policies.

That pressure is understandable. In moments of stress, it is very human to focus on the short-term and find comfort in the familiar, rather than forge new directions that address long-term needs as well.

As members of the NZAB, our role is to help the federal government keep an eye on that long-term. Through research and engagement, we identify actions that can be taken today to get Canada on a realistic path to our 2030, 2035 and net-zero by 2050 emissions targets.

Our work finds that strong climate policy is crucial to Canada's climate and economic futures. Canada needs to make the upfront investments in policy and infrastructure today that will build the future low-carbon industries of tomorrow and deliver long-term prosperity.

We sincerely hope that our advice, which encourages the federal government to redouble its efforts by consolidating and implementing new policy measures, assists Canada in meeting its emissions targets and building a better, safer, and more prosperous future for Canadians.

*Simon Donner
Co-chair of the Net-Zero Advisory Body

*Simon Donner resigned from the Net-Zero Advisory Body prior to the publication of this report

About the Net-Zero Advisory Body

Launched in February 2021 and formalized under the *Canadian Net-Zero Emissions Accountability Act* (CNZEAA) in June 2021, the NZAB's mandate is to provide independent advice to the Minister of Environment, Climate Change and Nature with respect to achieving net-zero emissions by 2050, including:

- greenhouse gas (GHG) emissions reduction targets for 2030, 2035, 2040, and 2045
- emission reduction plans from the Government of Canada, including measures and sectoral strategies that the government could implement to achieve a GHG emissions target
- any matter referred to it by the Minister

We also have the mandate to conduct engagement activities related to achieving net-zero emissions. Our advice must consider a range of factors, including environmental, economic, social, technological, and the best available scientific information and knowledge respecting climate change, including Indigenous knowledge.

NZAB members

*Catherine Abreu
Director
International Climate Politics Hub

Michael Bernstein
Executive Director
Clean Prosperity

*Simon Donner, Co-Chair
Climate Scientist and Professor
University of British Colombia

Robert Hornung
Independent Consultant

Damon Matthews
Climate Scientist and Professor
Concordia University

Karen Ross
Executive Director
Farmers for Climate Solutions

We thank past members who have departed the NZAB and who have made important contributions to this annual report: Louise Comeau, Shianne McKay, Gaëtan Thomas and our co-chair Sarah Houde.

*Catherine Abreu and Simon Donner resigned prior to the publication of this report.

Overview

This third annual report covers the period since our last annual report, that is, from November 2024 to November 2025. It is divided into three sections.

Section 1 provides our advice to the Minister. This includes advice drawn from research on unlocking investment and reducing GHG emissions, drawn from research on provincial and territorial contributions to emissions reductions that was conducted with the Canadian Climate Institute and modelling from the Navius Institute. Some of this advice was shared with the Minister in a briefing memo earlier this year. The section also contains a summary of earlier advice provided to the Minister of Environment, Climate Change and Nature on net-zero industrial policy, based on interviews with international and national practitioners of industrial policies. We also present our pre-published net-zero energy system vision and new advice on the development and application of such a vision as well as advice on approaches to addressing negative and excess emissions.

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Advice 4: Canada should immediately develop its own institutional ITMOs framework and integrate it into the national climate strategy

Section 2 presents the findings from a research project into how federal entities (federal departments, federal agencies, and Crown corporations) could contribute to Canada's transition to net-zero emissions. The section also contains a summary of the work undertaken to better understand sources of GHG emissions in agriculture, and the social and behavioral challenges associated with adopting climate-friendly practices in the sector.

Section 3 presents a summary of our engagement and collaboration activities since our last What We Heard Report. We share details of 57 activities conducted across 87 different organizations and individuals, encompassing discussions and briefings, roundtables, presentations, conferences, panels and a questionnaire where we sought public feedback. This section also highlights the findings of an engagement project undertaken by our partners at Cambium Indigenous Professional Services (CIPS), who heard about climate change perspectives directly from Indigenous Peoples, organizations, and leaders.

Introduction

Canada is at a crossroads on climate change.

The latest data suggests that Canada's initial progress on reducing GHG emissions has slowed or stopped. Our 2030 and 2035 emission reduction targets are in jeopardy. Failure to meet these interim targets will only increase the cost and difficulty of fulfilling Canada's legal obligation to reach net-zero GHG emissions by 2050. The actions we take in the coming decade will be critical in determining our success in getting to net-zero.

Canadians are concerned about climate change. People across the country are living with its consequences: forest fires, heat waves, floods and other climate events are deeply affecting our lives, livelihoods and communities. Public opinion research shows that most Canadians want the government to improve economic conditions and to take action on climate, together and at the same time.

This should inspire efforts to strengthen climate policy. Instead, the economic challenges facing Canada because of actions taken by the current United States administration have led to pressure to weaken or abandon our existing climate policies.

While there is merit in reviewing Canada's climate change policies and making changes to enhance their efficiency and effectiveness, our research and analysis finds that backsliding on climate policy would jeopardize our climate and economic futures. Rather, Canada must strengthen its climate policies to reduce the impacts of climate change and retain our ability to compete in a global economy that is transitioning to clean energy.

In this challenging time, it is helpful to remember why Canada joined countries around the world in setting a long-term goal of achieving net-zero emissions.

Net-zero emissions, as a concept, is about addressing climate change. It originates from science. The world needs to stop adding GHGs to the atmosphere to stop the planet from warming. The science is abundantly clear on this point.

Net-zero emissions, as a goal, is also about much more. It is about motivating innovation and maintaining long-term economic competitiveness. Despite the recent political changes south of the border, the world is continuing to take action on climate change. Almost 140 countries, representing three-quarters of global emissions, along with hundreds of cities and companies are still committed to some form of reaching net-zero.

As low- and zero- carbon technologies become increasingly cost competitive and widespread, Canada cannot afford to be left behind. There are significant opportunities to grow and build a modern and competitive economy and energy system while also pursuing our emission reduction goals. Having ambitious targets and supportive policies that enable increasing investment in these technologies is critical to Canada's future economic prosperity.

To be successful, Canada needs long-term goals and clear pathways to those goals. Building cleantech industries, expanding and decarbonizing our electricity system, changing how we transport people and goods, and modifying how we heat and cool our homes and buildings are all multi-decade processes that we need to initiate now. Incremental changes to our current systems will simply not deliver the necessary, system-level transformations in how we generate and use energy.

We need to make choices today that are compatible with the long-term pathways to net-zero, and avoid actions that will lock us into systems or technologies that will eventually be replaced at great cost to taxpayers and communities. Canada's renewed focus on nation-building infrastructure projects provides an important opportunity to pursue these objectives, provided that the decision-making process keeps an eye on the long-term. In addition to top-down selection of major projects which are compatible with a low-carbon future, we need to start from the bottom-up, with an industrial policy that grows Canadian businesses that can compete in a decarbonizing world.

We must start today, to capitalize on opportunities in the growing clean energy economy, and to help avoid the most catastrophic costly impacts of climate change. As we describe in our second annual report, climate change is a cumulative problem. The longer we delay action, the worse the impacts become, and the harder the transition is on communities. While Canadians are increasingly aware of the increased flooding, wildfires, and extreme weather events already put in motion by climate change, things will be much, much worse in a world that fails to meet net-zero emissions.

A long-term focus is also critical at this moment given the economic and geopolitical disruptions brought about by the current United States Administration. While it is tempting in times of stress to revert back to what we've done in the past, to positions and actions that provide a sense of comfort and safety, that could leave us on a dead-end path in a decarbonizing world. This is a moment to invest in the future, to move climate and energy policy forward, not backward, to meet the challenges of today and tomorrow.

Section 1 - Our Advice

In this section, we first provide advice drawn from research on federal and provincial contributions to mitigation, some of which was shared in an earlier briefing note, as well as a summary of advice on net-zero industrial policy that was pre-published in March. We also provide new advice based on our research and development of a net-zero energy systems vision, as well as advice related to Canada's use of carbon dioxide removal and internationally transferred mitigation outcomes.

Unlocking Investment and Reducing GHG Emissions

In our work on closing the gap to 2030, we had advised five sets of actions. First, we urged the Government to finalize and implement policies that had already been announced or partially developed including the clean economy investment tax credits, the oil and gas sector emissions cap or other policies applied to the oil and gas sector, Clean Electricity Regulations, the Green Buildings strategy, landfill methane regulations, medium- and heavy-duty zero emission vehicle sales mandate and vehicle GHG emissions. Second, we advised the Government to address the negative interactions between some federal climate policies and the industrial carbon pricing system to achieve additional emission reductions from oil and gas, electricity, and heavy industry. Third, we recommended steps to strengthen the industrial carbon pricing system including tightening performance benchmarks. We also advised that the Government secure additional emissions reductions from the oil and gas sector via strengthening either the announced oil and gas emissions cap or the industrial carbon pricing system performance standards in all sectors combined with an expanded carbon contract for differences program. In addition to those measures, we recommended adoption of a small set of new and additional actions, such as strengthening the oil and gas methane regulations and phasing down sale of new and replacement fossil fuel heating and cooling devices, to address the remaining gap to the 2030 target.

As with our previous advice on closing the gap to 2030, we think that the federal government cannot achieve its climate change goals alone. The provinces and territories have a critical role to play. Climate policy in Canada is a shared effort and policies from all levels of governments contribute to emissions reduction, but may also overlap in unintended ways. Assessing areas of potential overlap can identify opportunities to increase policy efficiency and cost effectiveness and also ensure that federal actions recognize and respect regional differences, a foundational value of the NZAB.

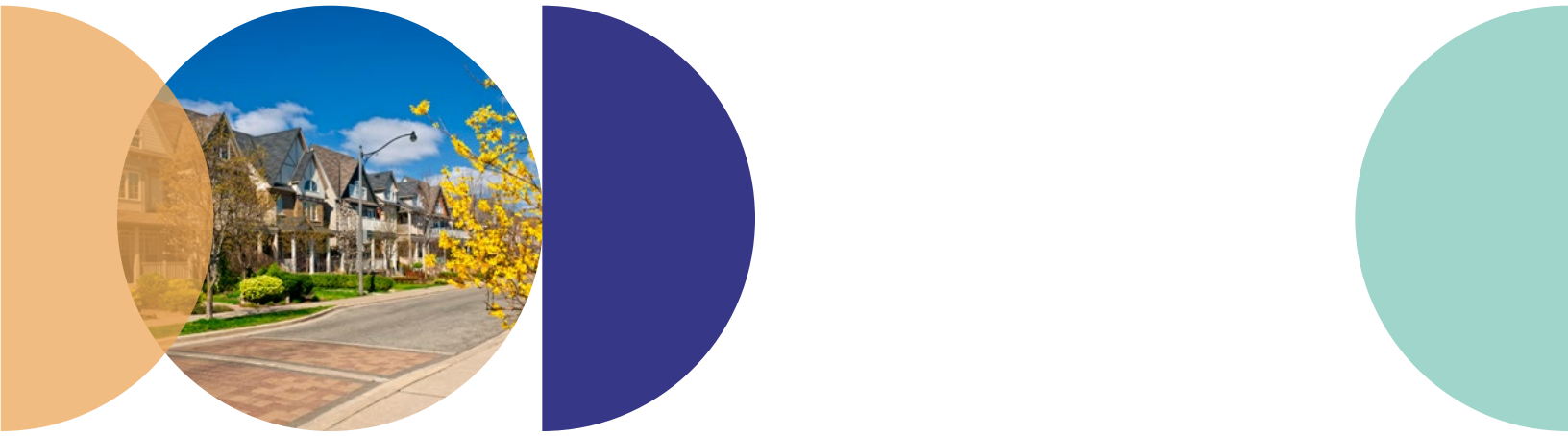
In July 2025, we met with the Minister to discuss advice that drew upon our research and analysis of provincial and territorial contributions to emission reductions. This new advice built on work that was done on closing the gap to the 2030 emissions target and published in December 2024 as part of the NZAB's second annual report. It was supported by new modelling and analysis undertaken by the Canadian Climate Institute and Navius over the last year. The analysis by the Canadian Climate Institute concludes that Canada's biggest emissions cuts come from shared policies of both the federal and provincial governments that combine policies tailored to unique provincial contexts with minimum national standards.

This year's new analysis of provincial and territorial contributions to emissions reductions took into account policies in place as of April 2025 and did not include the consumers carbon tax or the oil and gas emissions cap (as it had not been finalized). The modelling projected that legislated policies are insufficient to meet Canada's 2030 and 2035 targets. It did not reflect changes that happened after this date, such as the Government announcement on September 5th to remove the 2026 target and launch of a 60-day review of the Electric Vehicle Availability Standard. Since this analysis was conducted, provincial governments have also announced important changes such as the removal of the consumer carbon tax in British Columbia and enhanced flexibility for the industrial carbon pricing system in Alberta. All those changes will make it even more difficult to achieve the 2030 and 2035 emissions targets, and to shift Canada onto a long-term net-zero pathway.

In our advice to the Minister based on this research, we provided four recommendations to unlock investment while keeping our climate objectives in reach. We reaffirmed our previous recommendation to strengthen the industrial carbon pricing system and suggested this be done by increasing its overall stringency as well as extending coverage to smaller emitters. We also suggested reviewing and adjusting existing climate policies to maximize emissions outcomes and reduce regulatory overlap and costs.

Recognizing the critical importance of measures shared between federal and provincial governments, we suggested increased cooperation and using and enhancing equivalency agreements to secure emissions outcomes, increase transparency and improve monitoring. Finally, we advised that the Government expedite methane regulations and programs to reduce emissions from building heating and cooling, actions which can achieve near-term emissions reductions at low cost while also providing economic opportunities (see Annex 1 for details).

Canada will not meet its emissions targets without strengthening its climate policies. Our analysis finds that reviewing and enhancing the efficiency and effectiveness of the climate policy suite is essential to closing the gap to our emissions targets, and to supporting long-term economic prosperity. Adjusting the policy suite, while following the NZAB's values and principles like respecting regional differences, is key to responding to the evolving international policy landscape. Removing or weakening climate policies without a negotiated plan among federal and provincial governments to strengthen other measures will undermine clean growth by raising investor uncertainty about Canada's climate commitments. We are confident that the recommended actions will contribute to emissions reductions and a cleaner environment while stimulating the economy over the long-term.



Advice on Unlocking Investment and Reducing GHG Emissions

Advice 1

Strengthen the industrial carbon pricing system

The modelled policy scenarios highlight the importance of a significantly strengthened industrial carbon pricing system to reduce emissions and unlock investment. Under federal law, provinces and territories can choose to apply their own systems for pricing large emitters or adopt a federal backstop. There are currently nine different industrial pricing systems across the country often referred to as large emitter trading systems, including eight output-based pricing systems and one cap-and-trade system (Quebec).

In our second annual report, our advice highlighted the need to strengthen industrial carbon pricing systems and avoid an oversupply of cheap credits that weaken the price signal sent to industrial emitters by tightening performance standards, offering a broad-based carbon contracts for difference program to provide price certainty, and reducing regulatory overlap.

We once again recommend increasing the stringency of the industrial carbon pricing system by increasing benchmarks in the output-based pricing systems to bind the price, removing large emitters from the *Clean Fuel Regulations* to prevent stacking of large-emitter and clean-fuel-regulation credits, and increasing coverage to capture smaller emitters (generating more than 10 kilotonnes (kt) CO_2e/year). These changes need to be embedded in equivalency agreements if provinces wish to implement their own regulations or approaches to meeting federal objectives. They must reflect a strengthened federal backstop to deliver the promised emissions reduction and stimulate investment.

Our analysis also makes it clear that simply connecting and allowing credit trading among Canada's federal and provincial pricing systems will not alone address the oversupply of cheap credits.

Advice 2

Adjust existing policies to maximize emissions outcomes

Adjusting policies to reduce unproductive regulatory overlap is a quick and low-cost way to cut emissions. It is faster, cheaper and more effective to adjust existing policies than to remove and/or replace those policies. Our second annual report highlighted the importance of reducing negative interactions between the federal policies and the industrial carbon pricing systems to deliver more emissions reductions.

The new analysis for this report points to the value of fine-tuning the federal climate policy suited based on a comprehensive evaluation of policy interactions. We recommend reducing overlap, for example, between the *Clean Fuel Regulations*, the *Clean Electricity Regulations*, and the Electricity Vehicle Availability Standard to increase regulatory efficiency at low cost. Solutions include reintroducing the Standard and:

- removing electric charger installations from creating *Clean Fuel Regulations* credits well before the current plan of 2035
- removing passenger vehicles to shift the *Clean Fuel Regulations* to heavy-duty vehicles, and/or
- removing large emitters from the *Clean Fuel Regulations*

Advice 3

Use equivalency agreements to secure emissions outcomes, increase transparency and improve monitoring

Equivalency agreements allow provinces to use their own unique approaches to meet or exceed minimum standards established by the federal government. As the main driver of emissions reductions, policies under equivalency agreements such as industrial carbon pricing and methane regulations (see Advice 4) remain crucial going forward. We advise continuing to use those equivalency agreements, while also providing better transparency and monitoring around them, which can increase accountability.

Equivalency agreements driven by federal policy (such as large emitter pricing) will, if sufficiently stringent, deliver the majority of provincial and territorial GHG emissions reductions by 2030 and 2035.

Advice 4

Expedite methane regulations and programs targeted at buildings

There is an opportunity to address methane emissions as a cost-effective tool to achieve emissions reductions. Policies for both oil and gas and landfills are already underway and can be accelerated. The building sector also presents important opportunities for emission reductions. Adoption of British Columbia's Zero Carbon Step Code for buildings by all provinces would enable significant reductions in the long term. Moreover, providing increased incentives for low-income household adoption of heat pumps would also be a very effective measure.

We recommend finalizing and implementing methane regulations for both oil and gas (75% reduction from 2012 levels by 2030) and landfills (50% reduction from 2019 levels by 2030) to deliver low-cost short-term reductions. These targets can also be strengthened. In our second annual report, we reported that the 75% reduction target for oil and gas is a floor, not a ceiling, for what's possible. Given that significant methane emissions reductions from the oil and gas sector are achievable and affordable, we advised the federal government to strengthen this target to an 80% reduction.

We also recommend accelerating heat pump incentives for low-income households and encourage other provinces to adopt British Columbia's Zero Carbon Step Code for buildings to realize GHG emissions reductions by 2035 and beyond. These actions will stimulate investment and, given the lifetime of buildings, deliver emission reduction benefits for years to come.

Advice 5

Finish implementation of the 2030 Emissions Reduction Plan

The four sets of actions recommended above are an extension of last year's advice. According to the modelling, these actions would at most get Canada to a 28% reduction in emissions below 2005 levels by 2030, and a 31% reduction by 2035, still well short of the targets[1]. To go further, we continue to advise the Government to pursue the other actions recommended in last year's annual report to close the gap to the 2030 emissions target. This includes implementing announced but not finalized policies as well as policies paused since last year's report like the Electric Vehicle Availability Standard. In addition, it is critical to secure emissions reductions from the oil and gas sector either by using the announced oil and gas emissions cap or supporting a strengthened and tightened industrial pricing system with an expanded carbon contract for differences program.

These measures will stimulate cost-effective emissions reductions and investment as well as help to ensure that Canada does not stray too far from a credible pathway to net-zero emissions by 2050.

1. If estimated emissions reductions from LULUCF accounting, nature-based climate solutions, and agricultural soils based on the 2024 Biennial Transparency Report are included, the maximum reductions reach 33% by 2030 and 37% by 2035.

Net-Zero Industrial Policy

In March 2025, we responded to the former Minister's request to provide advice on net-zero industrial policy in our report Collaborate to succeed: The Government of Canada's role in growing domestic clean technology champions. Our hope is that our advice within this report sparks active discussions between government and stakeholders to design and implement a modern net-zero industrial policy that grows cohorts of successful homegrown businesses that can compete internationally and prepare Canada for a net-zero future.

We based our advice on international best practices, conducted 47 interviews and reviewed the literature to identify common views on net-zero industrial policy in the Canadian context. In fall 2024, we solicited additional feedback via a stakeholder questionnaire and heard from industry experts, academics, labour representatives and non-governmental organizations.

We recommend that the federal government adopt a more strategic approach to net-zero industrial policy that is developed and implemented in collaboration with the private sector, key stakeholders and Indigenous Peoples. It must be complemented by efforts to build a supportive culture and increased technical capacity within government over time. The four key components of a successful industrial policy are: prioritizing sectors, convening stakeholders, setting technology-specific goals, and aligning various policies, programs and funds in support of those goals.

Canada must act decisively, as simply adding more federal policies or programs that are not integrated into a broader strategic approach will not suffice. Government culture and capacity must be modernized simultaneously across aspects of industrial policy, supported by continuous coordination between the public and private sectors. Joint learning, experimentation, and capacity-building will be essential throughout both the development and implementation of new industrial policy.
A modern net-zero industrial policy can position Canada to grow cohorts of successful homegrown businesses that can compete internationally and prepare the country for a net-zero future.

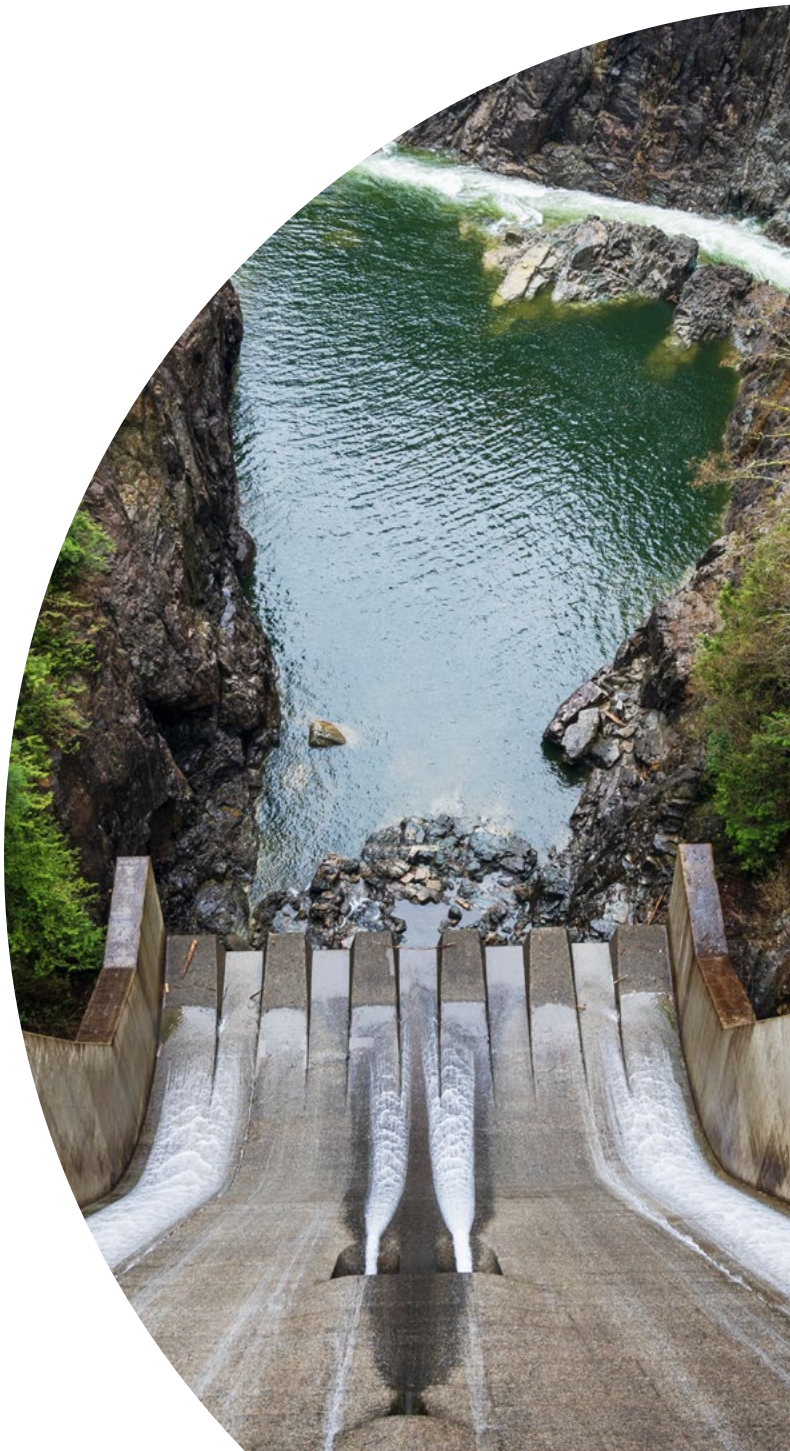
Advice on net-zero industrial policy

Prioritize sectors

Advice 1

Start with a few priority sectors for net-zero industrial policy

To avoid spreading resources too thin, we recommend that the Government concentrate on a few priority sectors with high growth potential which together will benefit all regions of the country. The selection of sectors should align with the government's vision, considering national security, economic development potential, energy security, and net-zero goals.
The NZAB has proposed specific sectors in our first annual report; electric vehicles, hydrogen, biofuels and synthetic fuels, and value-added forestry.
The 2024 Cabinet Directive on Regulatory and Permitting Efficiency for Clean Growth Projects identified 6 key sectors: 1) greening manufacturing, industry and hard-to-abate sectors; 2) critical minerals; 3) power/electricity; 4) nuclear; 5) enabling infrastructure; and 6) clean fuels.



Convene stakeholders

Advice 2

Create formal, technology-specific forums for private-public co-design and implementation of industrial policy roadmaps

By combining the strengths of the public and private sectors in research, development, and road mapping, governments can overcome common coordination problems. They can use funding for research and development, as well as access to laboratory expertise, to work with industry partners. This partnership helps build strong regional value chains and clusters. Collaborative spaces for designing, implementing, and monitoring industrial policy are also crucial.

Technology forums must be ongoing and sustainable, guiding all parts of the process from defining objectives to identifying, implementing, monitoring and modifying actions. The effectiveness of net-zero industrial policy initiatives will be enhanced through private-public co-design and implementation of industrial policy roadmaps that are developed with key stakeholders and supported by the Government.

Advice 3

Advance inclusive growth through Indigenous partnerships

It is crucial to integrate industrial policy planning with other important and long-standing Indigenous priorities such as clean drinking water, poverty, healthcare, the infrastructure gap, and recognition of Indigenous rights. Ensuring access to capital is crucial, such as via the National Indigenous Loan Guarantee Program, but increasing support for capacity-building, training, and mentorship programs is also essential to developing Indigenous-owned ventures over the long-term. Deepening collaboration with First Nations, Métis, and Inuit partners can also be achieved through co-developing roadmaps and incentives for Indigenous clean energy projects in Canada.

Advice 4

Consolidate and deepen in-house, technology-specific policy capacity across the federal government

The Government needs better internal coordination to build technology-specific policy capacity. It can tap into private sector and academic expertise by expanding the roles of independent advisory councils, upskilling its current workforce to develop technology-specific policy experts, and/or enhancing Canada's national research labs.

Set net-zero competitiveness goals for priority sectors

Advice 5

Set a few, technology-specific, measurable goals that focus on innovation, are developed with key stakeholders and are supported by the whole government

These goals offer a clear, strategic focus for public and private sector initiatives. They help coordinate efforts and build capacity for better performance. Technological sovereignty should also be the underlying goal of net-zero industrial policy, growing domestic production, creating employment, and exporting high-value-added innovative technologies. For example, Japan has an objective of 600 Gigawatt hours or 20% of the global battery market by 2030. Germany also aims for 1 million public vehicle charging points by the same year.

Align policies, programs, and funds

Advice 6

Align research, development and deployment funding to scale Canadian firms

To help Canadian firms scale, the federal government should align funding for research, development and deployment across different programs. This alignment would enable Canadian firms to develop net-zero technologies into first-of-a-kind, large-scale demonstrations, with the goal of scaling into world-leading exporters. Smaller research and development funding programs like those from the National Research Council and Natural Resources Canada, need to align with larger programs that support cleantech deployment, such as the Strategic Innovation Fund and the Canada Growth Fund.

Advice 7

Improve clarity on roles across the federal government by having central agencies select a few priorities and assign responsibility

Central agencies must clarify the roles of federal entities in technology development and deployment. Canada could, for example, set up technology-specific working groups that could align high-level strategies with regional needs and provincial policies. This approach could maximize regional investment impacts and support Canadian firms' technological leadership.

Advice 8

Strategically coordinate use of existing demand-side policy instruments beyond carbon pricing

Demand-side policies like procurement, regional hubs and regulations are crucial for creating markets and can provide early revenue and reference customers for Canadian firms. Domestically, setting life cycle assessment thresholds, local content requirements, or bonus multipliers could create a market for Canadian firms. Internationally, Canada could benefit from cooperating with likeminded, high-ambition countries by, for instance, setting strict life cycle assessment standards for net-zero products. There's also a need to align federal policy with that of provincial and territorial governments.

Net-Zero Energy Systems Vision

Transforming Canada's energy systems to support achieving net-zero emissions is an incredible opportunity to deliver tangible benefits for all people living in Canada. In our first annual report, we emphasized the need for the Government of Canada to develop a net-zero energy vision. Following this, we conducted engagement with diverse stakeholders, where we heard that such a vision is essential to building "buy-in" to Canada's net-zero journey and driving the demand and investment required for the transition to a net-zero future.

In March 2025 we released the NZAB's vision for Canada's future net-zero energy system that shows how a transition to net-zero emissions provides an opportunity to pursue multiple objectives that would benefit Canadians beyond GHG emissions reduction. The vision describes seven potential goals Canada should pursue as part of this transition, how the transition can help Canada achieve these goals, and the benefits that Canadians would experience. It also emphasizes that the shift to a net-zero energy system must be inclusive, collaborative, and centered on people.

The NZAB hopes that this document can serve as a starting point for the development of a more comprehensive net-zero energy vision to guide future policies, actions, and investments. For Canada to succeed in transitioning to a net-zero pathway and achieving other vital goals, like delivering more reliable and affordable energy and advancing reconciliation with and self-determination for Indigenous Peoples, the full diversity of Canadians need to see themselves reflected in the energy vision.

Advice on Net-Zero Energy Systems

Advice 1

The Government should engage in a collaborative process with key stakeholders and Indigenous Peoples to develop a net-zero energy systems vision for Canada that builds from the NZAB's document and seeks to identify the goals Canada should pursue to maximize the benefits of the transformation to net-zero for all Canadians.

This long-term vision must be developed collaboratively with a broad range of stakeholders and rights holders, and must recognize and respect regional differences. The vision developed by the NZAB—with its seven goals of healthier people, land and waters; more reliable, resilient and secure energy; improved energy affordability; new economic opportunities and jobs reconciliation with and self-determination for Indigenous Peoples; inclusive and collaborative planning; and increased energy independence for individuals and businesses—can serve as a launching point for this conversation.

Advice 2

The Government should work with key stakeholders and Indigenous Peoples to promote and disseminate the vision once developed.

A net-zero energy systems vision is of no value if it simply sits on a shelf. It is critical that the government work with all supporters of the vision to promote and disseminate its message that achieving net-zero GHG emissions by 2050 is about more than emissions reduction – it is also an opportunity to pursue multiple objectives that will improve the lives of Canadians. A broad communications campaign that would see a diverse group of stakeholders and rightsholders deliver consistent messaging across a variety of communications channels can inform and build support among Canadians for the transition to net-zero.

Advice 3

The Government should direct that all federal agencies and departments articulate their respective roles in advancing the net-zero energy systems vision.

Integrating the energy systems vision into federal planning and reporting processes will help align federal action and accountability with the long-term goals being pursued through the transformation to a net-zero energy system. The vision is necessary to guide Government actions, policies and investments, including in relation to major projects and priority sectors for industrial policy.

Developing a Carbon Budget for Canada and Addressing Excess Emissions

In our second annual report, we recommended that Canada adopt a target of a 50-55% reduction below 2005 levels by the year 2035 to keep Canada on a pathway to net-zero emissions. We stressed that while Canada must focus primarily on reducing or eliminating emissions, achieving interim emissions reduction targets may require additional actions such as carbon dioxide removal from the atmosphere and internationally financed emissions reductions. Achieving net-zero emissions in the long-term and limiting any overshoot of global temperature limits is also expected to require some amount of carbon dioxide removal.

We also recommended that the federal government adopt a carbon budget approach and address Canada's emissions in excess of its fair share of the global budget. Carbon budgets specify the cumulative amount of GHG emissions permitted over a period of time to limit a specific temperature increase, while excess emissions can be understood as cumulative emissions in excess of Canada's fair share of the global carbon budget that are not avoided via direct emissions reductions, carbon dioxide removal or emissions trading. We noted that the options to address excess emissions fall broadly into 3 categories: 1) reaching net negative emissions, that is, removing more GHGs from the atmosphere than are emitted by human activity via enhancing the ability of natural ecosystems to absorb GHGs or using carbon dioxide removal technologies; 2) supporting mitigation in other countries, via a Paris Agreement mechanism known as internationally transferred mitigation outcomes; and 3) providing international climate finance. While some of these 3 options could be used to achieve Canada's legislated emissions targets, they also can be used to address excess emissions. They cannot, however, be double-counted. For an action to be counted against excess emissions, it cannot also be used as part of the calculation of Canada's national emissions inventory or cumulative emissions.

Encouraged by the former Minister of Environment's response to our second annual report, in which he expressed interest in the results of our work on excess and negative emissions, we have assessed options to address excess emissions. We conducted literature reviews on the three categories listed above, and analyzed responses to a questionnaire sent to stakeholders in November 2024. Section 3 of this report summarizes the questionnaire results, which finds overall support for the carbon budget approach and provides useful insights into stakeholder perceptions of excess emissions. We also relied on an assessment framework developed with the Canadian Climate Institute to assess different carbon dioxide removal options, and a Canadian Climate Institute analysis of the internationally transferred mitigation outcome policy landscape.

1 - Removing GHGs from the atmosphere

According to the Intergovernmental Panel on Climate Change, carbon dioxide removal refers to techniques and technologies and approaches that remove carbon dioxide (CO_2) from the atmosphere and store it for long periods in geological, terrestrial or oceanic reservoirs[2]. This is an effective way to offset residual emissions in sectors where it is difficult to reduce them, such as agriculture, aviation and cement production, and is the only way to achieve net-negative emissions after reaching net-zero targets. It is also the only way to deal directly with historical emissions that have accumulated in the atmosphere over decades of industrial activity.

It is important to distinguish carbon dioxide removal from carbon capture utilization and storage (CCUS): CCUS is not a form of carbon dioxide removal, as it is aimed at preventing carbon dioxide from being emitted to the atmosphere, rather than removing carbon dioxide already present in the atmosphere.

The Intergovernmental Panel on Climate Change reports show that achieving the Paris Agreement goal of limiting global temperature rise to 1.5°C at the end of the century will require achieving net-zero by mid-century, followed by net-negative emissions thereafter. Achieving net-negative emissions will require methods to remove carbon dioxide from the atmosphere at a rate that is faster than needed to address any remaining hard-to-abate emissions.

These methods are evolving, and can be roughly divided into two broad and in some cases overlapping categories:

- Conventional methods, which includes existing and evolving methods like afforestation/ reforestation, biochar, wetland restoration and soil carbon sequestration. These methods capture CO_2 via natural processes that can be enhanced by appropriate technological or other human intervention.
- Novel methods, which includes a range of technologies still under development, such as bioenergy with carbon capture and storage, direct air capture, enhanced rock weathering, and ocean alkalinity enhancement.

According to the State of Carbon Dioxide Removal report, conventional methods currently remove around 2 billion tonnes of CO_2 a year globally (which is equivalent to about a third of net CO_2 emissions from global land-use activities), representing 99.9% of total carbon dioxide removal, while other methods account for less than 0.1%[3]. Though upscaling of carbon dioxide removal is necessary to achieve net-zero emissions, the Intergovernmental Panel on Climate Change cautions against overreliance on carbon dioxide removal due to concerns about the feasibility and sustainability as well as associated social and environmental risks.

2. Intergovernmental Panel on Climate Change. 2022. Climate Change 2022: Mitigation of Climate Change – Working Group III Contribution to the Sixth Assessment Report.
3. Smith et al. 2024. The State of Carbon Dioxide Removal 2024 - 2nd Edition.

Risks, challenges and opportunities

All methods for removing carbon dioxide from the atmosphere have limitations and risks. Conventional methods are less expensive and more widely affordable. However, they are considered temporary due to their limited capacity for long-term CO_2 storage and are also limited by land availability. Conversely, technological methods have the potential to store CO_2 for at least several centuries but are currently costly and immature. In addition, both methods are subject to the risk of reversibility, as natural reservoirs (terrestrial, oceanic, geological) can release CO_2 over time. However, the risk of reversibility is higher with conventional methods such as afforestation, which are sensitive to natural disturbances (for example, fires, storms, pests) and changes in land use by landowners.

The feasibility and scale-up potential of several carbon dioxide removal technologies also remain uncertain as they can have social or environmental consequences: marginalization of Indigenous communities, threats to food security, loss of biodiversity and pressure on water resources. Some technologies, such as direct air capture and bioenergy with carbon capture and storage, are particularly energy- and water-intensive. The deployment of carbon dioxide removal methods therefore involves trade-offs, and the best option is to implement a diversified portfolio of carbon dioxide removal solutions to address uncertainty, maximize the chances of meeting climate targets, and generate co-benefits for people and ecosystems (see Intergovernmental Panel on Climate Change (2022) on co-benefits).

Finally, there is a risk of moral hazard, which arises when policymakers and industries limit efforts to reduce GHG emissions based on the expectation they can rely on the future deployment of carbon dioxide removal technologies. Such an attitude would jeopardize climate goals if carbon dioxide removal methods did not deliver the expected results.

Framework for evaluating technology options

The choice of carbon dioxide removal methods, and the scale and timing of their deployment, will depend on how risks are managed, but also on other factors. The NZAB worked with the Canadian Climate Institute to create a framework for assessing carbon dioxide removal methods for Canada across several criteria: associated benefits, costs, removal potential, feasibility, risk of reversibility (duration timeframe), and environmental and social impacts. The framework was then applied by the Canadian Climate Institute to nine carbon dioxide removal methods: biochar, grassland restoration, improved forest management practices, enhanced rock weathering on agricultural soils, enhanced rock weathering (no soil enhancement), bioenergy with carbon capture and storage, direct air carbon and storage, ocean alkalinity enhancement (electrochemical) and ocean alkalinity enhancement (materials-based).

The framework clearly outlines the trade-offs associated with each of these technologies and confirms that using a portfolio of technologies is likely the best approach to their implementation in Canada. Conventional nature-based methods like grasslands restoration and improved forest management practices are low cost and bring high environmental and community co-benefits, but are less durable and have lower maximum removal potential. More novel nature-based methods like biochar can bring benefits to soil quality and agricultural communities, but have tradeoffs in terms of cost and maximum removal potential.

In terms of technological methods, direct air capture and bioenergy with carbon capture and storage are more technologically mature than enhanced ocean alkalinity and rock weathering technologies. However, the cost associated with direct air capture poses a major challenge in terms of feasibility, especially relative to the lower costs of emissions mitigation. Deployment of this technology at scale will depend primarily on the political choice to provide the financial resources, and hence will require consultation on the allocation of those resources. The significant land requirements for bioenergy with carbon capture and storage deployment create direct competition with farmers for land and water resources, as well as potential land conflicts with conservation, restoration or other nature-based land management initiatives. Additionally, some provinces are better suited than others for the deployment of certain technologies. Ocean technologies are only suitable in the Maritime provinces and British Columbia, while a wider range of technologies are suitable in the Prairie and central Canadian provinces.

Given that carbon dioxide removal will have an impact on the traditional lands of Indigenous Peoples, they must be consulted and collaborated with in relation to any policy decisions. Consultation must correctly honour Indigenous Peoples as rights holders, not merely stakeholders, to ensure free, prior and informed consent to prevent actions intended to respond to climate change from perpetuating the disproportionate environmental harm experienced by Indigenous Peoples. Policies and programs designed collaboratively with Indigenous Peoples, for example with respect to nature-based solutions, could provide co-benefits in terms of environmental protection and support and enhance economic opportunities (see Advice 3 of Industrial Policy section). Across diverse regions and ecosystems, Indigenous Peoples play a key role of stewardship and conservation of the lands and waters. Partnerships like the Indigenous-led agreement in the Northwest Territories can help to protect nature. Manitoba Path's to Net-Zero: Guided by the spirit of the Manoomin[4] is also based on strong partnerships with Indigenous Peoples aiming to identify nature-based solutions and increase resilience.

Advances in research and ongoing technological progress mean that the carbon dioxide removal method assessment framework must be used as an evolving tool. The values used to assess some assessment criteria may change. For example, social acceptance is a variable that may evolve over time, in parallel with technological progress. Similarly, advances in public policy may have an impact on some assessment criteria. For example, greater government investment in research may reduce the costs of negative emission technologies.

4. In the plan, the leader of the path to net-zero is the Anishinaabe teaching of manoominikenzhii, the spirit of the wild rice.

Advice on carbon dioxide removal

Advice 1

Emissions reductions should be the top priority of federal climate mitigation policy

Over the long-term, carbon dioxide removal programs, policies and investments should be considered only as a strategy to either i) offset residual emissions from hard-to-abate sectors or activities, such as agriculture, aviation and cement production, or ii) achieve net-negative emissions after 2050 which could then address excess emissions beyond Canada's fair share of the global carbon budget. These are mutually exclusive options: a given quantity of carbon removal cannot be claimed as both an offset for residual emissions in Canada's National Inventory Report and as a contribution to addressing Canada's excess emissions.

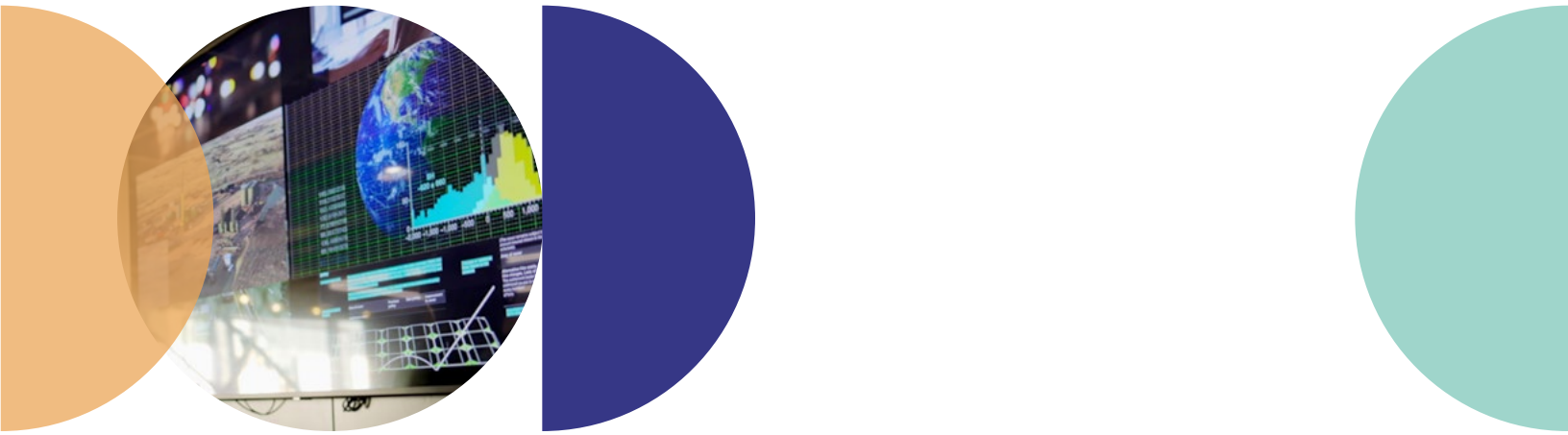
It is important to reduce direct domestic emissions as much as possible to transition Canada's economy and realize the co-benefits of mitigation action. Without aggressive emissions reductions, net-zero will be much more expensive and difficult to achieve regardless of the success of carbon dioxide removal efforts. After net-zero is achieved, additional carbon dioxide removal will be needed to achieve net-negative emissions, which would contribute to addressing Canada's excess emissions and limiting global temperature overshoot. Aggressive direct emissions reductions and development of Canada's approach to carbon dioxide removal should be pursued simultaneously. Without improvements in cost and other capacity constraints, deployment of carbon dioxide removal will continue to be limited.

Advice 2

Establish a working group to develop a national carbon dioxide removal strategy

Carbon dioxide removal policies, programs and investments must balance the need to scale deployment in order to achieve Canada's legislated emissions targets and address excess emissions, with the risk of potential negative trade-offs or disincentivizing emissions reductions efforts. Consultation with experts across academia, civil society, government and industry, as well as with Indigenous Peoples is crucial. To this end, we recommend the government establish or identify a group to develop a national strategy that balances the opportunities and risks of different approaches and reflects the values, rights and interests of people across the country.

The national strategy, first and foremost, should develop clear national definitions and guidelines on what activities are classified as carbon dioxide removal. Other elements of the strategy may include establishing a comprehensive certification system for projects (for example, for sale of credits on carbon markets), limits or targets for use in achieving legislated emissions targets and in addressing excess emissions, methods for supporting Indigenous partnerships, investment tax credits and/or targeted industrial policy. It should incorporate consideration beyond direct emissions reductions, like co-benefits, equity considerations, risks of negative impacts and other criteria identified in our assessment framework.



2 - Supporting mitigation in other countries, via a Paris Agreement mechanism known as Internationally Transferred Mitigation Outcomes

The use of Internationally Transferred Mitigation Outcomes allows international cooperation to achieve climate objectives by transferring units representing emissions reductions or removals under Article 6 of the Paris Agreement. Countries have recently agreed on partial rules and can use Article 6 through bilateral cooperative approaches (Article 6.2) and a centralized mechanism under the United Nations Framework Convention on Climate Change secretariat (Article 6.4). Overall, Internationally Transferred Mitigation Outcomes can help to reduce the cost of mitigation by enabling the transfer of international credits for mitigation activities that provide other co-benefits.

As with carbon dioxide removal, domestic reductions should remain the priority and this advice is aimed at the limited but still valuable role for internationally transferred mitigation outcomes in meeting Canada's emissions targets, with addressing excess emissions as a future consideration.

Through its partnership with NZAB, the Canadian Climate Institute prepared a report on the potential role of Article 6 and ITMOs in Canada. The report found that Canada could benefit from ITMOs in the current context of high mitigation costs and ambitious emission reduction targets. In their modeling, Navius and the CCI showed that Canada could reduce its mitigation costs per tonne by 20 to 70 percent by using ITMOs to achieve its 2035 target. This opens up opportunities for strategic bilateral agreements with other countries, particularly in the Global South, that would allow Canada to increase its clean technology exports and support its energy sector. The report argues that, to be effective, ITMOs must be implemented within a transparent framework that ensures the integrity of carbon credits and addresses potential double-counting issues. While the guidelines published by the UNFCCC secretariat address these concerns, each country should establish its own framework for participation. Japan has developed a joint credit mechanism that Canada can draw on for guidance.

Advice on Internationally Transferred Mitigation Outcomes

Advice 1

High integrity internationally transferred mitigation outcomes (ITMOs) can offer a credible, cost-effective way to supplement domestic climate policy and support sustainable development in the Global South.

ITMOs can play an important though limited role in helping Canada meet its post-2030 emissions targets or address excess emissions while also supporting other nations in meeting their sustainable development goals. With the implementation of Article 6, countries are moving quickly to identify and develop opportunities for transfer of mitigation outcomes which qualify under the international rules. Canada must act to establish investment opportunities and establish itself as a leader in international mitigation finance.

Advice 2

Overreliance on ITMOs reduces the co-benefits of domestic mitigation actions, and risks slowing the pace of clean economic growth.

ITMOs should only play a limited role in helping Canada achieve its legislated emissions targets. As with carbon dioxide removal, there is a moral hazard risk to an overreliance on ITMOs, in that it could lead governments and industry to limit domestic emissions reduction efforts, and reduce the associated economic, environmental and health co-benefits. The government needs to place clear guardrails on the use of ITMOs to achieve Canada's emission targets.

Advice 3

Focus on realistic projects and initiatives that serve as a platform for trade, cooperation and development of clean energy and net-zero technologies which will help Canada and the world transition to net-zero pathways.

ITMOs have the potential to be a tool for achieving emissions reductions and shifting the world to a net-zero pathway as well as an opportunity to build cleantech capacity in Canada and abroad, develop international relationships and help other nations meet sustainable development goals. The government should prioritize projects that meet the criteria of reducing emissions, supporting partner nations' development priorities, developing and transferring Canadian technology, and helping shift both nations toward a net-zero pathway.

Proposals to receive emissions credits for exporting LNG to jurisdictions reliant on higher-emitting forms of energy do not meet these criteria. Crucially, such deals are unlikely to be eligible under Article 6 for ITMOs because there is no evidence that LNG exports drive the reduction of emissions abroad.

Advice 4

Canada should immediately develop its own institutional ITMOs framework and integrate it into the national climate strategy.

A federal strategy and framework is critical to developing international partners, setting standards, managing project approvals and coordinating with other levels of government. Rather than develop new programs from scratch, this framework can be efficient by working with existing government systems, like Export Development Canada, the Canada Growth Fund, and the Clean Growth Hub. This will help launch initial pilot projects drawing from existing international relationships which can further build institutional capacity and demonstrate Canada's interest in international cooperation on climate action.

There are advantages to Canada acting quickly to develop an ITMOs strategy. Other nations are taking action in response to the passage of Article 6. If Canada is slow to act, it may miss opportunities to build partnerships and develop high-integrity projects.

3 – Providing international climate finance

International climate finance is another mechanism to help respond to Canada's cumulative emissions over time exceeding a fair share of the global carbon budget. While climate finance cannot directly counter the climate effect of Canada's excess emissions, it is often presented as a way for industrialized countries to take responsibility for their disproportionate role in climate change. International climate finance poses specific challenges in assessing the size of finance mobilized and its contribution to effective mitigation. This is partially due to the wide range of activities under climate finance (adaptation, mitigation, loss and damage, etc.) as well as the difficulty in attributing mitigation outcomes to specific financial commitments. Climate finance can also be an important enabler of environmental and economic policies and can overlap with Internationally Transferred Mitigation Outcomes or carbon dioxide removal activities.

While reviewing literature, we found that countries use different approaches to assess their fair share portion of the remaining global carbon budget and their contributions to international climate finance. Most countries, including Canada, however, do not explicitly quantify how their climate finance international efforts contribute to achieving a fair share of global efforts or their domestic target. For example, Environment and Climate Change Canada reports that Canada's international climate finance has reduced or avoided 234 Mt of GHG emissions and increased climate resilience for 10.5 million people cumulatively over time but there is no assessment of whether this contribution is sufficient given Canada's contribution to global emissions or share of the global carbon budget to date.

More research and information are needed to provide advice on how climate finance can deliver specific objectives to help close the gap with the remaining global carbon budget and address the impacts of climate change. There are many advantages of more broadly using climate finance and an opportunity to better communicate these efforts and benefits for Canadians. As recommended in last year's annual report, adopting a carbon budget and tracking excess emissions would provide an opportunity to bring a missing clarity to the relationship between Canada's domestic and international efforts to address climate change. Quantification of excess emissions could, for example, help inform the scale of international climate action financed by Canada.

Section 2 – Our observations

In addition to developing the advice presented in the previous section, we have also been working to advance our thinking on other topics. This section summarizes the outcomes of two research projects completed this year on the role of federal entities and on agriculture. We describe how work in these areas can help support the net-zero transition and offer suggestions for future research.

Federal entities

In our first annual report, we advised the Government to direct all federal agencies, departments and Crown corporations to publicly articulate their role in helping Canada achieve net-zero emissions, and empower them to play a more ambitious role by formalizing net-zero objectives in their corporate mandates, changing mandates if required, ensuring all executive compensation is meaningfully and transparently linked to climate mitigation performance, and applying common reporting standards.

Building on that commitment, we are now pleased to share the findings from a research project commissioned to deepen our understanding of how federal entities could contribute to Canada's transition to a net-zero emissions pathway. We categorized the Canadian federal public sector into 3 types of entities: federal departments, federal agencies, and Crown corporations, each with varying governance structures and objectives. Federal departments develop policies and deliver services; federal agencies deliver specific programs and enforce regulations, reporting to a minister but with some statutory independence; and Crown corporations provide commercial or public services of national interest at arm's length from government, while still following broad policy direction from ministers.

We engaged PricewaterhouseCoopers LLP to conduct interviews and a roundtable discussion with a representative subset of 28 federal departments, agencies, and Crown corporations, and to assess the findings. This work provided a valuable insight into the progress, opportunities and challenges faced by federal entities in aligning with net-zero objectives and highlights potential areas of focus for strengthening net-zero governance across the Government of Canada. The NZAB is not providing formal advice based on this research project, but we do provide the recommendations from the project report in Annex 3.

What we learned

The project identified three top priority areas to guide net-zero efforts for federal entities:

Consistent Mandates

Many federal entities indicated support for net-zero in principle but that they lack detailed, tailored guidance on how to act. We learned that they find their climate responsibilities to often be vague or not prioritized amid other pressing mandates like housing or affordability. Sudden policy changes and unclear expectations may also hinder progress. To improve this, the project report recommends clearer and more specific mandates that reflect each entity's unique role and impact (see Annex 3).

Operational Formalization

We learned that while some federal entities have launched individual climate projects, few have fully integrated climate goals into their core governance and operations. The findings highlight that differences between federal entities in terms of guidance availability and reporting capacity underscore the need for more consistent support and clearer expectations across the federal government. The differences also demonstrate that some entity types have structural designs that may strengthen their climate goals (Crown corporations use the global Task Force on Climate-related Financial Disclosures (TCFD) framework because it applies to corporations and financial institutions, whereas federal departments and agencies do not). Furthermore, some participants from Crown corporations highlighted that there may be a need to update from the use of the TCFD framework in favour of the newer, enhanced International Financial Reporting Standards Climate-Related Disclosures (IFRS S2).

Participants shared that discussions about net-zero often happen only when required for reporting and not as part of regular decision-making. They emphasized the need for clearer scoping of responsibilities, especially how mandates apply to direct (Scope 1 and 2) versus indirect (Scope 3) emissions, and the integration of policy and programming impacts.

There are significant challenges associated with measuring and reporting Scope 3 emissions across federal entities due to limited access to high-quality Scope 3 data and a lack of consistent tools or methodologies to estimate and track these emissions. While the TCFD framework encourages reporting of Scope 3 emissions, Scope 3 emissions are not necessarily part of Canada's National Greenhouse Gas Inventory, as they can include emissions that occur outside of Canada, creating confusion for federal entities. Federal departments and agencies unable to follow the TCFD framework (for example, TCFD versus International Financial Reporting Standards – Sustainability Disclosure Standard 2) thus lack guidance on which global reporting framework to follow.

The Task Force on Climate-related Financial Disclosures was created by the Financial Stability Board in 2015 as a framework for corporations and financial institutions to report on climate-related governance, strategy, risk management and metrics/targets. The Government of Canada announced that Crown corporations would be required to begin TCFD-aligned climate disclosures in Budget 2021. Federal departments and agencies are not corporations or financial institutions, and instead rely on various Departmental Plans, Departmental Results Reports, and the Greening Government Strategy for climate-related reporting.

Capacity and Capabilities

We learned that there is a wide gap in climate knowledge and skills across federal entities. Some entities are doing well thanks to strong internal champions, but many lack the training and expertise needed to drive net-zero efforts effectively. Participants underscored gaps in senior leadership expertise, advocated for more tailored and role-specific training, and highlighted the importance of leveraging and expanding existing training tools.

It was interesting to note that while the federal entities project and the NZAB's research project on net-zero industrial policy were conducted independently, both identified a gap in specific net-zero expertise across the federal government. Within net-zero industrial policy, the capacity gap is perceived as a barrier to effective interplay with the private sector as comparable expertise would enable a more seamless exchange and implementation of net-zero solutions. The federal entities project revealed a broader view, framing the capacity gap as a systemic issue tied to hiring and professional development in climate expertise. Together, the findings point to the benefits of rebuilding and modernizing internal public service capabilities to best support Canada's net-zero ambitions. This also reinforces our industrial policy advice shared in Advice #8, which emphasized the need for strategic coordination of procurement and other demand-side policy strategies. Strengthening internal public service capacity and clarifying mandates around net-zero objectives would enable federal entities to more effectively operationalize these tools.

In conclusion, federal entities are engaged and want to lead on climate, but uneven mandates, informal processes, and limited internal expertise are holding them back. By focusing on the three priorities of clear mandates, stronger operations, and better skills, Canada's public sector can take a more coordinated and capable approach to reaching net-zero.

Agriculture

In early 2024, the NZAB commissioned research to begin exploring GHG emissions in agriculture, focusing on technical, social, and financial challenges and opportunities to reducing emissions in this sector. This foundational sectoral research was designed to inform the NZAB because the emissions modelling methods typically used in net-zero research lack sufficient detail on this critical Canadian sector. Without a more comprehensive representation of the emissions profile of agriculture, and the climate solutions within, the NZAB's advice for Canada's full net-zero potential has been limited.

We engaged Dr. David Burton, the director of Dalhousie University's Centre for Sustainable Soil Management, for his research and expertise. Dr. Burton produced two internal reports: "Understanding the Opportunity to Reduce Greenhouse Gas Emissions from Agriculture" and "Social Acceptance of Climate Action in Agriculture". The NZAB will use these reports as a foundation for initial engagement with the sector, and in time, to advance targeted advice for the government.

The first report outlines key emission sources, data uncertainties, potential mitigation strategies like improved nitrogen management and practices that improve soil carbon sequestration, policy gaps and areas for further research. The report highlights that many strategies that reduce emissions also offer a breadth of co-benefits like improved soil health, improved climate adaptation, water management and quality, and biodiversity. These additional benefits are important to farmers and ranchers, and strengthen the positive outcomes in the sector. The report also summarizes existing government programs and identifies their limitations, including associate risks, gaps in coverage, and the durability of emission reductions.

The second report highlights the social barriers to achieving emissions reduction in Canadian agriculture. It emphasizes the importance of public perception, farmer attitudes, regional divides, and economics. While many Canadians would be willing to choose more sustainable food products, they know little of how farming works to inform their consumer decisions. From the agriculture perspective, most farmers and ranchers are proud stewards of the land, but they can lack knowledge about emission reduction potential in their operations or are skeptical about the challenges and opportunities. Ultimately, emission reduction in agriculture can come with upfront costs and risks that are hard to manage and prioritize amid multiple and complex business decisions.

Regional sensitivities and differences currently complicate the implementation of national policies in the sector. Policy challenges also include inconsistent messaging about interventions, policy rationales that don't resonate within the sector, and a lack of trust in government. Policy interventions could have a greater and longer-lasting impact by emphasizing how emissions reduction programs can bring opportunities to enhance economic viability and resilience of Canadian farms and ranches, as well as deliver additional co-benefits to farmers and ranchers. This approach would be more effective than focusing solely on the broader societal imperative to address climate change.

Taken together, these reports suggest several areas for further research and consideration, including:

- methods to improve on-farm data collection for more accurate emissions tracking
- strategies to build long-term political commitment to emissions reduction in agriculture
- targeted financial support to help scale adoption of on-farm innovations that reduce emissions
- research on how to balance the goals of agricultural growth and emission reduction in policy design
- strategies to increase public awareness and support for lower emission agriculture
- approaches to engage farmers with tailored strategies to address regional differences and skepticism using trusted agents within the farming community
- integrating co-benefits into policy and communication, prioritizing these over emissions reduction

The research we commissioned underscores that while technical solutions to reduce GHG emissions are possible, their success hinges on broader systemic support. This includes more and improved data, measurement and reporting; supportive policy; and better communications. The NZAB hopes to use this research in the future as the foundation for broader sector consultation and careful consideration of targeted policy advice, within our broader mandate of Canada's pursuit of net-zero emissions by 2050.

Section 3 – Engagement and collaboration

Engagement activities

The effects of climate change are increasingly touching many aspects of everyday life across Canada, from displacement due to natural disasters, to increased food insecurity, to more frequent and extreme heat and weather. The ways in which climate change is experienced across Canada are as diverse as the people and communities that make up this country. The NZAB is mandated to conduct engagement activities related to achieving net-zero emissions. By engaging with stakeholders, partners, and people across Canada, we can better develop robust advice to the Minister of Environment, Climate Change and Nature on pathways to net-zero that encompass a broad spectrum of considerations important to those living in Canada.

Since our What We Heard Report, which covered engagement in 2022 and 2023, we have continued to engage, listen and learn from diverse perspectives across Canada. We have done so through for a such as roundtables, workshops, conferences, questionnaire submissions and discussions. Our in-person engagements have included co-hosting a conference in Ottawa with the Canadian Climate Institute, an in-person Engagement Day in Ottawa, and attending COP29, where the NZAB delegates hosted a panel on carbon budgets. In fall 2024, the NZAB invited experts, partners and stakeholders to respond to a questionnaire to gather diverse perspectives on advancing Canada's net-zero future.

2024-2025 Engagement by the Numbers

- 58 engagement activities
- 87 unique proponents engaged

How has the NZAB engaged?

Type of Engagement	Description
Discussions and briefings	• Hosted and/or attended dedicated discussions and briefings • Bilateral meetings with experts, officials, and decision-makers
Roundtables	• Hosted a roundtable with representatives of 28 federal entities (federal departments, federal agencies and Crown corporations) to hear and discuss perspectives on net-zero governance at the federal level
Presentations	• Delivered presentations at conferences and stakeholder meetings • Heard from partner organizations on the outcomes of research and engagement projects supported by the NZAB and Environment and Climate Change Canada • Hosted an in-person event to introduce the 2024 advice to the Minister
Conferences	• Co-hosted The Net-Zero Edge: Navigating the New Realities for Canadian Competitiveness conference with the Canadian Climate Institute • Met with delegates at the Assembly of First Nation's 2024 Climate Gathering • Attended COP29 as members of the Canadian delegation
Panels	• Hosted a COP29 panel discussion on carbon budgets at the Canadian Pavilion • Participated in panel discussions to share our advice and perspectives on pathways to net-zero
Questionnaire	• Shared a questionnaire with over 500 proponents seeking perspectives on three lines of inquiry

What we heard

Federal entities

For our federal entities research project, we engaged PricewaterhouseCoopers LLP to conduct interviews and host a roundtable with 18 federal departments, federal agencies and Crown corporations to explore how Canada could contribute to net-zero emissions. The roundtable brought together 46 representatives from 23 federal departments, agencies and Crown corporations to discuss the priorities identified during the interviews. Participants emphasized the need for clearer scoping guidance on net-zero governance (particularly regarding direct and indirect operations and scope 3 challenges), as well as a call for more consistent reporting standards or frameworks that could be applied across federal entities where possible. They also highlighted the importance of addressing workforce and leadership capacity gaps to strengthen net-zero governance.

Questionnaire

We developed a questionnaire for experts across the country, comprising nine questions divided into three themes: 1) carbon budget and excess emissions; 2) provincial and territorial contributions to emissions reductions; and 3) a net-zero energy vision. We received 39 submissions from academia, civil society, industry and think tanks. Those submissions provided important insights and helped to shape documents such as the net-zero energy vision. Respondents also highlighted the importance of Indigenous partnerships to enhance energy projects legitimacy and success, as well as to advance equity and reconciliation goals.

Questionnaire: Carbon budgets

We asked participants if they thought that Canada should implement a carbon budget and how it should be done. See Annex 4 for a summary of comments received.

Overall, respondents agreed that carbon budgets provide a framework for implementing principles such as equity and justice in the definition of domestic emission reduction trajectories. They recognized that Canada would exceed its fair share of the world's remaining carbon budget to avoid the Paris temperature limits and that it is vital to address emissions in excess of that budget. They also emphasized the importance of a flexible and transparent approach to carbon budgeting that involves all stakeholders, given that developing a budgeting approach that reflects equity and fairness can be complex. Some of the respondents highlighted the challenges of implementing a carbon budget and the unclear consequences of exceeding an allocated budget. For example, it was noted that collaboration between federal, provincial, and territorial governments could be affected by the difficulty of reaching consensus on implementation of carbon budgets. Respondents also noted the risk that carbon budgets could be perceived as an additional (rather than complementary) requirement, methodology, or set of targets. As a result, the development of a federal carbon budget framework would require collaboration and consultation to minimize criticism or confusion, which would be counterproductive to the objective of a budget framework.

Questionnaire: Excess emissions

On the question of how excess emissions can help Canada meet its climate obligations, responses demonstrated that the concept of excess emissions was understood in different ways. Some respondents highlighted the importance of international credibility and equitable contributions and emphasized the need for the right tools to track progress and ensure long-term objectives. Other respondents highlighted the importance of mobilizing international climate finance as a key element of global action. Among those who discussed technological and nature-based solutions, there were notable differences of opinion, and many noted the risks of reversals, where sequestered carbon dioxide can be re-emitted to the atmosphere, and the risks to biodiversity from carbon removal efforts.

Respondents were asked to assess a list of criteria that would be most appropriate for evaluating options to address excess emissions. Among these, durability, environmental and biophysical impacts, socioeconomic impacts, and compatibility with net-zero were most frequently identified as key criteria to guide the selection of carbon removal technologies for implementation in Canada.

We also asked what policies Canada should adopt to promote carbon dioxide removal, including whether a target should be adopted. Policy measures to encourage the promotion of carbon dioxide removal were proposed along five categories: set a separate carbon dioxide removal target, support nature-based solutions, incentivize innovation, create a robust framework, and leverage carbon markets. Some of the policies proposed include the creation of youth climate corps, the harmonization of carbon markets or the creation of distributed energy frameworks (see Annex 4 for details). These results were considered in developing our advice on negative and excess emissions.

While many policy measures were suggested, some respondents suggested caution around setting a target for carbon dioxide removal. They argued that currently the cost per ton of CO_2 removal is much higher than most mitigation options, making carbon dioxide removal unviable in the short term. Some also feared that adopting a carbon dioxide removal target would only increase the oil and gas industry's dependence on public funds for the development and implementation of carbon dioxide removal technologies. Finally, the risk of excessive dependence on technological methods of carbon dioxide removal (for example, direct air capture) was also highlighted as something not to be overlooked.

Finally, we asked, considering the risks and benefits of different options, what should be the priority to address excess emissions from among restoring ecosystems to enhance natural carbon sinks, carbon dioxide removal, internationally transferred mitigation outcomes and international climate finance. The rankings favored ecosystem restoration, followed by carbon dioxide removal, international climate finance and internationally transferred mitigation outcomes.

Questionnaire: Energy vision

The questionnaire also asked about the benefits of a net-zero energy system future for Canadians, beyond reducing GHG emissions. We also asked about suggestions for key elements of a vision of a net-zero energy system, or any other advice on how the vision should be developed and shared.

Submissions emphasized non-GHG co-benefits and diverse regional solutions. Respondents also highlighted that capacity building and communication efforts will be crucial to develop the vision. Results were used to help shape our Net-Zero Energy System Vision.

Questionnaire: Provincial and territorial contributions to emissions reductions

We asked participants what the federal government can learn from innovative provincial and territorial policies or policymaking processes as well as successful examples of Indigenous climate governance for energy systems or climate plans. Submissions highlighted the importance of integrated resource planning and collaboration on training, nurturing spaces for innovation with initiatives such as performance-based carbon offset protocols, distributed energy resources, reporting on net-zero progress, and supporting municipal implementation, for which some participants cited Edmonton's carbon budget as an example. Respondents also highlighted the importance of regionally tailored approaches such as energy innovation funding promoting regional economic development, differentiated carbon pricing systems and low-carbon building standards, and the importance of scaling policies that work (such as Indigenous-led renewable energy projects), as well as social and equity considerations, and policy co-design and implementation with Indigenous Peoples and stakeholders.

The second question focused on policy gaps that are within federal jurisdiction and considering current provincial and territorial climate policies where the federal government could undertake additional action. Three themes emerged from the submissions; to harmonize and coordinate action, to enhance funding and to create new initiatives. Specific suggestions include: focusing on a smaller number of major and pilot projects, sectors or technologies and establishing sectoral strategies under guidance of multistakeholder tables; expanding federal incentives and programs for renewable energy, integrated community energy plans, electrification of buildings, infrastructure retrofits, transportation, heavy industry, sustainable jobs training and economic diversification; and tightening existing regulations, codes and standards.

Indigenous engagement

First Nations, Métis, and Inuit are important leaders on climate action, and part of our mandate is to consider Indigenous knowledge alongside the best scientific knowledge available as we develop advice for the Minister of Environment, Climate Change and Nature. A realistic pathway to net-zero for Canada is one that centers the rights, priorities and knowledge of Indigenous Peoples. In our 2022-2023 What We Heard Report, we concluded that the NZAB needs to strengthen its relationships with First Nations, Inuit and Métis to best provide advice to the Minister that is grounded in and reflective of Indigenous perspectives and priorities. We have much to learn, for example, from Indigenous rights holders and organizations advocating a vision of climate action that addresses deep structural inequities and advances self-determination alongside emissions reductions.

Since 2022, the NZAB partnered with Cambium Indigenous Professional Services (CIPS), an Indigenous-owned and operated organization with deep engagement expertise, to develop and implement an Indigenous Engagement Strategy. This approach of working with an organization outside of government was crucial for the NZAB members, given the diversity of Indigenous perspectives across the country, and the challenging relationship between the federal government and Indigenous peoples. In the past year, CIPS' engagement project included interviews with Elders, leaders, youth, and academics, along with participation in conferences, national gatherings, and community-based events. Together, these varied engagement activities have allowed for direct dialogue and listening to diverse Indigenous perspectives on climate change impacts and net-zero emissions. CIPS has shared their project report with the NZAB so that we may better understand Indigenous considerations as we continue to develop advice for the Minister.

Drawing on the engagement strategy developed by CIPS, the NZAB's Indigenous Engagement Strategy upholds the NZAB's 10 values and principles and serves as the blueprint for the NZAB in undertaking meaningful and sustained engagement with Indigenous Peoples. This includes building trusted relationships with Indigenous partners and developing advice to the Minister that reflects Indigenous engagement and multiple ways of knowing. We have heard the importance of early, thorough and ongoing relationships with First Nations, Métis and Inuit as being essential for the NZAB to develop advice in which Indigenous Peoples can see themselves. Informed by the expertise shared with us from CIPS, the NZAB will aim to continue building respectful and collaborative relationships with Indigenous partners to ensure that our advice always considers a diversity of Indigenous perspectives.

What We Heard: Key themes and insights from Indigenous Peoples

Education and capacity: Many stressed the importance of youth-focused education, skills development, and support for community energy champions.

Equity and affordability: High energy and fuel costs, reliance on diesel, and the impacts of melting permafrost were raised as significant challenges, with calls for fair pricing, subsidies, and access to renewable technologies.

Land and Culture: Traditional Indigenous knowledge and land-based practices were clearly identified as integral and inseparable from climate solutions.

Indigenous sovereignty and participation: Many emphasized Indigenous ownership of projects, recognition of the United Nations Declaration on the Rights of Indigenous Peoples and building capacity to ensure meaningful involvement.

Partnerships and opportunity: A consistent message was that fair access to procurement and employment should complement strong economic partnerships where Indigenous Nations are decision-makers, hold equity stakes, and benefit from sustained opportunities.

We are grateful to the First Nations, Métis, and Inuit individuals, communities and organizations that have taken the time to share their perspectives with us.

We deeply thank Cambium Indigenous Professional Services for their partnership and wisdom that was essential to the development of the NZAB's Indigenous Engagement Strategy and in building Indigenous engagement knowledge amongst our members. We are also thankful to CIPS for sharing the Indigenous perspectives heard from their project's work. These insights provide a strong basis for reflection, while also underscoring the depth of knowledge and strength of Indigenous Peoples. Above all, we recognize there is still much to learn from First Nations, Métis, and Inuit voices in shaping Canada's net-zero future.

Youth and net-zero research projects

In 2022, the NZAB was consulted to identify net-zero research projects for Environment and Climate Change Canada funding that are catalyzing net-zero research, analysis, and knowledge mobilization by Canadian think tanks, academic institutions, and other research groups. 16 research projects were selected and most are now concluded. In addition, 6 net-zero engagement youth-led projects seeking to build awareness, dialogue and capacity among Canadian youth were selected, all of which were concluded in March 2025.

We had the opportunity to hear directly from some project leaders about their results, with a strong emphasis on knowledge mobilization and communication throughout.

For example, we learned that the University of Calgary's Canadian Climate Policy Partnership (C2P2) mobilized partners from 17 universities across Canada to better monitor the progress of key policies across the federal and provincial governments and to develop a database of policies across the federal government that can be used for different types of analysis including modelling.

Québec Net Positif presented its project on small and medium enterprises (SMEs) in transition. The project recruited more than 500 participants with the goal of reinforcing the capacity of Quebec manufacturing SMEs to develop positive climate actions such as reducing emissions and create a favorable business ecosystem to accelerate the transition to net-zero.

Efficiency Canada and Carleton University presented on how energy efficiency policy can contribute to net-zero emissions. The project focuses on utilities, demand-side measures, innovation in new housing construction, energy affordability and workforce development.

Finally, we also heard from Net-Zero Atlantic about its project on integrating behavioural science into climate mitigation strategies. They presented some of their research findings on human capital strategies, policies to reduce transportation emissions and barriers to adoption of pro-climate practices in the Atlantic provinces

While we are unable to reflect every comment shared with us back in detail in the advice, we are grateful for the time, energy and effort of everyone who has shared their ideas with us and hope that we have faithfully summarized the key themes raised during our engagements. We look forward to continuing to work with and hear from stakeholders, partners and interested parties to inform our advice on Canada's pathways to net-zero.

Conclusion

This has been a challenging year for Canada. As the country navigates near-term geopolitical and economic stressors, there are calls to push aside longer-term priorities like addressing climate change and preparing for a low-carbon future.

The CNZEAA was designed for these moments of stress. Governments face pressure to respond to current events with actions that will have a visible short-term impact, even more so during times of economic uncertainty. Legislation like the CNZEAA reminds us to look up from the wheel and pay attention to the road ahead.

The interim emissions targets are crucial signposts along the pathway to net-zero. They should serve as motivation to make the upfront investments in policy and infrastructure that will reduce emissions and build low-carbon industries, as well as serve as checks on our progress.

It is important to ensure that the actions we take in response to short-term challenges do not push us further from a net-zero pathway. Losing our net-zero focus will not only have repercussions for a changing climate and its impact on Canadians, it will also make it harder for Canada to compete and prosper in the economy of tomorrow.

This has also been a challenging year for the NZAB. As a result of the government transition, our resources for conducting research and meeting our legislated obligations under the CNZEAA have been more limited than in the past. This has led the members of the NZAB to reflect on the need for, and value of, independent, objective advice to government. Unlike many of the voices that seek to influence the federal government, the NZAB has no vested interests in the outcome, other than to help the government achieve the objectives of the legislation. The NZAB therefore plays a key role as an independent and non-partisan source of advice and expertise.

We hope this report can contribute to advancing Canada's climate policies as we chart our path to net-zero. At this moment of geopolitical and economic uncertainty, it is important to reaffirm our choices of solutions that work both for the environment and the economy. We hope to continue the conversation on how Canada can contribute to a net-zero world.

Glossary[5]

Carbon budgets specify the cumulative amount of GHG emissions permitted over a period of time to limit a specific temperature increase. Carbon budgets differ from point-in-time targets in that emissions not only have to fall to a certain level by a particular year, but the overall emissions allowed in a given period are also limited.

Carbon contracts for difference provide a guaranteed minimum price for carbon credits sold by a company on the carbon market. When the market price is lower than this minimum, the entity offering the contract compensates the company for the difference, reducing its investment risk. Conversely, if the market price exceeds the guaranteed minimum, the company reimburses the difference to the entity offering the contract, enabling both parties to share in the profits.

Bio-energy with carbon capture and storage (BECCS) Carbon capture and storage (CCS) technology applied to a bioenergy facility. Depending on the total emissions of the BECCS supply chain, carbon dioxide can be removed from the atmosphere.

Carbon Dioxide Removal methods refer to processes that remove CO_2 from the atmosphere by either increasing biological sinks of CO_2 or using chemical processes to directly remove and bind CO_2.

Direct air carbon dioxide capture and storage (DACCS) or direct air capture (DAC) is a Chemical process by which CO_2 is captured directly from the ambient air, with subsequent storage.

Carbon capture and storage (CCS) refers to the capture of emission from a power plant or other point source of emissions, with storage in geological reservoirs. This can decrease emissions, but is not a carbon removal technology unless applied to biomass energy (BECCS).

Carbon capture, utilization and storage (CCUS) refers to a suite of technologies in addition to CCS whereby captured carbon is used to produce other products or fuels. These technologies can also reduce emissions, depending on the utilization pathway, but do not produce carbon removal.

Emissions gap is the disparity between an emissions reduction target by a certain deadline and the estimated emission reductions that are achievable within the same timeframe.

Excess emissions are the net emissions produced in excess of Canada's fair share of the global carbon budget. They can be estimated as the difference between a fairness-based carbon budget and a target-based carbon budget or actual emissions trajectory.

Internationally Transferred Mitigation Outcomes (ITMOs) are the result of different types of activities, defined as real, verified, and additional, representing emissions reductions or removals, and including mitigation co-benefits resulting from adaptation actions and/or economic diversification plans or the means to achieve them.

Investment tax credits incentivize private sector investment in specific sectors by offering tax breaks, in terms of less delayed payments, on a portion of investments.

5. Terms are adapted from Intergovernmental Panel on Climate Change, the United Nations, and other sources.

Negative emissions are the removal of GHGs from the atmosphere by deliberate human activities, which is in addition to the removal that would occur via natural carbon cycle processes. Also known as Carbon Dioxide Removal.

Net-negative emissions refer to a future state where levels of carbon dioxide removal are larger than any remaining residual emissions, leading to net emissions falling below net-zero.

Net-zero emissions refer to a future state where either GHG emissions have been completely eliminated, or remaining residual emissions are balanced by an equivalent amount of carbon dioxide removal, leading to zero net addition of GHGs to the atmosphere from human activities.

Oil and gas sector emissions cap focuses on reducing emissions by setting a maximum allowable emission limit on the oil and gas operations.

Output-based pricing system establishes emissions limits for regulated facilities based on their emissions-intensity performance standards. Facilities emitting below their limit earn credits they can sell or save. Those exceeding their limit must compensate for excess emissions. This system ensures all industrial emissions are incentivized under the carbon price, while limiting costs to maintain competitiveness and prevent carbon leakage.

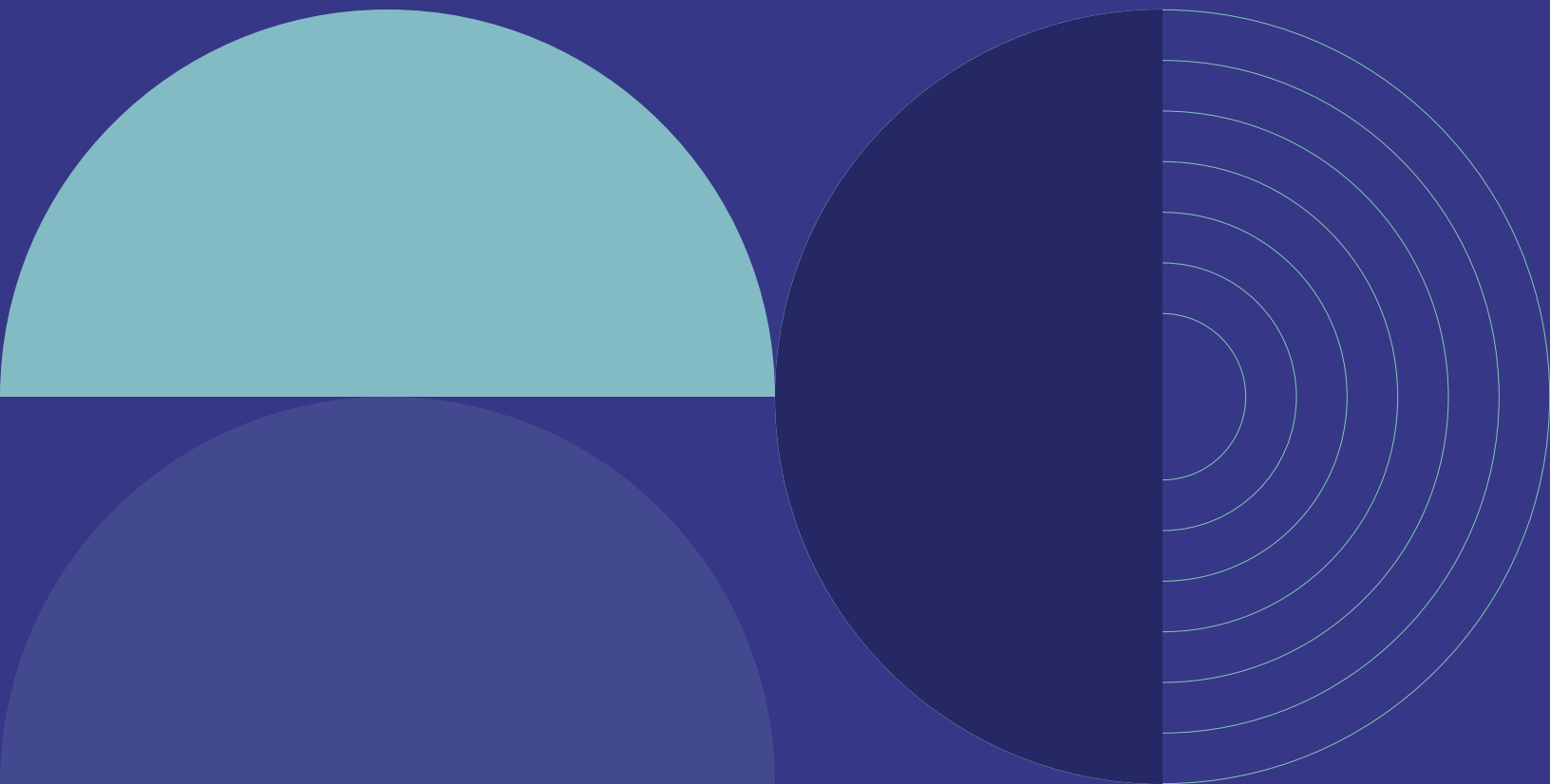
Reversal risk is the risk that sequestered carbon dioxide can be re-emitted to the atmosphere.

Zero-emission vehicles are vehicles that have the potential to produce no tailpipe emissions such as battery-electric (BEV), plug-in hybrids electric (PHEV) and hydrogen fuel cell (FCV) powered vehicles. They may still have a conventional internal combustion engine but must be able to operate without using it. Emissions may still be generated during the life cycle of the vehicle, for example during production of the vehicle and their components.

Zero-emission vehicle sales mandate is a regulatory policy that mandates automakers and importers to sell a certain percentage of vehicles with zero emissions within a specified timeframe.

Annex 1

Analysis of Provincial and Territorial Contributions to Emissions Reductions



Analysis of Provincial and Territorial Contributions to Emissions Reductions

To understand the interplay between federal and provincial policies, in collaboration with Canadian Climate Institute, we first looked at analysis of historical trends from 2005 to 2022. This highlighted an overall domestic GHG emissions decrease of 8%. We also looked at analysis looking at how the three parameters of economic activity, energy efficiency and carbon content of energy sources could each explain the variation in Canada's GHG emissions over time.

In our collaboration, the Canadian Climate Institute completed an analysis by province that reveals important regional disparities in GHG emissions. Emissions declined in most provinces but rose in Manitoba, British Columbia, and especially Alberta, which experienced a general increase in oil and gas activity, particularly with the development of the oil sands. The main factors explaining the overall decline in emissions in Canada are the decarbonization of electricity, and in particular the coal phase-out in Ontario and Alberta as well as the increased use of clean technologies. Energy efficiency improvements in the building and transportation sectors have also been instrumental in reducing overall emissions, despite strong population growth.

Nearly 350 policies have been implemented by federal and provincial governments, some of which overlap or touch similar areas. In collaboration with Canadian Climate Institute and Navius technology-rich computable general equilibrium model called gTech, we projected the future of these different policies on emissions and their interactions. Here are some of the key insights on the effectiveness of policies:

Harmonized federal-provincial policies, that is, policies under equivalency frameworks such as industrial carbon pricing, deliver the largest emission reductions to 2030 and 2035. However, provincial and federal policies are also important contributors to reductions. In Alberta and Saskatchewan especially, harmonized policies targeting industrial GHGs achieve the most reductions and show less overlap than in other provinces.

Provincial and harmonized policies contribute between 70% to 75% of 2030 reductions and 71% to 77% of 2035 reductions. Of these GHG reductions, provincial policies are responsible for 6% to 27% of the reductions planned for 2030 and 8% to 22% of the reductions planned for 2035, mainly in the transportation and electricity sectors.

Provincial policies implemented by Quebec, Ontario, and British Columbia in the transportation and electricity sectors have contributed significantly to emissions reductions. They include zero-emission vehicle requirements in Quebec, biofuel regulations, and investments in nuclear plant refurbishment in Ontario. Modelling also shows that policies in the building sector, such as energy-focused building codes in British Columbia, could have a greater impact in the long term if low-income households received subsidies for the purchase of heat pumps.

Shared jurisdiction and the existence of hundreds of climate policies mean that policy interactions are inevitable; most policies will not achieve a theoretical estimate of each policy's greenhouse gas reduction in isolation. The main concerns relate to the overlap between the federal *Clean Electricity Regulations* (which will become mandatory in 2035) and provincial and equivalence policies (Output-based Pricing System), as well as the decline in the price of credits under the federal *Clean Fuel Regulations* due to provincial blending policies and the federal Electric Vehicle Availability Standard[6].

Based on the historical and policy effectiveness analysis, modelling mentioned above, and the most recent policy changes (such as the removal of the consumer carbon price while the industrial carbon price is still in effect), the NZAB proposes opportunities to enhance ambition towards the milestone years of 2030 and 2035, with the potential to unlock investment and to reduce GHG emissions by an additional 68 Mt by 2030, and 72 Mt by 2035.

6. The government of Canada has announced on September 5, 2025, the removal of the 2026 target and launch of a 60-day review of the Electric Vehicle Availability Standard. Prime Minister Carney launches new measures to protect, build, and transform Canadian strategic industries.

Annex 2

Overview of International and Canadian Carbon Dioxide Removal Policies

Overview of international policies

Since the Paris Agreement in 2015, climate policies have been strengthened in several countries with the adoption of long-term strategies or laws setting net-zero targets for mid-century. Some countries have recognized the importance of carbon dioxide removal in achieving net-zero emissions and have set carbon dioxide removal targets distinct from GHG emission reduction limits. In this case, two approaches are identified. Either countries set a percentage of total emissions to be removed, as is the case in Sweden, Germany and Belgium, or they specify the exact quantity of carbon dioxide to be removed in tonnes, as is the case in the United Kingdom (UK) and the State of California in the United States.

For instance, Belgium plans to reduce its emissions by 95% compared to 1990, with the remaining 5% to be achieved through carbon dioxide removal[7]. Germany plans to remove 40 million tonnes of CO_2 by 2045, in the Land Use, Land-Use Change and Forestry (LULUCF) sector, equivalent to 3% of its 1990 emissions[8]. The UK has committed, in its Net-Zero Strategy adopted in 2021, to capture at least 5 Mt of CO_2 per year by 2030 through bioenergy with carbon capture and storage, direct air capture and enhanced rock weathering, with the goal of increasing this to around 23 Mt of CO_2 per year by 2035[9].

To stimulate investment in carbon dioxide removal technologies, countries are using economic and financial incentives such as tax credits, public funding for demonstration or research and development programs and, to some extent, certification of carbon credits removed. While many incentives focused on different parts of the carbon dioxide removal process such as the carbon capture, they cannot all be considered to be just carbon dioxide removal. Carbon dioxide removal must also be permanent to maximize climate benefits.

7. Climat.be. 2020. Vision and strategic workstreams for a decarbonised Belgium by 2050: Input to the Belgian long-term strategy.
8. Boettcher et al. 2023. Energy Research & Social Science 98. The formative phase of German carbon dioxide removal policy: Positioning between precaution, pragmatism and innovation.
9. Department for Energy Security and Net Zero and Department for Business, Energy & Industrial Strategy [UK]. 2021. Net Zero Strategy: Build Back Greener.

Tax credits provide financial support, usually in the form of tax reductions or refunds, for each tonne of CO_2 removed. Currently, tax credits for CO_2 removal technologies are much less common than tax credits for carbon capture and storage technologies, that is, technologies that reduce emissions from energy production. In the United States, the Inflation Reduction Act[10] passed in 2022 significantly expanded the 45Q tax credit program created in 2008, to cover direct air capture projects. For direct air capture, the Inflation Reduction Act offers tax credits ranging from $50 to $180 per ton of CO_2 stored in saline geological formations. For CO_2 removed using BECCS technology, it provides up to $85 per tonne of CO_2 for geological storage. It should also be noted that while BECCS can be considered negative emissions under certain assumptions and considering land-use, fossil fuel energy with CCS is not carbon dioxide removal. Amidst the passage of the One Big Beautiful Bill in 2025, multiple tax credits for clean electricity were cancelled but incentives under the 45Q tax credit program remained in place at the time of writing.

Demonstration programs focus on feasibility studies and research and development activities. They represent a crucial phase in the scaling-up of carbon dioxide removal technologies. In Europe, the Innovation Fund has financed direct air capture and BECCS project. Sweden has also allocated 36 billion Swedish krona (€3.3 billion) for BECCS projects between 2026 and 2046[11], as well as funding for research and innovation projects under the Industrial Leap program[12]. Under the Infrastructure Investment and Jobs Act and the Inflation Reduction Act, the United States allocated over $3.5 billion to support the development of four regional direct air capture centers[13], and $19.5 billion to various conservation programs that support conventional carbon dioxide removal technologies through the US Department of Agriculture for the period 2023-2027[14].

Carbon markets allow governments, organizations, businesses or individuals to buy and sell carbon credits, that is, tradable units representing a tonne of reduced, sequestered or avoided GHGs[15]. Those markets are either created by regulation (compliance markets) or voluntary markets, where demand comes from corporate objectives or as a way to offset emissions. Market environmental integrity and the presence of high-quality and verifiable credits is an important concern, which is often more pronounced in the voluntary market.

Policies are currently being developed in some jurisdictions to expand the types of projects admissible to carbon dioxide removal and to enhance environmental integrity. In 2024, the European Union adopted the Carbon Removals and Carbon Farming regulation, the first EU-wide framework for the certification of permanent carbon removal, carbon farming and carbon storage in products across Europe. The European Commission is also planning to integrate carbon dioxide removal into its EU Emissions Trading System by 2026.

Like the EU, Japan also launched the Green Transformation Emissions Trading Scheme (GX-ETS) in 2023, which includes, under certain conditions, carbon dioxide removal credits from direct air capture, bioenergy with carbon capture and storage and coastal blue carbon[16]. Based on this analysis, we have identified the following elements as essential to the effective deployment of technologies that remove carbon dioxide from the atmosphere:

- a clear and coherent regulatory framework whose goal is to preserve strong environmental integrity
- strong economic and financial incentives
- transparent governance and accountability

10. United States. 2022. Inflation Reduction Act of 2022.
11. Carbon Gap. 2025. Sweden.
12. Swedish Energy Agency. 2025. The Industrial Leap.
13. United States Department of Energy. Regional Direct Air Capture Hubs.
14. Jones et al. 2024. The Landscape of Carbon Dioxide Removal and US Policies to Scale Solutions.
15. United Nations Development Programme. 2022. What are carbon markets and why are they important?
16. DR.fyi. 2024. Japan's GX-League and Carbon Removal in GX-ETS.

The potential for carbon dioxide removal in Canada

To date, Canada has not set a specific carbon dioxide removal target. However, Canada published in 2023 its Carbon Management Strategy, which is based on five priorities: accelerating innovation and RD&D, advancing policies and regulations, attracting investment and trade opportunities, scaling up projects and infrastructure, building partnerships and growing inclusive workforces. The strategy emphasizes the importance of using technology to remove carbon dioxide from the atmosphere, focusing on methods such as direct air capture, biomass carbon removal and storage and enhanced carbon mineralization, all of which have strong long-term CO_2 storage potential. The strategy also considers proposed ocean-based approaches, such as direct ocean capture and increasing ocean alkalinity, which our assessment framework found may have more limited potential.

Canada is progressively putting in place an enabling regulatory framework for the development of carbon dioxide removal. In June 2024, the government adopted the Carbon Capture, Utilization and Storage Investment Tax Credit. While carbon capture, utilization, and storage technologies are not carbon dioxide removal technologies, they may in some cases share the same geological storage challenges. The tax credit applies to the purchase of equipment used to capture CO_2 from fuel combustion, industrial processes or directly from the air, as well as to the transport, storage or industrial use of the captured carbon. For direct air capture projects, expenditures incurred between 2022 and 2030 are eligible for a 60% credit, while carbon transport, storage and use are eligible for a 37.5% credit. Several provinces, such as Alberta, British Columbia and Saskatchewan, have already implemented CO_2 storage regulations and are therefore eligible for the Carbon Capture, Utilization and Storage Investment Tax Credit[17]. The province of Ontario is currently developing a regulatory framework for this purpose[18].

In early 2025, Environment and Climate Change Canada released the Preliminary Draft Federal Offset Protocol: Direct Air Carbon Dioxide Capture and Geological Storage for public comment. Projects under this protocol sequester GHGs, for which federal offset credits may be issued under *Canadian Greenhouse Gas Offset Credit System Regulations* established in 2022.

To stimulate the carbon market, the Government of Canada made a commitment in 2024 to purchase at least $10 million worth of carbon dioxide removal services by 2030 as part of its Greening Government Strategy. As part of this, a consultation was launched in February 2025 to assess the industry's capacity to supply offset credits generated by carbon dioxide removal projects. Other large-scale initiatives, such as the Net Zero Accelerator Initiative and the Climate Action and Awareness Fund, offer funding opportunities for the development of carbon dioxide removal.

17. Pembina Institute. 2023. Engineered Carbon Dioxide Removal in a Net-Zero Canada: Opportunities and challenges for non-biological CDR deployment; Government of Saskatchewan. Storage Project Application.
18. Government of Ontario. 2025. Geologic carbon storage.

Annex 3

Federal Entities

Federal Entities

The research project on how federal entities could contribute to Canada's transition to a net-zero emissions pathway provided recommendations in the three areas:

1. Consistent Mandates

The project report recommends that clear mandates reflecting each entity's unique role and impact should:

- be aligned with broader federal strategies but adapted to local or sector-specific realities
- include clear performance expectations and targets
- be flexible enough to evolve based on new data and stakeholder feedback

In other words, federal entities need a roadmap that shows them what is expected, how to achieve it, and how to measure progress.

2. Operational Formalization

Achieving a structured, consistent approach where net-zero considerations are embedded in federal operations requires moving beyond ad hoc initiatives. The project report recommends integrating climate into day-to-day operations and management systems, including:

- formalizing roles and responsibilities for climate oversight
- aligning executive performance incentives with net-zero goals
- building systems to monitor and report on emissions and climate risks, including the harder-to-measure Scope 3 emissions

3. Capacity and Capabilities

Improved internal capacity will allow federal entities to not just set climate goals, but to me et them meaningfully. Suggestions in the project report for progress in improving internal capacity and capabilities include:

- upskilling senior leaders and frontline staff with tailored training
- including climate skills in hiring and development plans
- strengthening collaboration and knowledge-sharing between departments and with external partners

Annex 4

Feedback from the Questionnaire

Feedback from the Questionnaire

Carbon budgets and negative emissions

11 key themes emerged to explain how Canada should proceed in establishing a carbon budget. A qualitative analysis using NVivo software showed that themes related to a credible approach, budget design, stakeholder engagement, and international considerations were the most frequently discussed (See table 1).

Table 1 Summary of stakeholder input on carbon budget

Themes	Comments received
GHG emissions and removals	Focus on large emitters, large polluters should pay, prioritize domestic reductions (no offsets), prioritize direct reductions, account for all GHG emissions/removals, set carbon quotas, account for carbon stocks, base budget on excess emissions reductions, adopt ambitious and early emission reductions, include high-quality carbon removals *"The methodology used to establish a carbon budget must include carbon stocks and GHG emissions and removals from all ecosystems in Canada, particularly peatlands and forests, in addition to accounting for all emissions from all industries and related infrastructure, with a focus on the largest emitters. Flexibility mechanisms, such as interim targets and the use of offsets, should prioritize direct reductions while remaining aligned with net-zero principles."*
Budget design	Establish a 5-year budget, provide flexibility, align emissions targets and budgets, use the NZAB advice, use sub-national carbon budgets, adopt predictable budget (10 years before), avoid complex methodologies, implement carbon budget in the form of an emissions cap, match the carbon pricing system with the cap budget, use budgets based on straight line to net-zero. *"Carbon budgets must be ambitious and based on a linear path to net-zero, i.e., consistent with the 2030 and 2050 targets. […] In this regard, Canada can take inspiration from the UK's five-year budget approach and set 5-year emissions reduction targets to ensure that total cumulative emissions over the next 25 years remain within Canada's fair share of global emissions. Future carbon budgets must be predictable, i.e., set several years before the period concerned. The domestic carbon budget should be integrated into the government's budget planning and updating process. The carbon budget should include provisions for addressing excess emissions, such as deploying carbon dioxide removal technologies and contributing to international climate finance mechanisms."*

Themes	Comments received
Capacity-building	Create a skilled and adaptable workforce, develop training and retraining programs, strengthen planning capacities. *"The implementation of the carbon budget should prioritize the creation of a skilled and adaptable workforce as the foundation for its success and include labor standards in policies aimed at reducing excessive emissions. A key element would be to invest in training and retraining programs that help Canadian workers transition from carbon-intensive industries to low-carbon sectors. This can be achieved with support from unions, non-profit education organizations, and union-affiliated training centers. By aligning workforce development and high labor standards with the goals of a carbon budget, Canada can reduce emissions while supporting workers and communities through a just and equitable transition. A carbon budget should be inclusive of the community, ensuring that municipalities and Indigenous communities have the resources and capacity to plan and act to reduce local emissions."*
Communication	Use appropriate communication, enhance communication methods *"To build trust and raise awareness, carbon budget should be communicated in a motivating, non-political, and action-oriented way. Communications on the carbon budget should aim to mobilize public and private resources for emissions reductions at source and clearly distinguish emissions reductions from elimination efforts."*
Credible approach	Set interim targets, use a transparent process, provide accountability, use robust measurement, reporting, and verification (MRV), use a credible approach, emphasize ambitious and early emission reductions, set clear targets for emission reduction and removal, align with Nationally Determined Contributions, use regular progress assessment, enforceable mechanism, annual targets, targets-based, avoid complex methodologies for transparency *"An approach based on interim targets aligned with Canada's Nationally Determined Contributions ensures transparent and accountable implementation of the carbon budget. This would allow for regular assessment of progress through the establishment of a robust system for monitoring, reporting, and verifying emissions. Enforcement mechanisms would allow for corrective action in the case of deviation. These could include penalties for non-compliance and incentives to exceed targets to encourage steady progress toward Canada's climate goals. The carbon budget must be developed using a target-based approach."*
Stakeholder engagement	Engage with the public, Indigenous engagement, industry engagement, stakeholders' engagement, industry engagement *"Engaging the public, Indigenous communities, industry, and other stakeholders in the carbon budget design and review process will ensure the approach is equitable, actionable, and widely supported."*

Themes	Comments received
Federal-Provincial-Territorial governance	Assess the impact of policies, amend the CNZEAA, integration of budget with provincial policies, budget integrated into policy, federal-provinces-territories collaboration, national grid, sub-national budget, integration with provincial policies, provinces and territories participation, integrated into policy *"By leveraging a carbon budget, Canada can strengthen its climate governance, send clear signals for investment and innovation, and build confidence in its ability to meet its climate commitments. Embedding a carbon budget into federal policy will allow for carbon emissions targets to be integrated across sectors and will foster coordinated action. For the national carbon budget established under the CNZEAA to be achievable, Canada needs a clear understanding of what emissions reductions are required in each province and territory recognizing the shared responsibility between the federal and provincial governments to reduce emissions. With this in mind, the carbon budget must be aligned with provincial and territorial climate plans, to encourage collaboration and consistency between different jurisdictions. The budget could then be allocated among different provinces and territories in the form of subnational five-year carbon budgets."*
International considerations	Adopt UK approach/model, meet the 1.5°C target, comply with international obligations, use international comparisons (per capita), compensate through international climate financing *"The carbon budget must take into account the international obligations and implications. For example, Canada's current GHG reporting to UNFCCC does not provide sufficient information and data to develop realistic and meaningful emissions reductions targets and plans. If [LULUCF reporting] gaps are not addressed, the carbon budget will lack legitimacy at the national and international levels. The carbon budget must also reflect Canada's fair share of the global carbon budget. Every budget must be set with "a view to meeting" the long-term target and international obligations, namely the Paris Agreement's 1.5°C goal."*
Scientific and expert considerations	Rely on data and models, based on experts' advice, address climate change impacts, rely on collaborative efforts, use the NZAB advice, rely on science *"Carbon budgets must be based on expert advice and the NZAB, as well as scientific knowledge about climate change. Independent experts […] can play a critical role in supporting Canada's carbon budget implementation by providing robust modelling and scenario analysis to inform target-setting and policy design; facilitating knowledge sharing and collaboration across modelling and policy communities; and developing open-source tools and datasets to enhance transparency and accountability."*

Themes	Comments received
Sectoral and regional approaches	Set sectoral targets, use sectoral allocation, use sectoral budget and pathways, focus on challenging sectors, use separate target (reduction vs. removal), use regional approach *"One possible use of a carbon budget would be to establish targets and budgets by sector as this would allow tracking of leaders and laggards, thereby identifying needs for dealing with excess emissions. The carbon budget could be subdivided into sectoral budgets to ensure that all sectors achieve their fair share of emissions reductions, while recognizing the particular challenges in areas such as heavy industry, agriculture, and transportation. The budget could also be allocated among the various provinces and territories by setting the maximum allowable emissions within their geographical boundaries.* *Flexibility mechanisms, such as interim targets and the use of offsets, should prioritize direct reductions while remaining aligned with net-zero principles."*
Sharing of responsibilities	Rely on fair-share, equitable efforts across industries and regions, define fair-share, base budget on historical responsibility, use international comparisons (per capita) *"Canada's carbon budget should be grounded in a transparent methodology that defines its "fair share" of the global carbon budget, taking into account Canada's historical emissions, its financial/economic capacity to decarbonize, and domestic equity considerations."*

Feedback from the Questionnaire

Excess emissions

Table 2 Example of policy measures suggested in the Questionnaire to promote carbon dioxide removal (CDR)

Set a separate carbon dioxide removal target carbon markets	Support Nature-Based Solution	Incentivize Innovation	Create a robust framework	Leverage carbon market
Align the target with Canada's net-zero goals for 2035 and 2050, and ensuring it complements emission reductions Integrate CDR targets into provincial and territorial climate policies Incorporate CDR goals into industrial decarbonization efforts Avoid interference between CDR and emissions reductions Focus on achieving accurate emissions reporting before setting a carbon dioxide removal target	Investigate implications of CDR for biosphere carbon stocks and inversions Develop programs to protect and enhance natural carbon sinks like wetlands and forests Restore degraded ecosystems: peatlands, forests, coastal areas Promote payment programs for ecosystem services to reward farmers and communities that contribute to CO_2 removal	Fund research and development of novel technologies Introduce financial incentives, such as tax credits or grants Create a technology-agnostic CDR investment tax credit separate from the existing carbon capture, utilization and storage (CCUS) Standardize measurement, reporting, and verification(MRV) Integrate public-private partnerships (PPPs) into policies for carbon dioxide removal	Regulate carbon removal credits. The government should ensure that legislation on geological storage takes CDR into account Develop standards and guidelines for CDR technologies Amend CNZEAA to introduce CDR targets Develop robust guidelines for identifying residual, hard-to-abate emissions in economic sectors Expand the existing CCUS Investment Tax Credit to include carbon removal technologies Build CDR on a foundation of robust science, accurate characterization of impacts, clear cost assessments, and trustworthy emissions accounting Consider impacts on carbon sinks in the Impact Assessment Act	Ensure high quality of carbon credits Procure CDR credits through government. This would give Canadian companies active in the CDR field a strong signal on the demand Integrate CDR into carbon pricing mechanisms and emissions trading systems, ensuring that credits for removal are verifiable, additional, and durable Adopt a standalone carbon removal procurement program Integrate carbon removal protocols within its GHG offset market

Feedback from the Questionnaire

Provincial and territorial contributions to emissions reductions

3 themes emerged from the submissions; to harmonize and coordinate action, to enhance funding and to create new initiatives.

Table 3 Examples of additional measures that could be taken to address gaps in federal policy

Harmonize and coordinate action at different levels	Enhance funding at the municipal and regional level	Create new innovative solutions
Harmonize FPT carbon markets (for example, CDR protocols, forest offsets)	Directly fund municipalities for their climate measures (for example, operational funding for public transit, decarbonization of buildings)	Fund research and introduce federal procurement requirements for community benefits agreements and labor project agreements
Implement a federal data-sharing standard (for example, common data sets, regular publication, open publication by default)	Increase support for capacity building in municipalities and Indigenous Nations, organizations and businesses	Create a youth climate corps in partnership with provincial, territorial, and Indigenous governments
Enhance coordination of federal policies, funding programs, and procurement	Increase funding for climate change adaptation	Strengthen climate communication, such as: setting a clear vision for a net-zero Canada, including the role of oil and gas; using public health concerns to regulate natural gas; and banning fossil fuel advertising
Strengthen leadership on interprovincial electricity transmission	Strengthen federal support for northern, remote, and rural communities in terms of energy costs, access to energy, and food insecurity	Establish a national framework for distributed energy resources to empower local energy generation and storage
Improve federal reporting, for example: encourage provinces and territories to take more climate action (for example, link national targets to provincial and territorial efforts in the EPA progress report) and update national inventory reports (for example, WCI-linked emissions reductions, include nature-based sources and sinks)	Introduce more generous subsidies for the promotion of clean energy (wind and solar) and for the renovation of housing and other infrastructure that can significantly reduce emissions	Establish environmental standards for equipment suppliers (building, transportation, industry, etc.)
Finalize initiatives underway such as the Marine Climate Action Plan, the Blue Economy Strategy, Bill S-243 on the Climate-Aligned Finance Act –mandate transition plans, implement 1.5C-aligned taxonomy, carbon offset protocols for agriculture, Medium- and heavy-duty zero-emission vehicle sales mandate, and the Sustainable Jobs Action Plan		Amend the Greenhouse Gas Pollution Pricing Act to extend exemptions for eligible fuels used in agricultural farms and include machinery used for grain drying, irrigation, and heating and cooling of livestock barns, greenhouses and other agricultural growing structures