



ACHIEVING 2050: A CARBON PRICING POLICY FOR CANADA



National Round Table
on the Environment
and the Economy

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sur l'environnement
et l'économie

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Canada

CANADA MUST ACT

IF WE ARE TO ACH

EMISSION REDUCT

DECISIVELY NOW

MEET OUR 2050

CLIMATE TARGETS.

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The National Round Table on the Environment and the Economy

ABOUT US

Emerging from the famous Brundtland Report, *Our Common Future*, the National Round Table on the Environment and the Economy (NRTEE) has become a model for convening diverse and competing interests around one table to create consensus ideas and suggestions for sustainable development.

A Solutions-Focused Mediator

The NRTEE has been focused on sustaining Canada's prosperity without borrowing resources from future generations or compromising their ability to live securely.

Since its creation in 1988, concerns about climate change, air quality, and water availability have made Canadians and their governments increasingly aware of the need to reconcile economic and environmental challenges as they have become increasingly interlinked. They are the flip sides of the same coin. That need for reconciliation—and the process of working towards it—is the National Round Table on the Environment and the Economy's *raison d'être*.

Our mission is to generate and promote sustainable development solutions to advance Canada's national environmental and economic interests simultaneously, through the development of innovative policy research and advice.

NRTEE ACT, 1993

We accomplish that mission by fostering sound and well-researched reports on priority issues and by offering advice to governments on how best to reconcile the often divergent challenges of economic prosperity and environmental conservation.

A Unique Convener

The NRTEE brings together a group of distinguished sustainability leaders active in businesses, universities, environmental groups, labour, public policy, and Aboriginal communities across Canada. Our members are appointed by the federal government for a mandate of up to three years. They meet in a round table format that offers a safe haven for discussion and encourages the unfettered exchange of ideas leading to consensus. This is how we reconcile positions that have traditionally been at odds.

A Trusted Coalition-Builder

We also reach out to expert organizations, industries and individuals that share our vision for sustainable development. These partners help spark our creativity, challenge our thinking, keep us grounded in reality, and help generate the momentum needed for success.

An Impartial Catalyst of Change

The NRTEE is in the unique position of being an independent policy advisory agency that advises the federal government on sustainable development solutions. We raise awareness among Canadians and their governments about the challenges of sustainable development. We advocate for positive change. We strive to promote credible and impartial policy solutions that are in the best interest of all Canadians.

A National and International Leading Force

We are also at the forefront of a prospective new international research network that will bring together some of the world's most renowned sustainability research institutes. This will build our research and capacity, giving us access to new thinking and proven solutions in other countries that could benefit Canada. Armed with a proven track-record in generating environment and economic solutions, we now seek to use our influence and credibility to move forward Canada's environmental and economic priorities in concert with the world.

An Independent Leader

The NRTEE Act enforces the independent nature of the Round Table and its work. The President and CEO is accountable to Parliament and reports, at this time, through the Minister of the Environment. The NRTEE is not an agency of Environment Canada or any other federal government department, but its financial and reporting obligations are included within the broader environmental portfolio of government.

The NRTEE's Dynamic Secretariat

A group of staff maintains our secretariat that conducts the policy research and analysis required by our members in their work. The secretariat furnishes administrative, promotional and communications support to the NRTEE. We are here to answer your questions or direct you to an expert who can. Please let us know how we can help you.



National Round Table
on the Environment
and the Economy

Table ronde nationale
sur l'environnement
et l'économie

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BOB PAGE, PH.D.
NRTEE CHAIR

As Chair of the NRTEE, I am pleased to introduce our major new report on a unified carbon pricing policy for Canada, called *Achieving 2050*. The Round Table integrates environmental and economic interests and perspectives to create our vision of sustainable development. This report shows how that can be done by designing a comprehensive cap-and-trade system for the Government of Canada to achieve its environmental targets for GHG emission reductions, at the least economic cost.

The carbon pricing policy proposed in this report is responsible, reasonable, and realistic. It is *responsible* by integrating economic concerns with reaching our environmental goals up front. It is *reasonable* by providing a suitable transition period to get the proposed new cap-and-trade system up and running across the country. Finally, it is *realistic* by building on existing climate policy approaches – federally, provincially, and internationally – so we can make faster progress in reaching our goals.

The NRTEE believes now is the time to act more decisively and urgently to ensure Canada is on the most effective path forward to achieving deep, long-term emission reductions. *Achieving 2050* sets out a road map to get us there. We hope governments and Canadians will find it useful in considering the challenging and complex issues and solutions Canada must address to help combat climate change.



DAVID MCLAUGHLIN
NRTEE PRESIDENT
AND CEO

Achieving 2050 is the product of over a year of intensive research and consultation by the NRTEE with leading national and international experts, environmental organizations, and industry associations. It builds on our previous report, *Getting to 2050*, which called for a carbon pricing policy for Canada to achieve our GHG emission reduction goals. *Achieving 2050* goes the next step by proposing the design and implementation of a pan-Canadian carbon pricing policy, unified across all emissions, sectors, and jurisdictions.

A unified carbon pricing policy for Canada is the first, essential step in preparing to link or harmonize emissions trading systems with our major trading partners. Our proposed policy sets out the issues and trade-offs governments and Canadians must consider. And it recommends new governance mechanisms and processes to ensure Canadian climate policy is integrated, coordinated, and collaborative.

Carbon pricing is a policy whose time has come. Now is the time to lay the groundwork for a truly effective long-term climate policy framework based on a unified carbon pricing policy at home, and internationally harmonized approaches abroad. *Achieving 2050* will help us get there.

ACKNOWLEDGEMENTS

In developing *Achieving 2050* the National Round Table on the Environment and the Economy benefited from the insight and advice of many important stakeholders who contributed to this report.

In particular, the NRTEE would like to thank the more than 30 members of the Expert Advisory Committee who provided valuable and timely commentary on our research and conclusions over the course of three extensive roundtable sessions at critical junctures in the development of this report and its conclusions. We would also like to thank the 63 participants in our regional outreach sessions which took place in the fall of 2008 in Vancouver, Calgary, Toronto, Montreal and Ottawa who provided us with detailed sectoral and provincial context for our thinking.

Participants represented a wide variety of environmental and economic interests, sectors, and organizations as well as leading national academic, public policy, and governance experts in this project's research fields.

At the Round Table itself, several members of the Secretariat staff played vital roles in conducting the research and analysis behind *Achieving 2050*, preparing drafts, briefing stakeholders, working with our Members, and organizing numerous meetings and consultation sessions, and undertaking the pain-staking production and communications process. This included:

Policy:

Alex Long, Dale Beugin, and Will McDowall

Communications:

Robert Paterson, Tony Bégin, Tania Tremblay, and Edwin Smith

Administration:

Isabella Kavafian, Tammy Robillard, Denise Edwards, and Richard Pilon

We would also like to acknowledge the significant contribution of the project's lead economist, Dave Sawyer of EnviroEconomics as well as Jill Baker, formerly of the NRTEE, for her early direction of this project, along with our report peer-reviewers, Stephanie Cairns, Carolyn Fischer, Andrew Leach and Nic Rivers, and our national and international researchers and experts who provided advice and reports during our process.

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EXECUTIVE SUMMARY

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**THE NRTEE'S CARBON
PRICING POLICY IS
RESPONSIBLE, REASONABLE,
AND REALISTIC FOR
CANADA AND CANADIANS.**

EXECUTIVE SUMMARY

In 2009, Canada finds itself facing both new and familiar climate policy challenges. The past several years have seen the emergence of federal and provincial plans to arrest and ultimately reduce greenhouse gas emissions (GHGs) in Canada. A variety of policy instruments have been ventured—from carbon taxes to trading regimes to technology funds to regulations. A deeper understanding by many Canadian interests of the likely scale of the problem and solutions to it is taking root.

Yet, the collective result has been perhaps less than anticipated. Carbon emissions remain on a rising path; Canadian businesses and consumers confront the prospect of a fragmented patchwork of federal, provincial, territorial, and regional carbon pricing policies sprouting across the country and continent; and now we are dealing with the onset of a global economic recession more complicated and profound than we have experienced in decades.

But with these challenges come opportunities. A new administration in the United States has committed to significant climate policy action domestically and internationally. A growing international consensus to develop a post-2012 framework implicating all emitters is emerging. And, economic recession will ultimately give way to renewed economic growth, giving Canada the opportunity to position itself now for a truly sustainability-oriented recovery based in part on an effective, unified national carbon pricing policy.

The movement toward a low-carbon world is inevitable. But our place in it is not. Like our economy as a whole, Canada's long-term competitiveness in a low-carbon future will not be served by inter-jurisdictional carbon competition here at home or by allowing protectionist carbon barriers to

be raised at our expense abroad. The link between the two is obvious. Engagement internationally needs to be reinforced by harmonized action nationally. Canada's national environmental and economic interests jointly demand such an approach.

The National Round Table on the Environment and the Economy believes now is the time to press forward on the design of the right climate policy for Canada and Canadians. A year of research and consideration has reinforced our view that it is urgent to act decisively, even in the face of current economic turbulence and evolving climate science. Now is exactly the time to seize the opportunity before us—of preparing for a sustainable economic recovery and actively engaging the US and our other major trading partners. Now is the time to lay the groundwork for a truly effective long-term climate policy framework through a nationally collaborative approach to a unified carbon pricing policy in Canada and an internationally harmonized approach in North America.

This report recommends a unified carbon pricing policy for Canada—a policy aimed at meeting one clear objective: ***the greatest amount of carbon emission reductions, at the least economic cost.*** Following more than a year of research and consultation, our report sets out what we believe is the most effective, realistic, and achievable carbon pricing policy for current and anticipated Canadian circumstances.

The scale of transformation to the Canadian energy system to meet the federal government's 2020 (20% below 2006 levels) and 2050 (65% below 2006 levels) emission reduction targets should not be underestimated. Greenhouse gases are so widely embedded in the energy we use that to significantly reduce emissions will have wide-ranging economic and social implications. Our collective challenge now is to transition the emerging fragmentation of current carbon pricing policies to a unified policy framework across all emissions nationally. The negative consequence of not doing this, and maintaining this fragmentation of differentiated carbon prices across emissions and across jurisdictions, will be significantly higher economic costs, intensified environmental impacts, entrenched barriers that will make it harder to act in the future, and the real risk of not being able to meet Canadian emission reduction targets.

A CARBON PRICING POLICY FOR CANADA

The carbon pricing policy proposed in this report has two main goals. *First*, it seeks to achieve the Government of Canada's medium- and long-term greenhouse gas emission reduction targets at least cost. *Second*, it seeks to minimize adverse impacts of achieving these targets on regions, sectors, and consumers.

A nationally integrated carbon pricing policy is required to meet these goals based on four main elements. At the core is an **economy-wide cap-and-trade system** to price carbon and provide real market incentives for firms and households in Canada to change their technology choices and behaviour in order to reduce emissions. **Complementary regulations and technology policies** are then needed to improve the cost-effectiveness of the cap-and-trade system by broadening coverage across all key emission sources, while supporting targeted technology development and deployment. Participation in **international emissions markets** through trading and credit purchases will help reduce economic costs at home by allowing Canadian firms and consumers access to credible reductions internationally. Finally, a climate **governance and implementation strategy** is needed to establish new, collaborative institutions and coordinating processes to implement and adapt the carbon pricing policy over time, making sure it sends a clear and certain price signal to industry and consumers, while remaining responsive to new information and situations.

These are our conclusions:

- An economy-wide carbon price signal is the most effective way to achieve the Government of Canada's medium- and long-term emission reduction targets and reduce cumulative emissions released into the atmosphere.
- That price signal should take the form of an economy-wide cap-and-trade system that unifies carbon prices across all jurisdictions and emissions and prepares us for international linkages with our major trading partners.
- An effective carbon pricing policy needs to find a balance between certainty and adaptability—it should be certain enough to transmit a clear, long-term price signal to the economy upon commencement to encourage technology and change behaviour, yet adaptable to changing circumstances and future learning.
- There is a cost to delay in the form of higher carbon prices later to meet targets, and a cost to maintaining Canada's current fragmented approach to carbon pricing policies in the form of reduced GDP and higher carbon prices over time.
- Canada's economy will continue to grow under this policy—it is forecast to be twice as large in 2050 than today—but this will be smaller than if no carbon pricing policy were adopted.
- New federal/provincial/territorial governance mechanisms and processes should be put in place to achieve a harmonized Canadian carbon pricing policy.
- Technology development and deployment, along with the electrification of the energy system, is central to emission reductions and is stimulated through an economy-wide carbon price signal, as well as appropriate public investment in carbon capture and storage and renewable energy.
- Complementary regulations and technology policies in the transportation, buildings, oil and gas, and agricultural sectors are also required to ensure broad-based emissions coverage at an overall lower price, reduce total emissions, and meet government targets.

GUIDING PRINCIPLES FOR A CANADIAN CARBON PRICING POLICY

Getting started with the right national carbon pricing policy is the first, best step Canada can take to achieve its ambitious medium- and long-term greenhouse gas emission reduction targets. Our research indicates that Canada has the capacity to successfully achieve these targets while maintaining a high standard of living and continued economic well-being. But our research also shows that this transformation will require us, as a country, to take three steps:

First, we need to implement a carbon pricing policy that is both certain and adaptable.

Investors and consumers will have the confidence to change their behaviour if they are certain the policy and prices are real; at the same time, the policy must be responsive to changing information and circumstances to secure our own interests.

Second, we must unify carbon policies and prices here at home. That means transitioning from the current, fragmented patchwork of federal, provincial, territorial, and regional policies to a unified or harmonized carbon pricing policy that covers all emissions in all jurisdictions.

Third, we need to link our carbon pricing policy and trading system with the world next door.

Enabling international emissions trading, particularly with our largest trading partner, the United States, will help address competitiveness concerns and manage our costs.

Unify at home; link with abroad; implement with certainty and adaptability. This is the foundation for the specific carbon pricing policy guiding principles we set out below:

- 1. Focus on carbon prices and economic efficiency.** With Canadian targets set, an important first principle is to ensure that the policy focuses on economic efficiency so that long-term costs are minimized. This means providing a unified carbon price across emissions and jurisdictions. While adverse impacts on some segments of the economy and society can be expected, these are best dealt with through targeted income support and not through a fundamental dilution of the carbon price signal.
- 2. Move to uniformly apply the carbon price across all emissions.** This will make Canadian carbon policy more cost-effective by avoiding sector-specific exclusions for competitiveness or jurisdictional reasons. While there will likely be adverse and perhaps disproportionate impacts on some, the carbon pricing policy should not deliberately omit emissions as a starting point. Otherwise, overall costs will need to rise accordingly by those

paying to meet the stated targets, which will be viewed as unfair and inequitable. Using revenues generated by the cap-and-trade system through the auctioning of emission permits provides flexibility within the uniform system to address specific economic or societal needs arising from the carbon pricing policy.

- 3. Contain costs initially and then transition the policy to deliver more certain emission reductions over time.** Uncertainties dominate climate policy, including abatement response, cost uncertainties, and most importantly the carbon prices that major competitors will be imposing on their industries. These uncertainties indicate a need for climate policy to initially contain costs as uncertainties are revealed. But with cost containment comes reduced emission reductions that must be balanced against achieving our targets. The carbon price should therefore align with the emissions reduction targets. Ultimately, there is a need to transition the initial cost containment approach to one focusing on getting the emission reductions we need through higher carbon prices over time.
- 4. Position Canada to participate in international policy frameworks.** Given the very high carbon prices required to attain domestic reductions sufficient to hit our long-term targets, a policy that seeks real and verifiable reductions from outside Canada to lower domestic costs makes sense. To implement this, Canada's carbon pricing policy should be designed to eventually link with major trading partner systems, particularly those of the United States.
- 5. Develop governance mechanisms to set policy but also to update expectations about future carbon prices.** Policy credibility over the long term is required to drive needed technology investment and behavioural change. Creating dedicated governance mechanisms that implement the carbon pricing policy in a transparent and accountable manner is central to maintaining this credibility. This requires a rules-based approach that minimizes political interventionism and future policy backsliding. Monitoring and reporting progress publicly is equally important as part of updating expectations that carbon prices or emission quantity restrictions will need to rise or fall, relative to that progress.

RECOMMENDATIONS

This report serves as a comprehensive and integrated recommendation for developing and implementing a Canadian carbon pricing policy. To reinforce the report's research, analysis, and conclusions, the NRTEE highlights the following specific recommendations for consideration:

1. Unify carbon policies and prices across emissions and jurisdictions based on three principal policy elements:
 - an economy-wide cap-and-trade system transitioned from current and planned federal, provincial, and territorial initiatives;
 - complementary regulations and technology policies in the transportation, buildings, oil and gas, and agricultural sectors; and
 - international carbon abatement opportunities that are credible, affordable, and sustainable.
2. Ensure the unified Canadian carbon pricing policy can link with current and proposed international systems and, most particularly, with a prospective trading regime likely to emerge in the United States, to ensure compatibility in pricing and action.
3. Use generated revenue from permit auctions first and foremost to invest in the required technologies and innovation needed to meet the Canadian environmental goal of reduced GHG emissions.
4. Transition the current fragmented approach to carbon pricing across jurisdictions and emissions to a unified Canadian carbon pricing regime as soon as possible and no later than 2015.
5. Establish a dedicated carbon pricing governance framework based on adaptive policy principles to develop, implement, and manage the unified carbon pricing regime over time with the following elements:
 - Federal/provincial/territorial collaboration through an ongoing forum, which would allow governments to coordinate and harmonize efforts and actions in support of the unified carbon pricing policy, and regularly consult and engage with each other to maintain progress and direction on carbon emissions pricing revenue distribution and climate policy development.

- An expert Carbon Pricing and Revenue Authority with a regulatory mandate to collect auction revenues from emitters, set carbon pricing schedules and compliance rules, establish permit allocation rules based on principles and policy directions set by the federal government, monitor and enforce compliance, implement procedures for monitoring and reporting emissions, and ensure confidence in the long-term robustness of the policy.
- An independent, expert advisory body to provide regular and timely advice to government on interim targets for each compliance period; on the distribution of auction revenue to meet environmental, economic, and social objectives as required; on ongoing evaluation and assessment of the carbon pricing regime; and on any proposed adjustments to the policy and pricing framework for decision makers to consider.

SETTING THE STAGE

CHAPTER ONE

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**THE NRTEE'S CARBON
PRICING POLICY IS DESIGNED
TO ACHIEVE THE GOVERNMENT'S
EMISSION REDUCTION TARGETS
AT THE LEAST ECONOMIC COST.**

CHAPTER ONE

SETTING THE STAGE

In its 2007 climate change plan entitled *Turning the Corner*, the Government of Canada announced ambitious long-term greenhouse gas (GHG) emissions reduction targets for Canada of 20% below 2006 levels by 2020 and 65% by 2050. In January 2008, the National Round Table on the Environment and the Economy (NRTEE or Round Table) released a report entitled *Getting to 2050: Canada's Transition to a Low-emission Future*, recommending that the government implement a strong, clear, consistent, and certain carbon¹ price signal across the entire Canadian economy as soon as possible in order to successfully shift to a lower GHG emissions pathway. We determined that market-based instruments—either a carbon tax, a cap-and-trade system, or a combination of the two—were necessary, with complementary policies in certain sectors, to achieve the government's targets. We identified technology development and deployment as central to reducing emissions and determined that pricing carbon would foster this. Finally, we said the overall impacts on the Canadian economy, while significant for some sectors and regions, were manageable in the long run.

Our research went further than before in demonstrating that this policy approach was the most effective path to transition Canada to a low-emissions future. But important questions of actual carbon policy design and implementation demanded further attention. Which carbon pricing instrument was best for Canadian circumstances? How should it be designed and how would it work? How should the transition be managed and over what time period? What are the implications for Canada's economy of achieving deep emission reduction targets and how can we address concerns about competitiveness and fairness? What are the international implications of one policy choice over another?

¹ Each reference to carbon in this report implies changes in the level of all greenhouse gases specified in common units of CO₂e (carbon dioxide equivalent).

These all raise fundamental issues of carbon pricing policy design and implementation that governments will have to consider. Recognizing this need, the NRTEE embarked on a year-long research program to reinforce our *Getting to 2050* report that would result in new advice on the most effective carbon pricing policy for Canada, in the form of this report. The Round Table implemented an ambitious and detailed research agenda comprising eight background studies, the formation of a national expert advisory committee to review our research along the way, and original economic modelling and analysis. Preliminary conclusions were tested with environmental and economic stakeholders in a series of regional consultations across the country. And at each step of the way, members of the Round Table reviewed the research and considered its implications culminating in this advisory note and a more detailed companion background technical report.

1.1 KEY CONSIDERATIONS AND ASSUMPTIONS

We made a number of considerations and assumptions in our research and our approach to ensure validity and relevance.

- **We use the Government of Canada’s GHG emissions reduction targets.** Adopting the government’s own targets of 20% below current (2006) levels by 2020 and 65%² below current levels by 2050 ensures our research is grounded in current approaches. It also ensures that the government can, with confidence, use these findings now to determine what will be needed in the long run to achieve stated policy goals and targets.
- **We use the *fast and deep* emissions reduction pathway.** The government’s medium- and long-term targets are reflected in the NRTEE’s *fast and deep* emission reduction pathway from *Getting to 2050*. This report adopts this pathway and implies a fast start to emissions reductions prior to 2015, and a sustained and long-term focus on carbon pricing to deliver low-cost emission reductions in time. This was chosen as the preferred pathway because it avoided three specific risks: not attaining deep emissions targets, higher economic costs, and higher cumulative GHG emissions.
- **We recognize that our carbon pricing policy differs from some findings in *Getting to 2050*.** In *Getting to 2050* we assessed a Canada-alone scenario, where it was assumed that the government’s targets were achieved through domestic abatement action alone.

2 The federal government’s commitment for 2050 is 60% to 70% below 2006 levels; the NRTEE’s analysis in our *Getting to 2050* report took the mid-point— 65% below current levels—as does this report.

In this report, we adopt a more considered assumption that Canada will need to balance the costs of domestic action with the benefits of looking toward international carbon markets for lower-cost emission reductions. This reflects stakeholder input and our own learning and consideration during this project.

- **We are focused on the long term, not the short term.** The past year has seen significant developments in many of the major drivers that influence climate policy and emissions growth: oil prices rose by over two-thirds and dropped precipitously from a historical peak, a global economic recession looms large, and a new US administration with new commitments on climate policy has taken office. These are all important developments and we have strived to take as much of this into account as possible, from setting assumptions for our economic modelling, to setting transition time frames, to contemplating responsive policy options. In certain respects they make any policy choice at this time that much more difficult. But they also reinforce the core need for Canada to have a robust *and* adaptable carbon pricing policy framework that can accommodate new developments while keeping us on the path of achieving deep, long-term emission reductions.
- **We considered trade-offs.** Key trade-offs in designing any carbon pricing policy must be considered. First, certainty versus adaptability—how do you create a policy framework that is certain enough to drive investment and technology but adaptable enough to accommodate new economic and environmental circumstances? Second, environmental outcomes versus economic cost—how do you design policy instruments to get emissions down while addressing current and future competitiveness and prosperity issues? This report makes recommendations based on our consideration of how best to address such trade-offs.
- **We noted the changing climate policy landscape in Canada.** First, the federal Liberal Party proposed a carbon tax but was defeated in the 2008 general election. Second, the federal government has indicated its intention to shift from its original intensity-based emission reduction targets, set out in the *Regulatory Framework for Large Emitters* as part of the *Turning the Corner* plan, to a hard cap on emissions, perhaps aligning with a prospective cap-and-trade system in the United States. Our carbon pricing research, which began before these developments, has taken note of both. The proposed policy framework set out in the advisory note is designed to transition from the current intensity-based system to a hard cap by 2015, or even shift sooner to an absolute cap-and-trade system as part of linking with a United States' trading system.

1.2 OUR REPORTS

The NRTEE is providing two reports setting out first, our policy advice and recommendations to governments; and second, the technical research, modelling, and associated analysis and assessment we used to consider options, assess impacts, and design instruments. Both are essential reading for climate policy makers and we offer them as tools to help inform the Canadian public policy debate on climate change and carbon pricing.

This advisory note is organized as follows:

- Chapter 2 provides information on the goals of the carbon pricing policy, which includes achieving the government’s targets, minimizing the costs of achieving these targets and adverse impacts on some segments of society and the economy.
- Chapter 3 provides the essential design elements—or “policy wedges”—of the carbon pricing policy, which includes a unified carbon price across emissions, jurisdictions, and policies in the form of an economy-wide cap-and-trade system, complementary regulations and technology policy, and international abatement opportunities; and stresses the need to manage a credible and adaptable policy over time to deal with uncertainties.
- Chapter 4 provides a detailed design and implementation “road map” for the carbon pricing policy.
- Chapter 5 discusses likely impacts and outcomes from implementation of the carbon pricing policy, including the potential scale of the economic and technological transformation required to achieve deep emissions reduction targets, and potential adverse effects that the carbon pricing policy will need to address; and possible ways auction revenue can be used to address these effects.
- Chapter 6 focuses on issues of implementation and governance in relation to the carbon pricing policy. Key elements of this chapter include the need for an independent and transparent institution to implement the “rules of the game” in order to maintain credibility; the need for monitoring and reporting success; and the need to update expectations that carbon prices or quantity restrictions will rise or fall relative to success.
- The final chapter of the advisory note sets out the NRTEE’s main conclusion and recommendations.

1.3 MODELLING AND ITS CAVEATS

The NRTEE has, for several years and over a number of reports, undertaken economic modelling to help us understand the implications of various carbon pricing and climate scenarios. Each year we are called upon to review and assess the government's own methodologies and modelling as it relates to its annual reporting requirements under the *Kyoto Protocol Implementation Act*. We have also researched and released a report on international best practices in GHG emissions forecasting. This experience and understanding has assisted us in the use and role of modelling in this work and deepened our ability to utilize its results.

For this report we relied on established energy-economy models to conduct our analysis, supplement our knowledge, and inform our advice.³ The CIMS model, with its *fast and deep* scenario from our *Getting to 2050* report, was used to identify technically feasible and cost-effective abatement opportunities for the medium- (2020) and long-term (2050) targets. It was also used to inform our assessment of distributional impacts, to develop the technology forecast scenario, and to assess options for complementary regulations and technology policies. We then supplemented this by applying the TIM and D-GEEM models that explored the macroeconomic impacts of the CIMS modelling results. It is important to integrate macroeconomic considerations with those of capital stock turnover and technology investment. The modelling analysis conducted for this project is in-depth and used the most recent data available. Its assumptions are conservative. Overall, it should be viewed as rigorous and robust in the face of changing economic circumstances, particularly as it considers carbon pricing within a long-term context. Full details of our modelling, including assumptions, may be found in the companion technical background report.

Nevertheless, caveats remain. The most important is the inherent uncertainty that underpins any modelling of long-term targets and policies. We are forecasting a number of factors in the long term and thus there are uncertainties associated with them and how individuals, firms, and jurisdictions will respond to them. What follows, therefore, are not absolute *predictions* of the specific price of carbon and the exact economic and societal outcomes of achieving the government's medium- and long-term targets. Rather, what we set out is advice on how to achieve these environmental targets at least economic cost, and the likely impacts of achieving these targets through implementation of the proposed carbon pricing policy, based on the modelling and research undertaken. Its aim is to inform the collective public policy choices that will need to be made by shedding light and analysis, through our independent process, on what we believe is the best path forward to bring about deep emission reductions in Canada, now and for the long term.

³ Please refer to section 2.2 in the background technical report for more information on our modelling and assumptions.

**CARBON PRICING POLICY
GOALS AND OBJECTIVES**

CHAPTER TWO

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**THE NRTEE'S CARBON PRICING
POLICY HAS TWO GOALS:
TO BE COST-EFFECTIVE AND
MINIMIZE ADVERSE IMPACTS.**

CHAPTER TWO

CARBON PRICING POLICY— GOALS AND OBJECTIVES

The NRTEE's carbon pricing policy has two main goals:

- To be *cost-effective*. We seek to attain the Government of Canada's medium- and long-term emission reduction targets at least cost. The objective then becomes balancing environmental effectiveness with economic efficiency to calibrate the quantity of emission reductions with abatement costs over time as we strive to make emission reductions affordable.
- To *minimize adverse impacts*. We seek to minimize or otherwise moderate adverse impacts on regions, sectors, and consumers. The objective then becomes designing a carbon pricing policy to address and avoid, where possible, adverse distributional outcomes of pricing carbon across our economy.

The pursuit of these two goals are reflected throughout this document. In Chapter 3 we discuss the essential requirements to balance these goals, followed by the detailed carbon pricing policy presented in Chapter 4 that is designed to satisfy both the above goals and address the potential adverse impacts that could flow from the implementation of the policy, discussed in Chapter 5.

2.1

GOAL ONE: ACHIEVE THE GOVERNMENT OF CANADA'S GHG EMISSIONS REDUCTION TARGETS AT LEAST COST

In this advisory note we are interested in identifying preferred policy design options, not in assessing alternative emission reduction targets. This focus on design allows the NRTEE to step away from the discussion of “which target” and more helpfully address questions of policy design to move us forward. We can then make an informed contribution as to how the federal government can best achieve the targets it has set.

Our carbon pricing policy focuses on two main drivers:

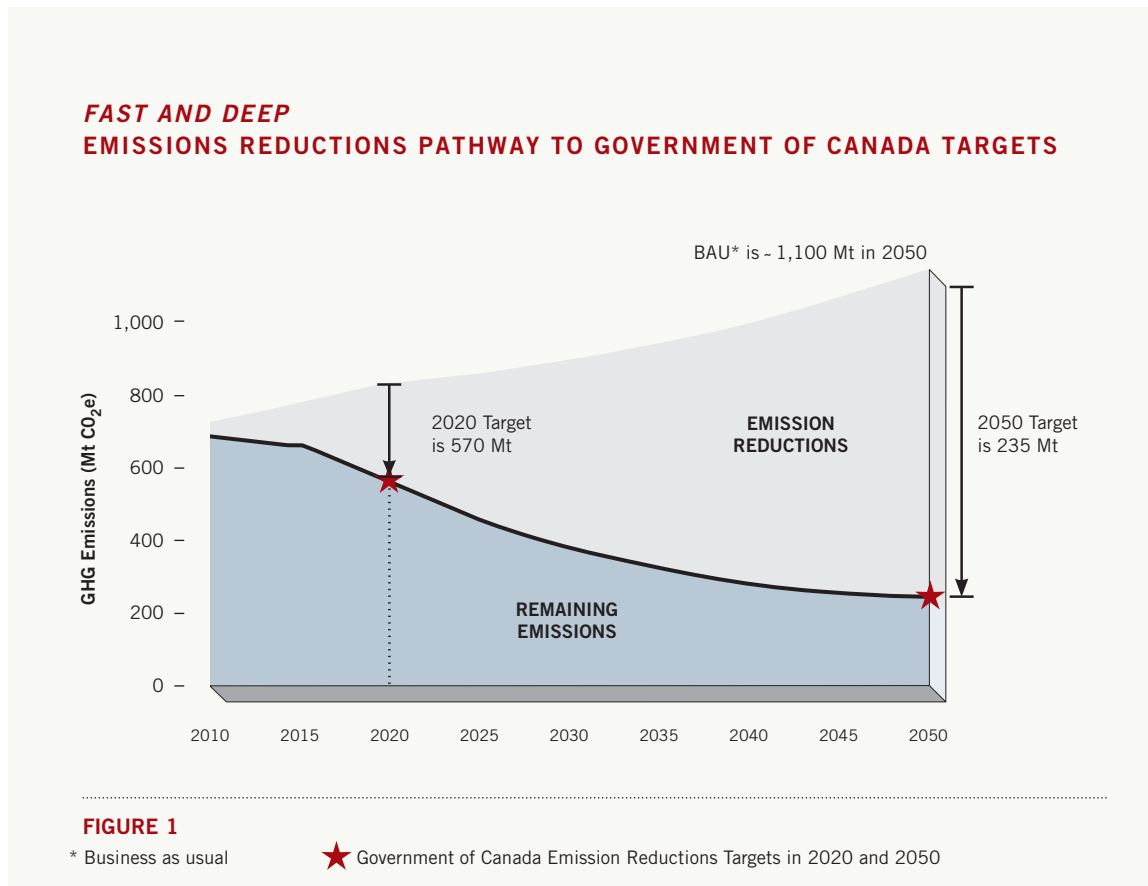
- environmental effectiveness, which implies that the policy achieves a given target;⁴ and
- economic efficiency, which means the policy should deliver those reductions at least cost.

In other words, the carbon pricing policy must integrate both environmental and economic considerations to achieve our desired environmental objectives at the least economic costs. This observation has important implications for the policy the NRTEE is recommending. It implies that whatever policy is implemented, it will have to incorporate design elements that enable cost to be stable within a predictable bandwidth, but at the same time allow emissions to be driven down to levels consistent with the stated emission reduction targets.

The NRTEE has adopted the Government of Canada's medium- and long-term GHG targets of 20% below 2006 levels by 2020 and 65% below 2006 levels by 2050, as announced in *Turning the Corner*. In our *Getting to 2050* report, the NRTEE advised that to achieve these deep emission reductions and minimize overall costs, the policy must put an economy-wide price on carbon. The preferred time path to do so was our *fast and deep* emission pathway, which required emissions to peak at 570 Mt in 2020 and then drop steadily to 235 Mt in 2050.

Figure 1 provides the time path of reductions based on this forecast of future emissions. We have continued to use this pathway for this report but have updated the business as usual (BAU) forecast using the latest available data from Canada's GHG inventory.

⁴ Ideally, the policy would seek to maximize environmental benefits while minimizing costs, however, by using the environmental targets already set by the government, we are able to focus on minimizing costs to meet those targets.



Implicit in that recommendation of an economy-wide carbon price and the reduction pathway to the targets, and carried forward in this current advice, is the principle of cost-effectiveness, defined as:

- Minimize the dollar value of the additional abatement costs per tonne of CO₂e reduced or the *carbon price*.

There are two parts to this indicator: the first is an emission reduction and the second is the cost of abatement. While an emission reduction is straightforward and defined as the quantity of carbon emissions reduced at a point in time, the cost of abatement needs elaboration. We define the abatement cost as the incremental change in annual capital, operating, and energy costs that can be attributed to the carbon pricing policy relative to a world without a policy implemented.⁵ This means that the success of the carbon pricing policy is verifiable if the targets are attained *and* the simple ratio of total abatement costs divided by total emissions reduced is minimized. Similarly, the mix

⁵ We recognize that the cost-effectiveness indicator is not relevant for setting emission reduction targets. Instead, the preferred target setting approach would be to minimize total abatement costs while maximizing cumulative emission reductions between now and 2050.

of alternative design options that make up the carbon pricing policy is assessed based on our first goal of cost-effectiveness. This also implies that the carbon pricing policy we assemble can be scaled to alternative emission reduction targets, that is, the policy should deliver cost-effective reductions regardless of the target. This is an important early conclusion that allows us the confidence to recommend moving now on such a policy despite uncertainties surrounding future climate issues.

We also refer to metrics such as GDP or consumer welfare,⁶ particularly in the context of our assessment of macroeconomic and competitiveness impacts. However, we use the required price of carbon to achieve emissions reductions as our primary metric of cost. Indeed, the carbon price *is* the major driver of macroeconomic and other impacts, and if the policy is cost-effective and achieves the reduction targets then it generally minimizes other impacts such as GDP losses.

2.2 GOAL TWO: ADDRESS ADVERSE IMPACTS ON THE ECONOMY AND SOCIETY

Our primary policy design focus is on seeking cost-effective emissions reductions. Any carbon pricing policy will have some unavoidable adverse impacts on the economy and society generally, but on certain segments more particularly. Our secondary challenge has then been to consider how we can address some of these impacts where they are of particular concern, while preserving our broad-based focus on achieving the deep emission reductions. The current economic downturn does not exacerbate these impacts as they occur over the medium and longer term—in fact, the need for timely action on emissions reductions remains undiminished. Policy design must nevertheless address adverse impacts of the policy in terms of how it performs against the following evaluation criteria:

- **Distributional impacts**—the preferred policy would distribute the costs and financial benefits equitably (as best as possible) among energy producers, households, other industry, and government. The burden of compliance costs can be expected to fall not only on those undertaking abatement efforts, but also on consumers. Closely allied are disproportionate impacts on certain trade-exposed sectors. Ultimately the question is, what are the design options that minimize income effects on disproportionately impacted groups?

⁶ A measure of consumer satisfaction related to consumption and leisure time, but not including benefits related to stabilizing climate or reducing CO₂ emissions

- **Acceptability**—the preferred carbon pricing policy should be broadly acceptable to the public, governments, industry, and other stakeholders. A broadly based level of acceptability will enhance the ability of governments to proceed with the carbon pricing policy and maintain its durability of application over the long-term vision that climate mitigation requires. These concerns specifically involve short-run income impacts on emitters related to stranded assets⁷ and increased costs. Thus, competitiveness and affordability impacts feed into this criterion.
- **Governance and administration**—the government’s ability to implement a significant new policy such as this, which will affect all provinces and territories, virtually all sectors of the economy, and most households in some fashion or another over time, will be tested. This is particularly acute given the current fragmented nature of climate policies across jurisdictions that will require harmonization, and the diffuse and overlapping responsibility across government departments charged with aspects of climate policy that will require integration. The need for transparent processes and institutions to manage the implementation of the carbon pricing policy over the long term is vital.

⁷ A stranded asset is an asset whose market value is less than its book value because it has become obsolete before the completion of its depreciation schedule.

**CARBON PRICING POLICY
ESSENTIAL DESIGN ELEMENTS**

CHAPTER THREE

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**A SINGLE NATIONAL
CAP-AND-TRADE SYSTEM
IS NECESSARY TO UNIFY
CARBON PRICES ACROSS
ALL EMISSIONS, SECTORS,
AND JURISDICTIONS.**

CHAPTER THREE

CARBON PRICING POLICY— ESSENTIAL DESIGN ELEMENTS

This chapter considers the essential design elements of a carbon pricing policy for Canada. It is important to state at the outset that this is not a simplistic question about choosing between carbon taxes or cap-and-trade systems and designing accordingly. Rather, it is how to design a carbon pricing policy that will deliver least-cost reductions in the long term while meeting the government's emissions reduction targets. In order to deliver these reductions over this long-term period, our research concludes that addressing uncertainties is critical. The design of our carbon pricing policy must therefore be able to adapt to new information and situations while keeping us on our emissions reduction track. This leads us to make two important policy design observations at the outset:

- 1.** The carbon pricing policy must be able to implement a unified carbon price across all emissions, policies, and jurisdictions.
- 2.** The carbon pricing policy must send a credible long-term price signal sufficient to drive new investment and technology development and change behaviour, while being responsive and adaptive to changing circumstances through time.

The following chapter discusses how the carbon pricing policy is designed to deliver low-cost reductions. Modelling results illustrate how the essential design elements deliver emission reductions consistent with the federal government's emission reduction targets. We then introduce the rationale for implementing an adaptive policy and describe how policy design can address this need.

3.1 THE ESSENTIAL ELEMENTS OF POLICY DESIGN: A UNIFIED CARBON PRICING POLICY

To achieve stated reduction targets at the least possible overall cost, all emissions must be covered as fully as possible. This requires a unified carbon pricing policy that consciously takes into account all emissions across all sectors and all jurisdictions. If this does not occur, we believe that the cost of the current fragmented carbon pricing policy approach in Canada, characterized as a fragmentation of individual sector and jurisdictional GHG policies sending differentiated carbon prices across emissions, will only intensify adverse impacts. Overall costs rise and the ability to achieve our GHG objectives diminishes the more the current fragmented climate policy continues. A major conclusion of this advisory note is that the costs of a fragmented climate policy across emissions and jurisdictions are unnecessarily high and that the current approach will be an impediment to achieving deep, long-term emission reductions at a manageable cost.

To address this risk of fragmentation, our research suggests that the preferred carbon pricing policy must first seek to send a common carbon price signal across all emissions and jurisdictions using one pricing instrument, and then seek to expand coverage to emissions that are impractical to address with a carbon price alone. Finally, the policy must be consistent with that of our major trading partners and seek to contain the costs of domestic action with lower cost carbon abatement opportunities abroad.

3.1.1 Unify carbon prices across emissions, jurisdictions, and policies

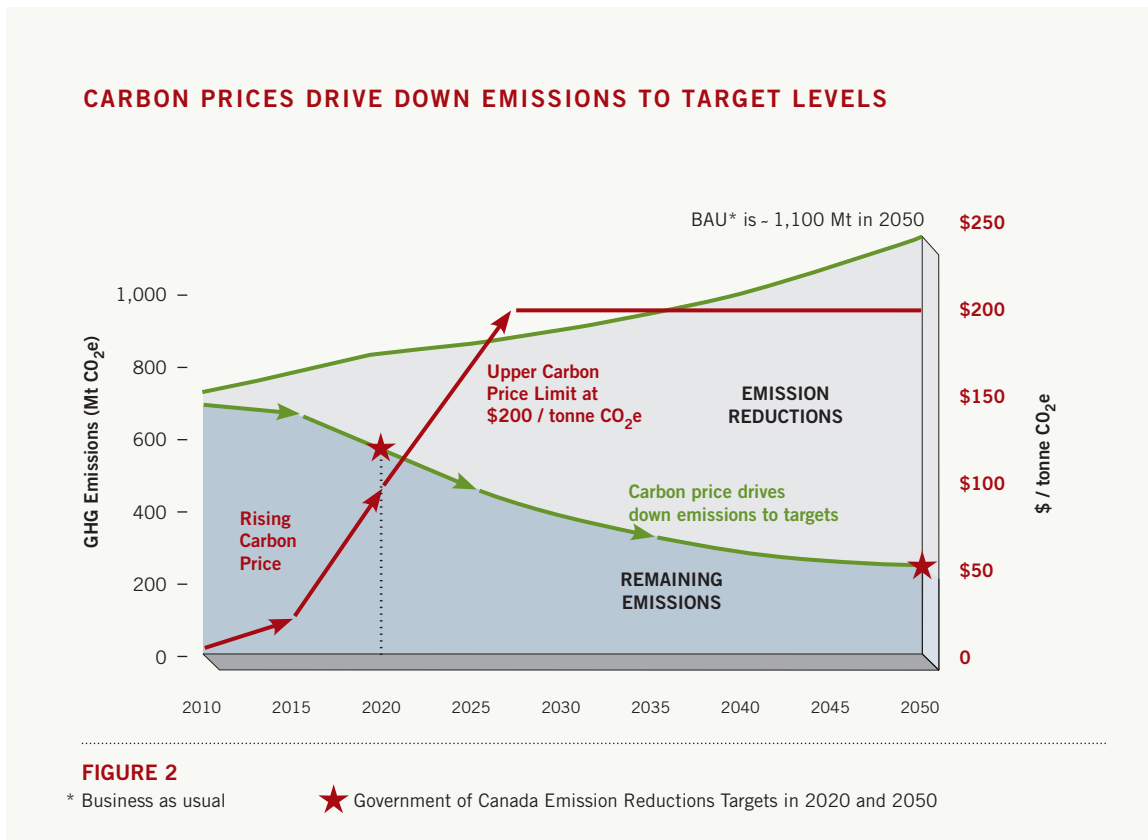
The main driver of cost-effective emissions reductions is the carbon price. In order for the carbon pricing element of the policy to work cost-effectively, three objectives are essential. Carbon prices should be:

- aligned to deliver the reductions necessary to meet the targets,
- uniform across all emissions and jurisdictions, and
- unified through a single national cap-and-trade system.

Align carbon price to deliver the reductions necessary to meet the targets

The main advantage of carbon pricing is that it signals that carbon is valuable and should be managed. The carbon price signals the level of action desired by the policy, and behavioural and investment decisions are then made accordingly. However, a shortcoming of most current federal and provincial carbon pricing policies is that the carbon price signal does not align with the stated targets. This gap between what is required to achieve the targets and what influences technology decisions leads to both high cost outcomes, as technologies are chosen that do not account for rising carbon prices in time, and the risk of not attaining targets, as technology choices are made that are inconsistent with the targets.

A first element of our carbon pricing policy is to identify the carbon prices required to meet the government’s 2020 and 2050 targets. Our research suggests that economy-wide carbon prices will need to rise to \$100⁸ per tonne of CO₂e by 2020 and upward of \$300 per tonne of CO₂e



by 2050 to drive the behavioural change and technology deployment underlying the achievement of deep reductions (Figure 2). Note, however, that to contain domestic costs and improve the cost-effectiveness of the carbon pricing policy (one of our two main goals), an upper carbon price limit is set at \$200 per tonne CO₂e in 2025. With this lower carbon price, domestic action falls short of the targeted emission reductions, requiring more steps.

Make carbon prices uniform across all emissions and jurisdictions

Covering all emissions, in all sectors as well as regions, becomes central to balancing costs while achieving reductions. A second essential element is to harmonize the carbon price seen by all in the economy. Practically, this means that sector-specific exclusions should be avoided so that the carbon price is broadly and uniformly applied across all emissions in Canada's national GHG inventory. But, the current trend in federal, provincial, and indeed international GHG policies, is to exclude those emissions that are perceived to be more politically challenging to address.

Our research indicates that large industrial emitters⁹ tend to face carbon pricing while transportation, light manufacturing, households, and buildings remain somewhat exempt, despite accounting for significant amounts of emissions. Excluding these emissions usually takes the form of differentiated carbon prices, where prices are either low, totally absent, or targeted through limited technology policy. But as Canada ramps up carbon prices to align with GHG targets, the continuation of these trends leads to two main risks:

- *Costs rise significantly when carbon prices are applied differentially across emissions.* If the current path of incomplete coverage of carbon pricing policy on all emissions continues, Canada can expect higher costs as low-cost abatement opportunities are not sought from all emissions. Our research suggests that if lower carbon pricing is applied in the non-industrial sectors, the carbon price in the industrial sectors must rise significantly—by 2 to 2.25 times, or \$200/tonne in 2020 and \$600/tonne in 2050—if we are to still achieve the emission reduction targets.
- *With lower carbon prices in the household, transportation, and light industry sectors, there is a real risk that we will not hit our targets.* While attaining the 2020 target appears feasible under differentiated carbon prices across emissions, we could have real difficulty in achieving the deep reduction targets for 2050, even with theoretical carbon prices at \$600 per tonne. Based on our assessment, emissions do not appear reactive to increasing carbon prices beyond a certain point, and so additional reductions seem uncertain.

⁹ Large emitters are companies that produce goods in emissions-intensive sectors, including primary energy production, electricity production and selected areas of mining and manufacturing production.

The broadly applied carbon price, however, delivers emission reductions uniformly across all emissions. Figure 3 shows sector and regional emissions “before policy.”

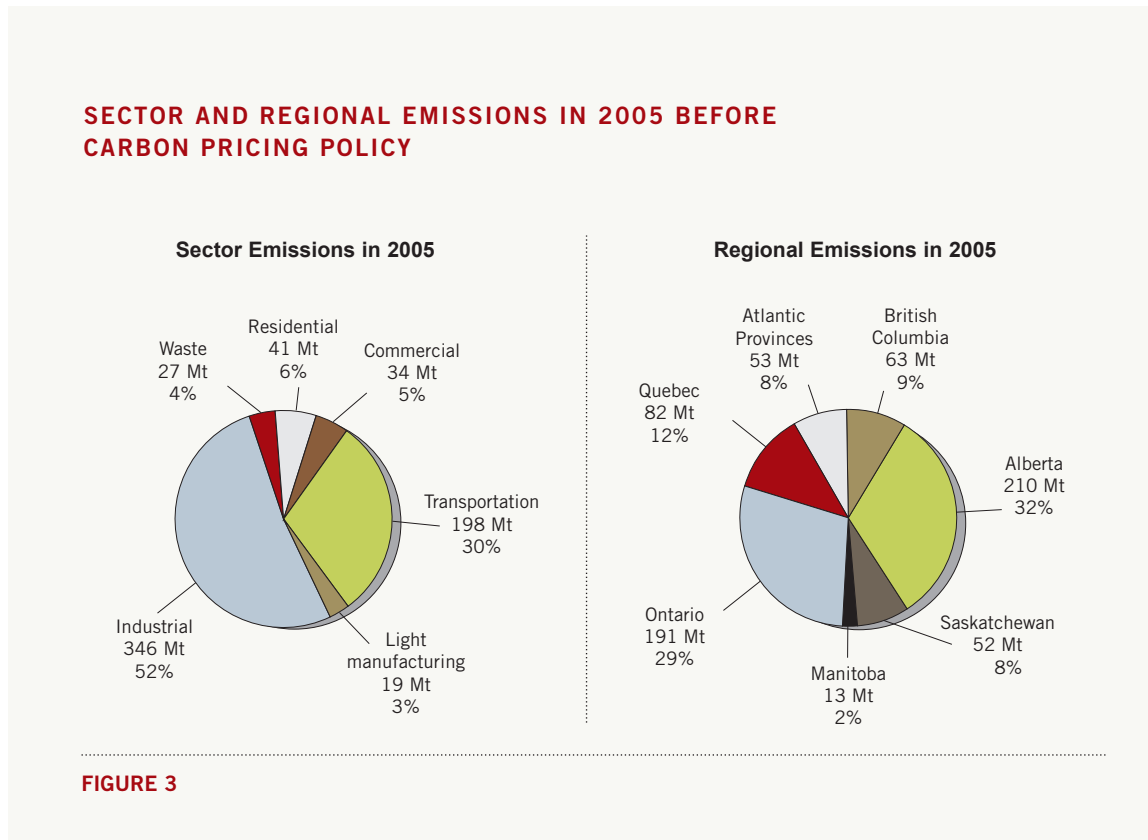


Figure 4 shows the relative contributions of emission reductions in 2020 across all Canadian emissions with the carbon price schedule outlined in Figure 2. While this figure seems to indicate Alberta and Ontario make disproportionate reductions relative to the other regions, in fact all regions and sectors make about the same level of reductions in response to the broad-based carbon price compared with their total emissions without a unified carbon pricing policy.

Just as the issue of unifying carbon pricing policy across sectors and emitters is important, the issue of fragmented policies across jurisdictions illustrates the importance of unifying policy in this area also. This rise of a fragmented or patchwork approach to carbon pricing now being observed across Canada poses risks (1) of notably higher costs for emitters if the targets are to be met, and (2) that overall prices will remain insufficiently low and targets will not be met.

SECTOR AND REGIONAL EMISSIONS REDUCTIONS IN 2020 AFTER CARBON PRICING POLICY

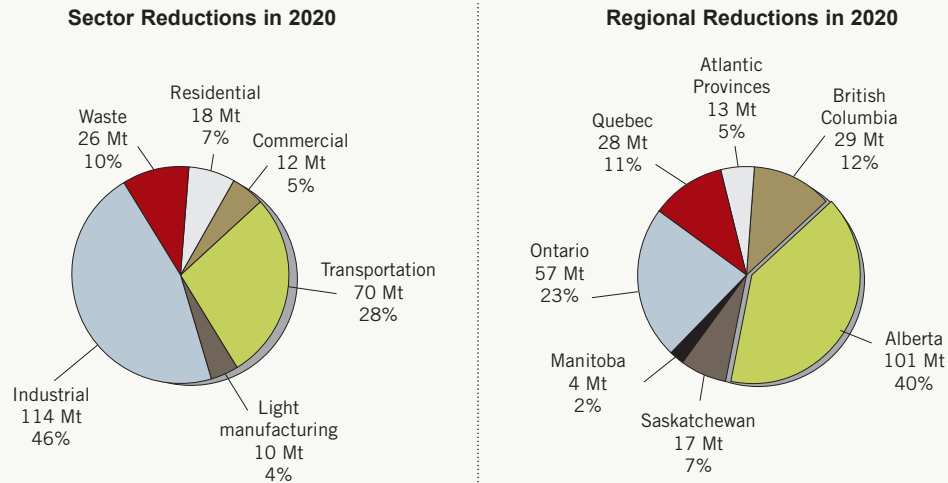


FIGURE 4

To provide a sense of this risk, we explored the cost implications of each region in Canada attempting to reach the national reduction goals on its own. We determined the required emission prices for each region to reduce its emissions by Canada's stated GHG objective of 20% below current levels by 2020 and 65% by 2050. We found that carbon prices would have to rise in the order of 25% above the unified approach, with increases in capital, operating, and energy expenditures 45% higher in 2020 and 25% thereafter (Figure 5). We also found that some jurisdictions, notably British Columbia and Alberta, would face significantly higher costs of achieving their share of Canadian emission reduction targets if they were to act independently. In Alberta, for example, carbon prices in our assessment would have to rise in the order of 300% beyond *fast and deep* prices in 2020, and 175% higher thereafter, if a fragmented policy were pursued without linking to a nationally unified system. In terms of economic impacts, the GDP costs of this fragmentation relative to an efficient unified policy are 7% greater than the unified approach in 2020, 20% in 2035, and 7% in 2050.

HIGHER CARBON PRICES WITH FRAGMENTED POLICY ACROSS JURISDICTIONS

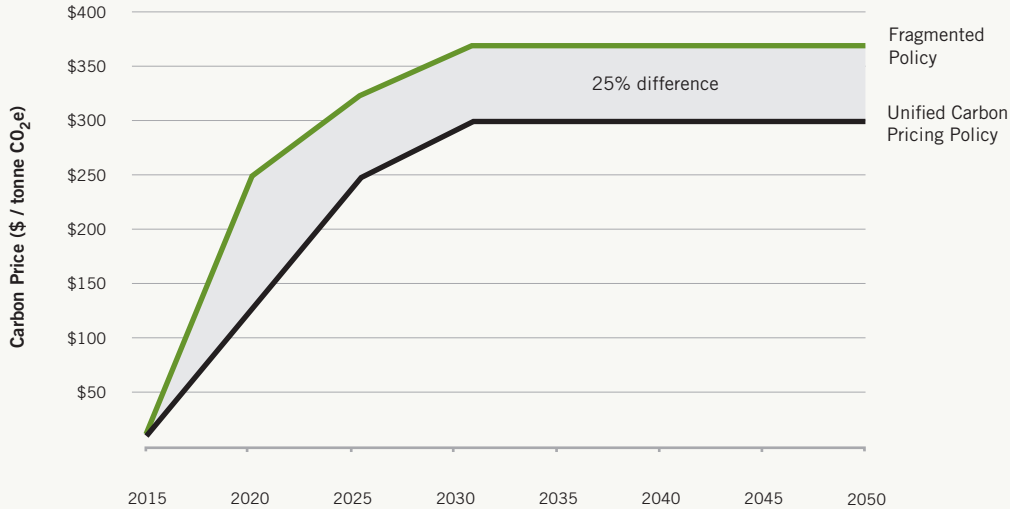
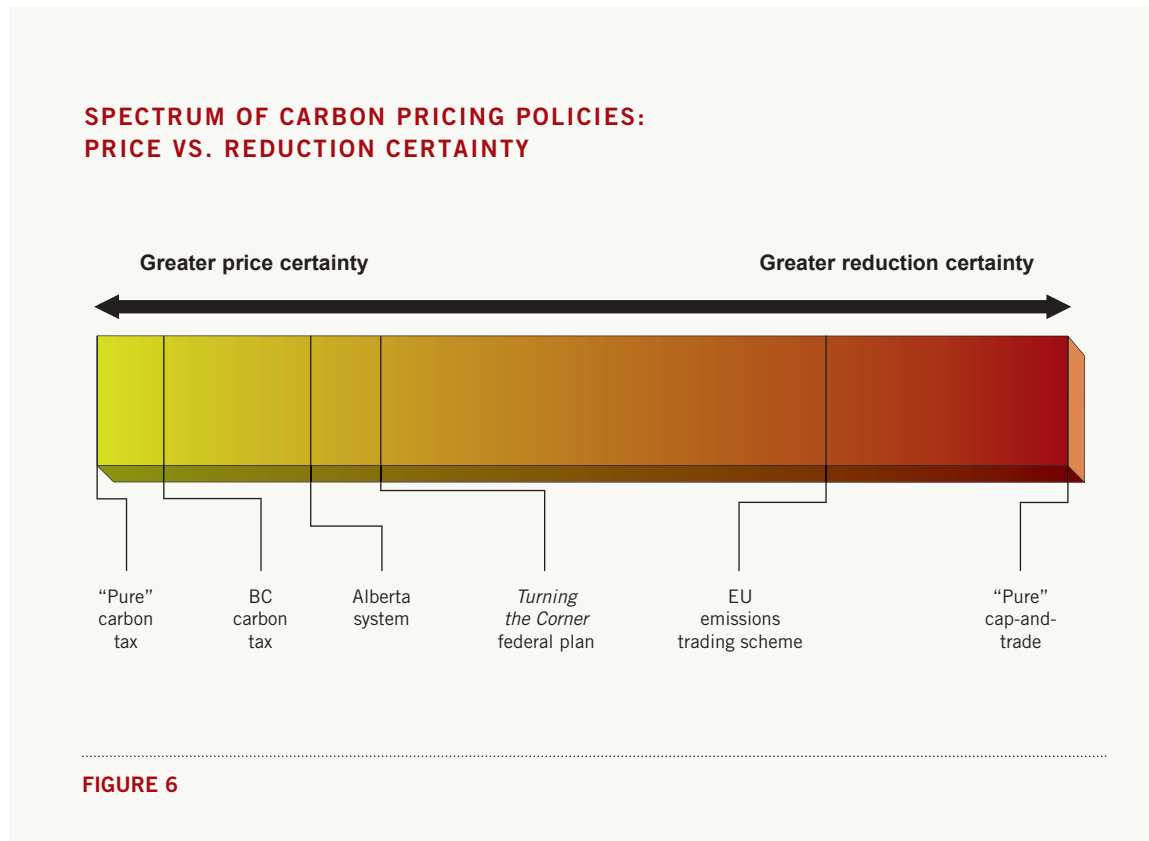


FIGURE 5

Unify carbon prices through a single national cap-and-trade system

The central design question for carbon pricing policy is the choice of a pricing policy instrument. At the outset, the NRTEE determined that in designing an effective carbon pricing policy we would not simply choose between the two principal instruments: carbon taxes and cap-and-trade systems. Each offers a benefit that carbon pricing policy seeks: price certainty through carbon taxes, emissions reduction certainty through cap-and-trade. Put another way, one offers *price-setting* certainty, the other offers *quantity-setting* certainty. In reality, price-setting approaches (taxes) can be blended with quantity-setting approaches (cap-and-trade) as we manage the trade-offs between the two. Figure 6 is a notional illustration of how existing and proposed carbon pricing instruments in Canada are neither a “pure” carbon tax nor a “pure” cap-and-trade system; rather, they blend aspects of one another to deliver on goals of price and emissions quantity certainty.



This consideration has important implications for the policy instrument the NRTEE is recommending based on our research. It implies that the carbon pricing policy must include design elements that enable costs to be contained (thus including features of a tax) *and* allow emissions to be driven down to levels consistent with the stated emission reduction targets (thus including features of cap-and-trade). Any carbon pricing policy must therefore blend design elements of both to enable costs to be stable within a predictable bandwidth, while allowing emissions to be driven down to levels consistent with the stated emission reduction targets.

But we did need to decide on a principal carbon pricing mechanism. In recommending a single, national cap-and-trade system for Canada, two main considerations influenced the NRTEE's choice:

- First, most provincial, federal, and international carbon pricing regimes are actively considering or implementing some form of cap-and-trade for large emitters. Proposals in the US also seek to include other emissions from the rest of the economy. This is important

since it points to an ability to ultimately contain the costs of domestic action alone through the ability to link and trade emissions permits across Canada and with other systems internationally.

- Second, given that cap-and-trade systems are proposed for implementation in multiple Canadian jurisdictions before 2015 (including Quebec, Ontario, Manitoba, Alberta, and British Columbia), it is simpler to transition these systems to one national cap-and-trade system shortly thereafter, thus quickly and effectively coordinating carbon pricing policies.

But with this choice of a national cap-and-trade system, issues remain. The federal *Regulatory Framework* is predicated on a cap-and-trade system for large industrial emitters representing some 51% of the economy's emissions. A first question arises as to how to integrate the 36% of emissions from buildings, households, transportation, and light manufacturing within a single national cap-and-trade system.¹⁰ Another issue is timeliness. An advantage of carbon taxes is their relative simplicity in design and implementation. A second question is therefore how fast a single, national cap-and-trade system can be up and running.

Our path forward is to design a carbon pricing policy that can balance these competing tensions. In this case it is to recommend a single national cap-and-trade program across emissions and jurisdictions, with definitive time frames for implementation. A national cap on emissions would be set for the economy at large. Large emitters would be covered with a portion of this national cap and the rest of the economy would be covered under the remaining portion. The large emitter portion of the cap would cover actual emissions and so address fugitive and process emissions, and provide a signal for carbon capture and storage. The remainder of the cap applied to the rest of the economy (buildings, transportation, and light manufacturing) would be apportioned on the carbon content of fuel purchased by these energy users.

Full trading of permits between large emitters and rest of economy emissions would be enabled under the single national system beginning before 2015. This option meets criteria of timeliness, coverage, and unification of the carbon price by 2015. The inclusion of a price floor and ceiling for permit prices we set out later in this report would ensure price certainty (an upper limit on potential costs) while a cap on emissions allows for quantity certainty. But such a system, with coverage of the non-industrial sectors, would need to be in place as soon as possible to minimize costs and get us started on a low-cost reduction pathway to unify prices across jurisdictions no later than 2020 and meet the government's medium-term target.

¹⁰ Note: the remaining emissions are fugitive emissions from agroecosystems, waste, and solvents. Some of these are dealt with in the discussion on complementary regulations and technology policies.

3.1.2 Expand coverage and address barriers using complementary regulations and technology policies

Getting to 2050 and our subsequent research leading to this report show that carbon pricing is the most cost-effective single measure to drive the adoption of carbon abatement technology in Canada. Yet our research also illustrates that a carbon price alone is insufficient because of market barriers in some sectors of the economy and a reluctance on the part of government and others to impose steep carbon price rises, especially in the short term. Supporting technology innovation, adoption, and deployment will be necessary given the need for widespread deployment of low-carbon technologies required to meet Canada's 2020 and 2050 targets.

As a carbon price alone does not achieve our emission reduction targets, we must look to other complementary regulations and technology policies to enhance the efficiency and effectiveness of the carbon pricing policy. Two types are necessary—one to ensure all emissions are targeted, and the second to address the specific technology barrier issues that impede carbon price signals.

- *Targeted regulations to expand policy coverage to more emissions.* Specific regulations can broaden the coverage of the carbon pricing policy by targeting emissions in certain sectors but do not respond efficiently to a carbon price signal alone.
- *Policies that support technology innovation, adoption, and deployment.* By addressing key barriers to innovation, adoption, and deployment of technology the price signal can have its full impact on the economy.

Carbon pricing is much less effective on its own in the key sectors of transportation, buildings, upstream oil and gas, and agriculture. Our research and analysis indicate that by covering these emissions with complementary policies, additional reductions can be gained while lowering total abatement costs. In modelling complementary policies to extend the coverage of the price signal, the national carbon price was reduced by about 30% from \$300/tonne CO₂e to \$200/tonne CO₂e to reach the same target.¹¹ In effect, the highest cost abatement opportunities were avoided under the carbon pricing component of the policy when regulations expanded coverage.

Many opportunities to develop complementary policies already have precedents in Canada: regulations to capture and use landfill gas exist in several provinces, as do regulations concerning energy efficiency in buildings, and the handling of upstream emissions in the oil and gas sector.

¹¹ Note, however, that higher costs were required in the medium term to account for the lower long-term price (i.e., with an expectation of a lower carbon price in the future, less abatement in the short term occurs, so the carbon price must rise to hit the *same target*).

The existing precedents for regulations in these areas suggest that such approaches are politically acceptable and administratively feasible. A recent NRTEE report on energy efficiency in Canada's commercial building sector called *Geared for Change: Energy Efficiency in Canada's Commercial Building Sector* demonstrates clearly the positive impact of complementary policies working with a carbon price.

The challenge is to ensure that these regulations impose costs that align with the broad-based carbon price so that costs across emissions are unified under both the pricing policy and the complementary regulations scheme. In doing so, governments and industry will need to address the difficult problems posed by institutional, financial, and other barriers within each regulated sector. Such barriers prevent the full impact of pricing and regulatory obligations from occurring, raise compliance costs, and hamper technology development and deployment.

3.1.3 Balance the cost of domestic action with low-cost international carbon abatement opportunities

As more reductions are sought in time, the importance of getting the carbon pricing right intensifies as increased costs are imposed on more and more of the economy. Our research indicates that there is a point at which additional domestic action does not deliver on our cost-effectiveness goal. The rationale for this is straightforward: the costs of abatement rise rapidly as deeper reductions are sought.

Figure 7 illustrates this point. As reductions are sought above 45% below 2006 levels by 2050, the incremental cost to move to our target of 65% increases from \$200 per tonne to over \$300 per tonne, and even higher to reach an 80% target. This observation indicates that at the target levels contemplated by the federal government, the cost of reductions rise faster than the quantity of emission reductions and each tonne reduced becomes more expensive.

Given the rapidly increasing carbon prices required to attain domestic reductions consistent with our long-term targets, a strategy that balances domestic action with real and verifiable reductions from outside Canada makes sense. Figure 8 highlights the benefits of such a strategy. This figure explores three possible scenarios to allow overall compliance costs to be contained: a domestic-alone strategy, a strategy allowing 10% of the government's target to be traded, and a strategy allowing 30% of the government's target to be traded. Most likely, international carbon purchases could be obtained at prices lower than Canadian domestic costs. Therefore, our compliance costs for the same target decline the more international trading is allowed.

THE RAPIDLY RISING DOMESTIC COSTS OF ABATEMENT

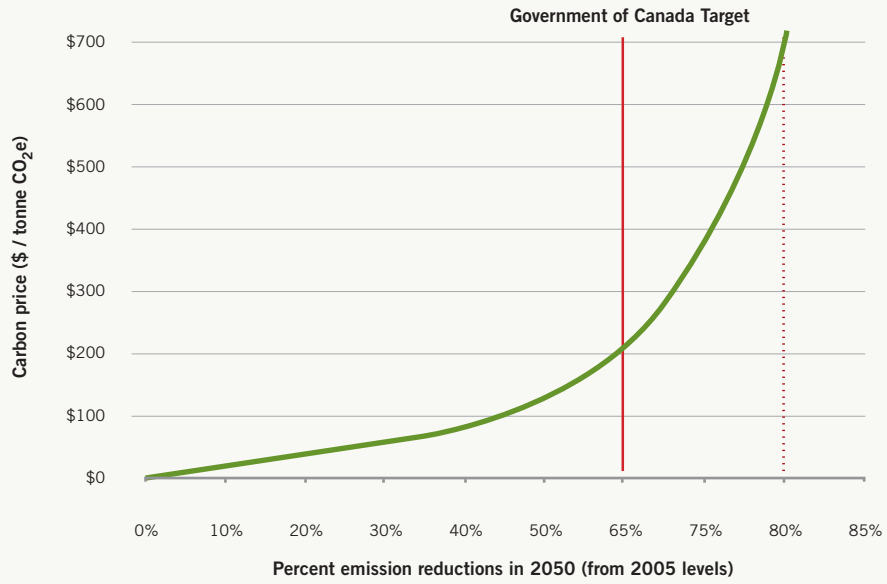


FIGURE 7

COST-EFFECTIVENESS COMPARISON BETWEEN DOMESTIC-ALONE VS. INTERNATIONAL TRADING AND PURCHASES

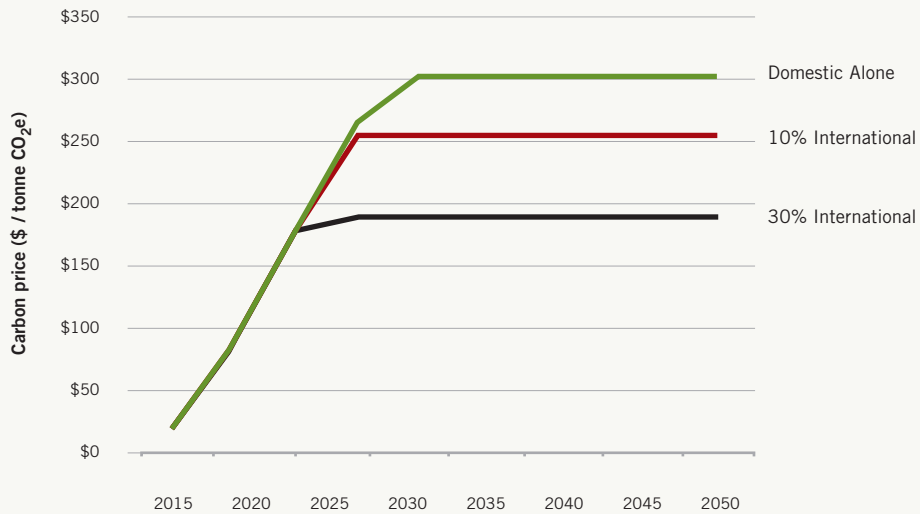


FIGURE 8

Three immediate implications become apparent. First, if the integrity of the GHG targets is to be maintained, any shortcomings relative to domestic emission reductions will need to be made up by having either governments or emitters purchase reductions internationally. This implies either linking with international mechanisms under the United Nations Framework Convention on Climate Change (UNFCCC), or linking directly with other trading regimes in Europe or the US. Canada's carbon policy framework therefore needs to be designed to facilitate such an occurrence. Second, these reductions need to be real and verifiable to ensure that they are not simply "hot air"¹² and that the overall global level of GHGs in the atmosphere is reduced. Third, Canadian firms can benefit by being able to sell domestic credits to firms in other markets.

The NRTEE's carbon pricing policy is therefore designed with a view of eventual linkage to trading partner systems and of participation in global frameworks:

- **Enable linking of trading systems.** Our analysis suggests that Canadian carbon costs of reaching deep targets are likely higher than those of many trading partners. A move to allow trading permits with comparable international emissions trading systems will help contain costs domestically and align carbon prices across trading partners so that overall competitiveness concerns are reduced.
- **Limit domestic carbon prices by enabling international carbon purchases.** Ideally, carbon costs faced by other major trading partners such as Europe and the US would inform the level at which we limit domestic carbon costs and the level at which we then seek international purchases. While international carbon prices are difficult to forecast, in all likelihood international real and verifiable emission reductions can be obtained at prices lower than the domestic carbon prices required to achieve Canada's targets. In developing and assessing our carbon pricing policy, we limit domestic carbon prices somewhat below the levels required to achieve domestic action alone through to 2020 and then limit the prices to \$200/tonne, approximately \$100/tonne less than what would otherwise be required to achieve our targets.

This observation that our domestic carbon costs rise quickly while delivering limited additional reductions reinforces the need to consistently balance the costs of emission reductions with the attainment of the emissions reduction targets. As an exclusive domestic abatement focus does not deliver on our central objective of delivering deep emission reductions at least cost, real reduction opportunities will need to be sought internationally.

12 Poorly-functioning offset systems can create "hot air" credits that do not represent real and additional reductions.

3.2 THE ESSENTIAL ELEMENTS OF POLICY IMPLEMENTATION: AN ADAPTIVE CARBON PRICING POLICY THAT SENDS A CREDIBLE LONG-TERM PRICE SIGNAL

The second essential element of our policy is that it must send a price signal to the economy that is both certain and credible now, but also responsive and adaptive over the long term. It must be certain and credible to change behaviour and drive investment through clear “rules of the game” and responsive and adaptive to new economic and environmental circumstances and information. Policy design must find a way to link these two needs.

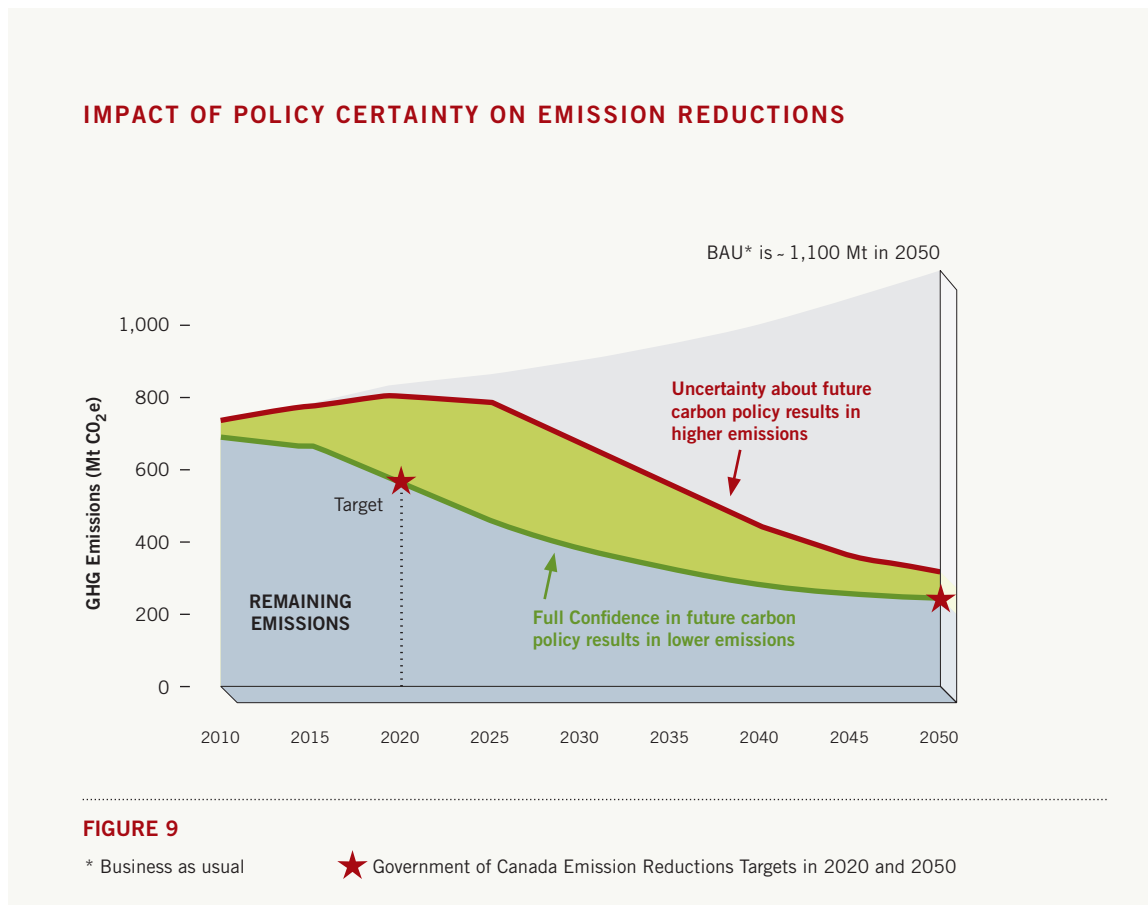
While policy adaptability and policy certainty are essential elements for any carbon pricing policy, there are trade-offs between the two criteria. If a policy has clearly been designed to be flexible or changeable at some future time, uncertainty as to the future nature of the policy follows. On the other hand, an attempt to fix policy in advance would imply a failure to adapt to new information, such as evolving climate science or the policies of Canada’s trading partners. Effective carbon pricing policy needs to find a balance between adaptability and certainty—it should be adaptable to changing and unknown future circumstances but certain enough to transmit a robust, long-term price signal to the economy upon commencement.

3.2.1 Policy certainty is required to influence long-term investment decisions

Firms and households routinely manage risk and uncertainty when making investment decisions. Yet uncertain climate policy raises additional risks. It elevates the cost of capital and alters investment decisions. Policy uncertainty increases incentives to delay investments in emissions-reducing technologies in order to wait for additional information or clearer policy commitment from governments. This is a real challenge as many industry sectors, particularly power generation, oil and gas, and manufacturing, all face significant short-term pressures to invest in new capital stock for the long term. Firms and households both tend to avoid making investments in a climate of uncertainty, especially if there is a prospect that price signals and policy directions will change abruptly, or down the road.

Effective policy is one that clearly and consistently communicates the long-term nature of a carbon pricing policy. Policy certainty therefore suggests that the carbon pricing policy will be maintained and is defined through time. Put another way, policy certainty ensures the price signal is not diluted by uncertainty about the permanence or longevity of the pricing policy. Our research suggests that a clear communication of a government's long-term commitment to a pricing policy is critical to achieving low-cost reductions aligned with the GHG targets. If consumers and businesses believe government might "backslide," or soften pricing policy as a result of political pressure, the policy's effectiveness is reduced.

In Figure 9, two scenarios are presented, one where investments are made with complete confidence in the carbon pricing policy and one where there is no confidence. With a lack of confidence, there is a lower level of overall investment that results in much lower emission reductions. With confidence in the carbon pricing policy, investments reflect the future value of carbon and so preferred long-term technology choices prevail. This illustrates the positive impact of certainty in carbon pricing policy.



3.2.2

Policy adaptability is required given the range of uncertainties

While policy certainty illustrates the importance of uncertainty from the perspective of firms and households, policy adaptability highlights the significance of uncertainty from the perspective of policy makers. Substantial sources of uncertainty complicate policy design, including the following:

- the carbon prices or caps implemented by Canada's major trading partners;
- the urgency of emission reductions, as dictated by evolving climate science;
- the cost and effectiveness of domestic policies;
- the strength of the economy; and
- the distribution of impacts on stakeholders.

Because of these sources of uncertainty, governments face risks in implementing domestic carbon pricing policy, and must take these issues into account. If, for example, Canada were to implement a carbon pricing policy independent of its trading partners, it could subject Canadian industry to heightened competitiveness concerns. If the carbon pricing policy were set too stringently, and emission mitigation costs were unexpectedly high, the Canadian economy could suffer disproportionate disruptions. Similarly, if short-term Canadian emissions reductions were too shallow, Canada might be forced to move toward more aggressive reductions in the future that would have a higher cost.

These risks can be reduced if the policy is designed to be adaptable and flexible. Policy adaptability would allow a policy to respond to new information in the future and help it remain focused on delivering cost-effective reductions consistent with the targets. Principles of adaptive management are applicable here. An adaptive management framework would monitor results and adapt to uncertainties and adverse outcomes. Adapting to policy in time would be important given the complexity of the energy system and the underlying uncertainties described above.

3.2.3

Balancing policy certainty and adaptability

While policy adaptability and policy certainty are important objectives for a carbon pricing policy, there are trade-offs between the two goals. If a policy has clearly been designed to be flexible or changeable at some future time, uncertainty cannot be avoided. On the other hand, fixing policy for the long term implies that it cannot adjust to new information. Our research suggests that a carbon pricing policy should instead strive toward balancing certainty and adaptability; it should transmit a robust price signal to the economy upon commencement, but be adaptable in the future.

Achieving this balance is really an issue of governance: it involves the design of institutions and processes associated with implementing and managing the carbon pricing policy over time. This is particularly true for Canada as a federation with shared jurisdiction for the environment, provincial ownership of natural resources in the ground, and revenue-sharing agreements with provinces for resource extraction offshore. In order to achieve our deep, long-term emission reduction targets, we require an institution and process that can manage uncertainties from the policy makers' perspective through an adaptive approach and manage uncertainties from the firm or households' perspective by minimizing risks of investing in low-carbon technologies and keeping price signals constant and affordable. Further discussion of governance issues related to the implementation of an adaptive carbon pricing policy is found in Chapter 6.

3.3 THE CARBON PRICING POLICY WEDGES

In order to meet our two main goals, we have translated these essential design elements into a workable carbon pricing policy consisting of “policy wedges.”¹³ Together, the policy wedges address each segment of emissions in Canada’s national inventory. The carbon pricing policy also includes an implementation strategy to deliver adaptive policy and certain long-term carbon pricing. We use three policy wedges:

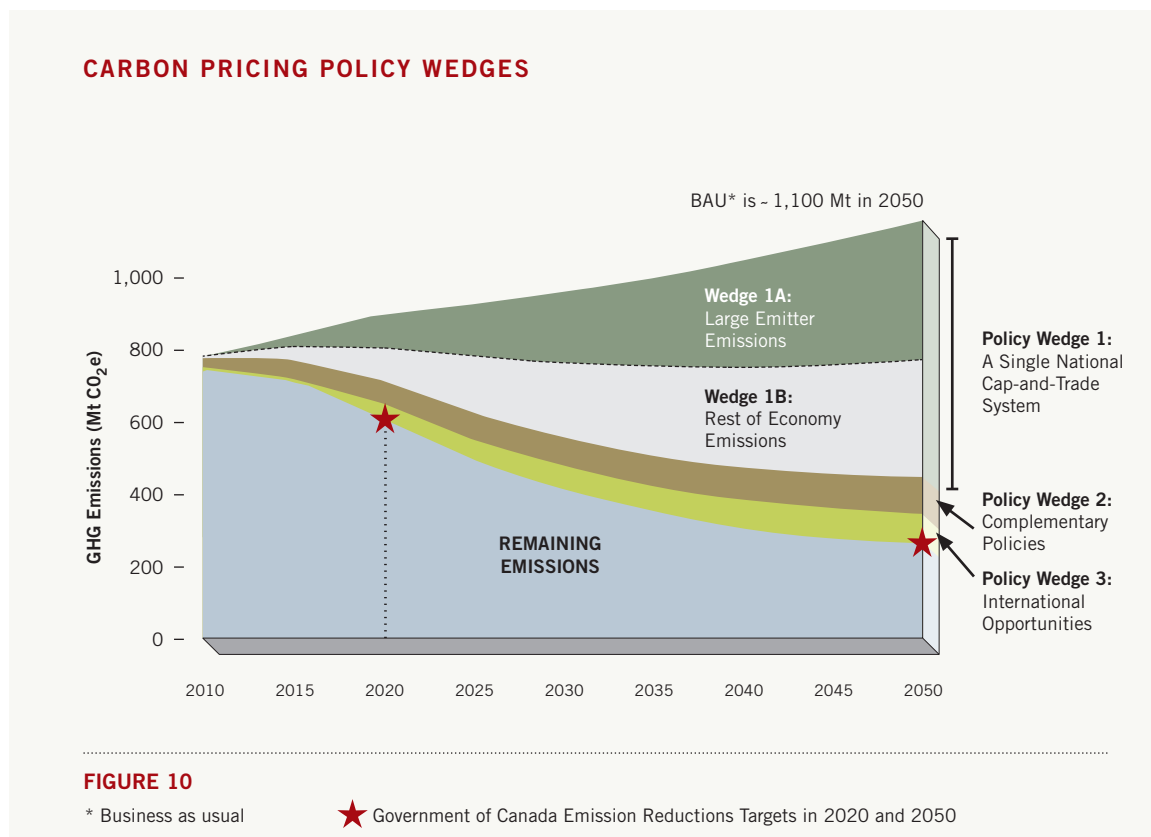
- 1. A Single National Cap-and-Trade System.** This will unify carbon prices and policies across all emissions from all sectors and all jurisdictions, based on one national cap differentiated across emissions:
 - *Large emitters.* This covers approximately 51% of emissions. By setting a maximum carbon price, we can include desirable elements of carbon taxes to enhance price certainty and contain costs while ensuring the cap on emissions works efficiently.
 - *Rest of the economy.* For the 36% of emissions in buildings, transportation, and light manufacturing, a cap would be applied at a point in the fuel distribution chain to those that distribute or import fuel, thereby limiting the number of trading entities while broadening coverage throughout the economy.
- 2. Complementary Regulations and Technology Policies.** Since market failures inhibit the carbon price from reaching all emissions, targeted regulations such as building codes,

¹³ The NRTEE first introduced the “wedge” concept in its 2006 *Advice on a Long-term Strategy on Energy and Climate Change*. While the focus of that note was broadly based on the technology wedge concept developed by Socolow and Pacala (2004), this report has built on that model but instead uses policies, not technologies, as the basis for the wedges.

appropriate regulations, appliance and vehicle fuel-efficiency standards, and targeted public investment through technology development and deployment subsidies would help ensure that all sectors of the economy are contributing to emission reductions and that low-carbon technology deployment occurs in a timely manner. This would include regulations for some of the remaining hard-to-reach emissions.

- 3. International Carbon Abatement Opportunities.** As carbon prices rise significantly from 2015 onward, we need to ensure the cost of domestic action alone is not prohibitive. Access to international carbon abatement opportunities will help align domestic carbon costs with those of our major trading partners and ensure that as carbon costs rise and further units of reductions become more expensive, we do not spend a disproportionate amount for fewer actual additional reductions. In time, international purchases could account for 20% of the targeted reductions in 2020 and less than 10% in 2050.

Figure 10 provides modelling results the NRTEE conducted for these three policy wedges and the contribution of each to the overall reductions in time. They demonstrate how individually and together they reduce carbon emissions and meet the government’s medium- and long-term GHG emission reduction targets.



The next chapter sets out the detailed design features—our “road map”—of the NRTEE’s recommended carbon pricing policy for Canada focusing on each of the policy wedges, showing how they will work. After, we turn to our consideration of the expected outcomes and impacts of the proposed policy on industry, households, and government and how we can mitigate adverse effects. Institutions and processes to manage the policy over time are as important as getting the design right. We therefore discuss important elements of the implementation and governance of a carbon pricing policy that provides long-term certainty but is adaptable to changing circumstances over time.

**CARBON PRICING POLICY
THE “ROAD MAP”**

CHAPTER FOUR

20

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**THE ROAD MAP TRANSITIONS
CANADA FROM A FRAGMENTED
PATCHWORK OF CURRENT
POLICIES TO A UNIFIED
CARBON PRICING POLICY.**

CHAPTER FOUR

CARBON PRICING POLICY— THE “ROAD MAP”

With the main architecture of the carbon pricing policy framed, the focus now turns to policy design and implementation. Our recommended carbon pricing policy combines the three policy wedges. Emissions reductions are broad-based; the initial low, consistent cap and resulting price on all emissions rises over time so that abatement efforts increase as cost and technology becomes more certain and responses and barriers are better understood. Such a dynamic carbon pricing policy implies the need for a design and implementation road map. Approaching this challenge as one of transition, giving the economy and Canadians time to adjust consistent with meeting carbon emission reduction targets, makes the most sense and is the most feasible.

In this chapter we first set out the critical time periods on the road map when key policy objectives must be satisfied, and then present detailed information on the main design features of the three policy wedges.

4.1 TRANSITION FROM FRAGMENTATION TO A UNIFIED CARBON PRICING POLICY

The policy road map is divided into three time periods to transition us to the policy objective of a unified carbon pricing policy. The period between now and 2020, however, is most critical to a successful transition. During this period, the existing patchwork of climate policies across Canada will have to unify to avoid the risk of carbon policy and pricing fragmentation. We will also have to get going sooner rather than later. The three time periods are as follows:

- *The current fragmented period* covers currently announced programs and policies at the national, provincial, territorial, and regional levels from now to 2015. This period is characterized by multiple carbon policies all sending different carbon price signals into the economy. The risk with this fragmentation is that it creates investment uncertainty, leading to a delay in action, or insufficient action to place Canada on a technology trajectory that aligns with our longer-term GHG objectives. Fragmentation in this period is manageable from a cost perspective given that the expected emissions cap and resulting price is lower, thereby lowering the economic risk of a fragmented policy. However, the emissions cap and resulting price in this period will need to rise from zero (or a very low price) on some emissions to upwards of \$50 per tonne by 2015 to ensure we are positioned to meet targets. It will also need to be broadly applied to all emissions, especially those in buildings, vehicles, and light manufacturing outside of the large industrial emitters.
- In a *critical transition period*, between 2015 and 2020, Canada must work to bring together the disparate carbon pricing policies, both across jurisdictions and emissions. At the end of this period all emissions—including those from households, transportation, and light manufacturing—will need to see a stringent cap that is likely to result in a unified permit trading price in the order of \$100 per tonne by 2020. The policy should also prepare for linking with international emissions trading systems.
- *A unified long-term carbon pricing period* should be achieved by 2020 and continue through to 2050. At the start of this period, all emissions are covered under an emissions cap and resulting price of \$100 per tonne CO₂e removed, but the expectation is that the long-term price is actually higher, in the order of \$150–\$200 per tonne of CO₂e removed. As prices increase, access to low-cost yet verified international reductions becomes increasingly important.

With each implementation period defined, we now move on to discuss the specific policy wedges of the proposed carbon pricing policy and map them onto each transition period.

4.2 THE DETAILED DESIGN OF THE POLICY WEDGES

The three main policy wedges are as follows:

1. A single national cap-and-trade system generating a unified carbon price across all emissions with the cap apportioned between
 - a. large emitters, and
 - b. remaining emissions in the economy (buildings, transportation, and light manufacturing);
2. Complementary regulations and technology policies; and
3. International carbon abatement opportunities.

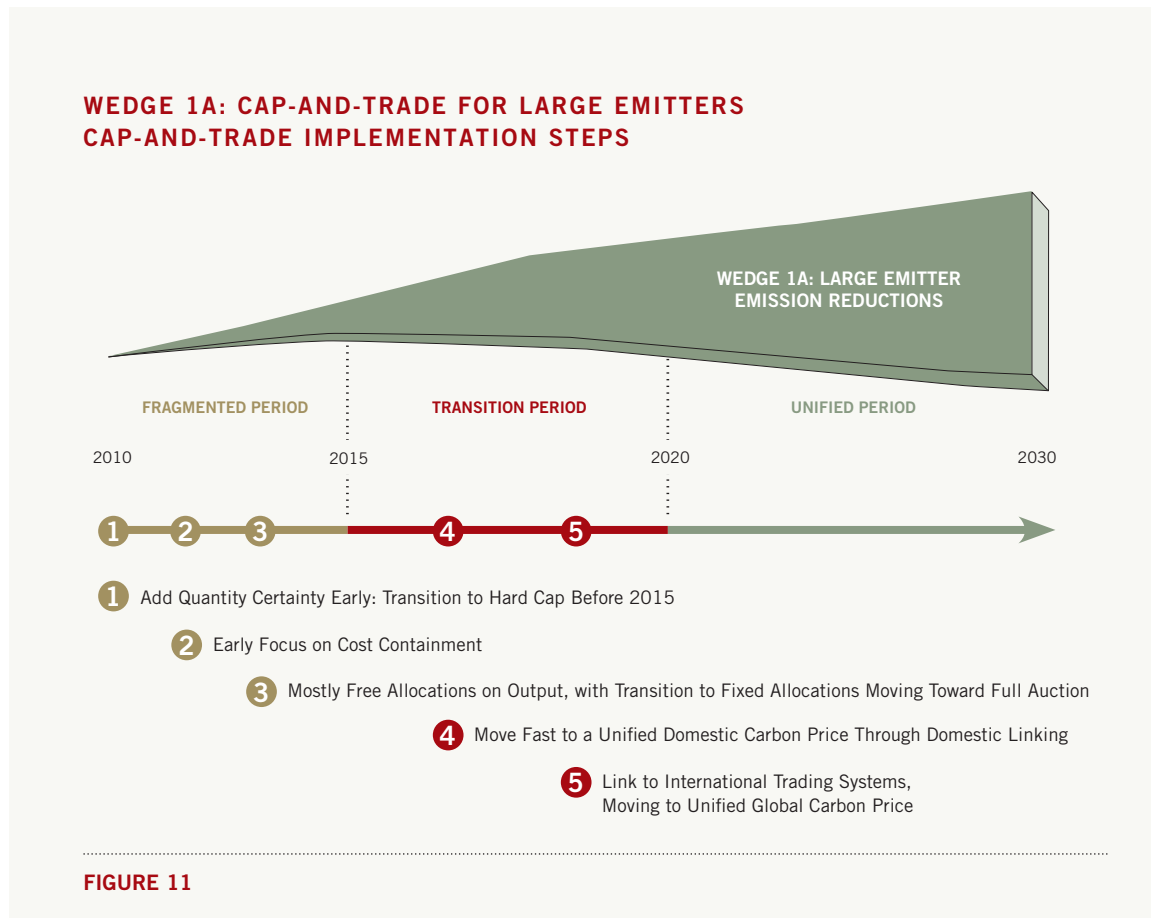
4.2.1 Wedge 1a. A cap-and-trade system for large emitters

The cap-and-trade system for large emitters representing approximately 51% of all emissions would involve setting the annual level of emissions reductions—a cap—by issuing emission permits. If individual emitters produce more emissions than they have permits, they can purchase additional permits through trading. Governments can fix the level of emissions to provide quantity certainty by determining the number of permits to issue, but the price of permits will be set by the market, and is thus uncertain.

The key policy design question is how to transition the current fragmented policies, based almost exclusively on cap-and-trade, to a unified or single national cap-and-trade system no later than 2015. A number of key steps need to take place for this to occur:

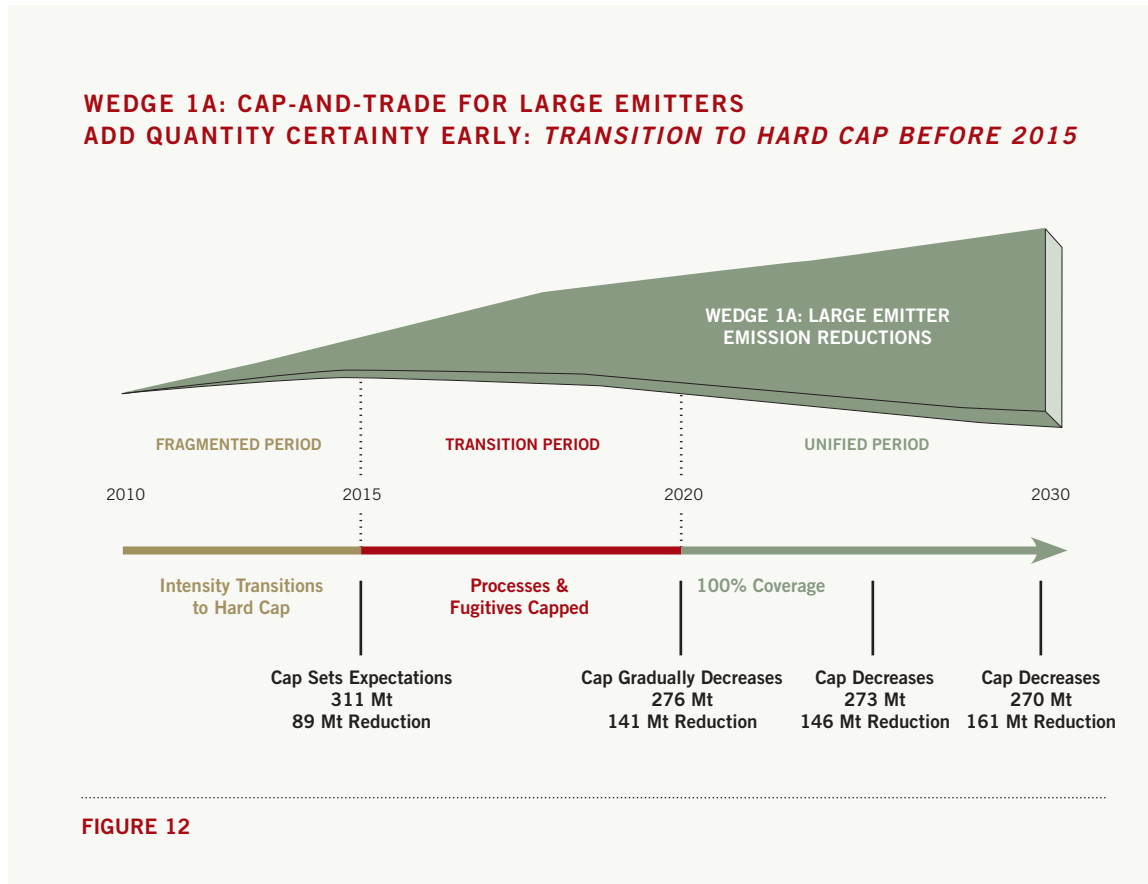
- Transition to a “hard cap” before 2015 to add quantity certainty early.
- Focus early on cost containment.
- Allow mostly free allocations on output, but transition to fixed allocations and full auction.
- Move quickly to a unified carbon price through domestic linking.
- Link with international trading systems to move toward a unified global carbon price.

The implementation and design road map for the large emitter policy wedge is presented in Figure 11, with specific details on each step following.



Step 1: Add quantity certainty early, transition to “hard cap” before 2015

Transition current large emitter policy to a hard cap. A first step will be to transition the proposed federal *Regulatory Framework*, with its intensity-based trading system and offset credits, to include a binding or “hard cap” soon after 2010. While this transition to a hard cap ensures quantity certainty, it does not ensure cost containment. Initially, there should not be a cap on some fugitives or process emissions from large industrial sources. The cap should be expanded shortly after 2015 to include all process and fugitive emissions (Figure 12).



Caps need to be announced well in advance, and reconciled with the medium-term, long-term and rest-of-economy emissions targets. The schedule for bringing down the “hard” cap should be announced well in advance of the implementation of the cap, with a schedule that ultimately corresponds to the share of large emitter emissions in the national target (e.g., 20% below current levels by 2020). Any allowance of short-term emissions above the cap to adjust for cost containment concerns will have to be reconciled with reducing the medium- and longer-term caps to ensure the long-term credibility of the caps. This balancing of short- and longer-term targets signals to participants that any relaxation in short-term caps will necessarily lead to even lower caps in the future—or deeper reductions from the large emitters and the rest of the economy, and a higher carbon price.

Our assessment indicates that the cap for industrial sectors, if applied uniformly as a 20% reduction from 2006 emissions, would need to be 311 Mt in 2015, 276 Mt in 2020 and 274 Mt in 2025.

These represent reductions in the order of 22% below forecast 2015 emissions and 35% below 2020 emissions. But given the need to focus GHG policy on carbon prices, ensuring cost containment is an important complement to the caps on emissions.

Step 2: An early focus on cost containment through a “price ceiling”

Set a high limit on the permit price to contain costs and reduce permit volatility. The costs of achieving the cap will be unknown initially and a “price ceiling,” or maximum carbon price, can be an option to control rapidly rising costs. A low price ceiling reduces expected costs and also price volatility, which is often larger at the beginning of a trading program.

To contain domestic costs through seeking lower cost international abatement opportunities, we set the maximum level of the carbon price ceiling below our expected carbon prices if the targets were achieved through domestic action alone, climbing from \$50 in 2015 to \$100 in 2020 and \$200 after 2025. With this price ceiling in place in 2020, emissions under the carbon price limit for all large emitters are about 325 Mt in 2020, which is a shortfall of about 49 Mt relative to their target. This shortfall must be made up if targets are to be met. In lieu of additional domestic action to reduce emissions, firms would be required to pay an estimated \$360 million¹⁴ to a central government authority, which then makes international purchases to address the shortfall. During the fragmented period, with low carbon prices, a portion of the proceeds could also be used domestically for investments in viable low-emitting technologies to set the ground for later reductions.

Phase out domestic offsets. Offsets, which are reductions from sectors not covered by the cap-and-trade system, may initially be desirable to transmit a broad price signal. But these need to be phased out rapidly before the transition period concludes since most if not all offset opportunities would be eliminated before 2015 given the cap on emissions in the rest of the economy and the complementary policies.

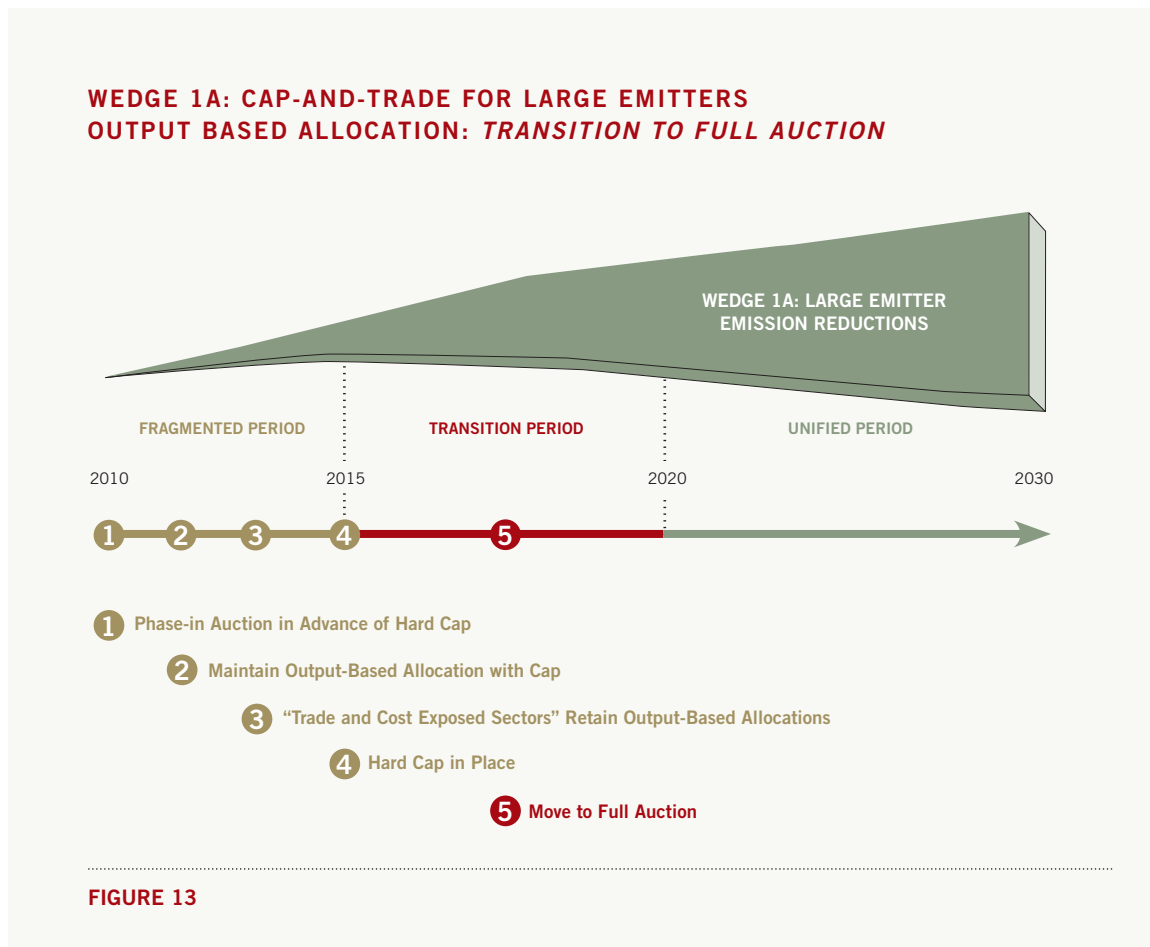
Step 3: Mostly free allocations on output, but transition to fixed allocations moving toward full auction

Standardize allocations with a view of eventual linkage across jurisdictions and internationally.

In transitioning from the fragmented period, how permits are allocated to firms will need to be standardized. If intensity-based systems that set performance standards for industry remain in

¹⁴ Discounted to \$2006 using a discount rate of 8%. This rate reflects Government of Canada standard practice on discounting, with observed discount rates published in the *Canada Gazette* ranging from 6% to 10%.

Canada, as at present, it is likely preferable to continue on this emissions intensity path as the basis for future allocations for a set period of time.¹⁵ In transitioning to a fixed cap, the approach that best aligns with the intensity standard is output-based allocations, which are based on performance relative to an average intensity and as a share of their contribution to production from the sector. Essentially, the intensity-based allocations can continue as long as their sum is less than the cap (Figure 13).



¹⁵ The proposed intensity-based systems under the Government of Canada's *Regulatory Framework* and Alberta's operational *Specified Gas Emitters Regulation*, for example, do not allocate emissions, but instead use sector benchmarks to set performance standards based on emissions and production. Other proposed systems, like the Western Climate Initiative and US congressional initiatives, allocate permits initially, most likely based on emissions, and then move to full auction where allocations are not required. Since the *Regulatory Framework* has not been officially abandoned and a potential cap-and-trade system with the US is neither official nor agreed to by either the US or Canadian governments at this time, our carbon pricing policy takes both of these situations into account. It is designed to either transition from the currently proposed intensity-based system to a hard cap by 2015, or shift sooner to an absolute cap-and-trade system in preparation for eventual linkage with a US system.

A movement toward auction should follow shortly thereafter, where most sectors will need to transition to a fixed allocation (some share free and some share auctioned) and ultimately zero allocation or full auction. However, the implicit subsidy to output using the intensity standards can be counterproductive in many sectors, as conservation is a legitimate means to reducing emissions.¹⁶ One option is to quickly ratchet the intensity standards down to zero, thereby requiring all emissions to be covered through auction or permit purchases. If some free allocation is still deemed to be necessary, the other option would be to use historical data on allocations (or production capacity) during the transition, averaging over the period and applying an appropriate factor to come up with a fixed allocation. While the prospect of future allocations will provide an extra incentive for production during the transition, that is preferred to basing allocations on emissions during that period, where the level of emissions would be influenced upward by the prospect of gaining more allocations later.

The choice of allocation mechanism may also affect the feasibility of linking internationally and the choice of policy for coping with international competitiveness concerns, which are discussed below.

Move toward full auction by 2020. The rationale for auctioning is to capture, for public use, the value inherent in emissions. Auctioning requires firms to bid for emission permits in order to cover their remaining emissions after abatement has been undertaken. Most cap-and-trade systems are moving toward full auction, including the EU emissions trading scheme and most US proposals. Since permit prices are expected to increase at the start of the transition period and a cap limiting emissions would occur shortly thereafter, it seems unrealistic to rapidly transition from free allocations and no cap, to full auction with a cap. Instead, auctioning should be phased in during the fragmented period, culminating in full auction by 2020.

The exception is auctioning in the electricity sector, which should occur immediately. Permit costs in electricity markets can be passed through to customers. Experience from various trading regimes worldwide, including the EU emissions trading scheme, has shown that free allocations to electrical utilities transfers to their shareholders significant wealth that can take the form of windfall profits as carbon costs are passed on to customers, but the permit value is retained by the utility. While effective policy design should address this issue, it might not be as significant an issue in Canada given provincial jurisdiction for electrical utilities. An additional rationale for auctioning in the electricity sector is that by passing on the permit value under auction to customers, electricity prices and conservation are increased.

¹⁶ This allocation method sends a muted price signal through product prices, and so conservation is not fully prompted.

Once full auction is in place at the end of the transition period, the value of emission permits from large industrial emitters in 2020 would be in the order of \$9.5 billion.¹⁷ This would be a significant revenue stream requiring careful consideration as to its use and allocations.

Use allocations to mitigate competitiveness effects on trade and cost-exposed sectors, but decrease use of free allocations as competitiveness pressures lessen. There is no doubt that some segments of the economy will be impacted more than others under carbon pricing. These sectors tend to be both emissions intensive, meaning they use high quantities of fossil fuels, and are trade exposed, which means a high percentage of their output is exported or they compete with imports domestically. But competitiveness concerns are principally about two issues: relative carbon pricing between Canada and its trading partners and carbon leakage that occurs if Canadian production moves to countries without carbon pricing, lowering Canadian economic activity but not global emissions.

If Canada's trading partners implement similar carbon prices and adopt similar carbon pricing schemes, competitiveness concerns decrease. Most of Canada's top trading partners representing 86% of Canada's exports and 72% of imports in 2006 figures are considering implementing climate policy before 2020. This points to a narrowly focused concern over competitiveness for a small number of sectors, with particular risks in the short- to medium-term given the fragmented nature of international carbon prices.

Border carbon adjustments, or taxes or restrictions levied on imported products, are often cited as a means to address competitiveness issues. However, our assessment shows that their broad application increases total costs for Canada. If border tax adjustments are broadly applied on all imported goods, for example, all prices rise, which then impacts not only consumers but also producers as they see their input costs rise. This exacerbates competitiveness concerns by broadly raising production costs, unless the border carbon adjustment includes relief for Canadian exports.

A more effective strategy is to maintain the output-based allocation scheme for trade-exposed and emission-intensive sectors and not move to full auction until major trading partners do the same. This accomplishes two things: first, the output-based allocation acts like a subsidy to production since more allocations are provided with more production while the cap contains emissions growth. Second, the cost of the permits on the remaining emissions is not present, and thus a major source of financial cost is avoided. However, once most trading partners have comparable carbon pricing, output-based allocations generate a larger efficiency cost than they legitimately reduce in leakage, and they should be phased out for these sectors as well.

¹⁷ Discounted to \$2006 using a discount rate of 8%. This rate reflects Government of Canada standard practice on discounting, with observed discount rates published in the *Canada Gazette* ranging from 6% to 10%.

Defining rules to identify which subsectors would experience a financial hardship under carbon pricing is not easy. Care is needed to validate that impacts are due to carbon pricing and not to normal market competitiveness pressures. A screening system could be developed that assesses the ability of the sector to pass on costs to consumers, the extent of trade and carbon exposure relative to foreign competitors, and the financial impact on profitability.

Step 4: Move fast to a unified domestic carbon price through domestic linking

Move from equivalency to standardization in domestic cap-and-trade regimes. While equivalency agreements between provinces, territories, and the federal government can be considered as initial steps in standardizing emissions caps and resulting prices across Canadian jurisdictions, the road to carbon unification will require a rapid standardization of more than just prices. Rules that define and underpin carbon as a traded commodity will also be needed. A movement to standardization will then smooth the transition to a single unified system.

Transition to a single domestic regime with unified rules but decentralized revenue management. Prior to 2020 the federal, provincial, territorial, and regional systems now underway will need to unify under a common set of rules. Ideally these rules would be set under a national authority, agreed to by provincial and territorial governments, to ensure a unified carbon pricing policy across all jurisdictions and prepare the country for international trading. But given the scale and scope of the challenge ahead, active participation of the provinces and territories is essential. Two important functions will need to be determined: setting and implementing the rules of the game, and the fiscal distribution arrangements of generated revenue. Ideally these two functions would be separate, with new administrative functions developed for setting and administering trading rules while existing federal-provincial fiscal arrangements for revenue sharing from corporate and income taxation could be considered for use of auction proceeds until new ones are devised. The key point here is to separate the carbon pricing policy decisions from the revenue recycling or distribution issue in order to maintain the efficiency of the pricing policy to meet our GHG reduction targets. The more the two mix, economic efficiency is likely jeopardized as issues of income redistribution cloud the design of an efficient carbon pricing policy.

Step 5: Link international trading systems to move toward a unified global carbon price

Enable two-way international trading to contain and harmonize carbon costs. If the price ceiling is set low, and more permits issued when the price ceiling is accessed, other trading regimes may not want to link with this system given uncertainties over the credibility of the permits and the associated

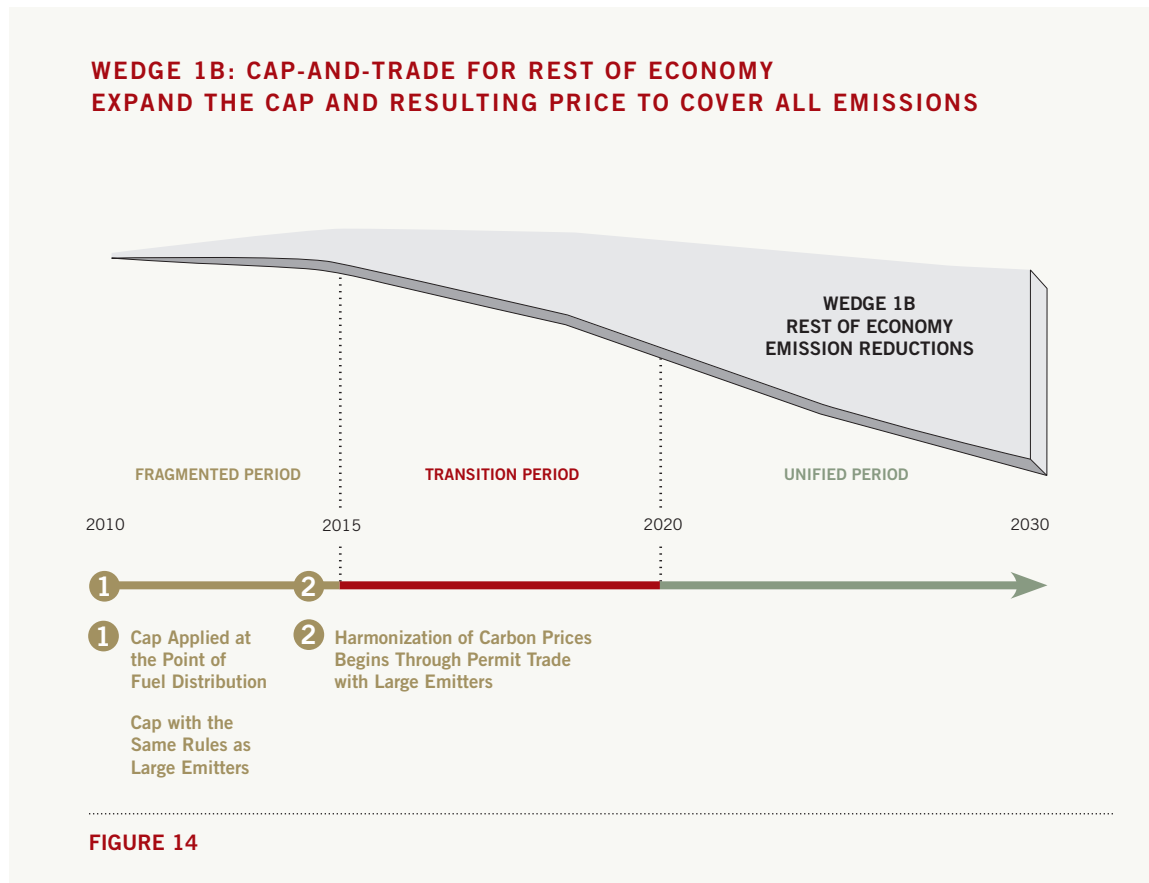
devaluation of permits. Similarly, if the cap-and-trade system includes an intensity cap, or broad offset provisions, linking becomes less desirable for other systems. In the case of the former, the EU emissions trading scheme does not have a price ceiling, which would make linking the current proposed system in Canada with the EU difficult. Similarly, most US climate bills currently before Congress, and the Western Climate Initiative's provisions, limit international offsets. Consequently, a goal of the transition is to look forward with an eye on standardization to make eventual linkage smoother and workable.

Linking may be best introduced on a gradual basis, waiting to observe the evolution of carbon pricing policies and prices in partner countries and then adapting accordingly. Large carbon price differentials could trigger significant financial flows in the form of permit transfers between linked systems. A related point is that permit sellers and permit buyers will not fare the same way under linked systems given that with linking, permit prices will either rise or fall. Falling prices may benefit buyers, but sellers would be worse off. What influences permit prices and hence the gains or losses from linking is the relative targets in the two linked systems and the subsequent costs of achieving those targets. Given uncertainty in both of these, it is not clear linking will automatically be beneficial for Canada. While linking is a fundamental objective of a unified carbon pricing policy for Canada, how it is accomplished must be carefully considered.

4.2.2

Wedge 1b: Cap-and-trade for the rest of the economy

Rapidly expand the carbon price to cover all emissions to keep total costs down. To do so means determining a pricing mechanism for those remaining emissions outside that of large emitters. This includes buildings, transportation, and light manufacturing. We propose a cap and resulting price on the carbon content of fuel purchased by these energy users that would escalate to about \$50 per tonne CO₂e by the end of the fragmented period (2015) and then increase to \$100 by 2020—the same as the price ceiling and expected price in the large emitting sectors under the main cap-and-trade system. At this point fuel distributors upstream would be required to obtain all of their permits from auctioning through the cap-and-trade system. Full trading between this portion of the economy and the large emitters wedge would be enabled under the single national system. No free permits would be allocated to avoid any prospect of creating windfall gains. With the cap-and-trade in place, emissions in this wedge are forecasted to fall from 282 Mt in 2005 to 267 Mt in 2020, and to 190 Mt in 2030. This is set out in Figure 14.



Avoid double carbon price hit for large emitters. Because large emitters are facing an emissions cap and resulting price on their emissions under cap-and-trade, the addition of an emissions cap and resulting price on fuels could result in a double carbon cost for some. As a result, there will be a need to either exempt fuel sales to purchasers who are in the large emitter cap-and-trade category or alternatively reconcile charge payments through tax returns. This process should be not unlike dealing with value added or general sales taxes on inputs for these businesses.

4.2.3

Wedge 2: Complementary regulations and technology policies

Complementary regulations and technology policies are necessary for two reasons: to expand coverage of the carbon pricing policy to all possible sectors, thus lowering costs; and to complement the

carbon price in order to address the issue of market barriers that are present in technology adoption and are not corrected by the imposition of a broad market-based carbon price signal.

In our research and analysis, we were able to lower the carbon price required nationally to attain the targets by both broadening coverage of the overall policy and addressing market barriers through complementary regulations and technology policies. This was achieved by addressing market coverage issues in upstream oil and gas, pipeline emissions, landfill gas, and agriculture sectors, and concentrating market barriers in the buildings and transportation sectors. Note that these regulations are set at levels to align with the carbon prices expected in each period, which do not exceed \$100 per tonne in 2020 and \$200 per tonne in 2050. This ensures that the complementary policies impose similar costs to the carbon pricing element of the policy.

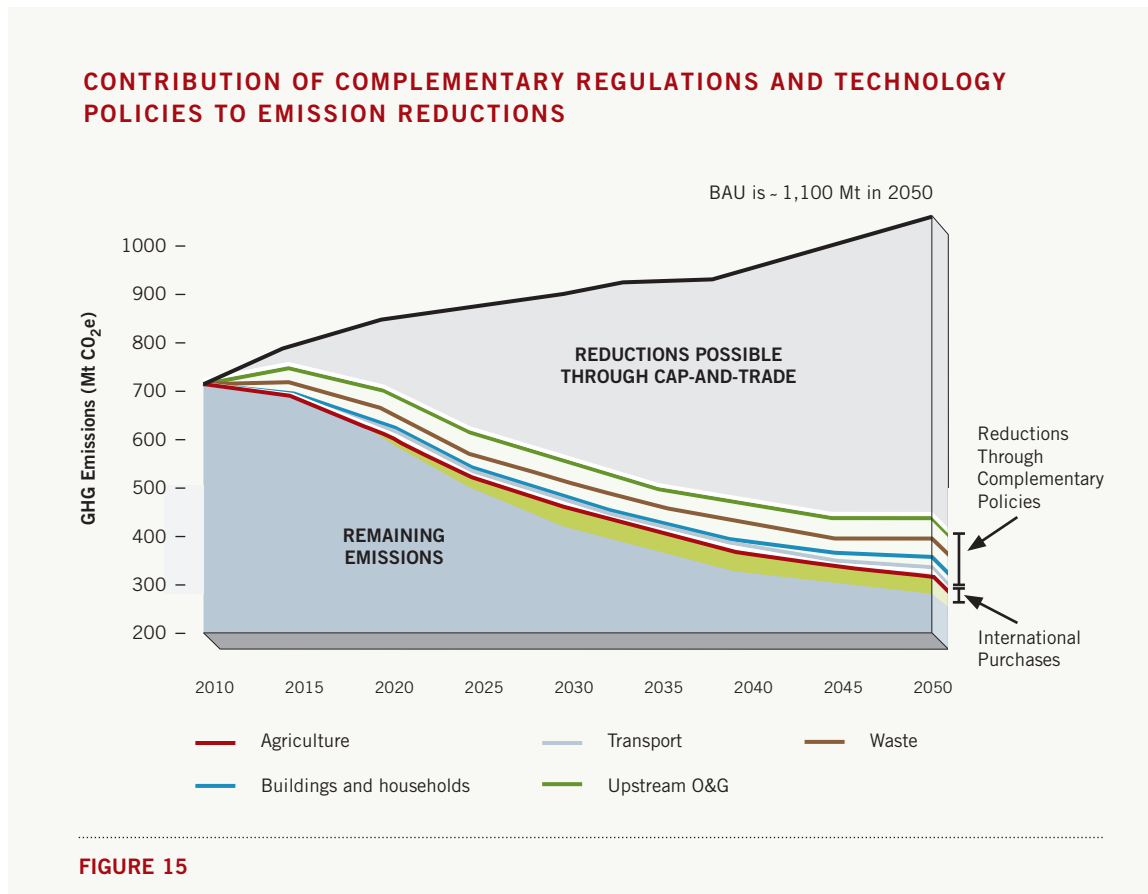
Specific areas were assessed to reduce emissions further and help lower overall costs:

- **High upstream oil and gas venting, flaring, and pipeline leaks:** Regulations would require the phasing out of venting and flaring (other than for safety reasons). Similar regulations could be used for pipeline leaks, with perhaps lower stringency given the technical impossibility of completely eliminating such leaks. Modelling estimated that a program of regulation aligned with *fast and deep* pricing could cut emissions from these sources by around 42 Mt CO₂e per year.
- **Landfill gas fugitive emissions:** Most abatement opportunities from the capture of landfill gas cost around \$15–\$25 per tonne CO₂e. Regulation could require the capture and destruction of landfill gas from all landfills (above a minimum size threshold). Modelling estimated that 25 to 28 Mt CO₂e per year could be reduced this way.
- **Agricultural emissions:** A significant portion of Canada's GHG emissions come from enteric fermentation (25 Mt), manure management (8.6 Mt), and agricultural soil management (23 Mt). Agricultural emissions reductions can be achieved through promoting significant changes in land use and agricultural practices, developing codes of practice, and updating current policies. Policies relating to these agricultural practices already exist but could be improved to meet GHG objectives. We modelled estimated reductions of 8 Mt in 2020 and 13 Mt in 2050 from this sector.

Specific regulations assessed to reduce emissions further and help lower overall costs, include the following:

- **Vehicle emission standards to accelerate reductions in the transportation sector:** Regulations could involve the national adoption of California's GHG emissions intensity policy out to 2020, gradually increasing in stringency to a zero GHG intensity policy by 2040. These regulations imply either complete electrification of the transport fleet or switching to an alternative liquid or gas motive fuel; biofuel and hydrogen are two candidates. The policy delivers 11 Mt CO₂e in 2015, gradually increasing to 68 Mt CO₂e by 2050.
- **Standards to overcome barriers in the building sector:** A widely acknowledged market failure is the disconnect between those who determine the day-to-day use of energy in building structures, and those who own them. The owners of buildings cannot necessarily recover investments in energy efficiency. Rather, the renters or leaseholders, who determine the energy load and pay the energy bills, reap the rewards, but have little incentive to make significant energy efficiency investments as they seldom have secure tenure to their residence. A Leadership in Energy and Environmental Design (LEED) standard or equivalent could be used as a base level for all new commercial buildings, and at least a 50% increase in shell efficiency for all residential buildings compared to current and planned codes. Further opportunities to increase energy efficiency in the commercial buildings sector can be found in a recent NRTEE report entitled *Geared for Change: Energy Efficiency in Canada's Commercial Building Sector*.

Figure 15 shows the positive effects of the complementary policies in inducing emissions reductions when they are used to complement the cap-and-trade system. In 2020, the complementary policies achieve 40% of all reductions and in 2050, 18% of all reductions as the carbon price signal takes effect. In terms of carbon costs, these targeted regulations were able to reduce costs nationally in the order of 15% in 2020, and 35% after 2025. Conversely, we found that misaligning the cost imposed by technology regulations relative to the national carbon price increased overall costs.



The scale of transformation to our energy systems necessary to meet medium- and long-term emission reduction targets is significant, and the sustained technology rollout required important. A number of barriers exist that impede this technology rollout:

- **Limited financing.** Risk and payback horizons also influence investment decisions; if the private perceptions of these factors do not align with the public ones, then policies may be needed to assist financing and manage risks for publicly desirable projects. Technologies for which capital costs are very large are more likely to need preferential financing or guarantees to reduce private investment risks.
- **Scale economies.** Economies of scale are an issue for many new technologies. Until enough units have penetrated the market, production costs are high and support services are scarce. Policies to address this barrier and increase market penetration can legitimately help some new technologies gain acceptance, lower production costs, and get off the ground, but they should be careful to avoid extended support for uneconomic technologies.

- **Distortions from existing regulations and institutions.** Inefficient regulations can impede technical progress. Unnecessary legal and regulatory barriers often favour incumbents and impede the diffusion of new technologies or market entrants. A related point is a lack of regulations to address new and emerging technologies, such as carbon capture and storage (CCS).
- **A lack of information.** For markets to function, they require not only good property rights and competition, but also information. Some product characteristics are easily observable, but others—like energy consumption rates—are not available or credible without government intervention and certainty.
- **Networks and infrastructure.** Some technological options require new infrastructure and support networks in order to function. However, private actors are reluctant to take on activities that supply public goods, and most would prefer to wait for someone else to do it. The resulting network externalities are one important cause of “path dependence” or “technological lock-in,” and public intervention may be required to change paths. Important examples lie in the distribution of fuels for transport: biofuels, hydrogen, compressed natural gas, or plug-in electric would require new fuel (or battery) distribution and storage equipment, as well as new vehicle engines.

Our research and analysis indicate that all these complementary policies will be required at some point during the implementation of the carbon pricing policy. But, there is a need to support technology development and deployment during the implementation period above and beyond the carbon price signal. We note that the need for deployment of technology must occur sooner rather than later. This is particularly the case in the fragmented and transition periods (before 2020), when emissions caps and resulting prices are low relative to those needed to trigger the investments required to achieve the longer-term emission reductions. This scenario requires a targeted public investment strategy, supported by auction revenue, that focuses on the right kind of carbon emission reduction technology. This should be integrated with a government-led, non-prescriptive, broad-based research and development investment strategy.

Given the cost of such an effort, it will be important to develop a clear and affordable framework that focuses on the right kind of investment, eliminates distortionary subsidies, and leverages public and private sector resources from within the sector and across affected jurisdictions. Consideration should be given so that these investments are “scaled” and “sunsetted”—scaled to meet the required need and match capital stock turnover cycles, and sunsetted once the full carbon price signal takes effect, private sector affordability issues diminish, and the technology rollout is in force. To

be effective, public investment must be accompanied by sectoral policies (including regulations, standards, and information programs) designed to encourage an efficient application of that money to the right technologies.

4.2.4

Wedge 3: International carbon abatement opportunities

Our research and analysis indicate that impacts on consumer welfare and gross domestic product associated with achieving Canada's emission reductions targets can be significantly reduced if we purchase international carbon permits and link our domestic trading system with other systems. This strategy helps us to avoid some of the most costly domestic abatement actions by looking abroad, despite the international financial transfer associated with this type of emission permit trading or purchases.

Ideally, carbon costs faced by other major trading partners, such as the EU and the US, would inform the level at which we cap domestic carbon costs and the level at which we then seek international purchases of carbon permits. This policy wedge has the additional benefit of allowing Canada to work internationally to influence carbon pricing to levels that match Canada's domestic abatement effort. While international carbon prices are difficult to forecast, in all likelihood international real and verifiable emission reductions can be obtained at prices lower than the domestic carbon price we have forecast.

Our scenario caps domestic carbon prices somewhat below the levels required to achieve domestic action alone, but high enough to reflect the increasing scarcity and rising cost of international reductions as more countries look abroad for low-cost opportunities. There can be benefits to allowing Canadian firms to sell domestic permits to other firms in international markets. Capping domestic carbon costs at \$100 per tonne in 2020 and \$200 after 2025 indicates that international carbon purchases would need to approximate 52 Mt in 2020 and close to 200 Mt in 2050. The associated financial transfer could be in the order of \$1.9 billion in 2020 and \$200 million¹⁸ in 2050. Any linked permit trading under a unified cap-and-trade system would be additional to this, assuming reductions could be purchased at prices lower than the capped carbon cost outside Canada. This implies an upper threshold price on domestic carbon costs below which linked permit trading could occur with the US or Europe, but above which payments from emitters would be used by government for international carbon purchases.

¹⁸ Discounted to \$2006 using a discount rate of 8%. This rate reflects Government of Canada standard practice on discounting, with observed discount rates published in the *Canada Gazette* ranging from 6% to 10%.

Access to international carbon abatement options is necessary to keep domestic costs down, but can result in significant wealth transfers and questionable environmental effectiveness if not managed well. The environmental effectiveness of such a policy can be reduced if real and verifiable international emission reductions are not sought. The World Bank–managed Prototype Carbon Fund, for example, has received criticism from environmental and community groups for funding large-scale development projects such as a eucalyptus plantation in Brazil, a hydroelectric dam in Guatemala, and a landfill in South Africa. These groups argue that such projects will offer little benefit to mitigating the effects of climate change and may cause social and environmental harm. There may also be distributional concerns over how the reductions are achieved in other countries. A protocol to ensure that the reductions are real, equitable, and sustainable could aid in guiding international carbon purchases.

4.2.5 Emission reductions and cost summary of the carbon pricing policy

With the carbon pricing policy implemented in 2020, including a national cap-and-trade system with full auction, complementary regulations and technology policies, and international abatement opportunities, the total compliance costs could be conservatively estimated at about \$3.4 billion.¹⁹ The policy would generate \$18 billion²⁰ in economic value since the remaining emissions beyond the 2020 emissions reduction target can be bought and sold in the trading market.

To reduce emissions either domestically or abroad to meet the 2020 target will require annual expenditures totalling \$3.4 billion in 2020. Emissions are reduced by 278 Mt in 2020, of which 178 Mt of are from the national cap-and-trade, 52 Mt are from the complementary policies and with the \$200 price ceiling, another 48 Mt from international abatement opportunities.²¹ This then triggers compliance costs of \$1.9 billion for those covered under the cap-and-trade, \$800 million for the complementary policies and \$700 million in international purchases. These figures mask some of the financial flows since the trading market could see permit sales of \$800 million between emitters. As well, with the international purchases, about \$1.7 billion in domestic compliance costs are avoided.

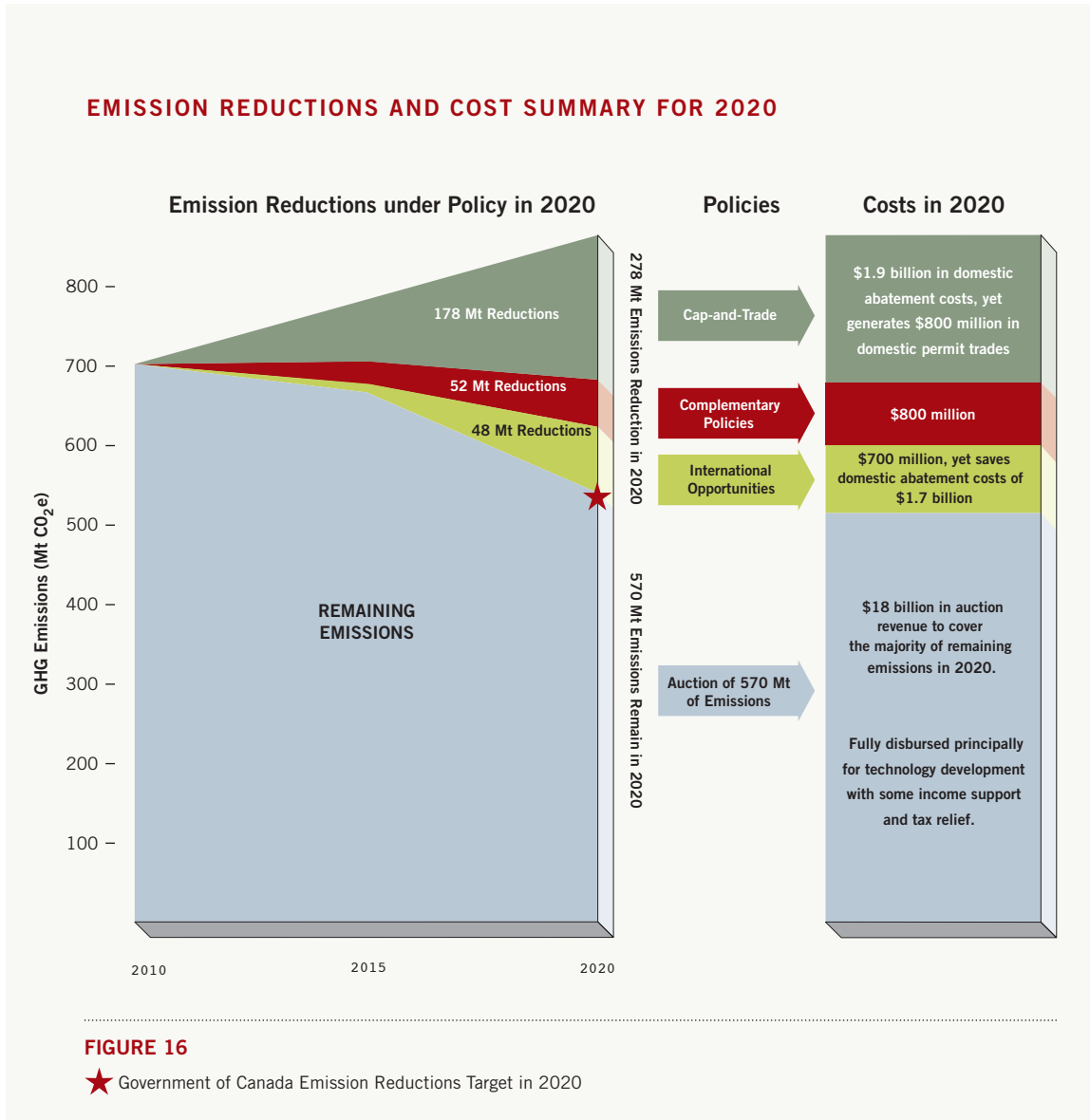
¹⁹ Discounted to \$2006 using a discount rate of 8%. This rate reflects Government of Canada standard practice on discounting, with observed discount rates published in the Canada Gazette ranging from 6% to 10%.

²⁰ The value of remaining emission times the permit price of \$100 in 2020.

²¹ This is likely conservative since we have assumed international purchases are at a price comparable to the \$200 price ceiling. If international purchases were lower cost, the forecast savings would be higher. We have also not included large emitter trade with the US or Europe, which could further lower costs through permit sales and purchases.

The value of the remaining emissions is \$18 billion in 2020. With the policy implemented and the 2020 target achieved, there would still be 570 Mt of emissions remaining. These emissions are valuable since they can be bought and sold in the trading market. How this value is distributed is important given its size. The NRTEE's carbon pricing policy initially recommends free allocation of permits, transitioning to full auction by 2020 to ensure funds are available to smooth the transition to a low carbon economy. Beyond 2020, a minimal amount of free allocations are still recommended on a conditional basis to deal with any interim competitiveness concerns.

There are a number of ways that the auction could be designed, including a uniform auction where the highest bid sets the overall price, and a block pricing auction, where permits are sold at differentiated prices based on bids. Each option leads to a potentially different distribution of the \$18 billion emissions value between government and those large emitters and fuel distributors requiring permits. In Figure 16, we show the maximum value accruing to the government through a uniform auction, where the highest bid price sets the overall auction price for all emissions. As part of the policy, the total auction value is then fully disbursed principally for technology development and deployment, and some select support for impacted households and businesses as well as tax reductions. These revenue options are further discussed in section 5.5.



**CARBON PRICING POLICY
OUTCOMES AND IMPACTS**

CHAPTER FIVE

20

50

**THE TECHNOLOGICAL
TRANSFORMATION TO A
LOW-CARBON ECONOMY
IS SIGNIFICANT BUT
MANAGEABLE FOR OUR
ECONOMY AND CONSUMERS.**

CHAPTER FIVE

CARBON PRICING POLICY— OUTCOMES AND IMPACTS

The NRTEE’s research indicates achieving deep GHG emission reductions requires nothing less than a technological transformation to a low-carbon energy economy. While the scale of this transformation is significant, the likely macroeconomic impacts on industry, regions, and consumers are manageable. Given the nature and sources of energy production and use, these impacts will not be uniform across the economy, the country, or households. They need to be addressed with additional policies beyond that of the essential elements of the carbon pricing policy.

This chapter identifies the broad, likely expected macroeconomic impacts that result from a unified carbon pricing policy designed to seek cost-effective emission reductions. As part of this policy, we need to consider how to mitigate adverse impacts on some segments of the economy and society. Knowing this, we can use the actual carbon pricing policy design to alleviate some impacts and apply other measures, particularly fiscal, to smooth the transition and ensure we stay on target.

Our research points to four main impact areas that must be addressed:

- Macroeconomic impacts—generally small, and manageable over time.
- Competitiveness impacts—primarily sector-specific so focus is known.
- Distributional impacts—for some households to which revenue recycling can ease some economic burden.
- Technology impacts—mostly positive but targeted assistance is still required.

All are important. Together, they both shed new light on the power of carbon pricing to drive transformational change and inform us of where we must concentrate our attention to address its effects.

5.1 MACROECONOMIC IMPACTS ARE MANAGEABLE

Our research and modelling shows that even with a unified carbon price signal, all sectors of Canada's economy and national income will be larger in the future than they are now. On its own, we can expect Canada's national economy overall to grow in the order of 40% by 2020, and 150% by 2050. With an efficient carbon pricing policy, the overall economy would likely be reduced in size from what it would have been by only about 1% to 3% in 2020 and 3% to 5% in 2050. This translates into a reduction in annual GDP growth of about 0.2% relative to an annual growth of about 1.5% to 2% between now and 2050.

Accordingly, under the proposed unified carbon pricing policy, there will likely be no major impacts on the demand for goods and services in the economy, productivity and labour markets, or real incomes. By 2020, domestic demand for goods and services could drop less than 1%. Changes in total exports and imports may change similarly with total trade volumes decreasing in the order of 1% by 2020. Over time, the composition of the economy will likely shift somewhat as less-energy-intensive sectors such as light manufacturing expand, while contractions in the size of energy-intensive sectors and some energy producers is correspondingly small.

With the sustained investments in low-emitting technologies triggered by the carbon pricing policy, both real wages and the labour supply increase relative to a world absent the carbon pricing policy, but likely only marginally. Because the quantity of goods and services supplied falls with increased labour, overall labour productivity declines, but again only by a small amount. Prices in the economy rise somewhat, reflecting the small scale of the necessary technology investments relative to the size of the total economy.

In our carbon pricing policy we discussed the use of permit revenues from auction to reduce the overall tax burden on businesses and households as a means of mitigating the macroeconomic impacts of carbon pricing. Table 1 provides an overview of how the macroeconomic impacts could be mitigated through improving the efficiency of Canada's tax system:

- **Cuts in corporate taxes** stimulate growth and “return” more of the lost GDP and economic output than reducing labour and payroll taxes. Corporate tax cuts implemented with the carbon pricing policy can significantly reduce the GDP impact and can therefore be an option to address competitiveness concerns (discussed below).
- **Cuts in labour (including personal income) and payroll taxes** do not stimulate as much growth as cuts in corporate taxes, but they assist with mitigating impacts on wages and the size of the labour force. Cuts in labour taxes can therefore improve the adverse impacts on households from the carbon policy.

**MACROECONOMIC IMPACTS AND RESULTS OF MITIGATING POLICIES:
CHANGE RELATIVE TO A CASE WITHOUT THE CARBON PRICING POLICY**

	Full auction with reduced corporate tax		Full auction with reduced income tax	
	2020	2050	2020	2050
GDP (%)	0.0%	-2.4%	-3.3%	-4.8%
Consumer welfare (%)	-0.8%	-2.0%	0.2%	-3.2%
Price of foreign exchange (%)	-0.4%	-1.4%	0.1%	-0.6%
Wage rate after tax (%)	-1.3%	-5.7%	-5.0%	5.6%
Labour force size (%)	0.0%	-0.6%	-1.3%	2.5%

TABLE 1

5.2 COMPETITIVENESS ISSUES ARE LIMITED BUT SIGNIFICANT FOR SOME

The seemingly small national macroeconomic impacts mask some impacts on segments of the economy that may be more significant. This suggests a “tale of two economies,” highlighting variability in the likely competitiveness impacts of a carbon pricing policy in different sectors. On one end of the spectrum, non-emissions-intensive and non-trade-exposed sectors (such as the service and some light manufacturing industries) will face small competitiveness implications. At the other extreme, emissions-intensive and trade-exposed sectors (such as industrial non-ferrous smelting) will face more substantial competitiveness risks. This indicates a concentrated exposure for a small segment of Canada’s total economy.

This tale of two economies stems from the reality that for 60% of Canada’s economic output, energy costs account for less than 2% of total costs, while only 12% of all economic output is from sectors that have energy costs greater than 5% of total costs. Also, some sectors have large shares of output traded and high import competition. While this indicates some trade exposure due to carbon pricing in Canada and not in other jurisdictions, many of Canada’s top trading partners, representing 86% of Canada’s exports and 72% of its imports, are actively considering implementing carbon pricing policies before 2020. The specifics of the design and in particular the stringency of these policies, however, remain uncertain.

Under our proposed carbon pricing policy, these competitiveness-exposed sectors could continue to grow, albeit at a slower rate than the rest of the economy. Still, relative to today, it seems feasible that with an efficient carbon pricing policy, the large industrial emitters, who account for about 20% of all economic activity, could be 1.8 times larger in 2050.²² We do note, however, that the transition to this outcome could still result in medium-term impacts that are significant for some. Some highly traded sectors such as iron and steel, cement, aluminum, and pulp and paper would likely experience larger impacts, with slow to negative growth rates between now and 2020.

Our main conclusions on competitiveness are as follows:

- Overall, net impacts of competitiveness issues on the Canadian economy as a result of carbon pricing policy will likely be small.

²² This implies a drop in growth of about 0.3% annually, which means these sectors would be about 7% to 8% smaller in 2050, relative to what they would have been with no carbon pricing policy in place.

- In the short-to medium-term, domestic climate policies and carbon pricing policies can be expected to be implemented by many of Canada's trading partners, moderating the direct impact of competitiveness issues arising from carbon pricing policy alone.
- With implementation of a carbon pricing policy for Canada, competitiveness and leakage risks change over time. Risks tend to be largest in the medium-term, as the stringency of the policy is increased, but decrease after international linkages harmonize prices with major trading partners.
- Some sectors of the economy will be more positively impacted (e.g., electricity generation, office machinery and equipment) while others will be more negatively impacted compared to no change in climate policy (e.g., the natural gas, refined petroleum, and crude oil sectors).

In the carbon pricing policy, permit allocations are proposed as one measure to address competitiveness, with firms that can demonstrate financial hardship able to gain free allocations instead of purchasing permits through auction. This may not be sufficient by itself, especially prior to 2020 when major trading partners may not have imposed similar carbon costs on their industries. Some other short-term measures may be required, such as using auction revenue to reduce corporate taxes. These options are discussed in more detail below.

5.3 DISTRIBUTIONAL IMPACTS FOR SOME HOUSEHOLDS AND COMMUNITIES WILL CREATE CHALLENGES

A story similar to that of competitiveness can be told about households. Carbon pricing alone may have a disproportionate impact on low-income households and equitable carbon pricing policy should address this issue. Revenue recycling mechanisms can be used to reduce or reverse regressive distributional effects, as discussed in section 5.5.

We assessed the impact of *fast and deep* carbon pricing on Canadian households in 2020. Data from Statistics Canada shows that income groups differ in their consumption patterns, and that as a result they differ in their production of greenhouse gas emissions. In general, higher-income households are responsible for more greenhouse gas emissions than their lower-income counterparts. The highest-earning 20% of Canadians are responsible for approximately four times more greenhouse gas emissions than the lowest-earning 20%. This means that under a uniformly applied carbon

pricing policy, highest earning Canadians would pay four times more. But this group earns six times more income than those at the opposite end of the spectrum, so the amount paid by higher earning Canadians would be smaller as a proportion of all income. This explains why some believe carbon pricing to be regressive.

Given income constraints, lower-income households are also less able to adjust their behaviour and spend on technology or energy efficiency measures in response to a price. Illustrative modelling conducted by the NRTEE estimates that lower-income households could pay nearly twice as much as higher-income households as a proportion of income, even though the price of carbon will cost less to them in absolute terms. For the 20% of Canadians with lowest income, a carbon price of \$100 per tonne in 2020 would add approximately \$1,000 a year to living costs, or just over 3% of their average disposable income ²³ (Figure 17). It is important to note, however, that these costs assume no change in behaviour or use of new technology so they could be less.

BURDEN OF A \$100 / TONNE CARBON PRICE ON HOUSEHOLDS AS EXPRESSED AS A PER CENT OF DISPOSABLE INCOME IN 2020

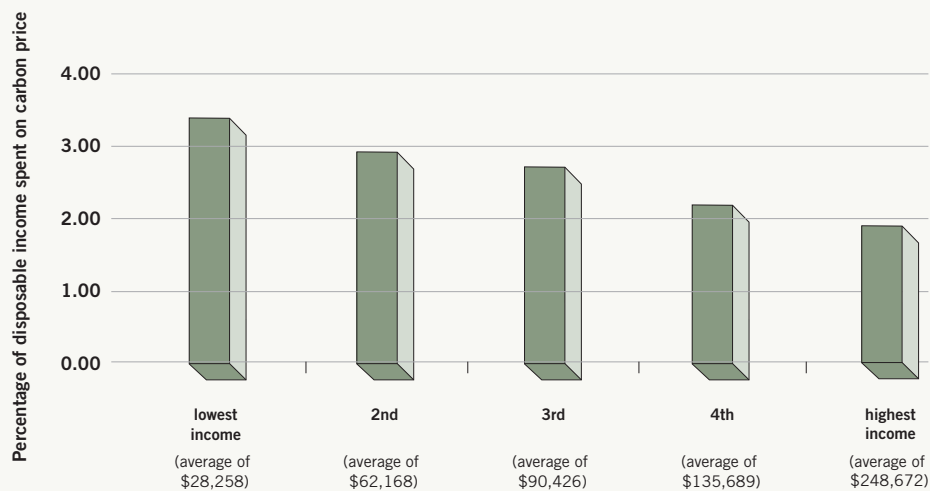


FIGURE 17

Note that the figure assumes households make no abatement efforts. In reality, households will respond to the price signal to reduce their costs, and actual expenditures will be less than as illustrated in this Figure.

²³ As defined by Statistics Canada, personal disposable income is the amount of income individual Canadians and unincorporated businesses have left over after they have paid their income taxes and social security contributions. This is different from total personal income, which is calculated before income taxes are deducted. Disposable income consists of all wages and salaries received by persons, self-employed and other unincorporated business income, interest and dividend income received by persons, plus unemployment insurance benefits and other transfers paid from governments to persons, minus income taxes (but not customs or sales taxes on commodities) and social security premiums paid to governments.

Carbon pricing will also affect households differently depending on the type of community—rural or urban. The average rural household will likely pay nearly 20% more, as a proportion of income, than inhabitants of major cities with populations greater than 500,000. Different effects drive the variation in relative financial impact of urban and rural households. First, on average, rural Canadians have lower incomes than urban Canadians. And while carbon pricing will have a disproportionate impact on lower-earning households, such analysis needs to take all discretionary income into account. Costs of living tend to be lower in some rural areas with higher levels of home ownership and lower property taxes, for example. Second, rural lifestyles may be more emissions-intensive in some cases, with limited access to public transit and in many cases greater distances to travel to access services. The data does not support a conclusion about which of these effects (differences between income and differences in lifestyle) is more significant.

Northern and remote communities face a particular challenge from carbon pricing. Prices of goods and services in many remote communities are already heavily influenced by the costs of energy, and carbon pricing will add to these transportation costs. Using the Northwest Territories as an example, it is noted that electricity prices for households there are typically at least three times higher than those in Vancouver or Winnipeg. Figure 18 shows the different impacts relative to income for rural and urban communities.

BURDEN OF A \$100 / TONNE CARBON PRICE ON HOUSEHOLDS BY COMMUNITY SIZE IN 2020

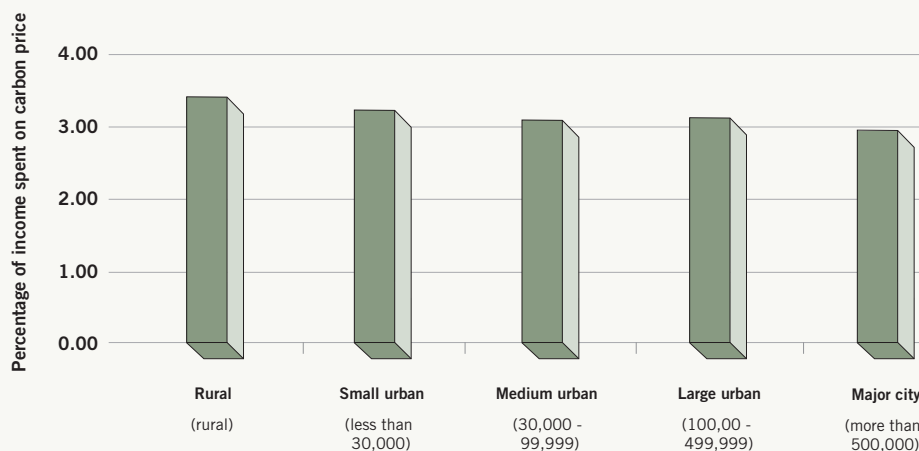


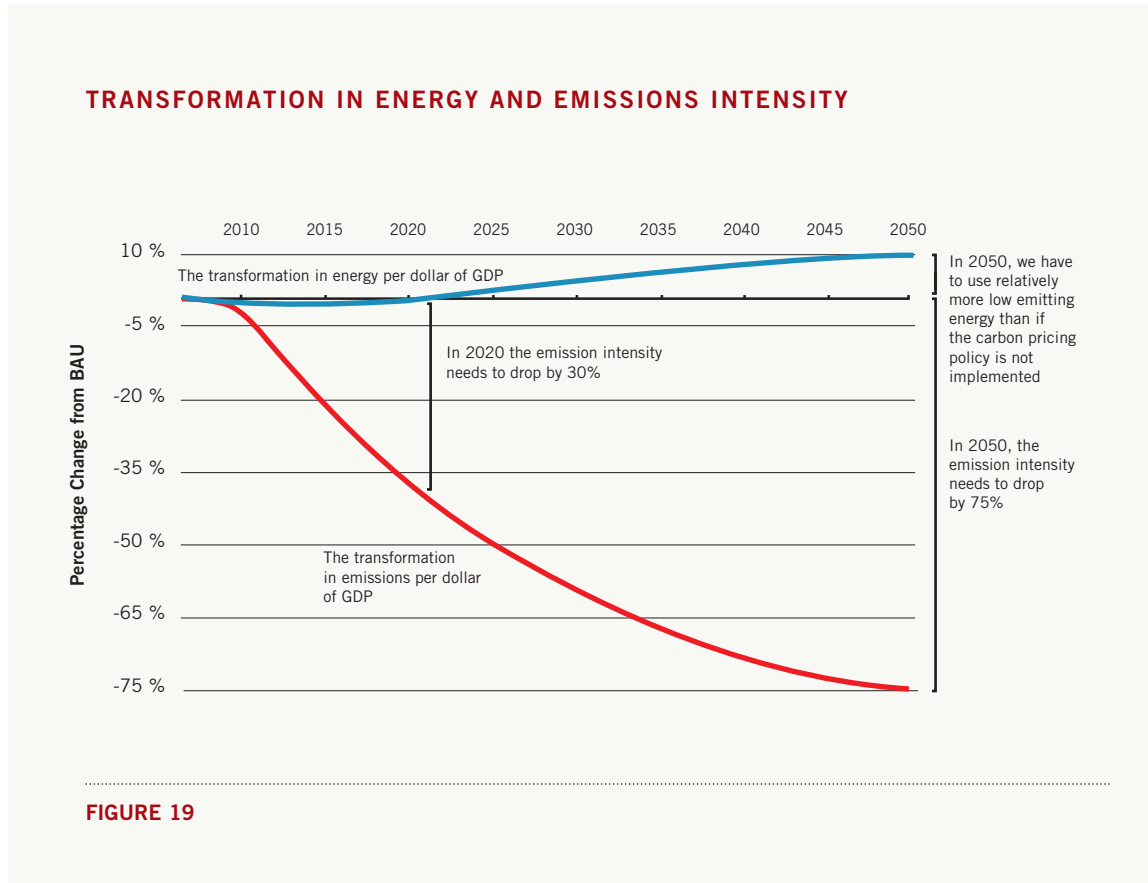
FIGURE 18

Clearly, important impacts can be expected on some households with the carbon pricing policy implemented. Our assessment indicates that as carbon prices rise, these impacts will become more acute unless mitigating action is taken. This indicates an ongoing and sustained need for income support measures delivered directly or through the tax system for some adversely impacted households, rather than outright exclusions from carbon pricing impacts that would make Canadian policy more inefficient and costly.

5.4 TECHNOLOGY DEPLOYMENT IS CRUCIAL TO SUCCESS

Our research and analysis demonstrates clearly the positive impact carbon pricing has on fostering technology development and deployment. This is crucial for generating the investment needed to develop and deploy new low-carbon technologies particularly in the energy sector. With carbon prices rising to \$100 per tonne of CO₂e by 2020, and upward of \$200 per tonne CO₂e by 2050, we can expect a significant incentive to deploy low emitting technologies. Our research suggests that with carbon prices at this level, behavioural change and technology choice will be influenced to levels that can decouple energy use from emissions, while sustaining national income and a vibrant economy. Under our unified carbon pricing policy, Canada's emissions intensity (or emissions per dollar of GDP) will decline in the order of 35% by 2020, and 75% by 2050 relative to what would happen absent the carbon pricing policy. At the same time, we could maintain or increase energy use relative to a future without the carbon pricing policy in place, increasing the amount of low-emitting energy used to produce goods and services in the economy (Figure 19).

The scale of the transformation and the underlying technology deployment to achieve this decoupling should not be underestimated. The necessary investment throughout the economy may need to increase by \$2.2 billion per year in the medium-term and \$2 billion per year thereafter.²⁴ This could mean that capital expenditures on low-emitting technology would be 5% higher annually than they otherwise would have been between now and 2030, and 7% higher annually in the longer-term. Much of these expenditures must occur in the electricity generation and biofuels manufacturing sectors with significant outlays in industrial sectors for CCS. While most sectors can expect an increase in investments, decreased investment in the transportation sector is also likely due to a shift toward smaller, less expensive vehicles as well as movement toward greater use of public transportation.



A few notable technology trends are worth mentioning (and are highlighted in Figure 20):

- The electrification of the economy.* The economy will not only reduce its dependence on fossil-generated electricity, it will also significantly grow the quantity of non-fossil-generated electricity produced. In our drive to decarbonize, we will use electricity more widely in our industrial processes, in transport, and in our buildings. Our modelling analysis suggests that the electricity sectors will grow under the carbon pricing policy by 25% above forecast levels by 2020 and 50% by 2050. All of this will need to come from a comprehensive portfolio of low- or zero-emitting generating technologies, notably CCS, hydroelectric power, nuclear energy, and renewables. A movement to low- or zero-emitting generation is therefore an important cornerstone of the electricity sector transformation. To ensure that electrification is sustainable, however, it will be necessary to reflect the full economic, environmental, and

24 Discounted to \$2006 using a discount rate of 8%. This rate reflects Government of Canada standard practice on discounting, with observed discount rates published in the *Canada Gazette* ranging from 6% to 10%.

INVESTMENT CHANGES IN KEY ECONOMIC SECTORS IN 2020 AND 2050 RESULTING FROM CARBON PRICING

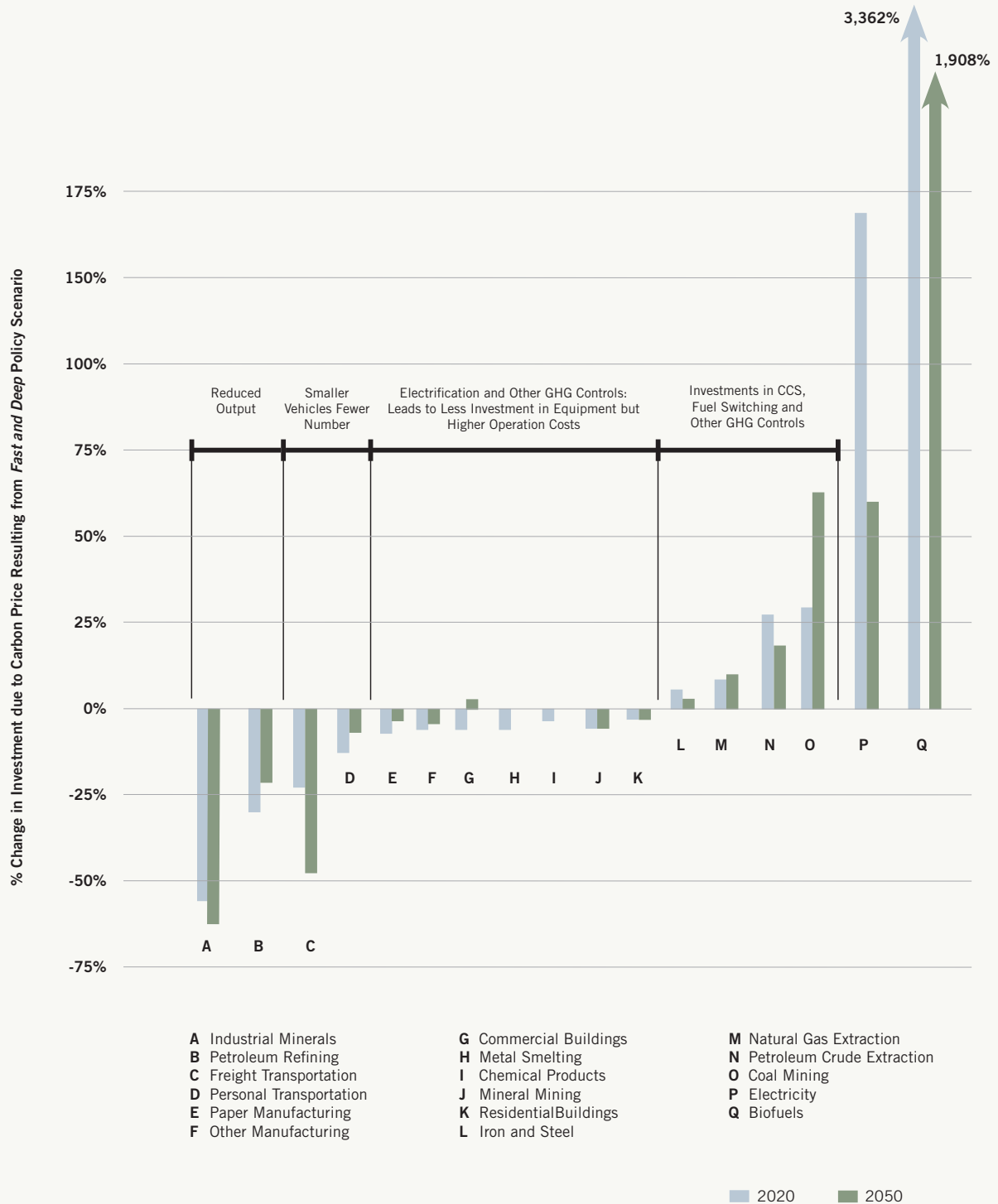


FIGURE 20

social costs of generation and transmission. Figure 20 reflects this trend with significant investments required in new low-emitting generation. This electrification will lower the investment costs for many sectors as fossil fuel energy equipment tends to be more expensive than electric. However, these gains are offset by rising electricity costs relative to the fossil fuel alternatives.

- *Output changes alter investment patterns.* With changing demand for low-emitting carbon products, some sectors such as industrial minerals and petroleum refining will see a drop in investment as the sector contracts. Other sectors, such as biofuels and electricity generation, will see large increases in investment as demand for their products increases with the carbon pricing policy.
- *Investments in CCS and fuel switching.* Carbon capture and storage will be widely deployed in large industrial sources with the implementation of the carbon pricing policy. This will be particularly concentrated in the west and to a lesser extent in Ontario, and in the oil and gas and electricity sectors and some industrial applications. With this deployment comes the need for more energy to capture and transport carbon for storage. This increased energy use explains the increasing energy trend in Figure 19.

But electrifying the economy with low-emitting technologies will not be enough. Significant technology rollouts must occur in virtually every corner of the economy and society. Figures 21 and 22 suggest that no single technology will provide the required reductions, but instead a suite of almost all available emission-reducing technologies must penetrate the market. The carbon pricing policy will also accelerate current low-emission trends in a number of key sectors including buildings, pulp and paper, transportation, aluminum manufacturing, and goods and services. Market penetration of current hybrid electric vehicles, for example, is a transition to increased penetration of plug-in hybrid and zero-emission electric vehicles. Similarly, current biofuels used for transportation will eventually need to be phased out as cellulosic ethanol is accelerated with investment certainty through carbon pricing.

Despite these forecasts, we recognize that technological change is inherently uncertain. We do not conclusively know what emissions reductions will ultimately be needed or what the corresponding prices will be. There is also uncertainty as to the costs of large-scale deployment of currently existing technologies, much less when breakthrough technologies might arrive, or to what degree the costs and/or quality of existing technologies will be improved. These kinds of uncertainties can create a tension among policy recommendations. On the one hand, government policies should be as neutral as possible to allow a broad range of technologies to emerge and compete, and to avoid the problem of governments attempting to pick winners. On the other hand, we cannot remain passive, given that we are largely aware of the major technological options that will be available over the next decades and know that some technologies have specific barriers and specific potentials that might require targeted assistance.

TECHNOLOGY DEPLOYMENT RESULTING FROM THE *FAST AND DEEP* CARBON PRICING SCENARIO

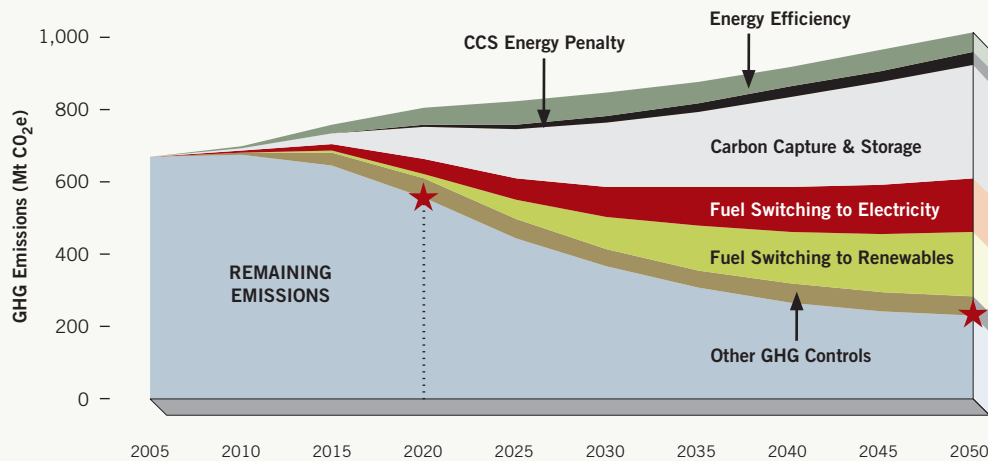


FIGURE 21

★ Government of Canada Emission Reductions Targets in 2020 and 2050

DETAILED TECHNOLOGY DEPLOYMENT SCENARIO

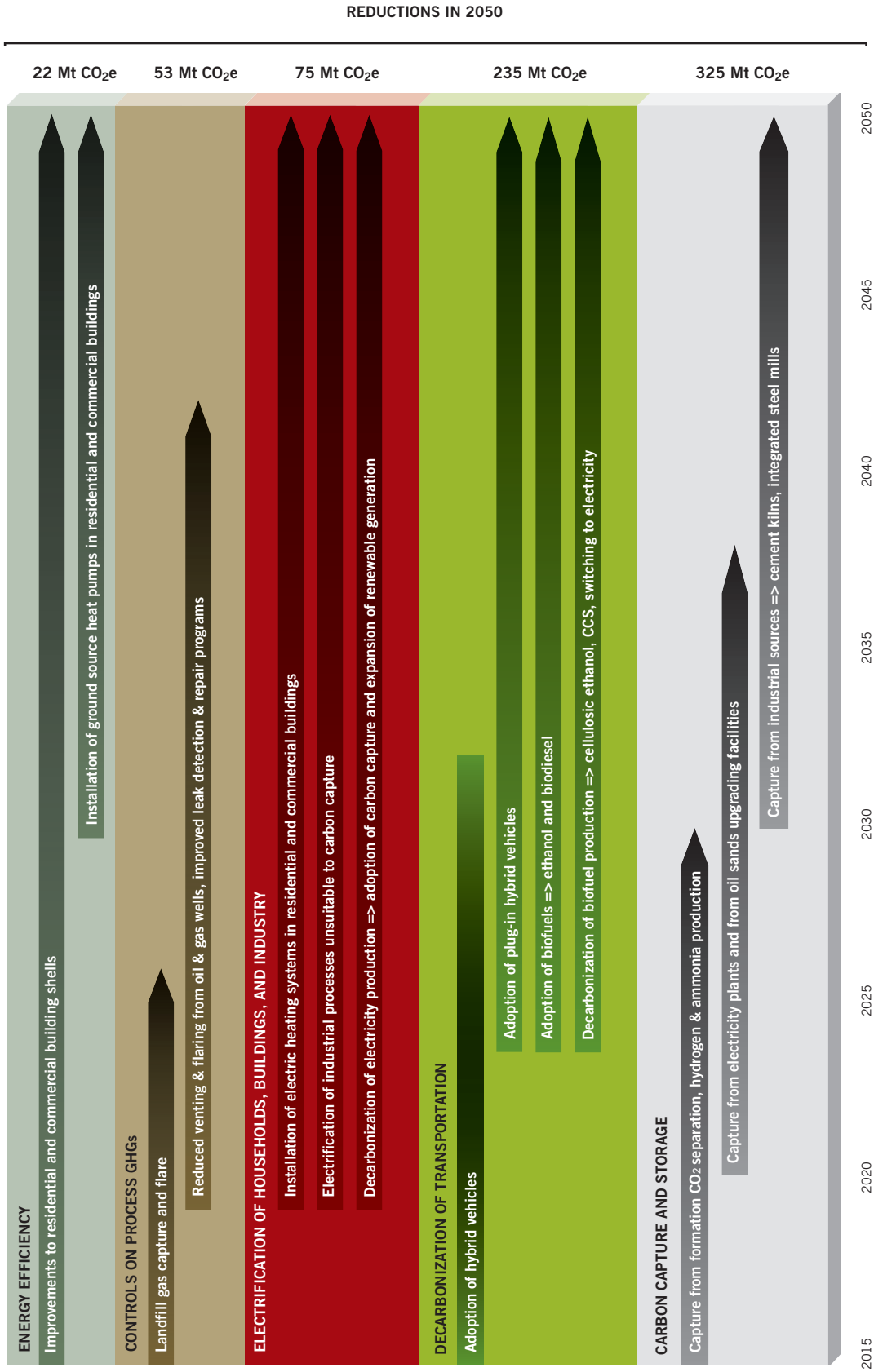


FIGURE 22
 This technology scenario results from the *fast and deep* carbon pricing pathway. As such, it focuses on technology deployment under carbon pricing with limited deployment resulting from complementary policies and none from international trading costs.

Our analysis also illustrates a carbon price alone is likely insufficient to drive the required technological change. Barriers to the deployment of technology represent a key issue that is central to design and implementation. Addressing barriers to deployment can improve both the effectiveness and economic efficiency of policy by helping the market to function as it should. Not all barriers, however, are market failures, and using complementary policies to address additional barriers may in fact reduce the cost-effectiveness of a carbon pricing policy. Further, being technology prescriptive, or trying to “choose winners” through policy increases the costs of carbon pricing policy.

5.5 SMOOTHING THE TRANSITION WITH AUCTION REVENUE

All the impact issues we have identified can be mitigated to varying degrees by the expenditure of auction-generated revenues. It can smooth the transition. Our analysis suggests that a full carbon permit auctioning system could generate revenue of approximately \$18 billion in 2020, and \$3 billion in 2050 (in today’s dollars) based on our carbon price path of \$100 in 2020 and \$200 in 2050. Using a forecast of government revenue in 2020, the \$18 billion would be equivalent to about 16% of total federal government receipts or all corporate income taxes.²⁵ This is a very large amount and points to a need for a thoughtful policy approach in order to both maintain support for the policy once implemented (especially given perceptions of regional wealth transfer) and ensure that the revenue is used wisely and effectively to meet our sustainability goal of deep emission reductions in the most cost-effective way possible.

An important consideration is that there will be different needs for revenue during different phases of the transition. With low carbon prices in the initial fragmented period, there will be a need to further stimulate the deployment of low-emitting technology to better align with the longer-term objectives. Similarly technology research and development takes time to become an innovation, and so early financial support is critical. Over time, the carbon price signal remains the most potent driver of technological innovation. In time as carbon prices rise and negative impacts become more acute on businesses and households, using revenue to reduce the economic impact of the carbon price on each will be required.

25 \$2006 at 8% discount rate.

Auction revenue could be used in each of the three transition periods as follows:

- *The Fragmented Period.* We see the need to initially use revenue to invest in low-carbon technology research, development and demonstration such as CCS. This is particularly the case in this fragmented period, where the carbon price is gradually increasing, and there is a gap between where the carbon price is and where it needs to be. This spending would help set the economy on the right path for expanding cleaner alternatives, and achieving the cost reductions needed for future deep targets.
- *The Transition Period.* In this period there will still be a need to invest in technology research, development, and demonstration. But with carbon prices aligning to deliver significant emissions reductions in 2020, and with broad-based carbon pricing and complementary regulations and technology policies taking root, the emphasis on direct financing of deployment will likely lessen. As auctioning is fully phased in during the transition period and carbon costs rise quickly, revenues will increase rapidly, but so too will the economic impacts. This means that a focus on compensating those most negatively impacted will need to occur.
- *The Unified Period.* In keeping with a need to focus on economic efficiency, the bulk of the revenue should be used to improve the efficiency of the economy as a whole and set the stage for sustainable growth alongside decarbonization. Our research indicates that if carbon pricing revenue can be used to offset personal income and corporate taxes, the overall economic impacts of the carbon pricing policy can be significantly reduced. This both maintains the strength of the carbon price, with the cap on emissions or the charge rate driving reductions, and reduces taxes to mitigate income impacts from higher energy prices. Our assessment indicates that a number of beneficial outcomes result from offsetting taxes, but most importantly allows the economy to continue on a path closer to that if carbon pricing were not followed. Indeed, reducing labour or income taxes can reduce by half, the impact on the economy.

In all periods, a portion of the revenues should be directed to offset harmful impacts to those subsets of the Canadian economy and its society that are likely to be disproportionately affected. At the same time, it is also the NRTEE's view that the focus of auction revenue must first and foremost be aimed at meeting environmental targets, and by investing in low-carbon technologies that put our economy on a clear path to sustainable development, and not at regional wealth distribution or broad-based societal engineering. Effective governance mechanisms and processes will be necessary to ensure this goal is met.

**CARBON PRICING POLICY
GOVERNANCE AND IMPLEMENTATION**

CHAPTER SIX

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**GOVERNANCE INSTITUTIONS
AND PROCESSES ARE
CRUCIAL FOR EFFECTIVE
IMPLEMENTATION OF A
UNIFIED CARBON PRICING
POLICY THAT IS CERTAIN
AND ADAPTIVE.**

CHAPTER SIX

CARBON PRICING POLICY— GOVERNANCE AND IMPLEMENTATION

When it comes to climate policy, implementation is at least as important as design. The unique transitional, economic, social, jurisdictional, and administrative challenges posed by developing and putting in place a carbon pricing policy touching almost all aspects of the economy and society demand special attention to governance issues. As we have seen, the policy needs to be both certain and credible but also responsive and adaptable. It needs to inspire investor confidence while changing consumer behaviour. It needs to address Canadian goals and requirements while integrating with global goals and requirements.

Climate policy also touches different responsibilities across federal government departments and agencies and across governments themselves—federal, provincial, and territorial. Fragmented policy is often a result of fragmented decision making. From an issue perspective, climate policy requires an integrated approach considering both environmental and economic issues but also more particularly energy, technology, and infrastructure issues so policy approaches work in tandem. From a jurisdictional perspective, climate policy requires a collaborative intergovernmental approach to align efforts, leverage resources, and keep costs down. From a political perspective, climate policy involves consideration of the difficult trade-offs necessary to alter behaviour about how we produce and consume energy over the long term, a perspective that short-term government decision-making cycles cannot always accommodate.

Governance institutions and processes are crucial for effective implementation of a unified carbon pricing policy that is certain and adaptive. They are necessary to ensure the right trade-offs are made. They are essential to ensure learning and adaptive management occurs. They bring about policy buy-in and help address issues of fairness and equity. And, in a federation like Canada with shared environmental jurisdiction between the federal and provincial/territorial governments and clear regional impacts of any national carbon pricing policy approach, looking to dedicated institutions and processes to help craft and work through difficult decisions makes sense.

6.1 PURPOSE

The purpose of any carbon pricing implementation strategy is to put in place a carbon pricing policy that meets our environmental targets in the most cost-effective manner, and is adaptable to changing environmental and economic circumstances and opportunities. As discussed in Chapter 3, the carbon pricing policy must send a price signal to the economy that is both certain and credible now, but also responsive and adaptive over the long term. It must be certain and credible in order to change behaviour and drive investment through clear “rules of the game,” yet responsive and adaptive to new economic and environmental circumstances and information.

While policy adaptability and policy certainty are essential elements for any carbon pricing policy, there are trade-offs between the two criteria. If a policy has been designed to be flexible or changeable at some future time, uncertainty as to the future nature of the policy follows. On the other hand, an attempt to fix policy in advance would imply a failure to adapt to new information, such as evolving climate science or the policies of Canada’s trading partners. Effective carbon pricing policy needs to find a balance between adaptability and certainty—it should be adaptable to changing and unknown future circumstances but certain enough to transmit a robust, long-term price signal to the economy upon commencement. Governance institutions and processes are needed to ensure this balance occurs.

While there are various models to govern national carbon pricing policies, the NRTEE believes it is important to identify the principles that should be used in developing institutions for carbon pricing policy, and the desirable characteristics of any proposed governance institutions. These principles can serve as a guide in the transition from the current fragmentation of carbon pricing policies across jurisdictions in Canada toward a unified domestic carbon pricing policy that could in turn link with the US and our other major trading partners.

Five principles for carbon pricing policy governance:

- *Cost-Effectiveness*—focusing on meeting the environmental goals at the lowest feasible costs
- *Inclusiveness*—all jurisdictions are implicated in participating in policy design and implementation
- *Fairness*—recognizing that some regions, industry sectors, and income groups will be impacted more than others
- *Transparency*—research, data, and information are independently collected, verified, and publicly disseminated
- *Communication*—regular and public explanation of decisions is provided

6.2 RULES-BASED GOVERNANCE

The long-term nature of climate-change-mitigation policy increases the prospect of policy shifts and turns across successive governments and in response to short-term concerns. This increases uncertainty, not reduces it, and can act as a barrier to needed investment and technological innovation. But the scale and scope of essential transformation to our energy systems to bridge the current climate divide necessitates integrating mechanisms and processes that can build policy consensus and action to meet the deep emission reduction targets we have already set for ourselves.

Indeed, a well-designed institution or process with transparent rules for policy adjustment will increase credibility and foster certainty, thereby reducing investment risk. It sends the signal to firms and individuals that policy changes will occur only under specific conditions, reducing the uncertainty associated with future policy adaptations and the probability of a high-cost policy shift at some unforeseen juncture. Further, a clearly defined process with longer transition periods allows firms and individuals to better anticipate potential policy shifts and plan accordingly. Similarly, a transparent process for policy adjustments can reduce transaction costs associated with this low-carbon transition.

Communicating credibility and commitment is an important objective for effective long-term climate policy. This can be done through policy, regulations, institutions, and processes. It can also be done through legislation. An example is the UK *Climate Change Act*, which requires the government to set five-year carbon budgets, starting with 2008–2012. Each five-year budget must be consistent with medium- and long-term targets, and is monitored by an independent body of experts. It provides interim or incremental carbon-emission mitigation through the five-year budget cycle, which is updated annually. By linking the specific short-term budgets with a more general planned trajectory for emissions reductions, this approach offers more assurance of longer-term policy credibility without precluding adaptive steps along the way.

A Canadian example is seen in the British Columbia carbon tax. The level of the BC tax is set by legislation, thus establishing short-term certainty, with scheduled rises by \$5 per tonne each year, from \$10 per tonne in 2008 to \$30 per tonne in 2012. The limited time horizon on the schedule allows the stringency to be adjusted after four years. To provide further certainty over the long term, BC has legislated targets for 2020 and 2050 and has also set short-term targets for 2012 and 2016 to guide progress.

6.3 REVIEWING PROGRESS

Regular, scheduled reviews of policy are an important part of effective policy adaptation. It allows for stock-taking and assessment. At each period of review, targets, policy stringency, or other policy design elements can be adjusted. Data regarding the performance of the policy should be collected and reported publicly. Key metrics could include, for each region and sector, the price of emissions permits, number of permits traded, tax revenue generated, changes in sector output, emissions intensities, and changes in technology investment. Similarly, the pricing institution should evaluate the impacts of the policy.

An important prerequisite of review periods is therefore regular monitoring of the impacts and effectiveness of the policy. Collecting this data is critical as review periods should be informed by good information; policy evaluation depends on policy monitoring. An important component of this is emissions forecasting. A 2008 report by the NRTEE, entitled *GHG Emissions Forecasting: Learning from International Best Practices*, offers a review and assessment of this issue from a governance perspective with the following conclusions:

- Use of an independent forecasting agency is preferable to provide more accurate and transparent emission forecasts for consideration by government policy makers, external analysts, and Parliamentarians and to facilitate ongoing audit and evaluation.
- Multi-source emissions forecasting from a group of individual government departments can be accurate, but works best both when centrally coordinated and with independent authority by the central coordinating department or agency to question other departmental forecasts.
- Regular independent reviews, audits and evaluations of government forecasts and forecasting methods by a third-party agency or process helps ensure accuracy of forecasts and that forecasting methodologies are up-to-date and robust.
- Forecasting must be sufficiently resourced and financed by governments to ensure data are up to date and most recent improvements in forecasting methodologies are incorporated for the benefit of policy makers taking decisions based on these forecasts.
- Regular, ongoing evaluation of past forecasts for accuracy and effectiveness is necessary to ensure continuous improvement of government forecasting methodologies and approaches.
- Ensure transparency and clarity with respect to key assumptions and methods.

6.4 CLIMATE POLICY GOVERNANCE IN CANADA

Canada's jurisdictional framework and circumstances add a level of complexity to the implementation and governance of a national unified carbon pricing policy. Currently, various governments are proceeding at varying speeds and stringency to establish and implement some form of carbon pricing policy. With the federal, provincial, and territorial governments all having constitutional authority to implement their own carbon pricing policies, transitioning from the current patchwork approach to a unified, national approach raises some key issues:

- Our research shows that while the transition to a unified carbon price will lead to significantly lower carbon costs overall from the current patchwork, greater costs will be likely borne by some provinces more than others given the carbon intensity of their industries and economy.
- In the movement toward a unified carbon price, there is a risk of a negative legacy of instruments toward harmonization; that is, some pricing instruments currently in place in some provinces might be less effective than those in others, or that will ultimately be proposed nationally.
- While the federal government has clear authority to set the national carbon price and targets, no established intergovernmental mechanism or process exist to bring provinces and territories together to forge a unified policy approach or carbon price.

In the NRTEE's view, implementing the proposed carbon pricing policy will require a reanimation of federal/provincial/territorial cooperation on climate policy. A unified carbon pricing policy means effectively moving from a focus on equivalency to a focus on standardization in domestic cap-and-trade regimes. Efforts will need to be made to settle on a set of standards that define and underpin carbon as a traded commodity. A movement to standardization with clear milestones will then smooth the transition for businesses and households to a single unified system.

A hierarchy of potential governance structures may be considered as part of the implementation process, based on the transition phase of the Canadian carbon market. These range from the most straightforward—common and shared data collection and dissemination—to a more integrated, harmonized approach involving delegated advice and/or decision-making authority to independent expert bodies. Given the highly technical and political nature of climate policy, there is value in considering the role of independent, expert, or third-party advisory or decision-making bodies

to assist governments, Parliament, and legislatures in deciding carbon pricing policy issues. The UK and Australia have recently established bodies to undertake some of these roles. A dedicated institution with the mandate to regularly review and report on carbon pricing policy issues sends an additional signal of certainty and confidence to the market that sudden shifts in pricing approaches will not occur. Establishing a clear method to credibly manage the carbon price over time could send the signal that the policy will be long lasting and that government is committed to its long-term implementation.

A brief description of the three main governance roles is set out below. They may be considered on their own or combined under various models.

- 1.** *Information role.* Independent data collection, monitoring, reporting and evaluation of carbon emissions and pricing patterns to allow for policy adjustments on an ongoing basis. Coupled with a forecasting function setting out a range of possible emission scenarios, this institution could serve to provide annual information to governments, industry, and Canadians on carbon-emission reduction progress. Possible models that could be drawn from include the US Energy Information Administration, Canadian Institute for Health Information, National Energy Board, and Statistics Canada.
- 2.** *Advisory role.* Advise governments on key aspects of the carbon pricing policy, such as carbon budgets, emissions trading, pricing, revenue recycling and distributional considerations, and competitiveness impacts. This could be coupled with the information role set out above. This independent expert advisory body would have influence and third-party credibility that could help governments make difficult decisions. Possible models that could be drawn from include the UK Committee on Climate Change and the BC Climate Action Team.
- 3.** *Decision-making role.* Responsible for making certain decisions in the implementation of the policy, including setting interim targets, carbon budgets, and permit allocation. This could be an independent body or a new federal/provincial/territorial institution to ensure more direct political accountability. A possible model that could be drawn from is Australia's Carbon Pollution Reduction Scheme regulator.

A notional mapping of roles and responsibilities for a Canadian carbon pricing policy is provided in Table 2 below.

NOTIONAL INSTITUTIONAL ROLES AND RESPONSIBILITIES FOR A CANADIAN CARBON PRICING POLICY	
INSTITUTION	ROLES AND RESPONSIBILITIES
Parliament	Sets the long-term goals and targets, the choice of instrument, the principles of design and operation, and the roles and responsibilities
Federal government, co-ordinated with provinces and territories through FPT process	Establishes carbon authority and independent advisory body; establishes basis for permit allocation; establishes criteria for free allocations and/or rebates
Provincial governments	Establish complementary regulations consistent with carbon pricing
Carbon Pricing and Revenue Authority	Empowered with regulatory and operational decisions: monitors and enforces compliance, runs auctions and collects revenues from emitters, determines which industries/entities meet criteria for assistance, has power to trigger any relief mechanisms, and sets rules for reporting and monitoring emissions
Independent Expert Advisory Body	Advises on interim targets for each compliance period, provides ongoing evaluation, and advises on adjustments to carbon pricing policy
Office of the Auditor General of Canada	Reviews and reports on collections and disbursements of auction revenue for transparency and accountability purposes

TABLE 2

6.5 MOVING FORWARD

The importance of an effective governance regime for Canadian carbon pricing policy cannot be overstated. Beyond the additional cost burden associated with policy fragmentation, a unified domestic carbon pricing policy is a prerequisite to establishing an effective North American

trading system. “Getting our own house in order” can only strengthen any overtures to a new US government intent on stronger international climate policy action. Current regional initiatives such as the Western Climate Initiative and the Regional Greenhouse Gas Initiative with their cross-border character could well find themselves integrating into a broader North American system once a pan-Canadian carbon pricing policy is adopted.

Similarly, there is a need for a transparent governance regime to address the regional aspects of Canadian climate policy. The linkage of energy and environment policy objectives in determining climate policy is real. Integrating the two so as to ensure the continued economic contribution to Canadians from the country’s significant energy sector is an important long-term consideration. Moving from the current fragmented approach under federal leadership and with provincial/territorial collaboration is, however, essential to establishing and implementing a unified carbon pricing policy that will achieve deep emission reductions at the lowest possible costs. A dedicated governance institution or process that can facilitate the transition process will help demonstrate that regional impacts and concerns are being actively considered and addressed.

The key features of an effective governance framework for a Canadian carbon pricing policy include the following:

- A clear and agreed policy road map set out by governments to provide certainty in the short-term through incremental, measurable milestones of a carbon price and establishment of trading systems.
- Specific timelines for progress along the way leading to the 2020 and 2050 medium- and long-term targets by establishing, for example, five-year, rolling carbon budgets to help inform industry, governments, and others on what must be accomplished to meet our goals.
- Regular and independent monitoring, evaluation, and reporting of progress to governments and the public so adjustments can be considered.
- Creation of an expert agency empowered with regulatory and operational decision-making authority over the details and implementation of the auction and trading rules.
- Creation of an appropriate federal/provincial/territorial governance mechanism and process to enhance collaboration and regularly consider progress and direction on carbon pricing and climate policy development.
- Creation of an independent, expert advisory committee to examine and make recommendations to government on key aspects of overall Canadian climate and carbon pricing policy.
- Using the Office of the Auditor General of Canada to independently report on the collection and disbursement of auction revenue.

CONCLUSION AND RECOMMENDATIONS

CHAPTER SEVEN

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**PRICING CARBON
IS A POLICY WHOSE
TIME HAS COME.**

CHAPTER SEVEN

CONCLUSION AND RECOMMENDATIONS

There is a need for greater urgency in Canada's response to the climate change challenge. Action delayed is effectively results denied. We need to take the steps *now* to ensure we are in a stronger position later to manage the even more difficult challenges inevitably ahead. Pricing carbon is a policy whose time has come. Putting a clear value on the carbon we emit will cause us to think and act differently about how we emit it.

More importantly, the Round Table does not see this as a sole environmental challenge or economic challenge. We do not see it just as industry's responsibility to act any more than the environmental community's responsibility to advocate. This is a collective challenge for us, and a collective responsibility for us, as Canadians. We view this as a national issue requiring the participation of us all to collectively determine and implement solutions that are not just effective but fair.

This report offers that opportunity. This report puts Canada on a path to a unified carbon pricing policy. It sets the stage for alignment of emission reductions systems in an increasingly globalized carbon-trading world. It harnesses market-based instruments as the most effective means of reducing emissions to meet the government's own targets. It addresses competitiveness concerns of industry by providing a suitable transition period, carbon permit allowances, and targeted revenue recycling to lessen impacts. It recognizes the key role of technology in achieving our goals by encouraging

innovation through an economy-wide carbon price and targeted public investment. And it places climate governance firmly on the agenda of our national leaders as part of a new, collaborative approach to climate policy development and implementation in Canada.

RECOMMENDATIONS

This report serves as a comprehensive and integrated recommendation for developing and implementing a Canadian carbon pricing policy. To reinforce the report's research, analysis, and conclusions, the NRTEE highlights the following specific recommendations for consideration:

1. Unify carbon policies and prices across emissions and jurisdictions based on three principal policy elements:
 - an economy-wide cap-and-trade system transitioned from current and planned federal, provincial, and territorial initiatives;
 - complementary regulations and technology policies in the transportation, buildings, oil and gas, and agricultural sectors; and
 - international carbon abatement opportunities that are credible, affordable, and sustainable.
2. Ensure the unified Canadian carbon pricing policy can link with current and proposed international systems and, most particularly, with a prospective trading regime likely to emerge in the United States, to ensure compatibility in pricing and action.
3. Use generated revenue from permit auctions first and foremost, to invest in the required technologies and innovation needed to meet the Canadian environmental goal of reduced GHG emissions.
4. Transition the current fragmented approach to carbon pricing across jurisdictions and emissions to a unified Canadian carbon pricing regime as soon as possible, and no later than 2015.
5. Establish a dedicated carbon pricing governance framework based on adaptive policy principles to develop, implement, and manage the unified carbon pricing regime over time with the following elements:

- Federal/provincial/territorial collaboration through an ongoing forum, which would allow governments to coordinate and harmonize efforts and actions in support of the unified carbon pricing policy, and regularly consult and engage with each other to maintain progress and direction on carbon-emissions pricing and climate-policy development.
- An expert Carbon Pricing and Revenue Authority with a regulatory mandate to collect auction revenues from emitters, set carbon pricing schedules and compliance rules, establish permit allocation rules based on principles and policy directions set by the federal government, monitor and enforce compliance, implement procedures for monitoring and reporting emissions, and ensure confidence in the long-term robustness of the policy.
- An independent, expert advisory body to provide regular and timely advice to government on interim targets for each compliance period; on the distribution of auction revenue to meet environmental, economic, and social objectives as required; on ongoing evaluation and assessment of the carbon pricing regime; and on any proposed adjustments to the policy and pricing framework for decision makers to consider.

APPENDIX: GLOSSARY

Note: terms in CAPITALS are found elsewhere in the glossary

TERM	DEFINITION
Abatement	Efforts to reduce greenhouse gas emissions are known as carbon abatement.
Allocation	The method by which emission permits are distributed in a cap-and-trade system. The emission permits themselves are also sometimes known as “allocations.” Typically, permits can be allocated freely or auctioned by government.
Border adjustments	An approach to addressing competitiveness issues through either 1) requiring imported goods to pay for their un-priced emissions costs, and/or 2) relieving exports of their expected emissions costs. The goal of these approaches is to level the playing field for Canadian firms in either the domestic or international market so as to not place Canadian firms at a competitiveness disadvantage.
Cap-and-trade system	Also known as a “tradable allowance system,” a cap-and-trade policy involves setting the annual level of emissions by issuing emission permits (allowances). If individual emitters produce more emissions than they have permits, they can purchase additional permits. Governments can fix the level of emissions (providing quantity certainty) by choosing the number of permits to issue, but the price of permits will be set by the market, and is thus uncertain.

Carbon tax	A carbon tax is a policy instrument that sets a per-unit charge on emissions. Typically the system involves a tax on fuels that emit carbon dioxide when burned and on other greenhouse gas emissions. A schedule for future tax rates would be established, sending a long-range price signal to the economy. The tax thus provides price certainty but leaves the annual level of emissions reductions uncertain.
Competitiveness	Competitiveness issues are possible adverse implications of emissions pricing that result if Canada implements an emissions pricing policy but its trading partners do not. Canadian firms thus have additional costs due to emissions that place them at a disadvantage relative to international competitors.
Coverage	A carbon pricing policy can be applied to different greenhouse gas emissions, different sectors of the economy, and different emissions sources. This is known as the coverage of the emissions pricing policy.
Distributional impacts	A criterion evaluating the extent to which a policy design will result in disproportionate impacts on different regions, sectors, or households; the criterion assesses issues of equity.
Downstream	Carbon fuels typically change hands between producers, processors and refiners, distributors, and final consumers who burn them. The final consumer, where fuels are combusted, is known as downstream in the fuel chain. See also UPSTREAM and POINT OF REGULATION
Economic efficiency	A criterion evaluating the extent to which a policy minimizes total costs, including the cost of compliance with the policy as well as transaction costs. Economic efficiency is also increased if a policy addresses other existing economic distortions or market failures.
Electrification	The shift of the energy system toward an increased use of electricity-using technology instead of fossil-fuel combusting technology. This shift on the demand side is enabled by a growth in electricity generation on the supply side to provide the required electricity.
Environmental effectiveness	A criterion evaluating the extent to which a policy design accomplishes its objective in reducing carbon emissions and lowering atmospheric concentrations of greenhouse gas emissions.
Fuel-switching	One kind of action that could reduce emissions. For example, in response to a carbon pricing policy, a firm could shift from coal-burning technology to natural gas burning or electrical technology.

Leakage	The relocation of greenhouse-gas-emitting firms to other jurisdictions to avoid the costs of an emissions-pricing policy. In this case, the policy has not reduced the total number of emissions, merely caused their point of origin to change. Since climate change is a global issue and the source of emissions does change their impact, leakage reduces the effectiveness of the policy.
Linkage	Linkages between emissions pricing systems (usually cap-and-trade systems) are explicit recognition of emissions reductions in one jurisdiction by another jurisdiction. For example, a linkage exists between systems A and B if firms in jurisdiction A can receive credit for emissions permits allocated in jurisdiction B. Linkages can be one or two way depending on whether both jurisdictions accept the other's credits as valid reductions.
Offsets	Offsets are emissions reductions that are created outside any regulated system and sold to regulated emitters. Regulated emitters can use offsets, instead of permits, to comply with the carbon pricing policy. For example, Company A wants to reduce its emission to 500 tonnes a year. It invests in energy efficiency technologies, and reduces its emissions to 600 tonnes a year, but finds that further reductions would be very expensive. Instead of reducing another 100 tonnes itself, Company A pays for emissions reductions in India, where there are more low-cost emission-reduction opportunities.
Point of regulation	Carbon emissions arise predominantly from the burning of fossil fuels. Carbon-based fuels like oil pass from the oil well to the refinery, to the distributor, and finally to the consumer. Carbon pricing can be applied anywhere along this fuel chain, and the point at which it is applied is the point of regulation. The point of regulation is usually described as UPSTREAM or DOWNSTREAM.
Price ceiling	In a carbon-trading system, the prices of emissions permits are determined by the market. If there are not enough permits, prices will rise, creating a strong incentive to invest in emissions reductions. However, if prices rise too fast and too high, the system may produce unnecessary and damaging shocks to the economy. A price ceiling, or safety valve, sets a maximum possible price. When prices reach the price ceiling, the carbon trading system exhibits similar features to price-setting approaches.

Price floor	Minimum price for CO ₂ e permits. No permit below this price would be sold in the market or by the regulator.
Revenue recycling	An element of policy design determining how government revenue (accrued through either a carbon tax or the auctioning of permits in a cap-and-trade system) will be allocated. Possible approaches to revenue recycling include reducing existing taxes, providing support for competitiveness issues, funding support for technological deployment and research and development, or addressing adverse distributional effects.
Upstream	Carbon fuels typically change hands between producers, processors and refiners, distributors, and final consumers who burn them. The producer, where fuels first enter the economy, is known as upstream in the fuel chain.