TALKING WITH ALBERTANS ABOUT A NEW WETLAND POLICY AND IMPLEMENTATION PLAN:

WHAT WE HEARD SUMMARY

Prepared for:

THE ALBERTA WATER COUNCIL

EXECUTIVE SUMMARY

The Wetland Policy Project Team ("WPPT") was asked by the Alberta Water Council ("the Council") to obtain stakeholder input on issues relating to a recommended Alberta Wetland Policy and Implementation Plan. Stakeholder perspectives were gathered via workbook submissions, a series of public workshops, an open invitation to provide submissions, and discussions with First Nations and Métis groups. Workshop design and facilitation, input, analysis and reporting were carried out by an independent consultant, IMI Strategics.

Five hundred and ninety useable workbooks were received during the period of mid-summer to mid-October 2007. As well, 219 individuals participated in seven workshops held across Alberta in the fall of 2007. Responses have been broadly categorized as having been received from community, industry or government members/representatives. The WPPT also received 21 written submissions from organizations that chose to contribute their input to the consultation process through a collective contribution, representing input from across their sector or organization. The GoA also provided a single coordinated response.

The WPPT hosted a series of five meetings with Aboriginal representatives between February and April 2006 in three different communities. Discussions included representatives of each of Treaty 6, Treaty 7, Treaty 8, and the Métis Nation of Alberta. These discussions identified many areas of similarity with other consultation input. They also raised other concerns including the need for congruent federal and provincial policies; protecting Treaty rights; incorporating Traditional Ecological Knowledge; the duty to consult with First Nations; and ensuring aboriginal community views and interests are included in the development review and approval process.

In general, respondents agreed that wetland conservation was important and should be considered in land-use planning and decision-making. As well, there was general agreement that a new Wetland Policy should apply to all areas of the province, however, most respondents were concerned with how the policy would be tailored to reflect the differences in geography between the Green and White Areas. There was also general agreement that the policy goal should be to maintain or increase wetland area, however, there were concerns expressed regarding the feasibility and desirability of *increasing* wetland area. Respondents emphasized the need to have tools, which could include regulation, objectives, incentives and education, to achieve this goal. Most respondents strongly agreed with the proposal that the Wetland Policy and Implementation Plan be integrated into existing legislation, policies and programs of the government.

There was general support for applying the proposed mitigation approach across the province and to all proponents. However, participants from all categories indicated that they felt the proposed approach would only be effective if there were appropriate tools associated with it. There was general support that, in the absence of sufficient knowledge on how to measure and restore wetland function, using a science-based ratio of wetland area restored to wetland area lost was appropriate. Opinion differed as to what the appropriate ratio should be. Opinion was almost evenly divided as to whether waterbodies constructed primarily for stormwater management and wastewater treatment should be considered as one option for compensation for wetland loss if they can mimic at least some natural wetland function.

Generally, there was agreement that ephemeral waterbodies should be recognized as wetlands and that they should be included in the wetland mitigation approach proposed for the new policy. Support was strongest in community respondents and weaker in government and industry respondents. However, there was strong agreement that education and awareness programs and initiatives should also be developed to enhance the stewardship of ephemeral waterbodies.

Key messages from the consultations as to what is necessary to make the policy successful include:

1. Develop a better understanding of wetland function and benefits; the relationship between wetland area and function; the costs and benefits of maintaining or increasing wetlands on the landscape; and their value in comparison to other land uses and values.

2. Direct effort into looking at how we can better manage wetlands including ensuring we have shared definitions and classification tools; sound science to support the policy and its implementation; the tools and expertise required (e.g. inventories, health assessment techniques, education and awareness, best management practices/ codes of practice, reclamation techniques, etc.) for a long-term, adaptive management approach with built in continuous improvement.

3. Make the policy flexible and sensitive to regional issues while still fair with a consistent regulatory approach. Clarify and understand the financial and legal implications of the policy and its implementation including the burden on proponents, municipalities and landowners.

4. Wetland conservation cannot occur in isolation of other land and water initiatives. Ensure integration with other federal, provincial and local policies, legislation and programs.

5. Support implementation and achievement of the policy by using a collaborative and coordinated approach and by adequately resourcing the infrastructure required to carry out implementation.

INTRODUCTION

The *Wetland Policy Project Team* ("WPPT") was asked by the Alberta Water Council ("the Council") to obtain stakeholder input on issues relating to the development of a new Alberta Wetland Policy and Implementation Plan. The purpose of the consultation was to determine what stakeholders have to say about wetlands in order to ensure that the WPPT can reflect their views in its work.

Stakeholder perspectives were gathered via workbook submissions, a series of public workshops, an open invitation to provide submissions, and discussions with First Nations and Métis groups.

OPPORTUNITIES FOR ALBERTANS TO PARTICIPATE

Workbook Submissions

The WPPT provided a Wetland Consultation Workbook ("the workbook") to Albertans online and in hard copy at various provincial and municipal venues across the province. A total of 590 useable workbooks were received during the period of mid-summer to mid-October 2007. Among these, 197 stakeholders identified themselves as community members; 83 identified themselves as government representatives; and 145 identified themselves as having an industry perspective. The remaining 195 respondents did not categorize their perspective.

Workshop Participation

Interested stakeholders indentified by the WPPT were invited by letter to provide their input on the workbook through a series of workshops held across Alberta in the fall of 2007. Two hundred and nineteen individuals participated in seven workshops held in Bonnyville, Edmonton, Calgary, Lethbridge, Red Deer, Fort McMurray, and Grande Prairie. Of those, 60 identified themselves as members of the community, 69 identified themselves as government representatives, and 88 identified themselves as having an industry perspective.

Each workshop employed two data collection techniques. First, small-group discussions dealt with five questions that had been identified previously by the WPPT on issues where it was felt that input was needed to clarify, inform, and guide the content and intent of the a new recommended wetland policy. This interactive technique provided an opportunity to garner an understanding of the rationale behind viewpoints expressed by stakeholders in attendance.

Second, at the end of each workshop all participants were asked to complete an individual comment form to rate their personal agreement on the same five questions. A sixth question that rated the importance of conservation to them as an individual was included in the comment form but was not addressed in the small-group discussion component of the workshops. The comment form gave each participant an equal opportunity to express their personal views in addition to providing their input into the group discussions.

The five questions which provided the basis for the workshop discussion were:

- Should the policy goal of the GoA be to maintain or increase wetland area? (Corresponds to Section 3 of the workbook).
- Should a new wetland policy apply to all areas of Alberta including both the Green and White Areas? (Corresponds to Section 2 of the workbook).
- Should ephemeral waterbodies be recognized as wetlands in Alberta? (Corresponds to Section 5, #2 in the workbook).
- Will the proposed wetland mitigation approach effectively contribute to wetland conservation in Alberta? (Corresponds to Section 5, #1 in the workbook).
- Is wetland restoration an important and effective tool for ensuring the recommended wetland policy goal is achieved? (Corresponds to Section 5, #3 in the workbook).

Independent Written Submissions

The WPPT received 21 written submissions from organizations that chose to contribute their input to the Wetland Policy and Implementation Plan consultation process through a collective contribution, representing input from across their sector or organization. Submissions were received in a number of formats, including letters, reports, emails, and partial or complete workbooks. Of the submissions received, 10 identified themselves as representing industry, eight were from the community, and two were received from municipal governments. The GoA also made a single coordinated response.

Because the format of written submissions varied considerably and many focused on only one or a subset of the issues, the responses were summarized individually by perspective category, since it was not possible to create a valid analysis across all the diverse submissions. The written submission comments were reviewed in relation to the workbook and workshop summary reports. Places where written submissions were not aligned with workshop and workbook results are noted in the text.

The above processes, including the workshop design and facilitation, input analysis and reporting, were carried out by an independent consultant, IMI Strategics.

Aboriginal Discussions

The WPPT hosted a series of meetings with Aboriginal representatives to gather their input on the a recommended Provincial Wetland Policy and its Implementation Plan. Five meetings were led by Henry Arcand, an independent consultant contracted by Alberta Environment. Meetings were held between February and April 2006 in three different communities, with discussions including representatives of each of Treaty 6, Treaty 7, Treaty 8, and the Métis Nation of Alberta.

SUMMING UP THE CONSULTATION INPUT

Feedback gathered from each of the processes described above has been combined and summarized in this report. Because many of the responses received by the WPPT followed the organization of the workbook, this report follows that structure and presents consultation input by workbook question.

Section 1 – Finding the Right Balance

"Wetland conservation is important to me, even if it means foregoing other land use activities in a particular area"

Overall, 90% of workbook respondents and 86% of workshop participants agreed (either strongly or somewhat) that conservation was important to them, even if it meant foregoing other land-use activities. The need to balance conservation of wetlands with other land-uses was repeated many times in responses to this question and was the most common comment of both those who agreed and disagreed with the statement.

Some respondents who agreed with the above statement identified wetland inventories and mapping as being necessary to support land-use decisions, which would in turn need to be supported by appropriately trained provincial and municipal staff and legislation. The need for accountability at the provincial and municipal government levels to support, monitor and enforce any proposed wetland policy was also noted.

Some participants who disagreed with the statement were concerned the policy had more to do with penalties than conservation, and that it would have a negative economic impact. Other concerns were related to our ability to understand and measure the costs and benefits of wetland conservation.

"Like other land uses and values, the costs and benefits of wetland conservation should be a consideration in land-use planning and decision-making."

Eighty-three percent of workbook respondents who answered this question agreed that the costs and benefits of wetland conservation should be considered in land-use planning and decision-making. This question was not asked at the workshops. Among those who supported this statement, some recognized the importance of wetlands in providing ecological benefits and stated that consideration of wetlands in decision-making and planning was long overdue. A number of supportive respondents mentioned that it would be less expensive to protect wetlands now compared to trying to replace them in the future at a greater cost and reduced functionality.

Among those who disagreed with the statement, some noted that wetland conservation should not take priority over other land-use activities and that wetlands cannot be managed in isolation. Some respondents said they felt the statement was imbalanced and would limit future economic and social benefits at the expense of conservation. Respondents were also concerned that the recommended Wetland Policy and Implementation Plan would duplicate existing policy and regulations in the Green Area. Finally, it was suggested that there should be a method of accounting and financially compensating for development losses suffered by landowners if a new recommended wetland policy was implemented.

Section 2 – A Policy for the Entire Province

"A new Wetland Policy should apply to all areas of Alberta including both the Green and White Areas"

This question was asked in the workbook and at the workshops. Overall, 93% of workbook respondents who answered this question agreed that a new wetland policy should include both the Green and White Areas, with three-quarters strongly agreeing and 18% somewhat agreeing. Results of the workshops were similar, where 91% of participants agreed (either strongly or somewhat) with the statement. Some of those who supported including both the Green and White Areas in a new policy stated they felt it would be more consistent and fair when protecting and restoring wetlands across the province. Some also felt it would aid proponents in understanding what is required of them, since the same policy would apply in both parts of the province. Some said that including the Green Area was of particular importance due to the development pressures it is currently experiencing.

Some of those who were opposed to including the Green Area were concerned that it is not yet technically feasible to restore peatlands since they take thousands of years to develop naturally. As well, some mentioned that practices that are currently in place in the White Area may be prohibitive to industry in the Green Area and that there is a lack of area available for mitigation. Finally, some respondents felt there was no evidence to suggest there was a problem with wetland loss in the Green Area.

Perhaps most importantly, both respondents who supported and those who opposed the above statement were concerned about how the policy would be tailored to reflect the differences in geography between the Green and White Areas. Respondents noted that the two areas had different types of wetlands, different development pressures, and varying restoration and reclamation challenges. Many respondents, both those agreeing and those disagreeing with the statement, felt that the tools and practices would need to be different in each Area to achieve successful implementation of the policy.

Section 3 – Setting a New Provincial Goal

"The Government of Alberta will maintain or increase wetland area (and hence wetland functions) in Alberta to maintain the ecological, social and economic benefits that wetlands provide. To achieve this goal, the Government of Alberta will work with Albertans to proactively protect, conserve and encourage the restoration of wetlands, thereby helping to ensure healthy watersheds that provide safe and secure drinking water supplies, healthy aquatic ecosystems, and reliable, quality water supplies for a sustainable economy."

Overall, 90% of workbook respondents agreed (either strongly or somewhat) with the proposed policy goal. The workshop participants were asked an abbreviated version of the question and 90% of them also agreed (either strongly or somewhat) that the policy goal should be to maintain or increase wetland area. Some respondents who supported the goal did not like the word *increase* in the proposed new policy because they felt it implied that created wetlands could adequately replace lost natural wetlands. These same respondents felt that the policy goal should instead emphasize the restoration of natural wetlands and the maintenance of wetland function.

Some of those who raised cautions about the goal indicated that a regional approach should be taken that would account for varying conservation urgencies. In particular, some respondents felt the policy was being driven by wetland issues in the prairie region of the province and that the policy was not applicable in the Green Area. Other respondents who did not support the proposed policy goal noted that most of the present damage to wetlands occurred through previous government policy and, therefore, the Province should not be passing the costs of that damage on to present-day industry. Many respondents, both for and against the goal, indicted the need for tools to support the policy goal, such as an inventory, to address a benchmark and a better understanding of wetland function.

It should also be noted that there was some confusion in both the workbooks and at the workshops regarding the scale at which the policy would be implemented. Some participants thought it would be implemented at a watershed scale, others within bio-geographical regions (i.e. boreal, aspen-parkland, mountain, etc.), while still others understood that it would be implemented at the provincial scale.

"How do you think maintaining or increasing wetlands can be achieved in Alberta?"

Workbook respondents emphasized the tools that would be needed to achieve the policy goal. These tools included various legislative and regulatory measures such as increased enforcement, restrictions on ATV use, and assorted municipal and provincial development regulations. Suggested fiscal tools included incentives to protect wetlands, and assorted financial penalties for those who drain or damage wetlands. Finally, a number of education and awareness tools were brought forward including greater industry-government-community cooperation, more data and information collection, and the need for more public education. These types of tools are repeated in the independent submissions. This question was not asked of workshop participants.

"What do you suggest as an alternative goal to achieve wetland conservation in Alberta?"

Responses to this question were very similar to the previous question's answers. This question was not asked of workshop participants. Most of the rephrased goals altered the words *maintain or increase*. Some respondents felt the goal should be to *maintain*, since they felt an increased wetland area was not desirable. Others wanted the goal to be to *maintain and/or increase,* which would allow for increase in some areas of the province and maintenance in the others. Still other respondents felt those words should be removed altogether. Finally, another group of respondents felt that the policy should focus on maintaining wetland function without reference to area.

Section 4 – Setting Outcomes to Achieve the Goal

Outcome #1 – Creating Awareness

"Albertans are aware of, and value, the functions and benefits that wetlands and wetland riparian areas provide"

Overall, this outcome was strongly supported. Ninety-six percent of workbook respondents agreed (either strongly or somewhat) with the proposed outcome. Seventy five percent strongly agreed with the outcome. However, some felt that the end goal of education and awareness should be that Albertans are able to make informed decisions about wetland trade-offs. This question was not asked at the workshops.

Most of the comments regarding this outcome stated the groups and organizations they felt should be targeted for increased education and awareness. Commonly cited groups include municipal governments, proponents, industry professionals, volunteer groups, and students.

Outcome #2 – Improving Our Knowledge

"Albertans have the knowledge to effectively protect, conserve, and restore wetlands"

This outcome was also strongly supported. Ninety-two percent of workbook respondents agreed with the proposed outcome, with 72% strongly supporting improving our knowledge. This question was not asked at the workshops. Some comments from those who agreed with the statement articulated the types of research they would like to see. These included mapping and classification work, monitoring and evaluation research, and new tools that would enable landowners to value and care for the wetlands on their property. Finally, some respondents indicated that although improving our knowledge was important, it was more important to turn the data into useful, practical information that is widely available and understandable. Those who disagreed with the outcome often said they felt we had enough information to act and felt that doing more research could stall on-the-ground progress.

Outcome #3 – Recommending Wetland Objectives

"Recommendations for wetland protection, conservation and restoration are made for watersheds across Alberta"

This outcome was strongly supported by workbook respondents. Ninety-two percent of those who answered this question (either strongly or somewhat) agreed with the outcome. Seventy-one percent of respondents strongly supported it. This question was not asked at the workshops.

Comments received on this outcome were similar regardless of whether participants were supportive of the outcome or not. Respondents were concerned that Watershed Planning and Advisory Councils (WPACs) and other volunteer groups lack the necessary capacity to achieve this outcome, particularly in the areas of funding, expertise, and authority. Many respondents felt WPACs would be too slow, inconsistent, would compromise too readily in order to reach consensus, or worked at an inappropriate scale to undertake this work. Many of these respondents suggested that the GOA should work with these organizations to provide oversight, enforcement, funding, goals, standards, and integrated legislation. Some respondents suggested the provincial government should undertake this work alone, while others strongly disagreed and felt that setting such objectives required broad participation from the community including industry, landowners, environmental groups, indigenous groups, and others. They supported WPACs or other organizations undertaking this work, but only with additional funding, technical expertise, and a method that ensures consistency across the province.

Outcome #4 – Using Incentives

"Where appropriate, incentives to promote wetland protection, conservation, and restoration are available, while disincentives to these activities are removed"

This outcome was strongly supported by workbook respondents. Overall, 96% of those who answered this question agreed (either strongly or somewhat) with the objective. Seventy-four percent of respondents strongly agreed. This question was not asked at the workshops.

All respondent groups were generally supportive of using incentives to protect wetlands. The few respondents who raised concerns noted that the process needed to be bureaucratically efficient and accessible. Some industry and community respondents stated that current provincial and municipal programs that promote wetland drainage should be terminated.

Community respondents were generally in favor of combining incentive programs with strict consequences and penalties backed by regulation and enforcement. Industry respondents sometimes stated they felt any incentives developed should not be punitive in nature. Both community and industry respondents were supportive of landowners being financially compensated for performing environmentally sustainable behaviours that benefit society. Industry respondents noted the need for developing Best Management Practices relating to wetlands. Government respondents were most likely

to suggest employing a suite of tools, including education, incentives, penalties and others, instead of focusing on only incentives and disincentives.

Outcome # 5 – Coordinating Activities

"The Wetland Policy and Implementation Plan is successfully integrated into the legislation, policies, and programs of the Government of Alberta and its partners"

This outcome was supported by workbook responses. Overall, 94% of workbook respondents who answered this question supported (either strongly or somewhat) integrating wetland activities with other provincial government initiatives. Most respondents (74%) strongly agreed with the proposed outcome. This question was not asked at the workshops.

Industry, government, and community respondents all noted problems with the current system including inconsistent government regulation, conflicting legislation and policies, inconsistent application and enforcement of policies and regulations, and poor government coordination and collaboration. They often cited them as reasons for the new policy to be integrated and coordinated and as reasons for greater collaboration. Many respondents suggested policies that should be carefully coordinated with a new Wetland Policy. Common suggestions included the Land Use Framework, Integrated Watershed Management Planning Process, and the Water for Life strategy.

Those who disagreed with the outcome were likely to say it was too vague or simplistic to agree with. They wanted to know which policies, regulations and programs would be coordinated, and what steps would be taken to achieve integration. Others were concerned about creating too much red tape.

Section 5 – Tools and Approaches for Achieving the Policy

#1 – The Wetland Mitigation Approach

"The proposed Wetland Mitigation Approach will effectively contribute to wetland conservation in Alberta"

Overall, 89% of workbook and 90% of workshop participants felt the proposed mitigation approach would contribute to wetland conservation in Alberta. However, some community respondents felt the mitigation approach provided big business with the opportunity to write off wetland compensation as a cost of doing business without having to avoid or minimize losses. Industry respondents were concerned about how the approach would be employed efficiently throughout the province, particularly in the Green Area.

Generally, participants from all categories indicated that they felt the proposed Mitigation Approach would be effective only if there were appropriate tools associated with it. Suggestions for improving the approach included:

- Ensure incentives are in place to encourage avoidance
- Prioritize protected wetland areas
- Develop a provincial wetland & water inventory
- Ensure alternatives are in place in regions with little upland, but lots of wetland area since avoidance is very difficult in these areas
- Improve research on the effectiveness of various mitigation techniques
- Improve our ability to assess impacts of proposed activities
- Improve collaboration
- Ensure a watershed management approach is undertaken
- Improve our ability to measure wetland function
- Provide a watchdog and/or broker for compensation

"The proposed Wetland Mitigation Approach should be applied throughout the province"

This question was not asked at the workshops. Most workbook respondents (90%) indicated they supported (either strongly or somewhat) applying the Wetland Mitigation Approach across the entire province. Seventy percent strongly supported this approach. Independent submissions that discussed this topic were generally focused on how the Wetland Mitigation Approach would be applied in the Green Area. In particular, the issue of how peatlands could be restored using compensation funds when they take thousands of years to develop was of concern. The need for flexibility in the tools to handle the wide variety of situations in the province was raised by many respondents.

"The proposed Wetland Mitigation Approach should be applied to all proponents"

Overall, 90% of workbook respondents agreed that the approach should be applied to all proponents. Seventy-one percent strongly agreed. This question was not asked of workshop participants. Comments received on this topic were mainly focused on possible groups and projects to be excluded from the Wetland Mitigation Approach. Commonly suggested exclusions included projects involving the public good, projects with temporary or short-term impacts, small operators, and private landowners.

"Until we know how to measure and restore wetland function, using a science-based ratio of wetland area restored to wetland area lost is appropriate"

This question was not asked of workshop participants. Eighty percent of workbook respondents agreed (either strongly or somewhat) that it was appropriate to use a science-based ratio; 46% strongly agreed. The most frequent comment provided by respondents was that the area or size of restoration is less important than restoring wetland function and quality. Those who disagreed with the statement indicated that the ratio is too high, or that it was not supported by science and a ratio of 1:1 was more appropriate. Those who supported the statement occasionally indicated the compensation ratio was not high enough and that enough emphasis had not been placed on avoidance. They felt a higher ratio would act as an effective deterrent.

"Waterbodies constructed primarily for stormwater management and wastewater treatment should be considered as one option for compensation for wetland loss if they can mimic at least some natural wetland function"

Support for this approach was divided. Overall, 49% of workbook respondents felt that constructed waterbodies should be considered as a compensation option if they had some wetland function. Thirty-four percent strongly agreed. This question was not asked of workshop participants. Seven independent submissions addressed this particular topic – two agreed that constructed wetlands should be considered, while five disagreed.

Some of those who disagreed with the statement either strongly opposed the practice altogether or were highly skeptical of the ability of stormwater management waterbodies to take on wetland functions in any fashion. More moderate comments indicated this practice might be acceptable for some constructed wetlands if science could prove they were providing some wetland functions.

For those who supported the statement, there was general agreement that constructed wetlands with a greater degree of wetland functionality should account for a greater portion of compensation than those with little or no functionality. Moderate supporters indicated using constructed wetlands as compensation should be restricted (for example, as a temporary measure, on a trial basis, or with increased monitoring requirements).

#2 – Recognizing the Role of Ephemeral Waterbodies

"Ephemeral waterbodies should be recognized as wetlands in Alberta"

Overall, 77% of workbook respondents who answered this question agreed that ephemeral waterbodies should be recognized as wetlands. Of those who agreed with the workbook statement, 53% strongly agreed. This question was also asked at the workshops where 62% of participants agreed with the statement, and 32% strongly agreed. Both the workshop results and workbooks indicated that support for this statement is strongest in community respondents. Independent submissions were also notably split, with slightly more (8 vs. 6) suggesting ephemerals should not be recognized as wetlands in Alberta.

Those who agreed with recognizing ephemerals as wetlands often cited the need for a way to protect the ecological functions ephemerals provide and were concerned that excluding them would leave them without any mechanism for protection. As well, supporters of recognizing ephemerals as wetlands sometimes suggested that their importance is increasing as an effect of climate change, and thus they should be recognized so they can be considered in planning and decision-making. Some who supported recognizing ephemerals felt they should have a different protection mechanism such as education, incentives, beneficial management practices or other tools.

Those who disagreed with recognizing ephemerals as wetlands cited problems with administering the policy or trying to adhere to it, since ephemerals are transitory by nature and can be difficult to recognize on the landscape. This concern was often greater for Green Areas of the province, where there is generally more water on the landscape. They often suggested including ephemerals would result in a great deal of uncertainty regarding the administration of the policy on the parts of government and proponents. Others suggested it was "premature" to be considering this question, and that it ought to be considered after the policy is implemented to determine if it could be effectively applied. Finally, some of those who disagreed said they felt the definition of an ephemeral was unclear and that a decision should not be made until the difference between a waterbody, wetland, and different classes of wetlands, was clearly understood.

"Ephemeral waterbodies should be included in the Wetland Mitigation Approach proposed in the new Wetland Policy for Alberta. This would require compensation for loss of area"

This question was not asked at the workshops. Overall, 69% of workbook respondents who answered this question agreed that ephemerals should be included in the mitigation approach. Of those who agreed, 45% strongly agreed. Comments relating to this question were very similar to responses to the previous question. Those who did not support including ephemerals were concerned about the practicalities of including them, since identifying them is difficult on the ground. Those who supported including ephemerals were concerned about the lack of a mechanism to protect them and ensure they are considered in decision-making processes. Some of those who supported including ephemerals felt the Mitigation Approach should have some flexibility when it came to the tools for protecting them. Some who did not support including ephemerals felt other tools would be better suited for protecting ephemerals than the Mitigation Approach.

"Education and awareness programs and initiatives should be developed to encourage the conservation of ephemeral waterbodies"

Overall, 90% of workbook respondents who answered this question agreed with developing education and awareness programs on ephemerals; 70% strongly agreed. This question was not asked at the workshops. Those who agreed with the statement often cited a lack of existing knowledge about ephemerals and difficulties encountered by officials in accurately identifying them on the landscape. Many comments suggested to whom the education and awareness programs should be directed. Common education targets included government officials, agricultural producers, developers, municipal planners, field staff, students and the public. Others suggested the focus of educational messages should be explaining their functional contributions to watershed health and identify management practices that can protect them. Those who disagreed often suggested the definition of an ephemeral should be clarified before any education is undertaken.

 # 3 – Wetland Restoration

"Wetland restoration is an important and effective tool for ensuring the new Wetland Policy Goal is achieved"

Overall, 93% of workbook respondents felt that restoration is an effective tool for ensuring the new policy goal is achieved. The number of supportive participants was the same at the workshops (93%). Those in agreement generally indicated that the Mitigation Approach alone is not enough and emphasized the importance of an accompanying education component and other tools. Those in agreement also emphasized that effective restoration will take considerable time and planning, which may be difficult to accomplish in the short term. The need for wetland mapping and better information was often mentioned. Finally, some supporters felt that avoidance should be emphasized over restoration, generally, in the new policy. They were concerned that proponents would view financial compensation as the "easy way out."

Many respondents who supported using wetland restoration as a way of achieving the new policy goal suggested characteristics that would be necessary for it to be effective. These included: having timelines, restoring the same wetland type, coordinating with watershed plans, recognizing regional differences, adapting as science improves, and ensuring restorations are located near the lost or degraded wetland. The need for wetland function, rather than area, to be emphasized was also noted in many supporters' comments.

Those who disagreed with wetland restoration suggested that scientific limitations for restoration would make the approach impractical in the Green Area of the province. Others felt a dearth of information and expertise in wetland restoration would render the approach ineffective. Some also questioned the use of particular ratios, since they felt there was not enough information to support using them.

First Nations and Métis Discussions

Discussions with First Nations and Métis groups saw many areas of similarity with other consultation input, particularly with the need for increased education and awareness; better knowledge around wetland management techniques; taking a shared governance and collaborative approach; and ensuring partners have the capacity to participate.

Some concerns not captured elsewhere included the need for congruent federal and provincial policies (provincial policies may impact downstream reserves and other lands under federal jurisdiction); protecting Treaty rights (i.e. access to wetlands for traditional activities like hunting, fishing, gathering); incorporating Traditional Ecological Knowledge; the duty to consult with First Nations; and ensuring aboriginal community views and interests are included in the development review and approval process.

Summary

In addition to the questions previously discussed, a number of key messages related to what is needed to make a wetland policy successful emerged from the consultation process including:

1. Develop a better understanding of wetland function and benefits; the relationship between wetland area and function; the costs and benefits of maintaining or increasing wetlands on the landscape; and their value in comparison to other land uses and values.

2. Direct effort into looking at how we can better manage wetlands including ensuring we have shared definitions and classification tools; sound science to support the policy and its implementation; the tools and expertise required (e.g. inventories, health assessment techniques, education and awareness, best management practices/ codes of practice, reclamation techniques, etc.) for a long-term, adaptive management approach with built-in continuous improvement.

3. Make the policy flexible and sensitive to regional issues while still fair with a consistent regulatory approach. Clarify and understand the financial and legal implications of the policy and its implementation including the burden on proponents, municipalities and landowners.

4. Wetland conservation cannot occur in isolation of other land and water initiatives. Ensure integration with other federal, provincial and local policies, legislation and programs.

5. Support implementation and achievement of the policy by using a collaborative and coordinated approach and by adequately resourcing the infrastructure required to carry out implementation.

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Synthesis, part of a Special Feature on Balancing Ecology and Community using Cumulative Effects Models

Threshold Considerations and Wetland Reclamation in Alberta's Mineable Oil Sands

Lee Foote [1]

ABSTRACT. Oil sand extraction in Alberta, Canada is a multibillion dollar industry operating over 143 km² of open pit mining and 4600 km² of other bitumen strata in northern boreal forests. Oil production contributes to Canada-wide GDP, creates socio-cultural problems, provides energy exports and employment, and carries environmental risks regarding long-term reclamation uncertainties. Of particular concern are the implications for wetlands and water supply management. Mining of oil sands is very attractive because proven reserves of known quality occur in an accessible, politically stable environment with existing infrastructure and an estimated 5.5 billion extractable barrels to be mined over the next five decades. Extraction occurs under a set of limiting factors or thresholds including: limited social tolerance at local to international levels for externalities of oil sand production; water demands > availability; limited natural gas supplies for oil processing leading to proposals for hydroelectric dams and nuclear reactors to be constructed; difficulties in reclaiming sufficient habitat area to replace those lost. Replacement of the 85 km² of peat-forming wetlands forecast to be destroyed appears unlikely. Over 840 billion liters of toxic fluid byproducts are currently held in 170 km² of open reservoirs without any known process to purify this water in meaningful time frames even as some of it leaches into adjacent lands and rivers. Costs for wetland reclamation are high with estimates of $4 to $13 billion, or about 6% of the net profits generated from mining those sites. This raises a social equity question of how much reclamation is appropriate. Time frames for economic, political, and ecological actions are not well aligned. Local people on or near mine sites have had to change their area use for decades and have been affected by industrial development. Examining mining effects to estimate thresholds of biophysical realities, time scales, economic allocations, and social tolerance helps to contextualize the needs for decision making and relevant policy formation as a way of constructively reconciling production with governing safeguards to the environment and citizens.

Key Words: *environmental constraints; limits; oil sands; reclamation; thresholds; time frames*

They [our tools] do not suffice for the oldest task in human history: to live on a piece of land without spoiling it. (Leopold 1949)

INTRODUCTION

Rational decision making about energy use is one of the great problems of this century. Risks from energy production include climatic changes, cascading biological repercussions, and potentially irreversible losses of ecosystems and their functions. The costs and benefits of energy use have broad implications for public welfare, and have led to geopolitical maneuvering and social discord over allocation of access for resource extraction (Homer-Dixon 1991, Larsen et al. 2005, Dyer 2006, Pasqualetti 2009, Simieritsch et al. 2009). Oil sands extraction will span a period of the greatest growth of population and consumption of energy that the world will have experienced to this point, pointedly focusing global attention on the conflicting demands between the environment and energy security.

In this paper I use the intersection of Alberta's surface mineable oil sands and pre-existing wetlands as a case study to examine the many linked social, economic, and ecological outcomes associated with the extraction of petroleum for human use. I explore the question of whether environmental and social thresholds will be exceeded as well as challenges in changing course. Thresholds are points in a continuum that represent irreversible or noteworthy changes in the human-resource relationship that manifest in ecological, social, or economic regime changes. Because they often involve unprecedented responses of low predictability, thresholds tend to be detected in hindsight, after they have been exceeded. To avoid this situation, ecological and social thresholds can be established as a planning objective that involves specifying more moderate development limits to minimize risk. Planning thresholds provide a way that policies and social consensus can be improved as well as benchmarks for monitoring progress. As a planning tool, thresholds are amenable to adaptive management and prescriptions for improvements. By explicitly involving repercussions of mining in the decision process, threshold-driven management is a form of risk-based management.

The oil sands provide an excellent illustration of threshold concepts. There are two broad propositions in this paper. The first is that scientific knowledge and operational techniques are weak or lacking for addressing a suite of impending resource constraints and ecological thresholds. The current guiding policy for development of high value, nonrenewable resources, i.e., petroleum, has not adequately addressed many

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concerns about excessive harm and violation of thresholds of other natural resources, particularly wetlands. In particular, the standards for habitat replacement, water use, air pollution, and aerial deposition of contaminants in the oil sands are weak, difficult to obtain, and confusing. In addition, because they are source based the standards that do exist provide little useful or constructive guidance for establishing development limits and have not presented realistic challenges to industry operations (e.g., Kennett and Wenig 2005, Dyer et al. 2011). Standards used for mining approvals are not applied transparently or consistently resulting in poor accountability for mining approval decisions and contentious public hearing processes. Thus far, the Government of Alberta has approved 100% of the oil sand mine applications received (Rooney and Bayley 2011), yet insiders realize this is misleading; project proponents are in close consultation with provincial regulators from project initiation, and flawed initiatives never reach the application stage. On 28 January 2011 a seventh mine owned by Total Ltd. was approved for startup in 2017 with plans to operate for 20 years thereafter (CBC 2011). The continued approval of mines in the face of increasing public concern raises questions of whether there is an adequate policy framework in place for the evaluation and approval of projects relative to thresholds (Kennett and Wenig 2005).

The second proposition is that sustainability of oil sands mining can be beneficially viewed in terms of thresholds by comparing short-term societal benefits to longer term societal costs. As a way of understanding the interrelationship between environmental degradation and social thresholds Homer-Dixon (1991) identifies seven major environmental problems that contribute to social conflict including: greenhouse effects; deposition of toxic materials; deforestation, overuse, and pollution of water supplies; depletion of usable fish; degradation of agricultural lands; and ozone depletion. All except the last two are immediate concerns for oil sands development. Other concerns related to health of local communities and global social acceptance are less easily measured and may only become recognized after large swings occur in existing regimes.

The social backlash that continues to build in response to ongoing development of oil sands without satisfactory consideration of environmental degradation is a risk to energy producer's continued operations. The paper is organized as follows. I first provide the local and global context and pressures for development of oil sands, even with the possibility of exceeding thresholds. I then outline the numerous resource and ecological constraints facing the sector, and uncertainties around irreversible changes. Finally, I outline potential social impacts from ecological degradation on local communities, particularly aboriginal communities. In the discussion section, impediments addressing thresholds are outlined. While this paper draws on a literature review, it is also informed by experts, i.e., university and industry operators, researchers, consultants, who have shared their research as well as considerations and prescriptions for reclamation.

The development context

The oil sands of northern Alberta are the largest, and potentially the most valuable hydrocarbon resource on earth. An estimated 173 billion barrels of recoverable oil exist in the ground as a thick, tar-like substance called bitumen (Government of Alberta 2012*a*). This mineral deposit is owned by the province of Alberta and leases are extended to private companies to mine and process the oil, a process that is expected to continue over the next 40 to 60 years. The value of this resource to the Alberta and Canadian economies is immense. Honarvar et al. (2011) estimate $2106 billion in GDP stimulation and 905,000 jobs created for Canada in the 2010-2035 period. Ebner (2005) describes the $1.4 trillion addition made by oil sands to the GDP of Canada during the 2000 to 2020 period with an average oil price of $40 per barrel.

Bitumen in the region is impregnated into shallow subterranean sands across an area of approximately 4750 km² (ERCB 2009). Approximately 20% of the oil sand deposits exist close enough to the surface to be extracted by surface mining. The remaining 80% will be extracted through steam-injection wells.

A number of factors make oil sands very attractive and are driving the development. These include:

1. Reliability of supply: there is a known volume and predictable delivery schedule.
2. Quality of product: though expensive to process, the quality of petroleum from bitumen mining is high and well known and extraction is not complicated by pressurized natural gas or highly toxic sour gases such as hydrogen sulfide.
3. Security of source location: the political system of Canada is well respected for its stability and long standing relationship with the adjacent and dominant U.S. market.
4. Ability to continue increasing production during a period of decreasing world supplies.
5. Relatively safe and simple transport of crude oil via pipeline to U.S. refineries as well as emerging opportunities to reach west coast ports for international distribution by tankers.

Other external market factors are also shifting attention to the oil sands. Petroleum demand from the world's largest consumers of oil, U.S., China, and India, are rising. At the same time, many low cost supplies are in a collapsing phase (Pasqualetti 2009). For example, production from Mexico's great offshore Cantarell oil field dropped from 2.1 million

barrels per day (MBD) in 2006 (Collier 2006) to 0.75 MBD in 2009 (Campbell 2009). Venezuela exports have slumped for political reasons while production in North Sea fields and Indonesia are rapidly declining. As a result of decreasing supply options and increasing demands, global inventories are declining. In 2003 there was a 3.0 MBD global surplus in oil production and by 2008 that was down to zero (Energy Information Administration 2007).

Harder to access hydrocarbon deposits are more costly and may pose even greater environmental risks. For example, between April and 15 July 2010 an offshore British Petroleum drilling platform collapsed and released approximately 5 million barrels of light crude oil into the Gulf of Mexico. This event immediately slowed offshore drilling progress in U.S. and international waters that will exacerbate future shortfalls. Shale gas production through formation fracturing (fracking) processes has also been associated with risks of groundwater contamination and earthquakes (Parfitt 2010, Holland 2011).

Resource constraints: water, pollution, energy, and carbon emissions

A number of resource constraints and challenges must be addressed as oil sand production is scaled up.

Water

Future production rates may be more limited by water availability and tailings storage than by production technologies, access to markets, or availability of reserves. Water is an essential component of the oil sands separation process. Between two to four barrels of water are needed to process each barrel of oil. According to 2010 data, five industrial oil sands companies held licensed water use permits in the lower Athabasca River Basin totaling 180 gigaliters annually, most of which is allocated to the surface mining operations in the Fort McMurray oil sands (Adamowicz et al. 2010). Water demands are expected to increase under business as usual cases (CAPP 2011) and this increase comes at a time when climate change is anticipated to reduce river flows (Mannix et al. 2010).

Water used for surface mining is a liability because it must be stored in tailings ponds (Giesey et al. 2010) so it is in the industry's interest to minimize water use. Water recycling helps to reduce demand on river sources but this concentrates contaminants in the tailing ponds. Tailing pond water volumes have increased over time and represent a major liability and risk to both energy companies and the public with approximately 1 billion cubic meters of tailings water stored on the combined oil sands as of 2009 (Simieritsch et al. 2009, Gosselin et al. 2010). Though technology is advancing rapidly to store produced water as shallow groundwater in clay and gypsum slurries, thickened tails, and polymer enriched sludges, tailings pond reclamation is an unproven technology. Companies do not yet have a cost-effective way to remediate the volumes of water produced and they may have to store it for decades to centuries (Del Rio et al. 2006).

Pollution thresholds

Pollution is used here to describe the production, concentration, and discharge of undesirable compounds as well as the placement of normally benign materials (salt) in an undesirable context. This is typically a consequence of industrial activity in the oil sands though smaller examples of natural geologic releases also occur. Many water quality problems remain to be addressed in postmining wetlands. Of the thousands of petroleum compounds found in natural crude oil, only a small fraction is actually water-soluble. Notable groups of these such as alcohols and naphthenates dissolve into the water used during the bitumen/water separation process. These soluble components as well as salts and some soluble/suspended heavy metals return to the tailings reservoirs with the waste water where they cause problems for insects (Barr 2009), fish (Tetreault et al. 2003), amphibians (Hersikorn 2009), and birds (Gentes et al. 2006). Initially the plans of oil companies were to use wetlands as scrubbers to improve processed water quality. However, this has not worked well for fully soluble components like naphthenics and salt, and these plans have been largely abandoned or marginalized. As a result settling basins are the primary method for suspended solid removal.

Trace amounts of petroleum compounds enter the Athabasca River naturally each year because of river down-cutting and annual river erosion. This natural contamination of the river is probably low compared to the two to eightfold increase in river loadings of petroleum associated directly with mining activities (Kelly et al. 2009). River and vegetation contamination near active mine sites is further compounded by aerial deposition from the mining, trucking, and upgrading ore (Kelly et al. 2009). Some leakage of contaminated water finds its way through containment dikes surrounding the greater than 170 km^2 of tailings ponds and Marsden (2007) relates a 1997 Suncor admission that approximately 1600 m^3 of contaminated water leaks into the Athabasca River daily from older tailing pond dikes. Ferguson et al. (2009) offer the optimistic appraisal that such leakage diminishes with time as fine clays plug the more porous flow paths in the dikes. However a legacy of contaminated pore water remains and regional groundwater is contaminated and will remain so for centuries. One great unknown is the degree to which downward migration of contaminated water occurs under the pressure of elevated tailings ponds.

It is difficult to establish acceptable thresholds for background and fluctuating levels of waterborne polycyclic aromatic compounds (PAC) in terms of environmental and human health. Kelly et al. (2009) found pollutant levels at key stream mouths on the Athabasca exceeded the levels known to cause death to fish embryos and affect endocrine function of adults.

This could be broadly taken as having exceeded an acceptable threshold of contamination at those specific locations, especially in waters fished downstream for household fish consumption. However possibly because of dilution and sequestration this same signal was not detectable downstream where the Athabasca entered Wood Buffalo National Park.

Energy and carbon

Substantial energy inputs are required to produce fuels from the tarry, sandy bitumen. Extraction of oil sands requires almost as much energy as is produced with an energy return on investment value of 1.5 whereas easily extracted Middle East oil may return 15 to 30 times the energy required to produce them (Rousse et al. 2009). Approximately 4% of all natural gas produced in the Western Sedimentary Basin of North America is used for oil sand processing but that amount could escalate by 2.5 times by 2015 (National Energy Board 2007). Use of natural gas for bitumen separation appears to be a cost-effective option; supplies are abundant, prices are low, and natural gas burns relatively cleanly and efficiently. However, local supplies are not infinite and natural gas has many competing markets domestically.

The hydroelectric potential of the major rivers in the region are being reinvestigated in anticipation of increased demands over the next 50 years from the energy sector production, both for oil sands and carbonates. In April 2010, British Columbia announced a major dam called Site C on the Peace River that would produce 4600 gigawatt hours of electricity annually (Hume 2010). The Alberta government has also considered a dam on the Peace River and the Northwest Territories is considering a major dam on the Slave River in Fort Smith, Northwest Territories. In each of these cases, oil sands are a major potential customer for energy sales.

Greenhouse gas emissions from oil sands pose a significant social and regulatory challenge for the industry (e.g., Chastko 2010). Energy requirements for processing bitumen have led to recommendations that nuclear power generation supplant natural gas as the primary energy source for oil sand processing (Halper 2011). They did not discuss uranium availability, waste disposal, malfunction risks, or public acceptability issues that are typically considered in environmental and social impact assessments prior to approval of nuclear power development.

Although this discussion centers on surface mining, an even larger volume of bitumen is liquefied beneath the surface through injection of steam and solvents in a process called steam-assisted gravity drainage (SAGD). The emissions from this technique are also significant: emissions from creating sufficient steam to produce the targeted daily volumes of 1 million barrels of oil are over 86,000 metric tons of CO_2 equivalents each day. Greenhouse gas emissions from the ultimate combustion of the oil will vastly exceed those from production however.

Wetlands and the potential for irreversible ecosystem loss

Wetland ecosystems get special consideration in the oil sands region because they dominate the landscape, occupying up to 65% of the active surface mining area (Raine et al. 2002). Wetlands are defined as areas that are substantially affected by water saturation or shallow inundation for periods of time sufficient to develop characteristic soil types, and/or specially adapted vegetation.

Wetlands contribute special ecological functions and values. They accumulate carbon and also slow water runoff resulting in longer time intervals for water infiltration and groundwater recharge. Wetlands also moderate storm water run-off, attenuating flood pulses for down-gradient receiving systems. The soils of most wetlands in the oil sands region are very active habitats for microbial communities. When contaminant levels are moderate, natural microbe communities can transform, sequester, bind, and isolate many undesirable materials from the water column, purifying water (Frederick 2011). Wetlands are also disproportionately valuable for wildlife, concentrating insect, fish, bird, and mammals in closely linked food chains. Wetlands provide aesthetic, recreational, cultural, and spiritual values for naturalists, hunters, and anglers.

A primary condition of mine permitting is the agreement to return disturbed wetlands on the mine sites to a socially acceptable condition. Ideally, conditions would be restored to those nearly identical to the premine state. However, peatlands, the primary class of wetland cover throughout the oil sands region, cannot feasibly be replaced because of insufficient available area, time requirements for peat development, gaps in reclamation knowledge, and expense. Peat accumulation is a complex nonlinear process (Clymo 1992) dependent on simultaneous accumulation and decomposition with a positive balance. Restoration of fen peatland conditions requires stable and calcium-rich groundwater of low salinity flowing into low gradient areas with a fairly stable climate and low fire frequency. Even with these exacting conditions, at 1 to 3 mm of peat accumulation per year, approximately one to three centuries would be needed to generate the 30 cm minimum of accumulated peat to technically qualify as a peatland.

Oil sands mining creates unique landscape replacement challenges, mostly related to new soil types, changes in land form, and severed hydrologic connections. In the short term, boreal forestland is largely replaced with large piles of sandy tailings and the fen wetlands are excavated disrupting water supplies. Fens are typically replaced with emergent lacustrine wetlands on salt-affected soils with low permeability. Because the bitumen resides on, and is overlain, by ancient marine sediments, salts are liberated by the hot water used to separate oil from sediment yielding salt concentrations of 4000 to 6000 microsiemens in the tailings. This is approximately 10%

seawater strength, too high for all common nonmarine wetland plants, fish, amphibians, and most insects, so the community diversity of plants and animals is reduced.

These challenges call for expensive and innovative management approaches to replace suitable growing conditions including: isolating damaging chemicals from the growing environment; elevating soil layers; installing under-drains to evacuate the saltiest water; and finding a tolerant subset of plants and animals that can persist in these novel conditions. Furthermore focusing only on replacement of landforms and soil conditions is insufficient. A broad consideration of the processes and requirements of entire ecological communities is required otherwise plant occupancy for crucial microbial, insect, and wildlife components will be missed.

Social thresholds

Local people of partial or full aboriginal heritage, predominantly Cree, Dene, and Métis, continue to live in the oil sands mining region and their occupancy predates oil sand discovery and development in the region. Local aboriginal communities maintain a complex relationship with oil sand development. Despite greatly increased employment opportunities with oil companies and some improvements in education and training, many communities have had limited success with government or industry in influencing the direction of land use planning and development and their impacts on wetlands, water quality, and wildlife habitat. Concerns about oil sands development include concerns about human health and water pollution; contamination of wild-gathered foods; and limited employment opportunities for Aboriginal youth near the oil sands (Droitsch and Simieritsch 2010).

There is strong evidence that First Nations view the landscape in a fundamentally different way than people with predominantly European backgrounds (Lewis 2010). A strong connection to the condition of the land is often brought forward by aboriginal communities for whom long-term reclamation and closure planning are of concern. Garibaldi (2009) contends that spirituality is inextricably linked to the concept of reclamation and that reclamation activities may be enhanced by clear linkages to land-connection desires of local people. It is significant then that reclamation may require excluding the public from mining sites for over 50 years, which would break the linkage of local communities to the land element for at least a generation or more and constitute a serious loss of connection with previously existing landscapes (Smith et al. 2002). It is unlikely that hunters, trappers, gatherers, and travelers in the region would retain detailed knowledge of exclusion zones for five decades. Isolation from the land contributes to increased First Nation concerns about maintaining identity through land-based traditional activities in the presence of oil sands development.

Tomich et al. (2004) provide a framework for understanding the socio-political dynamics of environmental issues by outlining seven stages of problem acceptance and action: (1) problem perception by pioneers, if judged correct, or crackpots, if judged wrong; (2) lobbying by action groups yet no action by authorities; (3) widening acceptance of problem existence and mounting pressure on authorities; (4) debates as to cause and effect and attribution of blame; (5) inventory and assessment of prevention and mitigation; (6) negotiation on prevention/mitigation steps; and (7) implementation of monitoring and enforcement of protections. These stages represent a sequence of social perceptions and responses relevant to oil sands mining. It could be argued that currently the oil sands are stalled at the fourth stage, i.e., debates as to cause and effect, in the cycle of social acceptance.

To most people, images from oil sand mines with large excavation pits, steaming upgraders, frothy brown lakes, and dusty large equipment digging open pits are disturbing (e.g., Latura 2011). The remote and inaccessible location of the mines in northern Alberta has meant that relatively few people viewed these settings and that for years there was relatively little public awareness or concern about what happened on these sites. Over the last decade, however, the public has become more aware of environmental challenges associated with oil sands development through feature magazine articles such as National Geographic (Kunzig 2009) and television specials highlighting carbon emissions and water shortages. Complaints of local First Nations communities activist groups such as Greenpeace refer to the mine areas as “tar sands” and publicly call for the end of mining (Greenpeace 2010) on the grounds of pollution, CO_2 releases, land use alteration, and cultural disruption (Chastko 2010).

In the spring of 2008, a highly symbolic and discrete event galvanized the public’s attention when 1600 migratory waterbirds, mostly ducks, became oil-soaked and died in the bitumen layer on a Syncrude tailings pond. Ducks die every year in Alberta, up to 100,000 can die naturally on a single lake from botulism outbreaks, and many biologists, the author included, are on record stating that the absolute number lost was not of significant concern to the continental population. However, the symbolic images of oiled birds dying in industrial ponds produced emotional reactions and public anger at Syncrude for poor prevention of a known problem. These exposures helped to elevate awareness and led to broad public acceptance of the problem and mounting pressure on authorities (stage 3 in the above cycle of acceptance).

Alberta is currently at the fourth, and arguably most difficult, stage of the acceptance cycle. Recent reviews of health impacts from the oil sands, and monitoring policies have generated extensive debate on cause and effect, which in many cases cannot be solved because of poor environmental monitoring in the region. Criticisms of Alberta’s monitoring of oil sands

impacts continue to build and include inadequate funding and poor design of monitoring protocols (Auditor General of Canada 2010, Gosselin et al. 2010, Dillon et al. 2011, Main 2011).

In 2008 the Government of Alberta launched a Land Use Framework (LUF) to address significant cumulative effects challenges related to land use in the province including criticisms related to the continual approval of oil sands projects in the absence of limits and thresholds. One of the key strategies of the LUF was to develop regional plans that would identify outcomes and cumulative effects thresholds for land, air, and water that could be used to establish guidance and regulatory parameters to set limits and conditions on project approvals (Government of Alberta 2008). However to date no regional LUF plan has been adopted by Cabinet. In addition, the draft regional plan that has been developed for the Lower Athabasca Region where the oil sands mines exist does not identify thresholds. Instead the recommendations only provide guidance for setting thresholds in subsequent subregional planning exercises. In the meantime, the government has changed and the LUF and supporting legislation (the Alberta Land Stewardship Act) is undergoing political review. The stalling of the framework and direction for cumulative effects management suggest the province has not yet advanced to steps 5 to 7. Nonetheless there remains a need for inventory and assessment of prevention and mitigation strategies for ecosystem impacts, as well as the negotiation and implementation of cumulative effects thresholds.

Challenges in setting thresholds

Policy challenges

In spite of mounting local, national, and international pressures to demonstrate better environmental outcomes in the oil sands, there are several difficult challenges to setting development limits. These are demonstrated by the inability of the province to come up with a suitable wetland policy for the region.

Governments are generating policies and protective legislation for wetlands and other impacts related to oil sands development. Currently Canada's national wetland protection policy is primarily a set of principles. Alberta currently has no wetland policy for the forested area of the province. The 1993 interim policy that applies for the settled area of the province requires compensation for damages to wetlands. In 2005, the Alberta Water Council was directed by the Government of Alberta to establish a Wetland Policy Project Team to develop recommendations for a new wetland policy and corresponding implementation plan. In 2008 the team recommended a no-net-loss goal to maintain wetland area in Alberta such that the ecological, social, and economic benefits that wetlands provide are maintained (Alberta Water Council 2008). However, in the fall of 2010, the government rejected the council's recommendations over concerns raised by oil sands stakeholders over potential costs of the policy.

In the current policy the language of wetland loss, reclamation, replacement, regulation, and policy are often confusing and even misleading in ways that make evaluation and accountability harder to achieve (Clare et al. 2011). The words creation, restoration, reclamation, and remediation are often ill defined or conflated. Each has a specific and different meaning and given that even experts sometimes interchange them, it is clear why the public struggles to grasp the concepts of ecosystem repair.

Because restoration time frames measured in centuries do not match business cycles or bonding/liability agreements, reclamation agreements tend to default to short-term and hence less rigorous requirements for approval. The regulatory intent of wetland reclamation focuses on the duty of those altering or destroying a wetland to return the sites to a condition capable of producing ecological goods and services. Because in many cases it will be impossible to replicate the original feature within a meaningful time frame, the approval for reclamation is often held to a standard of "equivalent capability" where similar degrees of social, ecological, and commercial goods and/or services can be produced from the site. Those goods and services may be of different types; for example, a groundwater recharge wetland might be replaced with a productive commercial forest under the concept of equivalent capability. Consequently, most peatlands will be replaced by upland forest, pasture, or marsh type wetlands for quicker results. The absence of knowledge on wetland reclamation also means that regulatory requirements, formulated without clear end use targets, are criticized as being vague or over specified.

The concept of equivalent land capability is based on a regional forestry classification called the Land Capability Classification for Forest Ecosystems (Leskiw 2004) and it may not fully capture nonmarket ecological goods and services specific to wetlands such as groundwater recharge, nutrient processing, flood attenuation, aquatic pollution abatement, biodiversity, aesthetics, or cultural values. A wetland's relative importance is context-dependent; for example, as wetland area dwindles, the scarce remaining wetlands may spike in value for regional biodiversity, flood attenuation, or recreational opportunities.

Costs of reclamation

Reclamation, clean up, and mine closure are very expensive activities and oil companies in the oil sands region have invested hundreds of millions of dollars into reclamation thus far but several key questions remain:

- Is the investment sufficient to reclaim the area?
- Who decides when reclamation is achieved?
- How is this decision made and enforced into the future?

Reclamation costs are estimated to fall between $10,000 and $250,000 per ha depending on end conditions sought (G. McKenna, BCG Engineering, *personal communication*; and two anonymous oil sands reclamation specialists). Using simple calculations to estimate the costs of wetland replacement based conservatively on $50,000 per ha for each of the 85,500 ha of wetlands slated for loss from mining yields an estimate of $4.3 billion required for wetland reclamation at a 1:1 ratio. If regulations require 3:1 area ratios for reclamation, that is, 3 ha of wetlands replaced for each one lost, the costs jump to $12.9 billion. In all of these reclamation projects success is not guaranteed. Assuming that of the 4750,000 ha of oil sands area, of which 3% are mineable, each mined hectare produces approximately $2.6 million in company income (assuming $70/barrel oil price as of June 2010, $18/barrel production cost, and after a 25% provincial royalty has been removed), the 4,750,000 ha of oil sands area of which 3% are mineable puts the net value of recoverable oil from mines underlying wetlands at approximately $196 billion.[1] The $12.9 billion calculated in wetland reclamation costs equals about 6% of the net petroleum profits these simple numbers suggest are being extracted, a lower reclamation rate than many other extractive industries face.

Despite ongoing research in wetland creation and reclamation in the oil sands region, only a few vegetated wetlands > 4 ha in size have been recreated on postmining oil sand substrates, and no large scale wetland creation > 100 ha has been attempted. Problematically, the regulatory agencies, primarily Alberta Environment, have issued little clear and consistent reclamation guidance and few criteria by which to gauge reclamation success. Consequently, as of 2011, for a variety of reasons, none of the industries operating in the region has attempted to validate any of their wetlands as certifiably reclaimed.

One argument sometimes given for the low reinvestment rate in wetlands is that uncertainty about reclamation success and the open-ended nature of the regulatory demands can be unsettling to investors. Such economic liabilities translate directly into stock values and place tremendous pressures on regulatory bodies in government to relax regulations. As of 31 March 2010 oil sands operators had cumulatively invested approximately $916 million into repair bonds (Government of Alberta 2011) to help ensure reclamation would occur should companies default on mine reclamation requirements. This $916 million is held to cover wetland replacement, mine site repair, roads and pipeline reclamation, and take care of hundreds of km² of contaminated tailings ponds and major dike maintenance over many decades. Auditor general reports suggest that this is an inadequate bond for cleanup responsibilities and would leave a seriously degraded landscape or a major cost to government and tax payers (Auditor General of Alberta 2009).

The potential for companies to default on bonds needs to be addressed. Historically, bond defaults have occurred in other mining situations throughout remote, lightly populated regions of northern Canada where abandonment of industrial extraction sites without reclamation has been common, if not the norm. Birtwell et al. (2005) reported on 50 northern Canadian lakes that were either partially or entirely eliminated, or approved for elimination, during the 1985-2000 era as a result of diamond mining, placer mining, or oil sands operations. In all cases, these violated the letter and spirit of Canada's Fisheries Act, yet, because of data gaps, absence of validation, or compensation, there have been no examples of whole lake restoration to date.

Meaningful time

Reclamation, which validates the concept of sustainability, is also hampered by the disappearance of meaningful benchmarks. When mining alters the entire landscape it is difficult without a benchmark to select a comparison of what it might have looked like in its "natural" reference state and identify an appropriate replacement type. The lack of benchmarking introduces a process of forgetting or "cultural amnesia" in social science terms. Natural scientists refer to this as the "shifting baseline syndrome" (Pauly 1995) whereby each generation relates the present with a limited historical recollection. Today natural reference areas still exist in northern Alberta because oil sands mining is a recent development embedded in a large region of similar habitat. Many people alive today will recall the appearance and configuration of specific premine sites. Aerial photographs from the 1940s and 1950s show the untracked expanses that are now open excavation pits and these may corroborate the personal narratives of many that traversed, lived on, hunted, and fished these areas before mining. Such memories may not persist for another 50 years however when oil sands mining is put in the context of landscape changes expected to occur from the development of other nonconventional oil and gas sources underlying the region.

Time scales are particularly difficult to relate to in a meaningful way considering bitumen is a nonrenewable resource that has taken hundreds of millions of years to accumulate, and at current extraction rates, may be exhausted from this formation in approximately eight decades, approximately the life expectancy of an average North American human being today. With as few as 10 years of accumulated evidence, projections are being formulated to confirm that long-term reclamation targets will be achieved and this is dubious forecasting given the uncertainties at hand.

From a survey of closure plans for 57 mines in western North America, McKenna and Dawson (1997) identified the uncertainty around time frames for good performance of their reclaimed land to be a most problematic aspect. They

identified 10 to 10,000 years as the range of time frames likely, but suggested a 200-year time frame for good reclamation site performance, a rough guideline emerging largely from uranium mines and mill sites. Peatlands will require centuries of natural peat accumulation under favorable climate to return to their premine function. Neither mining companies nor their insurers want obligations for centuries. Discount rates on investments and held bonds make long-term reclamation assurances very attractive but this does not increase their plausibility.

Time scales for quarterly business reports, media cycles, political election cycles, and government policy formulation are short, ranging from days to years. Such short-term decision frameworks have become the primary governing influence guiding reclamation criteria and regulation. Such criteria and regulations do not match well with biophysical time frames such as ecological succession, evolutionary processes, or geological and landform development, all of which operate in the centuries to multimillennial or even epochal time frames.

Companies and government representatives typically meet at the end of the productive mine life to renegotiate the terms of ongoing decommissioning and reclamation and to renegotiate the appropriate performance bond required (Government of Alberta 2012*b*). The long-term reclamation success will not be known until long after the final decommissioning agreement and bond renegotiation are settled. This creates a very difficult situation for policy setting.

Timing of knowledge is important too. Lindahl (2009:4) writes:

> *In reality, people tend to have access to different sources of information and may also differ with respect to skill of processing this information. The symmetry of information could vary from situation to situation, as it depends on how expensive it is to acquire information and on the rules of disseminating it. In a rivalry setting, agents may have incentive to use their own and others knowledge strategically, which could have consequences for individuals and overall welfare.*

To avoid as many reclamation responsibilities as possible, it may be rational in the short term for companies to not embrace recent but speculative wetland reclamation procedures, at least until after finalizing the mine closure agreements. Once reclamation techniques are proven they may be adopted by government regulators as standards of practice, and they may prove to be very expensive and hence a financial liability to companies.

CONCLUSION

Production of petroleum products comes not at a single calculable cost but as a series of complex interlinked and interactive costs that are borne by large sectors of society and indeed, the entire world population to some degree. Simple cost/benefit analyses fall woefully short of reflecting the trade-offs that must be considered in guiding where to pursue energy development and how to do so. Thresholds can provide definite decision points at which people, companies, or governments can choose to change their management strategies, or can provide boundaries beyond which all parties agree to cease or slow development. Examination of thresholds is instructive because embedded in establishing thresholds is the question of how to determine "Where is the stopping point?" or "At what point is different action merited?" Wetland impacts from oil sands mining illustrate the difficult social and scientific challenges in making these important trade-offs and developing thresholds.

The state of knowledge in wetland reclamation is meager in comparison to the needs to create, restore, reclaim, and compensate wetlands in the face of oil sands development. However the pressures to expand development are massive and accumulating from companies, government, and the public. This paper addresses a number of issues that taken in aggregate provide a larger breadth and dimension to the sustainability of oil sands development beyond the question of whether it is possible to simply compensate for some proportion of the physical damage done. Permanent solutions to reclamation problems may not be discovered for centuries, or ever, and the concept of a "disposable landscape" or a national sacrifice zone is troubling to many. There is legal precedent in the U.S. around brownfield sites, i.e., mine-scarred lands and hazardous pollutant sites, to place sites off-limits for decades awaiting technological fixes (U.S. Congress 1980). For example, the Rocky Flats Nuclear weapons facility in Golden, Colorado was made off-limits for 30 years during which time expensive decontamination work was undertaken.

Where thresholds are being approached, moderation of the pace or the manner of oil sand production may be required. Without specific targets, guidance, or alternatives, political restructuring and hardening of protections by government and industry may occur to allow mining to continue unabated despite growing public and international opposition. A broader consideration of environmental risks and social opposition will be needed to understand the profitability of operations because awareness of these effects is an increasingly large cost of conducting business.

Some undesirable thresholds may be avoided by increasing investments in reclamation efforts and processing efficiencies if knowledge can be developed to solve these novel problems. However if, in a very rational approach to oil sands production, trade-offs are useful to measure the costs and benefits of petroleum development as it is currently carried out, we must grapple with this very difficult question: how long can companies maintain the current social license to operate in the

existing knowledge vacuum? Because it is not possible to satisfactorily predict postmining wetland reclamation in advance, I suggest that negotiated thresholds may help development move toward a more acceptable way of mining and reclaiming wetlands.

Responses to this article can be read online at: http://www.ecologyandsociety.org/vol17/iss1/art35/responses/

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2020 CLIMATE CHANGE PLANS

NRT

NATIONAL ROUND TABLE ON THE ENVIRONMENT AND THE ECONOMY

MINISTERIAL
REFERENCE

REALITY CHECK: THE STATE OF CLIMATE PROGRESS IN CANADA

A REPORT BY
THE NATIONAL ROUND TABLE ON THE ENVIRONMENT AND THE ECONOMY

Canada

NATIONAL ROUND TABLE ON THE ENVIRONMENT AND THE ECONOMY

THE STATE OF CLIMATE PROGRESS IN CANADA

THIS NEW REPORT, REQUESTED BY THE FEDERAL MINISTER OF THE ENVIRONMENT, REMINDS US OF HOW FAR THE COUNTRY HAS COME, BUT ALSO OF HOW FAR IT MUST GO. IT SERVES AS A REALITY CHECK ON THE STATE OF CLIMATE PROGRESS IN CANADA TODAY.

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NRT

NATIONAL ROUND TABLE ON THE ENVIRONMENT AND THE ECONOMY

Disclaimer: The views expressed in this document do not necessarily represent those of the organizations with which individual Round Table members are associated or otherwise employed. The NRT strives for consensus but does not demand unanimity. The NRT's deliberations included vigorous discussion and debate reflecting diversity of opinion.

ACKNOWLEDGEMENTS

The NRT wishes to thank the many people who participated in our research and convening process to make this important report not just a reality check, but a reality.

The heart of the report is its original economic modeling and analysis. This was conducted by Navius Consulting led by Chris Bataille and Noel Melton. Dale Beugin of Skycurve Consulting coordinated their efforts, helped present results, and contributed drafts of two of the chapters dealing with this research. Dr. Andrew Leach of the University of Alberta provided early strategic advice and acted as that essential interpreter of this unique piece of work, particularly on the cost-effectiveness issues. The NRT was well-served by these leading Canadian energy/environment researchers and modelers and thanks them.

We wish to thank Andre Juneau and his team at the Institute for Intergovernmental Relations at Queen's University for hosting our dialogue session with governments and climate policy experts in March, 2012. This Canadian Climate Policies Dialogue Session was instrumental in bringing almost all governments to the same table to hear our research results and contribute their perspectives.

Participation by the federal and provincial/territorial governments was critical for this report to succeed. The NRT thanks deputy ministers, and assistant deputy ministers of environment and their officials from all jurisdictions who gave us their time, information, and helped us understand each of the climate policy plans being implemented across the country. Their interest and engagement in the NRT's work was gratifying.

Our own NRT staff applied their dedicated skills and commitment to meet the requirements of the Ministerial Reference to us and contribute to this final product. Julie St-Amour organized the Kingston Conference with Rachel Faulkner. Suzanne Loney provided her usual detailed eye for editing and form. The communications unit of Marie-Josée Lapointe, Tony Bégin, Richard Pilon, Edwin Smith, and Nadra Meigag met the compressed timeframes to produce the final English and French versions for public release.

Finally, the NRT wishes to particularly thank and acknowledge the contribution of Beth Hardy, research associate, to this report. Beth conducted the provincial climate plans analysis, engaged provinces directly to get their input, contributed draft chapters, and kept all the loose ends together. Beth's commitment and hard work were essential for this report to progress.

MESSAGE FROM THE VICE-CHAIR

In 2011, the Minister of the Environment asked the NRT to conduct a comprehensive assessment of provincial/territorial climate change plans and how they will contribute to meeting the federal government's 2020 target to reduce emissions. The minister stated the NRT was "uniquely positioned" to carry out this charge on his behalf. This report is the result of our work.

As an independent policy advisory agency on sustainable development, the NRT is providing original analysis, assessment, and advice to the Government of Canada and all provincial/territorial governments. This is the first such assessment of all the data and all the trends of government climate change policies to show progress towards reducing greenhouse gas emissions and meet our international climate change target.

The NRT believes it is essential that governments and policy makers in this field read what we found and consider our advice to move ahead. Canada will not make the progress it needs without this frank assessment of what we can really expect from climate policies now or soon to be underway. Nor will Canada achieve its climate goals without considering a better way to unify governments in a more coordinated approach with shared understanding that all must contribute.

R.W. Slater, CM, PH.D.
NRT Vice-Chair

MESSAGE FROM THE PRESIDENT AND CEO

Reality Check is just that: a reality check on where Canada really is in reducing greenhouse gas emissions to meet the federal government's 2020 target. The NRT's work is original and needed. Billions of dollars of investment and effort have been and will be expended by governments, industry, and consumers on various climate policies and programs to reduce carbon emissions. But how effective are they? Will they yield results? The NRT provides some answers.

We show, for the first time, comprehensively just where we are on the path to 2020. We illustrate the actual and expected contributions of federal and provincial governments to meeting this challenge. We demonstrate what it will take, and what it will cost, to close the emissions gap to Canada's 2020 target.

Carbon emissions in our country do not belong to any one level of government. National climate policy progress has been slow and difficult in Canada given the sources and trends in emissions across Canada. Governments have talked, have acted to some degree, but sustained progress Canadians can count on is not yet taking place. The NRT sets out advice on how to coordinate climate policies across the country so they work better, together.

Our message is clear. We need to move beyond current approaches and have a truly pan-Canadian dialogue on how to do this better. If not, Canada's 2020 target will remain a hope not a reality.

David McLaughlin
NRT President and Chief Executive Officer

ABOUT US

Through the development of innovative policy research and considered advice, our mission is to help Canada achieve sustainable development solutions that integrate environmental and economic considerations to ensure the lasting prosperity and well-being of our nation.

Emerging from the famous Brundtland Report, *Our Common Future*, the NRT has become a model for convening diverse and competing interests around one table to create consensus ideas and viable suggestions for sustainable development. The NRT focuses on sustaining Canada's prosperity without borrowing resources from future generations or compromising their ability to live securely.

The NRT 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.

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

The NRT brings together a group of distinguished sustainability leaders active in businesses, universities, environmentalism, labour, public policy, and community life from 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.

We also reach out to expert organizations, industries, and individuals to assist us in conducting our work on behalf of Canadians.

The *NRTEE Act* underlines the independent nature of the Round Table and its work. The NRT reports, at this time, to the Government of Canada and Parliament through the Minister of the Environment. The NRT maintains a secretariat, which commissions and analyzes the research required by its members in their work.

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David McLaughlin

NATIONAL ROUND TABLE ON THE ENVIRONMENT AND THE ECONOMY

OUR PROCESS IS THE WAY WE WORK

FINDING SUSTAINABLE PATHWAYS

RESEARCH

We rigorously research and conduct high quality analysis on issues of sustainable development. Our thinking is original and thought provoking.

CONVENE

We convene opinion leaders and experts from across Canada around our table to share their knowledge and diverse perspectives. We stimulate debate and integrate polarities. We create a context for possibilities to emerge.

ADVISE

We generate ideas and provide realistic solutions to advise governments, Parliament and Canadians. We proceed with resolve and optimism to bring Canada's economy and environment closer together.

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1.0 INTRODUCTION

NATIONAL CLIMATE CHANGE POLICY HAS BEEN AN ELUSIVE GOAL IN CANADA. AS A NORTHERN COUNTRY, CANADA FACES BOTH COLD WINTERS AND HOT SUMMERS THAT CONTRIBUTE TO HIGH ENERGY DEMAND AND EMISSIONS; AS A COUNTRY FORTUNATE TO HAVE ABUNDANT FOSSIL FUEL RESOURCES, IT IS ALSO CHALLENGED BY THE HIGH EMISSIONS CREATED BY THEIR EXTRACTION AND USE; AS A LARGE COUNTRY WITH LOW POPULATION DENSITY, CANADA CONFRONTS THE REALITY OF HIGH EMISSIONS FROM TRANSPORTATION; AND AS A GROWING COUNTRY, IT SEES UPWARD PRESSURES ON EMISSIONS.

All of these challenges and many others have made greenhouse gas (GHG) reduction policy quite contentious — politically and economically. The hard reality of developing an effective and acceptable national climate policy plan within a federation that shares responsibility for emissions management, places natural resource ownership in the hands of one level of government, sees uneven emission sources across the country, and needs to speak with one voice internationally has been tough to overcome. A new political economy with shifting patterns of economic growth, population change, and political power across the country now bears down even more on the issue.

Unsurprisingly, climate change policy in Canada has proved difficult to develop and divisive to implement. Successive governments, federally and provincially, have struggled to find the right formula that reduces GHG emissions within their jurisdiction while maintaining — indeed advancing — economic growth. Canada signed the Kyoto Protocol and is now withdrawing from it. Canada announced a national plan and new targets and then sought to align with developments in the United States, leading to a different plan and different targets. Provinces and territories acted both independently and banded together to reduce carbon emissions through a range of innovative, diverse, and traditional measures. Canada now has 14 climate policy plans on the books, one for the federal government and each province and territory. How is this to be reconciled?

As public interest and media attention on climate change ebbs and flows, the ability to maintain political momentum on the issue has ebbed and flowed with it. Climate policy horizons do not fit easily with political cycles here in Canada or elsewhere. Yet as the climate changes and awareness grows about the costs of climate inaction — of simply letting climate change play out — Canadians are reminded of our confronting the challenge of climate change at home and around the world.

Overall, some progress has been made in recent years. All governments — federal and provincial — have set GHG targets, put plans and policies in place to reduce emissions; most importantly, emission reductions have occurred. Despite this progress, climate change mitigation policy is fragmented, incomplete and remains a steep challenge for Canada.

This new report by the National Round Table on the Environment and the Economy (NRT), requested by the federal Minister of the Environment, reminds us of how far the country has come, but also of how far it must go. It serves as a reality check on the state of climate progress in Canada today. It reinforces some key truths about climate policy today in Canada: that a national target needs a concerted national policy behind it, that policy uncertainty still exists and stifles progress, that the country has yet to implement effective policies to address some large sources of emissions, and that all this means progress has been and will remain difficult and uneven across the country.

This is the context in which the NRT's report is submitted.

1.1 THE MINISTERIAL REFERENCE

In March 2011, the Honourable Peter Kent, Canada's Minister of the Environment, requested that the NRT provide independent analysis to the Government of Canada on provincial/territorial climate change plans and measures in support of the government's environmental agenda (see Appendix 7.1). His letter stated the NRT "is in a unique position to advise the federal government on sustainable development solutions."

The NRT was directed in this Ministerial Reference to conduct a comprehensive review of provincial and territorial climate change plans and assess their likely contribution to Canada's 2020 greenhouse gas emission-reduction target of 17% below 2005 levels. The Minister asked the NRT to:

1. analyze provincial plans to reduce emissions,
2. analyze progress to date in implementing their plans, and
3. estimate the emission reductions expected from current and future provincial and territorial climate change initiatives by 2020.

The specific purpose in doing so was to inform the Government of Canada's overall effort to achieve its 2020 target for GHG emissions through its sector-by-sector regulatory approach.

This report was developed in response to the Ministerial Reference. It includes our analysis and assessment of provincial GHG reduction plans and progress toward the 2020 target, together with advice on how Canada can meet this target. This is the first national-level study of this type that specifically models both federal and provincial/territorial climate policy actions to assess the extent to which they close the gap to Canada's 2020 target. It should not be the last.

It contains original modelling and forecasting informed by our own analysis and expertise but benefits from the input of the federal government and provincial and territorial governments in determining which policies to consider. Its importance lies not just in the numbers presented but also in the recognition that both levels of government are making contributions, as a whole, to emission reductions. The federal government set the target for Canada but emission reductions will have to occur right across the country to achieve those targets. For the first time, answers to four basic questions about climate policy progress in Canada and the 2020 target are answered in one report:

1. Where are we now?
2. Why are we here?
3. Can we reach our target?
4. What do we have to do to get there?

The NRT's work is new and vital for several reasons. No other objective analysis has modelled as many policies at one time. No other organization has brought governments together in one room to

discuss these four questions. No other report has developed forecasts based on such comprehensive modelling to say authoritatively what the country can expect. But beyond original modelling and forecasting, the NRT looked at both the *why* and *how* of Canada's path to 2020 to draw lessons for the future. We examine the choices governments have made to date and consider what this means for choices they will have to make in the future.

Similarly it is important to note what the report is not. It isn't an individual audit of federal and provincial/territorial (P/T) policies to determine effectiveness. Our aim was to realistically and accurately estimate the amount of emission reductions Canada could expect by 2020, the likely contributions of both levels of government to these reductions through their respective policies, how cost-effective Canada's approach has been as a result, and what might be required to close any emission gap to 2020. The NRT's focus has always been longer term, building on current policy approaches by governments to determine sustainable pathways ahead.

The NRT was directed in this Ministerial Reference to conduct a comprehensive review of provincial and territorial climate change plans and assess their likely contribution to Canada's 2020 greenhouse gas emission-reduction target of 17% below 2005 levels.

This report is of limited applicability to the territories. Absolute emissions are very small from each of these jurisdictions. Climate change plans do exist for each, but territorial governments have focused most of their efforts to date on adaptation to the impacts of climate change due to the extent of impacts in the north. NRT modelling reports likely territorial emission reductions within our national-level forecasts but is unable to provide a breakdown for each territory. A summary of mitigation-related challenges facing the three territories is provided in Chapter 3.

Consulting with Aboriginal communities was not part of the scope of the Ministerial Reference. However, all communities and all governments have a role to play in working to meet Canada's target.

1.2 THE NRT'S APPROACH

The NRT's approach was to conduct original *analysis* of Canadian climate policies, undertake a clear *assessment* of our progress to date, and offer considered *advice* on a path forward to achieving the 2020 target. Here's how we did this.

RESEARCH

MODELLING

Analysis and assessment required original economic modelling of Canadian GHG emission-reduction scenarios and policies. The NRT analyzed emissions trends from 1990 through current day and projected out to 2020 as well as 2030, both nationally and at the provincial level. From there, we considered not just existing, but proposed, federal and P/T climate policies and corresponding emission reductions to determine their likely contributions toward achieving Canada's 2020 emission-reduction target. This was necessary to draw a full picture of what Canadians could reasonably expect from government actions. A clear and transparent vetting process was undertaken by the NRT in consultation with the federal

and provincial governments to arrive at the list of policies to include in our modelling (see Appendix 7.7 for full list). All provincial governments were given the opportunity on two occasions to provide their views on our proposed actions to model for their respective jurisdictions. The NRT made some adjustments in response.

To carry out the actual modelling, the NRT contracted Navius Research Inc., a leading environment/economy consulting firm that has conducted work on this topic for the federal government, several provincial governments, as well as the NRT. Navius used the CIMS model, an energy-economy model, to generate forecasts of GHG emission reductions as well as to estimate the cost of achieving emission reductions under three policy scenarios. This approach allowed the NRT to provide much more detail than previously had been available about contributions needed from various provinces and sectors and their cost of achieving the 2020 target. A detailed explanation of how CIMS works is contained in Appendix 7.2, and the scenarios we used in the modelling work are spelled out in Chapters 4 and 5.

As noted, the NRT also pushed the analysis beyond the stated target date of 2020 to better understand the cost implications of meeting targets later. While the federal approach and a number of provincial plans congruently targeted a specified emissions level in 2020, it was clear to the NRT that the full effectiveness of some policies may not become apparent until after that date. As climate change is a long-term issue requiring long-term policy solutions, going out to 2030 might illuminate options and impacts in a clearer manner for governments. At some point in the future, Canada, as well as other countries around the world, may decide on new targets for 2030 to further address climate change. Our analysis can help inform that consideration for our country.

The NRT based its modelling analysis on Environment Canada's own forecasting inputs to ensure symmetry with its approach. We used established data from the National Energy Board and Environment Canada's *Emissions Trends* report. The NRT consulted provinces and territories directly and as often as possible to secure their input into our work as spelled out below. Our analysis is therefore based on sound and established emissions reporting data and information.

QUALITATIVE ASSESSMENT

The NRT also reviewed federal and provincial climate policy plans in detail. We performed a qualitative assessment of each to understand its focus, common and distinct elements, and how they complement the federal approach. Our qualitative assessment characterizes provincial plans based on a set of criteria, identifies leading practices from each jurisdiction, explores key considerations for policy design, and highlights future emission-reduction plans and emerging trends. We also undertook a past review of Canadian emissions trends to help explain why Canada is where it is today.

COMMISSIONED ACADEMIC RESEARCH

In order to provide perspective on the dynamics of climate policy in Canada, the NRT commissioned three research papers by top academic experts in the field. Topics included U.S. climate policy and its influence on Canadian intergovernmental climate policy coordination, intergovernmental collaboration and coordination in the context of federalism, and the environmental and economic impacts of overlap between federal and provincial climate policies.

CONVENING

PROVINCIAL/TERRITORIAL ENGAGEMENT

The NRT began its work by advising provinces and territories of the Ministerial Reference and seeking bilateral meetings with each government to help inform our work. Meetings were conducted with every province and Yukon to present information on the Ministerial Reference, as well as to strengthen our understanding of progress on the climate change file both internal to that province or territory and on an intergovernmental level.[a] All meetings included discussions about both broad policy approaches and specific details of the P/T's climate change plan, perspectives on the federal sector-by-sector approach, and evaluation and assessment of their own emissions estimates where available. They also included discussions about intergovernmental co-operation to date. Appendix 7.7 includes a list of meetings held, participants in attendance, and the NRT's request for information sent to provinces and territories.

During our meetings, the NRT received constructive engagement from governments. We committed to reconnect with each jurisdiction as we proceeded. Prior to commencing our modelling, the NRT asked each province to review the list of policies we planned to model derived from their plans to ensure that the policies and time frames accurately reflected their own information. Provinces were offered two further opportunities to pass along their suggestions and review our proposals prior to any modelling being conducted. This was necessary as some jurisdictions expressed concern that past Environment Canada modelling did not sufficiently incorporate their realities. More importantly for the purposes of our work, the NRT needed an accurate assessment of any and all proposed policy actions by governments so their likely emission reductions could be measured and considered in terms of achieving our 2020 target. We made efforts to include as many initiatives as practical in our data inputs to ensure a complete a picture as possible.

CANADIAN CLIMATE POLICIES DIALOGUE

On March 5 and 6, 2012, the NRT, in conjunction with Queen's University, Institute of Intergovernmental Relations, convened officials from the federal and P/T governments, several NRT Members, climate public policy experts, and intergovernmental experts in Kingston, Ontario. The purpose of the event was to present our early research findings; engage in a dialogue of the issues raised by the assessment; hear about ideas, solutions, and processes to move forward; and invite advice on the report's content and recommendations. Appendix 7.8 contains the agenda and participants' list alongside a brief summary of what we heard is contained in Appendix 7.8.

This unique event gave officials and experts the opportunity to discuss this issue in the same room. Three roundtable discussions were used to structure the dialogue. The first session focused on forecasted emission reductions from our modelling. The second session concentrated on provincial and territorial climate change plans. The last session focused on future directions for climate policy in Canada, including institutions and successful mechanisms required to achieve emission reductions, development of targets

a The NRT did not meet with the Northwest Territories and Nunavut.

and reporting, and inter-jurisdictional collaboration options. Each session included presentations, a roundtable discussion, and audience questions and comments. The dialogue from all participants provided valuable information and advice that has informed this report.

1.3 REPORT STRUCTURE

The report is presented as follows:

Chapter 2 provides historical context on the GHG reductions file in Canada and presents past and current emissions trends and levels, including sectoral and geographic composition. Its purpose is to factually ground where we are today and how we got here.

Chapter 3 includes a qualitative assessment of provincial climate plans. It sets out criteria for assessing the strength of provincial plans, highlights best practices at the provincial level, and discusses several policy challenges that need to be confronted moving forward. Its purpose is to provide information and assessment of provincial climate policy plans.

Chapter 4 presents results of the NRT's original modelling, including estimated emission reductions from current and future federal, provincial, and territorial climate change initiatives by 2020 and 2030. These results estimate the extent to which existing and proposed initiatives will contribute to achieving both provincial and federal targets. It estimates the extent of overlap between policies by both levels of government. Regional- and sector-level perspectives are also provided. Its purpose is to assess Canada's progress toward 2020 and see how much of a gap remains.

Chapter 5 builds on previous modelling results, providing new modelling data to assess the cost-effectiveness of Canadian climate policy to date and going forward. This is used as a base for then identifying the sectors and provinces that should be targeted for future cost-effective emission reductions and the level of costs associated with these additional actions en route to achieving the 2020 target. Its purpose is to establish a cost-effective road map forward for the country.

Chapter 6 draws our analysis and assessment together and sets out the report's conclusions and implications. Its purpose is to summarize key findings and provide the NRT's advice to the Minister of the Environment.

2.0 CANADA'S EMISSIONS STORY

THIS CHAPTER SITUATES OUR ASSESSMENT OF PROVINCIAL CLIMATE CHANGE PLANS BY PROVIDING AN OVERVIEW OF THE HISTORY OF MITIGATION POLICY IN CANADA, THE CURRENT EMISSIONS CONTEXT AT A SECTORAL AND REGIONAL LEVEL, AND FEDERAL MEASURES TO ENCOURAGE EMISSION REDUCTIONS ACROSS THE COUNTRY.

2.1
HISTORY OF FEDERAL CLIMATE POLICY

The Government of Canada has been engaged on the climate file for over two decades. In 1988, at "The Changing Atmosphere: Implications for Global Security" conference in Toronto, the Progressive Conservative government of Prime Minister Brian Mulroney committed Canada to reducing its GHG emissions 20% by 2005.[1] This target was altered later that year at a meeting of the G7 countries where Prime Minister Mulroney made a commitment to stabilize national GHG emissions at 1990 levels by the year 2000.[2] Two years later, the federal government introduced a *Green Plan* that contained $175 million for 24 GHG reduction policies mostly focused on energy efficiency and alternative energy. This plan came with a revised target to stabilize GHG emissions at 1990 levels by 2000. This was a non-binding target that Canada also embraced in the Framework Convention on Climate Change in 1992.[3]

In the last decade, three unique climate approaches have been taken by the federal government, which can be described, respectively, as the Kyoto approach, the *Turning the Corner* approach, and the Copenhagen approach.

In 1993, Prime Minister Jean Chrétien proposed the same GHG emission-reduction target that was committed to at The Changing Atmosphere conference in 1988 of 20% below 1988 levels by 2005.[4] In 1995, the federal government launched the *National Action Program on Climate Change*, which focused on information programs and small subsidies. The federal government estimated that this program would reduce GHG emissions by 66 megatonnes carbon-dioxide equivalent (Mt CO_2e) by 2010.[5] The main elements in the program were the Voluntary Challenge and Registry, asking for a voluntary submission of GHG emission-reduction plans and regular progress reports by companies; the Federal Buildings Initiative, supporting federal government building retrofits with higher energy efficiency standards; and the National Communication Program, a climate change education program for Canadians.[6]

In the five years leading up to the signing of the Kyoto Protocol, Canada went through multi-stakeholder consultations on emission reductions. There was agreement among the federal and provincial ministers of environment and energy (with the exception of Québec which sought a more ambitious target) that Canada's position would match the U.S.'s commitment to reduce emissions to 1990 levels by 2010. Although this target was agreed upon in the opening days of the Kyoto meeting, the federal government unilaterally announced that Canada would reduce its emissions to 6% below 1990 levels by 2010. After signing the Kyoto Protocol, in 1998 (before ratifying in 2002) the federal government released its *Action Plan 2000 on Climate Change*. This plan set in place subsidies for renewable energy alongside consumer/business energy information programs.

In the last decade, three unique climate approaches have been taken by the federal government, which can be described, respectively, as the Kyoto approach, the *Turning the Corner* approach, and the Copenhagen approach. Each approach is marked by differing emission reductions targets and measures to achieve these targets (see Table 1).

TABLE 1: CANADA'S CHANGING TARGETS

YEAR TARGET WAS SET	TARGET	BASE YEAR EMISSIONS (Mt CO_2e)	PROJECTED EMISSIONS TARGET (Mt CO_2e)
1988	20% below 1988 levels by 2005	588*	470 in 2005*
1990	Remain at 1990 levels by 2000	590	590 in 2000
1993	20% below 1988 levels by 2005	588*	470 in 2005*
1995	66Mt below 1995 levels by 2010	640	574 in 2010
1998	49Mt below 1998 levels by 2010	677	628 in 2010
2002	6% below 1990 levels by 2012[7]	590	555 in 2012
2007	20% below 2006 levels by 2020[8]	719	575 in 2020
2010	17% below 2005 levels by 2020[9]	731	607 in 2020

** This is an approximate number based on data in Environment Canada 1999 and NRT calculations*

THE KYOTO APPROACH

In 2002, Canada ratified the Kyoto Protocol it had signed in 1998 committing to reduce GHG emissions by 6% from 1990 levels by 2012.[10] At that time Canada's emissions had climbed from 1990 levels of 590 Mt to 717 Mt.

In 2000, the federal government began to outline steps to achieve the Kyoto target, including a federal commitment of $1.1 billion to incent GHG emission-reduction measures over a five-year period.[11] This plan was supplemented in 2002 with a *Climate Change Plan for Canada* that committed to establishing GHG reduction targets for large industry; providing flexible compliance through trading and other measures; co-funding emission reductions with provinces, municipalities, and others; and undertaking additional targeted measures.[12] In 2005, under Project Green, the government confirmed its intent to regulate large final emitters and provide compliance flexibility through emissions trading, offsets, and a technology fund.[13]

THE TURNING THE CORNER APPROACH

In 2006 the new Conservative federal government led by Prime Minister Stephen Harper announced that Canada was not on track to meet its Kyoto obligations.[14] Subsequently, in 2007, a new GHG reduction target of 20% below 2006 levels by 2020 was announced.[15] Canada's emissions had peaked around that same time at about 750 Mt, some 27% higher than 1990 levels.[16]

To meet the new target, the government introduced *Turning the Corner*, a domestic air emissions management plan with emissions intensity as the base measurement for emission reductions. *Turning the Corner* proposed the regulation of industrial emitters in a cap-and-trade system that would provide compliance flexibility through trading, offsets, and a technology fund, as part of a broader regulatory program aimed at reducing GHG and air pollution emissions.

THE COPENHAGEN APPROACH

In 2010, as a signatory to the Copenhagen Accord, Canada announced a new target of 17% reduction from 2005 levels by 2020, aligning with the United States' target.[17] This would yield roughly 30 Mt CO_2e fewer emission reductions per year by 2020 than the *Turning the Corner* plan. Emissions in Canada had meanwhile been declining at this point in time from 748 Mt CO_2e in 2007 to 690 Mt CO_2e in 2009, principally because of reduced economic growth and higher energy prices.[18]

To achieve this target, a new "sector-by-sector regulatory approach" was initiated. The centerpiece of the regulatory regime is a set of emissions performance standards starting with regulations for the electricity sector. In addition to the sector-by-sector approach, the government is also developing performance requirements for various products, which are referred to as product performance standards. Appendix 7.4 provides more information on the federal approach.[19]

KEY ISSUES

Despite a shift in targets and approaches over time, the Government of Canada remained a signatory to the Kyoto Protocol until the end of 2011, when the government announced its intention to withdraw on the grounds that the Protocol did not include the majority of global emitters and that the costs of compliance would be excessive without yielding environmental benefits.[20] Since 2007, the *Kyoto Protocol Implementation* Act has required the Government of Canada to provide an annual report on progress toward achieving the Kyoto commitment and created statutory obligations for the NRT to provide an assessment of these annual plans. The NRT's 2011 assessment report supported the government's own analysis indicating that Canada would exceed its Kyoto target by about 161 Mt CO_2e per year during the compliance period.[21]

Issues of international competitiveness — particularly with the U.S. — have been an important factor in developing Canadian climate policy as the NRT pointed out in *Parallel Paths: Canada--U.S. Climate Policy Choices*. In 2009 the government began to place more focus on working with the U.S. to achieve clean energy and climate change goals, primarily through co-operation on clean energy research and development and enhancing the electricity grid in ways that favour increased use of clean energy.[22] However, working closely with the U.S. on this file is a challenge given both the lack of a comprehensive U.S. plan to confront climate change and the important role that sub-national jurisdictions are playing on both sides of the border.[b] Canada has moved away from plans to implement a trading system for large emitters and has instead focused on harmonizing regulations and standards with those of the U.S. wherever feasible, as in the case of fuel economy standards.

2.2 HISTORY OF PROVINCIAL CLIMATE ACTION

The federal and provincial governments share jurisdiction over environmental matters under the Constitution of Canada (see Text box 1). This offers both benefits and challenges, which are discussed in the next chapter. As Canada worked to develop policies to manage climate change in the late 1990s and early 2000s, the federal and provincial governments

b A report providing details on the history of climate policy in the U.S. is available upon request (Rabe 2012).

initially sought a joint approach. This proved to be challenging, with widely divergent natural resource endowments yielding differing total and per capita GHG emissions and leading to differing economic interests with respect to climate policy. The choice of target under the Kyoto Protocol and the manner in which it was decided, together with the ensuing U.S. withdrawal, also proved divisive, with a number of provinces opposing Canadian ratification at the time. Once the federal government made the decision to ratify Kyoto, attempts at joint federal/provincial action on climate change basically dissipated and have not been formally resurrected.[23]

Following several years of federal policy uncertainty, provinces began to act more unilaterally in the mid-2000s. As the report discusses in Chapter 3 and in Appendix 7.6, the provinces are currently implementing a number of actions to address GHG emissions both independently and in co-operation with other provinces and some U.S. states.

Following several years of federal policy uncertainty, provinces began to act more unilaterally in the mid-2000s.

TEXT BOX 1

JURISDICTION OVER ENVIRONMENTAL CONSIDERATIONS

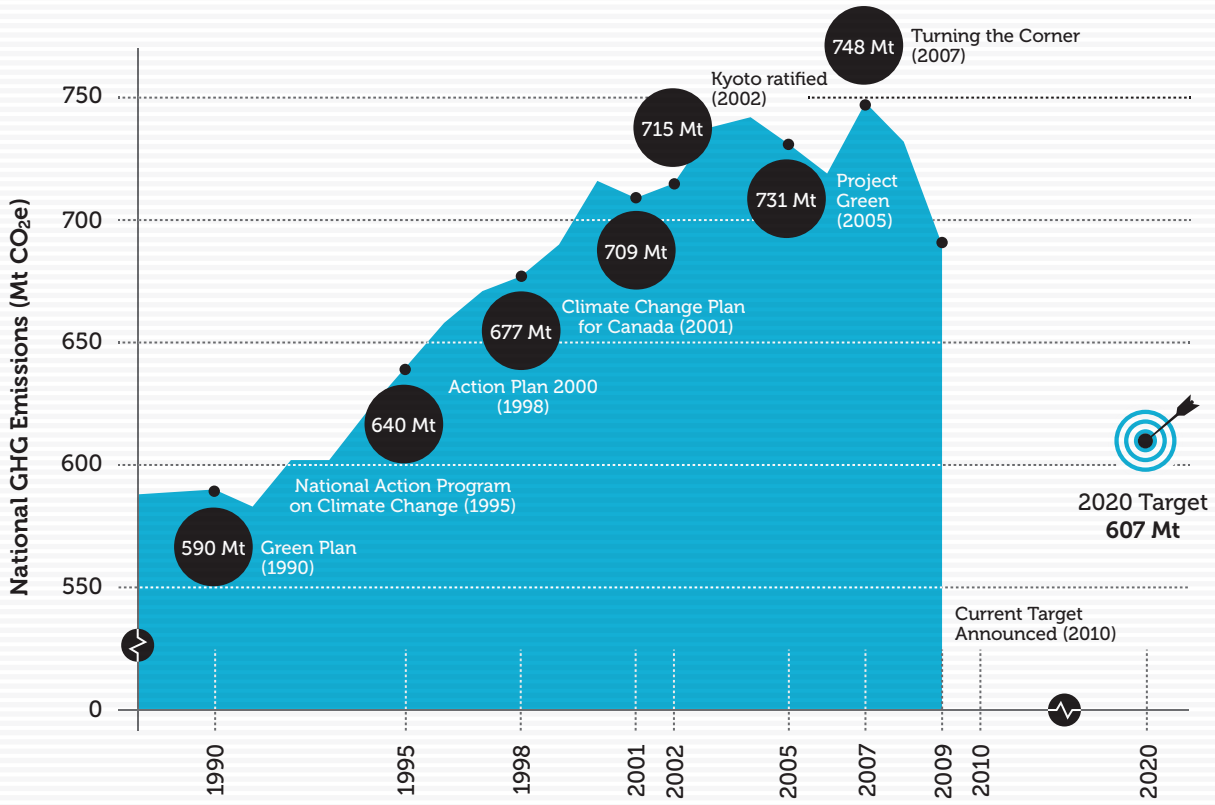
The Constitution of Canada entrenches authority over land and natural resources with the provinces. This gives provinces the power to determine the pace and scale of resource exploitation, receive royalties and rents and by extension, strong influence over the actual GHG emissions resulting from this development. However, the Constitution also allows for federal power over climate change policy in Canada, based on peace, order, and good government, or regulation of trade and commerce powers.[24] The extra-provincial, interprovincial, transcontinental and international nature of the challenge further points to a federal role. In addition, climate change can be viewed as a matter of national concern because addressing it requires one national law that can be met with flexible provincial action but cannot be satisfied by co-operative provincial action because the failure of one province to co-operate would carry with it adverse consequences for the residents of other provinces.[25]

In circumstances when there is conflict over jurisdictional authority, co-operation is a possible remedy. Tools for inter-jurisdictional co-operation include "memoranda of understanding to establish mutually supportive objectives, equivalency agreements which allow one jurisdiction's laws (usually the federal government) to be withdrawn from application if there are equivalent provisions at the other level (usually provincial), and express incorporation by reference of another jurisdiction's legislation."[26]

2.3
EMISSIONS TRENDS (1990–2009)

Figure 1 shows Canada's emissions trends since 1990 with federal climate policies overlaid. Emissions trends over time reflect a combination of forces including resource use, environmental policy, and economic trends. While Canada's emissions increased 17% between 1990 and 2009, a 6% reduction occurred between 2005 and 2009. The year 2005 is a useful benchmark as many provincial measures have been introduced since that time; 2005 now marks the baseline for measuring Canada's progress.

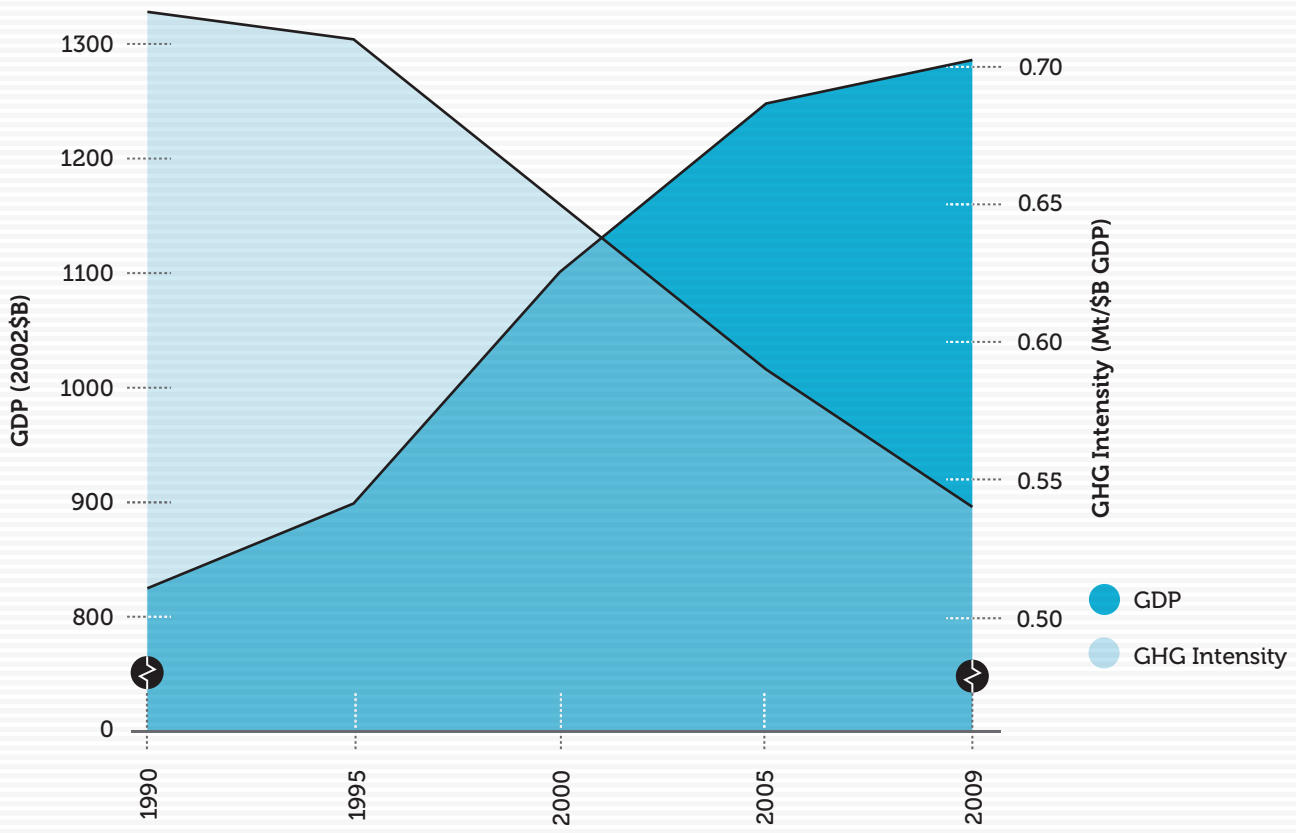
FIGURE 1: TIMELINE OF FEDERAL APPROACHES TO CLIMATE CHANGE AND EMISSIONS TRENDS



Source: Data taken from Environment Canada 2011b

Figure 2 demonstrates the connection between economic development and Canada's GHG emissions. Over the last two decades, our overall emissions have risen as has our GDP, but the emissions intensity of our economic output has fallen dramatically.

FIGURE 2: ECONOMIC GROWTH AND GHG INTENSITY OF ECONOMY (1990–2009)

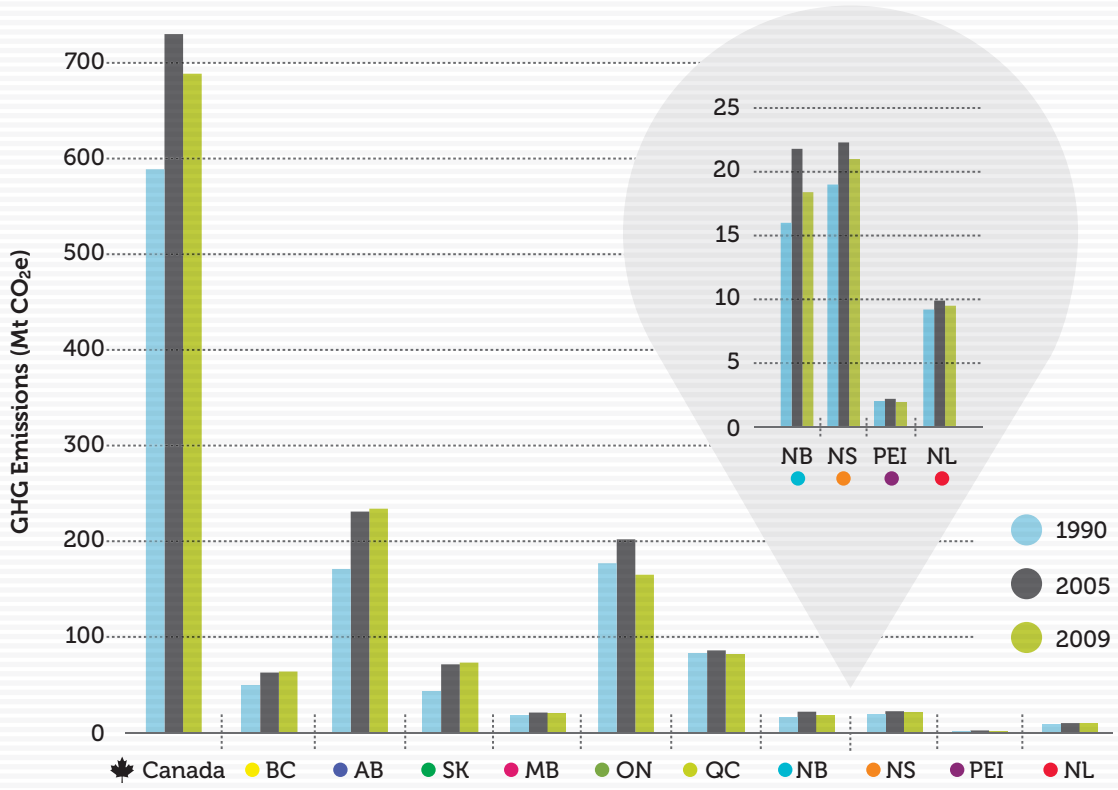


Source: Data taken from Environment Canada 2011b; and Statistics Canada ND

Figure 3 disaggregates emissions trends at the provincial level, indicating changes in emissions over time since 1990 and 2005. As shown, the most rapid growth in emissions over the last two decades occurred in Saskatchewan and Alberta. In contrast, Ontario, Québec, and Prince Edward Island have seen emissions fall over that period. In the 2005 to 2009 period, all provinces to the east of Saskatchewan along with British Columbia show overall reductions while Alberta and Saskatchewan reported more limited emissions growth. These recent trends can be explained by the economic downturn and the ramp-up of provincial GHG mitigation policies.

FIGURE 3: EMISSIONS TRENDS (1990–2009)

	Canada	BC	AB	SK	MB	ON	QC	NB	NS	PEI	NL
GROWTH 1990–2009	17%	28%	37%	69%	10%	-7%	-2%	15%	11%	-4%	3%
GROWTH 2005–2009	-6%	2%	1%	3%	-3%	-18%	-5%	-16%	-6%	-15%	-5%

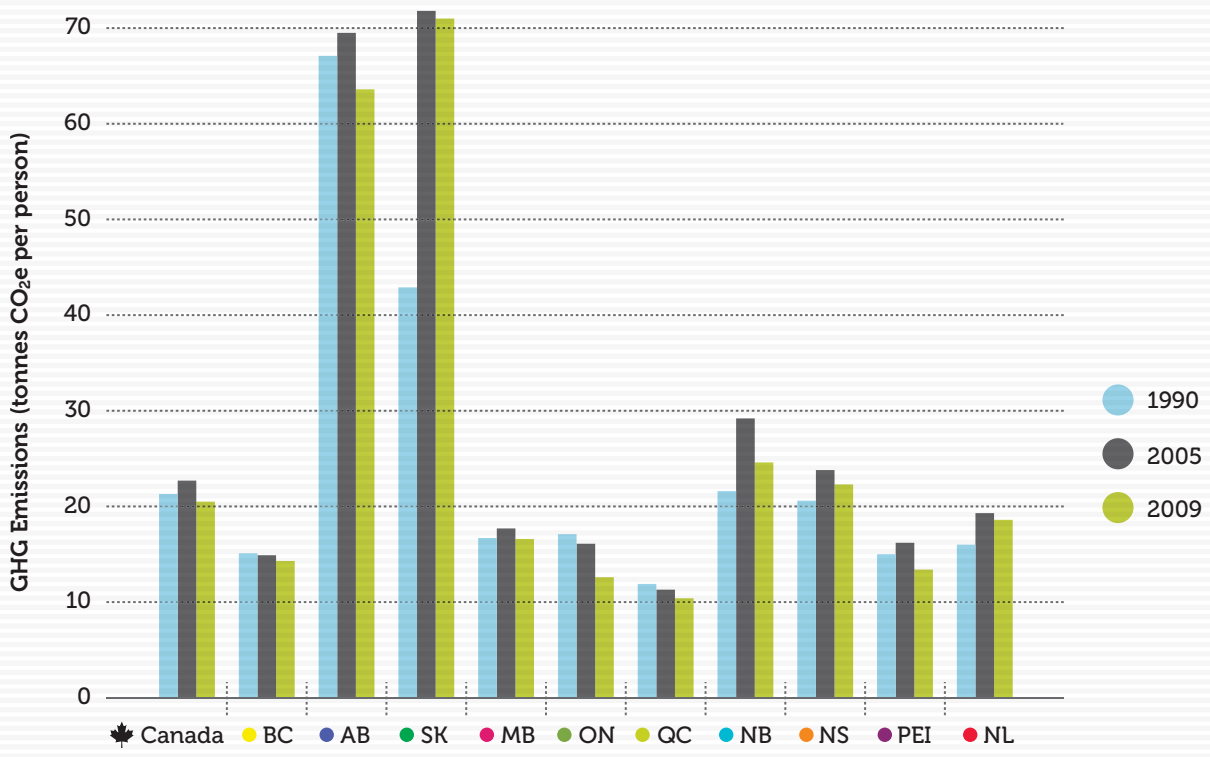


Source: Data taken from Environment Canada 2011b

On a per capita basis, there has been a slight downward trend for Canada overall since 1990, though the evolution is markedly different across provinces as shown in Figure 4.

In Chapter 4 of this report, we build from these historical trends to forecast future emissions to 2020 based on existing and proposed policies at the federal and provincial levels to assess the extent to which Canada is on track to achieve its 2020 target.

FIGURE 4: PER CAPITA EMISSIONS TRENDS (1990–2009)

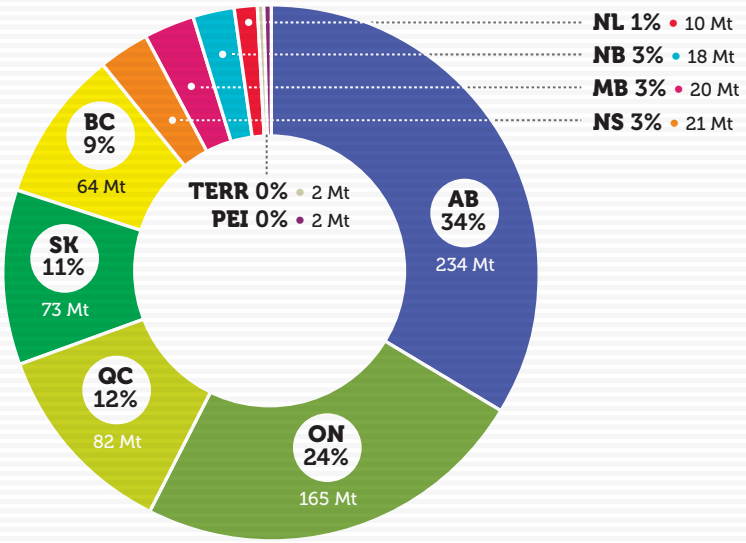


Source: Data taken from Environment Canada 2011b

2.4 EMISSIONS SOURCES BY PROVINCE/TERRITORY

Emissions vary significantly across the country, driven by diversity in population size, economic activities, and resource base among other factors. For example, regions where the economy is oriented more toward resource extraction will tend to have higher emission levels whereas more service-based economies tend to have lower emissions levels. Also, the key electricity generation sources vary across the country with provinces that rely on fossil fuels for their electricity generation having higher emissions than provinces that rely more on hydroelectricity. Figure 5 shows the provincial/territorial distribution of 2009 emissions across the country in absolute terms as well as the share this represents of total Canadian emissions.

FIGURE 5: PROVINCIAL/TERRITORIAL CONTRIBUTIONS TO CANADA'S TOTAL EMISSIONS (2009)



Source: Data taken from Environment Canada 2011b

On an absolute basis, the majority of emissions (58%) originate from just two provinces — Alberta and Ontario. Alberta has the highest number of GHG emissions because it is the largest energy producer in the country. In 2009, stationary combustion energy sources represented 56% of the province's emissions. Within that, electricity and heat generation accounted for 48 Mt CO_2e, fossil fuel production and refining emitted 36 Mt CO_2e, and mining and oil and gas extraction emitted 23 Mt CO_2e.[27] Ontario is the second-highest emitter because of

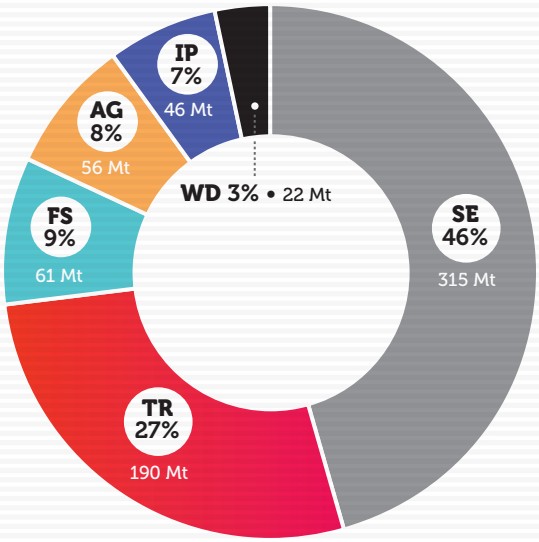
its population size, energy consumption, and sizeable transportation emissions. Transportation accounted for 58 Mt CO_2e, and manufacturing industries contributed 16 Mt CO_2e, followed closely by electricity and heat generation with 15 Mt CO_2e.[28]

Figure 4 shows that, in per capita terms, Saskatchewan and Alberta have the highest emissions levels. Saskatchewan's per capita emissions are high due to a small population and high stationary combustion and agriculture emissions. In Alberta, Saskatchewan, New Brunswick, and Nova Scotia, relatively high per capita emissions can be explained in part because of reliance on coal for electricity generation.

2.5 EMISSIONS SOURCES BY ACTIVITY

Under the United National Framework Convention on Climate Change, Canada's emissions are reported through activities including stationary energy, transport, fugitive sources, agriculture, industrial processes, and waste disposal. Figure 6 provides a snapshot of the composition of Canada's emissions by activity. As demonstrated, stationary energy and transportation are Canada's key sources, accounting for 73% of total emissions in 2009.

FIGURE 6: CANADA'S GHG EMISSIONS BY ACTIVITY (2009)



- **Stationary Energy (SE)**
  Emissions from fuel combustion (e.g., for energy and heat production, manufacturing, construction, etc.).
- **Transport (TR)**
  Emissions from fuel combustion related to passenger and freight transportation.
- **Fugitive Sources (FS)**
  Intentional and unintentional emissions from fossil fuel production, processing, transmission, storage and delivery.
- **Agriculture (AG)**
  Emissions from the production of crops and animals.
- **Industrial Processes (IP)**
  Emissions from processes such mineral, chemical, and metal production.
- **Waste Disposal (WD)**
  Emissions from the disposal of solid waste and handling of wastewater.

Source: Data taken from Environment Canada 2011b

Activity-based reporting is widely used, but a sector-by-sector emissions breakdown is also sometimes employed, particularly in support of sector-based GHG regulations. Text box 2 provides an explanation of the difference between these approaches.

TEXT BOX 2

MEASURING EMISSIONS SOURCES

Each year Environment Canada publishes emissions by activity in the National Inventory Report (NIR) on Greenhouse Gas Sources and Sinks in Canada to support its obligations as a signatory to the United Nations Framework Convention on Climate Change (UNFCCC). In contrast, Environment Canada's Emissions Trends Report categorizes emissions by economic sector. Our report relies primarily on activity-based data from the NIR to portray Canada's emissions story since this data was available for 2009, while sector-based data was only available for 2008. We wished to use the most recently available data in both cases. However, when referring to the federal regulations being developed under a sector-by-sector approach we present data by economic sector which is from 2008.

Since the completion of our report, the 2012 National Inventory Report has been released containing 2010 data and which for the first time now presents both activity-based economic sector-based emissions data. There is little material difference between the two sets of reports for total Canadian emissions reported from 2009 and 2010. Total emissions for Canada are virtually unchanged, rising only slightly from 2009 levels of 690 Mt CO_2e to 692 Mt CO_2e in 2010. And total emissions remain constant at 692 Mt CO_2e whether they are calculated and presented on an activity-based or an economic sector-based approach. Canada's 2020 target remains at 607 Mt CO_2e in all cases which is the focus of the NRT's modeling.

ENERGY EMISSIONS

In Canada, roughly 82% of emissions come from energy, which includes stationary combustion sources, transportation, and fugitive sources.[29] From 1990 to 2009, energy-related GHG emissions grew by 98 Mt CO_2e. This represents 87% of the total increase in GHG emissions over that period.

Stationary combustion alone represents almost half of Canada's total emissions. A breakdown of emissions from stationary combustion is provided in Table 2. Electricity and heat generation as well as fossil fuel production and refining are the largest contributors. Stationary combustion is a growing source of emissions attributable to growth in fuel consumed by mining and oil and gas extraction.

Emissions from these sectors leaped from 7 Mt CO_2e in 1990 to 31 Mt CO_2e in 2009, and from 3 Mt CO_2e to 23 Mt CO_2e in Alberta alone.[30] In contrast, emissions from fuel consumed by construction, manufacturing industries, and agriculture and forestry have all decreased slightly since 1990, with a combined decrease of just over 14 Mt CO_2e.

TABLE 2: SOURCES OF EMISSIONS FROM STATIONARY ENERGY IN CANADA (1990 AND 2009)

ACTIVITY	2009 Mt CO_2e	1990 Mt CO_2e	% CHANGE (1990–2009)
Electricity and heat generation	98	92	7%
Fossil fuel production and refining	64	51	25%
Manufacturing industries	43	56	-24%
Residential	41	43	-5%
Commercial and institutional	36	26	40%
Mining and oil and gas extraction	31	7	367%
Agriculture and forestry	2	2	-13%
Construction	1	2	-42%
TOTAL	**315**	**278**	**13%**

Source: Data taken from Environment Canada 2011b

Transportation is the second largest source of emissions and grew 30% between 1990 and 2009 in part because of a shift from light-duty gasoline vehicles such as cars to trucks, minivans, and sport-utility vehicles; increased vehicle usage overall; and greater use of heavy-duty diesel vehicles. Domestic aviation and marine emissions also fall into this category but have not contributed to this rise in emissions.[31]

Fugitive sources denote the intentional and unintentional releases of GHG emissions from coal mining and oil and natural gas exploration, production, transportation, and distribution. The vast majority of emissions are from fugitive oil and natural gas, in particular GHG emissions released through the venting process. Emissions from fugitive sources increased 44% since 1990 due primarily to growth in oil and gas extraction.[32]

NON-ENERGY EMITTING ACTIVITIES

In 2009, Canada's agricultural emissions contributed 8% of the country's total GHG emissions. These emissions come primarily from the release of methane from the digestive processes of ruminants and of nitrous oxide from the soil. Agricultural emissions rose 19% since 1990 primarily because of growth in livestock populations and increased application of fertilizers.[33]

GHG emissions resulting from industrial processes include emissions from the production of industrial goods (as distinct from emissions from fuel consumed by manufacturing). Emissions from this source overall fell by 18% since 1990 because of a decline in emissions from adipic acid, aluminum, magnesium, and iron and steel production.[34]

Waste disposal produced 22 Mt CO_2e in Canada in 2009, with the vast majority of emissions resulting from methane emissions from landfill waste management sites. Emissions from waste rose 16% since 1990. This rate of growth is lower than the population growth over that period due to higher use of landfill gas capture systems across the country.[35]

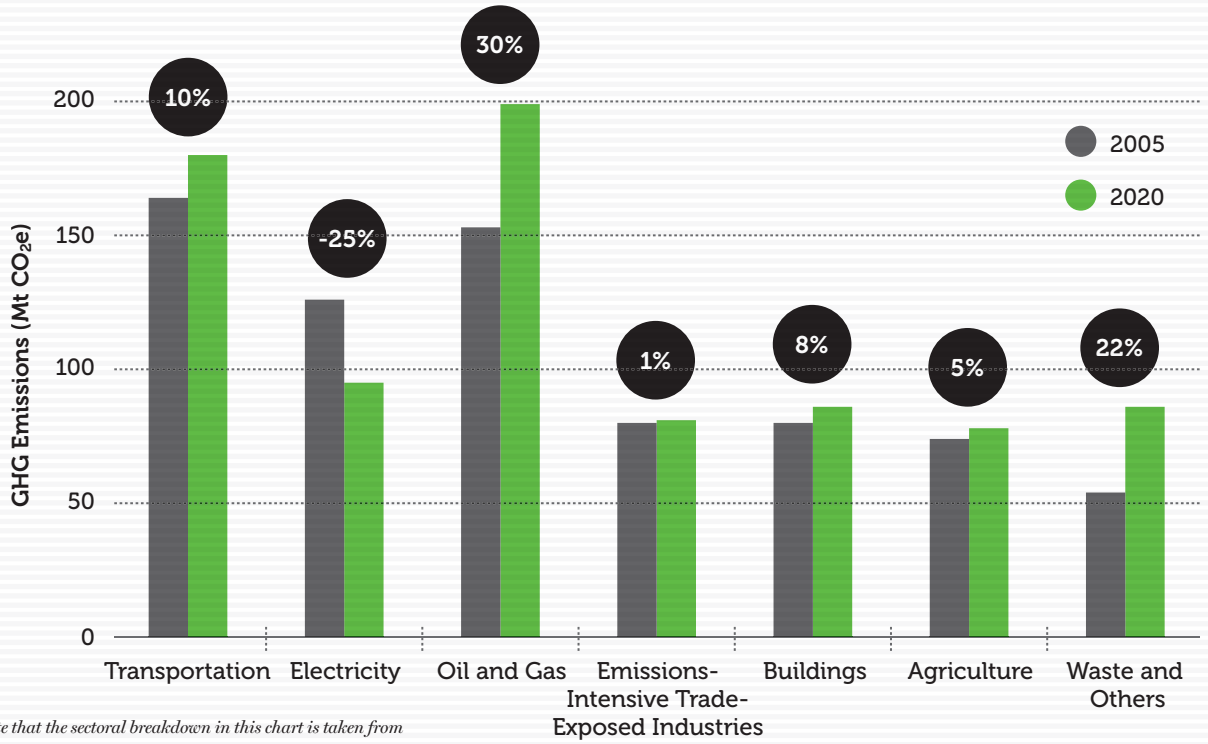
2.6 CONCLUSION

While this chapter summarized emissions policy and trends over the last two decades, Chapter 3 begins our current and forward assessment. Looking to the past, the largest sources of emissions growth are from oil and gas followed by waste and transportation.

Figure 7 shows an estimated 30% growth in the oil and gas sector from 2005 to 2020. Since it is the number-one growth sector, oil and gas emissions require priority policy considerations to address the rapid emissions increase. Looking ahead, our modelling that we set out in Chapter 4 shows the largest sources of emission growth remains from these three sectors: oil and gas, followed by transportation, and then waste.[36] Additional policies that target these sectors hold a lot of promise to stabilize emissions over time.

An iterative and collaborative approach to federal and provincial policy development offers the benefit of avoiding costly overlap and promoting co-operation toward shared objectives.

FIGURE 7: FORECASTED CHANGE IN EMISSIONS BY ECONOMIC SECTOR (2005-2020)



Note that the sectoral breakdown in this chart is taken from Environment Canada's Emissions Trends Report, not the National Inventory Report as in the rest of this chapter.

Source: Data taken from Environment Canada 2011a

At this point in time, the federal government is proceeding with a sector-by-sector regulatory approach that includes both emissions performance standards and product performance standards. There are indicators that oil and gas will be the next priority sector once the coal-fired regulations are completed. Regulation of this sector will be challenging due to its strong growth as well as the diverse nature of Canada's oil and gas industry where conventional drilling in Alberta has very different processes and GHG implications relative to offshore drilling in Newfoundland and Labrador.

At the same time, we can see that provinces are moving forward to manage emissions in their own jurisdictions by developing and implementing their own targets and measures, many of which are diverse and innovative. As Canada's emissions profile shows, the sources of emissions vary substantially across the country and are heavily concentrated in stationary energy and transportation. The challenge to the political economy of designing and implementing a national climate policy plan that is both effective and equitable is sharply represented. An iterative and collaborative approach to federal and provincial policy development offers the benefit of avoiding costly overlap and promoting co-operation toward shared objectives. However, it is not apparent. The next chapter assesses the provincial climate change plans that have been set out to date.

3.0 PROVINCIAL CLIMATE PLANS

PROVINCES ACROSS THE COUNTRY HAVE COMMITTED TO REDUCING THEIR GHG EMISSIONS AND HAVE INTRODUCED POLICIES TO MAKE PROGRESS IN THAT DIRECTION. A BROAD AND DIVERSE RANGE OF MEASURES EXISTS ACROSS PROVINCIAL CLIMATE PLANS. COMMON FEATURES OF PROVINCIAL PLANS INCLUDE PUBLIC EDUCATION CAMPAIGNS, ENERGY EFFICIENCY AND RENEWABLE ELECTRICITY PROGRAMS, AND GREENING GOVERNMENT OPERATIONS. DIVERSE MEASURES INCLUDE MARKET-BASED INSTRUMENTS SUCH AS CARBON TAXES, REGULATORY MEASURES, AND LEGISLATED RENEWABLES TARGETS. SINCE PROVINCES OWN, OPERATE, OR REGULATE POWER UTILITY SYSTEMS, THE LINK BETWEEN ENERGY AND EMISSIONS IS A CORE DRIVER OF PROVINCIAL EFFORTS TO COMBAT CLIMATE CHANGE.

This chapter begins the NRT's assessment of provincial plans and measures, identifying key elements of effective provincial plans, assessing the completeness of plans against this set of criteria and drawing out shared challenges and leading practices.

3.1 CHARACTERISTICS OF PROVINCIAL CLIMATE PLANS

In response to the Minister of Environment's request, the NRT has developed a framework to assess provincial climate plans. Consistent with earlier NRT advice (see, for example, *Achieving 2050: a Carbon Pricing Policy for Canada*[37]), this framework emphasizes the importance of establishing concrete goals and effective implementation plans alongside a strategy to assess results over time. While each province is unique and there is no common standard against which provinces articulate their climate policies, this framework can be applied across the board. Key characteristics of such a framework are explained on page 45.

Throughout the next three chapters of this report, we use this framework to assess provincial progress. The first three elements are addressed in this chapter. The last two elements warrant a more thorough analysis that builds on the qualitative analysis conducted in this chapter with quantitative analysis relating to elements 4 and 5, provided in Chapter 4 and 5 respectively. In Appendix 7.6 we provide a brief summary of each province's emissions profile, GHG reduction plan, and measures in place.

CHARACTERISTICS

CHARACTERISTIC 1 **IDENTIFICATION OF TARGETS AND TIMELINES** page 46	Provincial governments should publicly disclose targets and timelines to communicate the level of ambition of a climate plan, bring people and organizations together around a shared objective, and create accountability through a benchmark against which progress can be measured over time.
CHARACTERISTIC 2 **MEASURES THAT ADDRESS KEY EMISSION SOURCES** page 49	Plans should focus on establishing measures that confront the largest emissions sources to create the greatest environmental benefit.
CHARACTERISTIC 3 **EVALUATION MECHANISMS** page 51	Provincial governments should establish mechanisms to evaluate progress, provide transparency on results achieved, and strengthen plans over time in response to learnings.
CHARACTERISTIC 4 **ENVIRONMENTAL EFFECTIVENESS** page 81	Building on element 2, provincial plans should include sufficient measures to achieve the GHG reduction targets established.
CHARACTERISTIC 5 **COST-EFFECTIVENESS** page 96	Provincial plans should avoid delays and incent low-cost reductions to achieve the greatest environmental benefit at the lowest cost.

CHARACTERISTIC 1
IDENTIFICATION OF TARGETS AND TIMELINES

Provincial climate change plans should set out clear GHG emission targets with corresponding dates so that provinces can track their success over time. As shown in Table 3, all provinces have established GHG reduction targets and timelines but the choice of baseline year, target year, and emission-reduction goals varies between provinces.

TABLE 3: CANADA'S GHG EMISSION REDUCTIONS TARGETS*

	2020 TARGET (%)	2020 TARGET (Mt CO_2e)	2020 TARGET (Mt CO_2e)	2009 EMISSIONS (Mt CO_2e)
Canada	**17% below 2005**	**124 Mt below 2005**	**607 Mt**	**690 Mt**
BC	33% below 2007	21.5 Mt below 2007	43.7 Mt	63.8 Mt
AB**	18% above 2005	50 Mt *below BAU*	272 Mt	234.0 Mt
SK	20% below 2006	14.1 Mt below 2006	56.3 Mt	73.1 Mt
MB	Under Development (1.1 Mt or 6% below 1990 by 2012)			20.3 Mt
ON	15% below 1990	26.6 Mt below 1990	150.5 Mt	165.0 Mt
QC	20% below 1990	16.6 Mt below 1990	66.6 Mt	81.7 Mt
NB	10% below 1990	1.6 Mt below 1990	14.4 Mt	18.4 Mt
NS	10% below 1990	1.9 Mt below 1990	17.1 Mt	21.0 Mt
PEI	10% below 1990	0.2 Mt below 1990	1.8 Mt	1.9 Mt
NL	10% below 1990	0.9 Mt below 1990	8.3 Mt	9.5 Mt

* Unless otherwise noted, numbers in this column have been calculated by the NRT based on stated provincial and federal targets and data supplied in Environment Canada 2011b (see Appendix 7.6 for details).

** Alberta is the only province to state its 2020 emission reductions target in terms of megatonnes reduction from business as usual (BAU). This target comes from NRT calculations based on The Pembina Institute 2011 data which indicates that Alberta's BAU emissions in 2020 are projected to be 322 Mt.

The majority of provinces use 1990 as the baseline year against which subsequent reductions are set out, consistent with the baseline year used for the Kyoto Protocol. However, the official federal target under the Copenhagen Accord is based on a 2005 baseline. The use of differing base years makes it difficult to compare the stringency of targets across provinces. The Intergovernmental Panel on Climate Change recommends that developed countries set 2020 targets at 10–40% below 1990 levels and 2050 targets of 40–95% below 1990 levels.[38] As things stand, eight Canadian provinces are targeting reductions from 1990 levels by 2020 (anywhere between a 10% and 20% reduction) while two provinces — Alberta and Saskatchewan — have targets that would lead to an increase in emissions over 1990 levels. In the case of Alberta, its 2020 provincial target would exceed the province's 2005 emissions.[39]

If the provinces are unable to meet their respective 2020 targets, should federal policies ensure that Canada as a whole still reaches the target of 607 Mt CO_2e?

Summing up the targets set out by the provinces in Table 3, they yield a total Canada-wide emission level of 648 Mt CO_2e in 2020.[c] This sits 41 Mt CO_2e above the federal government's 2020 GHG emissions target of 607 Mt CO_2e. Assuming these targets are met, a key question is whether federal, provincial, or other actions will drive these remaining 41 Mt CO_2e of reductions. A further question remains: If the provinces are unable to meet their respective 2020 targets, should federal policies ensure that Canada as a whole still reaches the target of 607 Mt CO_2e?

Most provinces have stated additional interim targets to help reach their 2020 targets. Setting an interim target allows provinces to monitor their progress to their 2020 target not only to determine how effective measures have been with time, but also to guide the province in determining if other measures need to be implemented so 2020 targets can be achieved.

c This number comes from the 2020 emissions targets for each province calculated in Table 3. Manitoba's 2020 target is assumed to be 15% below 2005 (17.9 Mt CO_2e) from NRT calculations based on Environment Canada 2011a.

	PROVINCES WITH INTERIM TARGETS
British Columbia	6% below 2007 levels by 2012; 18% below 2007 levels by 2016
Alberta	20 Mt CO_2e below BAU by 2010
Manitoba	6% below 1990 levels by 2012
Ontario	6% below 1990 levels by 2014
Québec	6% below 1990 levels by 2012
New Brunswick	reduce to 1990 levels by 2010; 5.5 Mt below 2007 levels by 2012
Nova Scotia	2.5 Mt CO_2e below 2009 levels by 2015
Newfoundland and Labrador	reduce to 1990 levels by 2010

Several provinces have also indicated a 2050 emission reductions target. Setting future targets reminds provinces that achieving GHG emission reductions is a process that requires long-term commitments.

	PROVINCES WITH 2050 TARGETS
British Columbia	80% below 2007 levels
Alberta	200 Mt CO_2e below BAU
Ontario	80% below 1990 levels
Nova Scotia	up to 80% below current levels
Newfoundland and Labrador	75–85% below 2001 levels

In addition to setting overall targets and timelines, individual measures committed to in climate plans should also have specified targets and timelines so that their own contribution to the overall plan is known and success can be evaluated over time.[40] Over half of the provinces do set out targets and timelines for specific measures within their plans. A summary of each province's approach is provided in Table 5.

CHARACTERISTIC 2
MEASURES THAT ADDRESS KEY EMISSION SOURCES

To effectively reduce emissions, provinces need to identify and quantify their major sources of emissions and then set out measures to reduce emissions from these sources. Current climate plans generally set out measures that largely align with the major sources of emissions that are identified and ranked according to contribution to overall provincial emissions in Table 4.

TABLE 4: EMISSIONS BY ACTIVITY BY PROVINCE (2009 Mt CO_2e) AND RANKED BY SIZE OF CONTRIBUTION TO OVERALL PROVINCIAL EMISSIONS

		BC	AB	SK	MB	ON	QC	NB	NS	PEI	NL
Stationary Energy	Mt CO_2e	23.5	132.0	29.3	4.4	69.7	23.4	12.2	14.5	0.6	4.4
	Ranking	2	1	1	3	1	2	1	1	2	1
Transport	Mt CO_2e	24.6	35.2	14.2	7.0	58.2	35.6	4.6	5.2	0.8	3.6
	Ranking	1	3	3	1	2	1	2	2	1	2
Fugitive Sources	Mt CO_2e	6.0	35.7	15.2	0.6	1.6	0.7	0.2	0.1	-	0.6
	Ranking	3	2	2	6	6	6	6	6	-	3
Agriculture	Mt CO_2e	2.1	17.0	12.0	6.7	10.0	7.3	0.4	0.4	0.4	0.1
	Ranking	6	4	4	2	4	4	4	3	3	6
Industrial Processes	Mt CO_2e	3.7	12.0	1.6	0.7	18.2	9.1	0.4	0.3	0.0	0.2
	Ranking	5	5	5	5	3	3	4	5	5	5
Waste Disposal	Mt CO_2e	3.9	1.7	0.7	0.9	7.3	5.5	0.5	0.4	0.1	0.6
	Ranking	4	6	6	4	5	5	3	3	4	3

Source: Data taken from Environment Canada 2011b

There is also evidence of many provinces conducting forecasting and emissions trends analyses to inform the development of suitable measures. In addition, integration of measures across departments appears to be more and more the norm linking environmental and economic mandates.

The effectiveness of measures is heavily influenced by the choice of mandatory versus voluntary approaches. Generally speaking, mandatory measures provide more certainty that a given amount of emission reductions will be achieved because of the regulatory burden imposed. This *quantity certainty* exists in a cap-and-trade system where the emissions limit is established but the price of compliance is unknown. In contrast, a mandatory carbon tax provides *price certainty* but the level of emission reductions that will occur is uncertain. The forthcoming federal coal-fired power regulations and Québec's cap-and-trade system are examples of mandatory measures that will provide a more predictable amount of GHG reductions. Conversely, voluntary measures can raise awareness of energy conservation by consumers, but are not as effective as carbon pricing or regulations at changing behaviour or drawing investment that leads to reduced emissions.

With energy-related emissions (stationary energy, transportation and fugitive emissions) contributing 82% of Canada's total emissions in 2009, any provincial strategy must confront energy issues. As noted earlier, stationary energy and transportation are key emission sources across all provinces. A common measure to address stationary energy emissions has been investing in non-emitting electricity generation, which can yield large GHG reductions and offer co-benefits for local air quality and ecosystem health. Several provinces have pursued new electricity generation strategies that will make major progress in support of GHG reduction goals. Examples include Ontario's coal phase-out, Nova Scotia's renewable portfolio standard, Point Lepreau nuclear refurbishment in New Brunswick, and Newfoundland and Labrador's Lower Churchill hydroelectricity project. Large-scale hydro plants are already a main renewable energy strategy for British Columbia, Manitoba, and Québec.

Energy efficiency programs are also widely used to drive GHG reductions, improve air quality, and moderate the demand for new electricity generation capacity in response to economic and demographic growth. In addition, three provinces representing 75% of Canada's total population — Québec, Ontario, and British Columbia — continue to indicate their formal intention to introduce a cap-and-trade system that will affect energy emissions, although progress remains slow. Québec has moved the furthest along by adopting the Western Climate Initiative (WCI) regulation for establishing the system. British Columbia and Québec are also using forms of carbon taxes to lower energy emissions.

Many provinces are pursuing efforts to drive down transportation emissions through vehicle emissions standards, investment in public transportation, investments in research and development, and public awareness campaigns to reduce transportation emissions. However, addressing emissions from this source has proved challenging, as we see later in this chapter.

CHARACTERISTIC 3
EVALUATION MECHANISMS

Strong evaluation plans monitor and assess performance over time and incorporate adaptive management strategies to improve policies and practices.41 In addition, they include public reporting provisions so citizens and stakeholders can be made aware of progress. Many provinces are committing to providing interim reports prior to 2020 as a way of evaluating the effectiveness of individual measures, publicly indicating progress to date, and detailing areas that require more efforts so that the target can be reached. Nevertheless, these are not yet as comprehensive overall as they should be to independently evaluate progress and effectiveness.

Table 5 lays out three components that support measuring and evaluating climate change plans. Public reporting on progress toward meeting climate change objectives provides transparency and accountability. As a best practice, a third-party audit or assessment is ideal. This could be conducted by the province's Auditor General or another independent body, for example the Environmental Commissioner in Ontario and the Sustainable Development Commissioner in Québec.

Across the country, many climate change plans do include provisions for public reporting on progress and for periodic evaluation. Some provinces have already conducted evaluations and made program adjustments in response, with several going as far as publishing revised climate change plans. Independent assessments have taken place in three provinces already.

TABLE 5: ASSESSMENT OF PROVINCIAL CLIMATE CHANGE PLANS

	BC	AB	SK*	MB**	ON	QC**	NB**	NS	PEI	NL
CHARACTERISTIC 1 / TARGETS AND TIMELINES										
Targets with corresponding timelines are established	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Emission-reduction targets have been legislated	✓	-	-	✓	-	-	-	✓	-	-
Measures within the plan are assigned targets with corresponding timelines	✓	✓	-	✓	✓	✓	✓	✓	✓	✓
CHARACTERISTIC 2 / MEASURES TO ADDRESS KEY EMISSIONS SOURCES* **										
Key emissions sources are identified	✓	-	✓	✓	✓	✓	✓	✓	-	✓
Measures are set out to reduce emissions from key sources	✓	-	-	✓	✓	✓	✓	✓	✓	✓
Measures have been informed by emissions trends and forecasting	✓	✓	✓	-	✓	✓	✓	-	-	✓
There is coordination between the provincial environment department and departments responsible for effected sectors	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CHARACTERISTIC 3 / MEASUREMENT AND EVALUATION										
Provisions are set out for regular public reporting on progress	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Evaluation has occurred and new measures have been developed in response	-	-	UD	UD	-	UD	UD	-	-	§§
There has been an independent audit, assessment, or evaluation	-	✓	UD	✓	✓	-	-	••	-	§§

* Saskatchewan has not published an up-to-date climate change plan. To populate this table we relied on the province's earlier climate plan and more recent information provided by the province.

•• Nova Scotia's Minister's Round Table on Environment and Sustainable Prosperity will perform a public evaluation of the target every 5 years.

** The province is currently developing a new climate change plan. This table was populated using earlier climate change plans and more recent publicly available information (see Appendix 7.6 for references).

§§ The climate change plan is too recent to have been evaluated.

*** Key sources are generally defined here as the top three categories of emissions. However, where the third emissions source represents less than 10% of provincial emissions, we only considered the top two sources.

UD Under Development

3.2 SOME KEY CHALLENGES

TRANSPORTATION ISSUES

Transportation is the second-highest emissions source across the country with road transportation as the leading contributor.[42] Addressing emission reductions in this sector is particularly challenging given where and how Canadians live; quality of life and convenience when it comes to vehicle use; urban design; and the cost, choice, and availability of road transport options. In addition, investments in the transportation fleet are long-lived. Even when new technology becomes available, it takes time for that technology to make its way into the majority of the vehicle fleet. Federal vehicle performance standards and fuel regulation standards will contribute to emission reductions over time from transportation;[43] many provinces indicated to the NRT the need for continued federal focus in this area. At the same time, provinces will likely need to continue to invest in public transit and infrastructure, with and without federal support.

INTEGRATING ENVIRONMENTAL MANAGEMENT WITH ECONOMIC DEVELOPMENT

All provinces face competing pressures to invest in economic growth while seeking to reduce GHG emissions from that growth. Reconciling GHG emission reductions and economic growth is a particular challenge in provinces like Saskatchewan and Alberta where activities comprising emissions-intensive natural resource extraction contribute significantly to both the provincial and national economies. Both provinces have coupled economic growth with GHG mitigation in their regulations on large final emitters.[44] Policies in these provinces base requirements on emissions intensity, allowing for contributions to a technology fund as a compliance option to incent R&D for low-emitting technologies. Strong domestic and international demand for Canadian natural resource commodities, particularly oil and gas, will keep upward pressure on provincial and, by extension, national climate emissions goals. We further explore the economic efficiency of provincial plans in Chapter 5.

JURISDICTIONAL OVERLAP[d]

Jurisdictional overlap can have the drawbacks of leading to conflict, buck-passing, inefficient duplication of efforts, reduced democratic accountability, and the establishment of national standards that reflect the lowest common denominator. The potential advantages of this overlap are less commonly recognized but they include supporting provincial innovation and diffusion of novel policies, supporting oversight between orders of government, and tailoring of roles to each government's strengths. Federalism has been a particular challenge in Canada when it comes to developing and sustaining climate plans, relative to others like the European Union and Australia. Canada's difficulties are due to limited public support for deep action, the potential for

d Based on Harrison 2012, available upon request.

significant regional disparities in abatement costs, and a strong norm of federal-provincial consensus in intergovernmental relations. Going forward, policy makers should keep in mind that intergovernmental consensus is not the objective in itself; indeed consensus may mask or even contribute to lack of progress as individual jurisdictions act on their own. Furthermore, compatibility of federal and provincial climate change objectives can be more important than a shared plan on meeting those objectives. But the variation in provincial greenhouse gas intensities and emissions trends, and corresponding economic stakes, present tremendous challenges.

POLICY OVERLAP[e]

In a federation with fragmented climate policy plans, overlap between provincial and federal policies can be problematic depending on the policy instruments involved. We assessed the implications of overlap assuming that the federal government maintains its focus on emissions performance standards (e.g., coal-fired electricity generation regulations) and product performance standards (e.g., renewable fuels content) and that provinces move forward with a variety of price, quantity and regulatory measures. We found that in many instances overlap does not present policy problems, but there are cases where unintended consequences can arise such as redistributing emission-reduction requirements without creating overall environmental benefits, and increasing the overall cost of achieving a level of emission reductions. To avoid this problem, provinces should be cognizant of these risks in designing future policies and the federal government should consider regulatory approaches that do not penalize those provinces wanting to make similar or extra efforts. Equivalency agreements or negotiated regional and pan-Canadian approaches are tools to avoid problematic overlap. Appendix 7.5 provides additional details on our assessment.

INTER-JURISDICTIONAL COORDINATION

In Canada, while two bodies currently exist that could bring together governments to consider climate policy as it relates to achieving Canada's 2020 target, these mechanisms have not met to tackle such policy coordination head on.

First, the Council of the Federation comprises the premiers of Canada's provinces and territories. This institution promotes interprovincial-territorial co-operation while fostering meaningful relations between governments in recognition of their diversities. The Council has worked on climate change initiatives since 2007, including those focused on climate change adaptation and energy efficiency.[45]

e Based on Wigle and Rivers 2012, available upon request.

Second, the Canadian Council of Ministers of the Environment (CCME) is made up of provincial, territorial, and federal environment ministers. It seeks to achieve positive results on national environmental issues in a collaborative manner. The CCME's past work on climate change includes a 2003 report on climate change trends in Canada and a 2011 report on the use of water monitoring networks for climate change adaptation.[46]

THE ROLE OF MUNICIPALITIES[47]

In addition to the policies being pursued at the provincial level, many municipalities are also engaging in emission-reduction activities. Canadian municipalities are engaging in mitigation measures through the Partners for Climate Protection (PCP) network coordinated by the Federation of Canadian Municipalities (FCM) and Local Governments for Sustainability (ICLEI). PCP includes 221 Canadian member municipalities. Since 2008, PCP has developed the *National PCP Measures Database* to track projects, and it currently contains more than 700 projects that represent over $(2012)1 billion in investments leading to GHG reductions in excess of 1.7 Mt CO_2e. Emission-reduction measures span large and small communities, residential and corporate sources, energy efficiency, waste diversion, fleet improvements, and renewable energy activities among others. To date, district energy systems and landfill gas capture and recovery systems have produced some of the largest sources of reductions. Many provinces have identified the need to work with municipalities in their climate plans, but municipal actions are not typically accounted for separately in provincial reporting of emission reductions. Rather, they are reported as a reduction in the context of a sector, such as landfills and waste or from public transit.

LOOKING FORWARD

Provincial governments continue to explore new GHG reduction measures as the economy changes, technologies advance, and gaps between GHG reduction targets and current emission trajectories emerge. Newfoundland and Labrador has indicated that it may introduce regulations to limit emissions from industrial sources.[48] Ontario, Manitoba, and British Columbia may follow Québec and introduce emissions trading as members of the Western Climate Initiative (see Text box 3).

TEXT BOX 3

WESTERN CLIMATE INITIATIVE

The Western Climate Initiative (WCI) was initially introduced in 2007 as an agreement between five U.S. state governors to work together to establish GHG reduction targets, measure emissions, and develop market-based schemes to achieve reduction targets that allowed for interregional trading of permits. The design of the program proposed by WCI is a cap on all major emissions sources, a consistent reporting methodology for regulatees, and support for compliance flexibility through a cap-and-trade system that allows for banking credits over time and for offsets.

The WCI points to several benefits to the proposed regional system including greater economic efficiency through compliance flexibility, reduced risk of "leakage" of emissions to areas that are not covered by a GHG reduction target, economies of scale in administrative and technical oversight, and enhanced capacity to support future national-level systems.

Membership has declined from a high of 11 members to five current members: California, British Columbia, Manitoba, Ontario and Québec. Québec has clarified plans to proceed to implementation in 2013 by formally adopting a WCI regulation putting this into effect, using 2012 as the transition year. The other three Canadian provinces are at varying degrees of readiness to proceed with the system, but their plans are unknown and timing is uncertain.

Members of WCI are collaborating with other states and provinces across North America through *North America 2050: A Partnership for Progress*. This partnership provides a forum for states and provinces to share information, coordinate efforts, advocate, and reduce GHG emissions.

Source: Western Climate Initiative 2008, 2012a, 2012b; North America 2050 ND; Finances Québec 2012

As provinces move forward in implementing their plans, they have the opportunity to learn from the experiences of others and borrow existing policy measures and tailor them to their own circumstances. In one example of this, Saskatchewan is currently developing a regulatory regime for industrial emitters that shares many common elements with Alberta's *Specified Gas Emitters Regulation*.[49]

3.3 LEADING PRACTICES

GHG reduction policies across the country are diverse and many of them are also highly innovative. This section describes examples of leading provincial practices. Other jurisdictions may look to include such actions in their own suite of measures to enhance climate policies in the future.

A CARBON-NEUTRAL GOVERNMENT IN BRITISH COLUMBIA[50]

A key component of British Columbia's 2007 *Greenhouse Gas Reduction Targets Act* was a commitment to achieve a carbon-neutral public sector by 2010. The province relies on an approach of measuring, reducing, offsetting, and finally reporting emissions from public sector sources. In the buildup to 2010 almost $75 million was spent to conserve energy in public buildings. To supplement internal reductions, the government also purchased 0.7 Mt CO_2e of offsets from the Pacific Carbon Trust — a provincial crown corporation that reviews and approves offset projects. To date, offsets have been generated through forest-based carbon sequestration, energy efficiency, and fuel switching across the province.

FUNDING TECHNOLOGY DEVELOPMENT IN ALBERTA[51]

Alberta's emissions-intensity-based regulatory system allows regulated entities to achieve compliance through several mechanisms including contributing to a technology fund at a rate of $15/tonne CO_2e. This fund — the Climate Change Emissions Management Fund — is administered by an arms-length not-for-profit corporation. The corporation's mandate is to use Fund revenues to support GHG reduction activities and climate change adaptation within the province. Funding is distributed using a portfolio approach focused primarily on green energy production, energy efficiency, and carbon capture and storage (CCS). As of September 2011, the fund had collected $257 million, with 27 projects representing $126 million in investment expected to produce annual GHG emission reductions (by their reckoning) of 2.3 Mt CO_2e, or 23 Mt CO_2e over 10 years.[52]

CARBON CAPTURE AND STORAGE IN SASKATCHEWAN[53]

In 2011 the Government of Saskatchewan announced the approval of the construction of the Boundary Dam Integrated Carbon Capture and Storage Demonstration Project, a $1.24 billion project aimed at capturing emissions from coal-fired electricity generation and using the CO2 in enhanced oil recovery. Construction is now underway and once operational in 2014, the

project is expected to reduce GHG emissions by 1 Mt CO_2e per year. SaskPower, the provincial utility implementing this project, identified project goals including demonstrating an economic and technically feasible method by which to make coal-fired generation sustainable and influencing future industry-wide regulations and policies governing this emerging technology. Partners on the project include the provincial government, several private firms, and the Government of Canada, which has contributed $240 million toward the project.

EXPORTING CLEAN ELECTRICITY IN MANITOBA[54]

Hydro power is the main source of electricity in Manitoba and on an annual basis, Manitoba is a net power exporter. In 2010, non-emitting power exports reduced emissions outside the province by almost 7.2 Mt CO_2e — the equivalent of about one-third of Manitoba's expected 2010 emissions. Electricity is mainly transmitted via the north-south electricity grid from Manitoba to the United States.[55] As Manitoba Hydro continues to make investments in hydro capacity and wind power, the province should be in a position to continue contributing to emission reductions outside the province.

INCENTING SMALL-SCALE RENEWABLE ELECTRICITY PRODUCTION IN ONTARIO[56]

The Government of Ontario has developed a feed-in tariff (FIT) program to boost renewable energy use across the province. The Ontario Power Authority administers this program by entering into long-term purchasing agreements with renewable electricity producers working with bioenergy, solar photovoltaic, water, and wind. The program is designed to bring new electricity sources online in support of the coal-fired electricity phase-out, and support economic activity, new renewable electricity technologies, and growing employment in the industry. It is estimated that the FIT program will offset 8.4 Mt CO_2e that would otherwise be produced by natural gas facilities.[57]

ESTABLISHING AN EMISSIONS MARKET IN QUÉBEC[58]

In 2009, Québec tabled *Bill 42: An Act to amend the Environment Quality Act and other legislative provisions in relation to climate change* to allow it to establish a cap-and-trade system as part of its participation in the WCI. The province has since adopted a regulation in preparation for launching its provincial cap-and-trade system in 2013, following a year of transition. A second regulation will be required to link trading systems between jurisdictions. Participation will be voluntary in the first year, giving companies an opportunity to learn the system. As of 2013 roughly 75 operators — primarily from the industrial and electricity sectors — will be covered under the system and then in 2015 coverage will be expanded to fuel distributors and importers. The threshold that triggers participation is emissions of at least 25 kt CO_2e. Compliance permits will be distributed via free allocation, and/or auctioning and revenues from the scheme will be used to fund Québec's climate change plan for the period 2013–2020.

MAKING THE ENERGY-ENVIRONMENT CONNECTION IN NEW BRUNSWICK[59]

New Brunswick's 2011 *Energy Blueprint* identifies environmental responsibility as one of the province's key energy objectives. It recognizes that energy use is the source of 92% of GHG emissions and that the energy-intensive and export-oriented nature of its industries could be a liability if the environmental impact of energy is not lessened. The *Blueprint* identifies 20 government actions directed toward enhancing the energy sector including 13 actions that further the environmental responsibility objective. These actions include developing the province's 2012–2020 Climate Change Action Plan through cross-departmental participation, pursing regional electricity partnerships, and increasing the Renewable Portfolio Standard.

LEGISLATING A GREATER ROLE FOR RENEWABLE POWER IN NOVA SCOTIA[60]

The Government of Nova Scotia introduced a renewable energy plan for Nova Scotia in 2010, committing to source 25% of electricity from renewables by 2015 and setting a goal of 40% renewables by 2020. The 2015 target was put into law through the *Renewable Electricity Regulations* under the *Electricity Act*. When the targets were introduced in 2010, Nova Scotia sourced roughly 90% of the province's electricity from fossil fuels-based, principally coal. Recognizing that achieving the renewables targets will become increasingly difficult if energy demand rises, complementary energy efficiency measures are also planned.

BUILDING WIND ENERGY CAPACITY IN PRINCE EDWARD ISLAND[61]

Prince Edward Island has been committed to enhancing wind power capacity within the province since the development of the first utility-grade wind farm in 2001. In 2008, the Government of Prince Edward Island announced plans to generate an additional 500 megawatts of wind power by 2013. The province also supports wind energy R&D through collaboration with the Wind Energy Institute of Canada.

EXPANDING HYDROELECTRIC PRODUCTION IN NEWFOUNDLAND AND LABRADOR[62]

In 2010 the government of Newfoundland and Labrador announced plans to develop new large-scale hydroelectric generation on Labrador's Lower Churchill River. This project will commence with hydroelectric development at Muskrat Falls, and additional capacity is expected to be built at Gull Island further in the future. With this agreement, new transmission lines will allow for electricity to travel from Labrador to Newfoundland and from Newfoundland to Nova Scotia and create further potential for regional electricity exports. Once Muskrat Falls is operational, it is estimated that 98% of the province's energy supply will be non-emitting and that Newfoundland and Labrador's emissions will fall by 1.2 Mt CO_2e in 2020 (or 13% of the province's 2009 total emissions) as a result.

3.4
CLIMATE CHANGE PLANS IN THE TERRITORIES

Canada's three territories — Yukon, the Northwest Territories, and Nunavut — contributed 1.9 Mt CO_2e to Canada's total GHG emissions in 2009. The main emissions source in the territories is transportation (1.1 Mt CO_2e in 2009) with the largest sub-set of transportation emissions stemming from off-road diesel vehicles.[63] Transportation plays an integral role in socio-economic well-being in the territories. Even in Yukon where almost all communities are connected by roads, a large number of people still use off-road transportation to commute, receive provisions, and access health services.[64] Fuel content requirements may be considered to reduce emissions, but Arctic conditions need to be accounted for.[65]

Many isolated communities in the territories rely on diesel generators for electricity. Overall, hydro is the largest source of electricity generation for the North, but its distribution is very limited. Nunavut relies completely on diesel for electricity generation. Because of the heavy reliance on diesel, the desire to improve efficiency of diesel generators has increased in the territories, and is generally seen as a "reliable and least-cost, near-term solution."[66]

Yukon and the Northwest Territories have limited the application of GHG emission reductions targets to government operations.[67] Yukon seeks to cap GHG emissions from government operations in 2010, to achieve emission reductions of 20% below 2010 levels by 2015, and to be carbon neutral by 2020. The Northwest Territories has established a target to stabilize emissions from government operations at 2005 levels by 2015, to limit emissions increases to 66% above 2005 levels by 2020, and to return emissions to 2005 levels by 2030. Nunavut has no established target, but has committed to controlling and reducing GHG emissions between 2003 and 2013.

Each territory faces challenges on the horizon. Since 2009 there has been an increase in mining operations in Yukon with two new mines planned for the near future. The hydroelectricity grid has been maxed out in Yukon, and with additional mining activities, it will require more electricity. Rapid growth in the mining and natural gas sectors in the Northwest Territories could result in emissions increasing three-fold during the next two decades, with emissions from fossil fuels projected to reach 5,000 Kt by 2030.[68] Nunavut is focusing most of its efforts on adaptation, but mining growth in that territory may also create new pressures.

3.5 CONCLUSION

This chapter shows how without an agreed national policy approach, provincial climate policies in Canada have all developed individually. Nevertheless, even if divergent, these climate plans can still prove effective if they have the necessary common elements of targets and timelines, measures to drive emission reductions, and provisions to report and evaluate progress over time. The provinces have many crosscutting issues to consider when creating climate policies. These include ensuring that targets and timelines are ambitious yet realistic, balancing economic growth with emission reductions, and ultimately, determining how to tackle key emissions sources effectively to meet targets. Intergovernmental collaboration and regional efforts can prove instrumental in policy development. We have seen examples of this in Atlantic Canada and Québec as part of the Regional Greenhouse Gas Initiative (RGGI) with the New England states as well as the WCI. All provinces and territories should consider the effective and innovative reduction efforts of their counterparts when evaluating the effectiveness of their own measures and developing future policy choices.

As the levels of ambition in GHG reduction targets and the policy approaches to achieve them vary across provinces, so too will the environmental outcomes. The next chapter further investigates the GHG reductions expected from these plans.

4.0 TARGET 2020

IS CANADA ON TRACK TO MEET ITS 2020 GHG TARGETS WITH FEDERAL, PROVINCIAL, AND TERRITORIAL POLICIES THAT HAVE BEEN IMPLEMENTED AND PROPOSED TO DATE? IF NOT, HOW MUCH PROGRESS HAS THE COUNTRY MADE? WHICH SECTORS ARE RESPONSIBLE FOR DRIVING EMISSION REDUCTIONS? AND HOW MUCH ADDITIONAL EFFORT IS REQUIRED? THE NRT USED AN ECONOMIC MODELLING TOOL TO ANSWER THESE QUESTIONS. OUR ANALYSIS ASSESSES LIKELY CONTRIBUTIONS OF EXISTING AND PROPOSED FEDERAL, PROVINCIAL, AND TERRITORIAL CLIMATE CHANGE POLICES TOWARD ACHIEVING CANADA'S 2020 EMISSION-REDUCTION TARGETS.

This chapter provides an overview of our modelling approach and results. We begin by outlining the model itself and scenarios used to estimate emission reductions to 2020 from climate policies. Next, we present national forecast results and assess these likely reductions in the context of the federal 2020 target. We then provide a regional assessment, exploring the provincial distribution of forecasted emission reductions and progress toward each province's own targets as a continuation of our assessment of provincial plans from Chapter 3. Finally, we describe emission reductions from existing and proposed policies in terms of sector-level impacts. To offer a deeper picture of Canadian climate policy we also forecast emission reductions to 2030 and consider how far along Canada is to meeting another 2020 target it set for itself: non-emitting energy generation.

4.1 ANALYTICAL APPROACH

The NRT used the CIMS model to forecast the impacts of GHG mitigation policies to 2020. This section provides an overview of the modelling methodology and approach.[f]

STRENGTHS OF THE CIMS MODEL

CIMS is an economic modelling tool that simulates the evolution of the Canadian economy under a variety of energy and environmental policy regimes.

The model is based on detailed representation of technologies that use and produce energy. To generate a forecast, it simulates firm and household choices as these technological stocks are replaced over time. The model also includes equilibrium feedbacks, such that supply and demand for energy-intensive goods and services adjust in response to policy. Based on this representation of Canada's energy economy, CIMS can project the effects of government policies and programs on the energy-economy system, estimating how subsidies, regulations, and market-based policies influence technological development, firm and household decision making, demand for energy products, and resulting GHG emissions.

The model covers about 98% of Canadian GHG emissions apart from deforestation and land-use changes. It explicitly represents residential, commercial, personal, and freight transportation; industry; energy supply; agriculture; and waste sectors of the economy, with additional resolution for various subsectors. The model is disaggregated by province, although the Atlantic Provinces are grouped together. For this report, the NRT conducted supplementary

f The quantitative results in this report are drawn from the consulting analysis prepared for the NRT by Navius Research Inc. This report is available upon request (Navius Research Inc. 2012).

analysis to separate Atlantic forecasts by province based on supporting data from Environment Canada and assumptions about the electricity sectors in each province.[g] Emissions from the territories were not disaggregated explicitly in the modelling analysis because they are very small overall but are included in the national-level results. The regional and sector-level resolution allows for modelling a range of provincial/territorial as well as federal policies that apply either to specific sectors or to the economy as a whole.

Further, because the model is fully integrated, it also represents the interactions and overlaps between these different policies. Representing these interactions ensures that the model does not double-count emission reductions from different policies.

CIMS is a well-established modelling tool. It has been used by various provincial/territorial governments in Canada including British Columbia, Alberta, Saskatchewan, Ontario, the Northwest Territories, and Newfoundland and Labrador. It has also been used in a range of national-level analyses through organizations including Natural Resources Canada, the International Institute for Sustainable Development, and the NRT. As a result of these analyses, the model has continued to be improved through time. CIMS' track record for policy analysis in Canada establishes the model as a credible tool for analysis.

Finally, for the analysis in this report, the NRT applied CIMS using a transparent, credible modelling process. The baseline for the CIMS forecast was Environment Canada's assumptions for growth in each sector. Energy prices were drawn from the National Energy Board's 2011 *Energy Futures* report.[69] We presented the analysis to Environment Canada officials and also engaged with provincial and territorial government representatives on the modelling results at the NRT's Canadian Climate Policies Dialogue. Model results were also peer reviewed. The NRT adjusted and improved the forecasts throughout the modelling process in response to feedback.

LIMITATIONS OF ECONOMIC MODELLING

All model forecasts are inherently uncertain and should not be considered precise predictors of the future. The Canadian energy-economy system is complex, as are the effects of policy on this system. To simulate this system, the analysis depends on assumptions about technological and economic development, energy prices, and firm and consumer behaviour. The model uses credible sources to guide these inputs, but no amount of research allows perfect foresight into the future of the economy.

Yet uncertainty in the forecasts does not preclude the usefulness of models. Forecasts can provide a directional indication of the likely impacts of policy and can be very useful in comparing relative impacts of different policy tools. The goal of economic

g See Navius Research Inc. 2012 for more details.

modelling is not to produce a forecast for its own sake, but to draw insight and learning from forecasts and scenarios. This is the approach the NRT takes in this analysis. Overall, the NRT therefore remains confident in the modelling results presented here. The directional impacts of the modelling analysis in chapters 4-5 provide useful and important policy insight. To ensure the analysis is as useful as possible, we are transparent about the assumptions and limitations of the analysis. Appendix 7.2 provides additional detail on the CIMS model and the methodologies applied in this report.

DEFINING SCENARIOS

The scenarios modelled define the sets of federal, provincial, and territorial policies we explored within the modelling analysis. We assessed the likely impacts of three different sets of policies:

1. **Existing provincial and territorial policies** are measures to reduce GHG emissions that provincial or territorial governments implemented after 2005.
2. **Existing federal policies** are measures to reduce GHG emissions that the federal government implemented after 2005.
3. **Proposed federal, provincial, and territorial policies** are measures to reduce GHG emissions that have been proposed by any level of government for implementation by 2020 but have not yet been implemented. We included policies for which enough detail has been made public or available to us so that reasonable modelling assumptions could be made as to the nature of the measures.

We estimate the expected incremental emission reductions from each of these sets of policies to 2020 by layering the policies in sequential scenarios. The difference in forecasted GHGs between scenarios with and without a set of policies illustrates the incremental impact of that set of policies. To do this, we started with a *No Policy* case that assumes no new government measures had been implemented after 2005. This gives us a clear baseline upon which to measure the effectiveness to date and likely success of all federal and provincial/territorial policies implemented and proposed.

We then added to this scenario the *Existing Provincial and Territorial Policies* scenario to assess the incremental emission reductions expected from these policies. Next, the *Existing Federal Policies* scenario estimates the incremental emission reductions from federal policies implemented since 2005, in addition to existing provincial/territorial polices. Finally, the *Proposed Policies* scenario estimates the incremental emission reductions from policies from all levels of government — federal, provincial, and territorial — that have been announced but not yet implemented or legislated.

Table 6 provides an overview of federal, provincial, and territorial policies included in the modelling. For more details about specific policies included in the analysis, see Appendix 7.3.

TABLE 6: OVERVIEW OF EXISTING AND PROPOSED GHG MITIGATION POLICIES MODELLED

	Canada	BC	AB	SK	MB	ON	QC	NB	NS	PEI	NL	TERR
Carbon Tax		●					●					
Cap and Trade (WCI)		○			○	○	○					
Coal Phase-Out					●	●						
Vehicle Emission Standards	●/○	●				○	○	○	●	○		
Energy Efficiency Programs/DSM	●	●	●	●	●	●	●	●	●	●	●	●
Improved Building Codes		●			●	●					●	●
Renewable Portfolio Standards								○	●	●		
Renewable and/or Low-Carbon Fuel Standards	●	●	●			●	○	○				
Landfill Gas Regulation		●				●	●					
Regulated Emitters Legislation	●		●	○								
Technology Fund Expenditures			●	○								
Carbon Capture and Storage			○	●								
Feed-In Tariff for Renewable Electricity	●					●						

● = existing ○ = proposed

The NRT assessed all provincial, territorial, and federal policies and endeavoured to include as many individual policies as possible in the modelling analysis. We worked with representatives from the federal and provincial governments to ensure all major policies from each jurisdiction were included in the modelling. To manage the scope and complexity of the analysis, the NRT excluded some policies from the modelling based on qualitative assessment. Policies not modelled were either 1) likely to result in less than 1 Mt CO_2e of emission reductions annually or 2) had insufficient detail available to represent their likely impacts using CIMS.[h] In the case of the latter, some policies were still being defined by policy makers, while others are information-based or voluntary programs that do not translate well to the CIMS modelling framework. The NRT, however, qualitatively assessed the government measures not explicitly included in the modelling to assess how they might contribute additional emission reductions by 2020 to be as comprehensive as possible in our assessment (see Text Box 4).

Canada has a stated emission reductions target for 2020 of 17% below 2005 levels. To achieve this target, Canadian emissions must drop to 607 Mt CO_2e in 2020.

4.2 THE EMISSIONS GAP

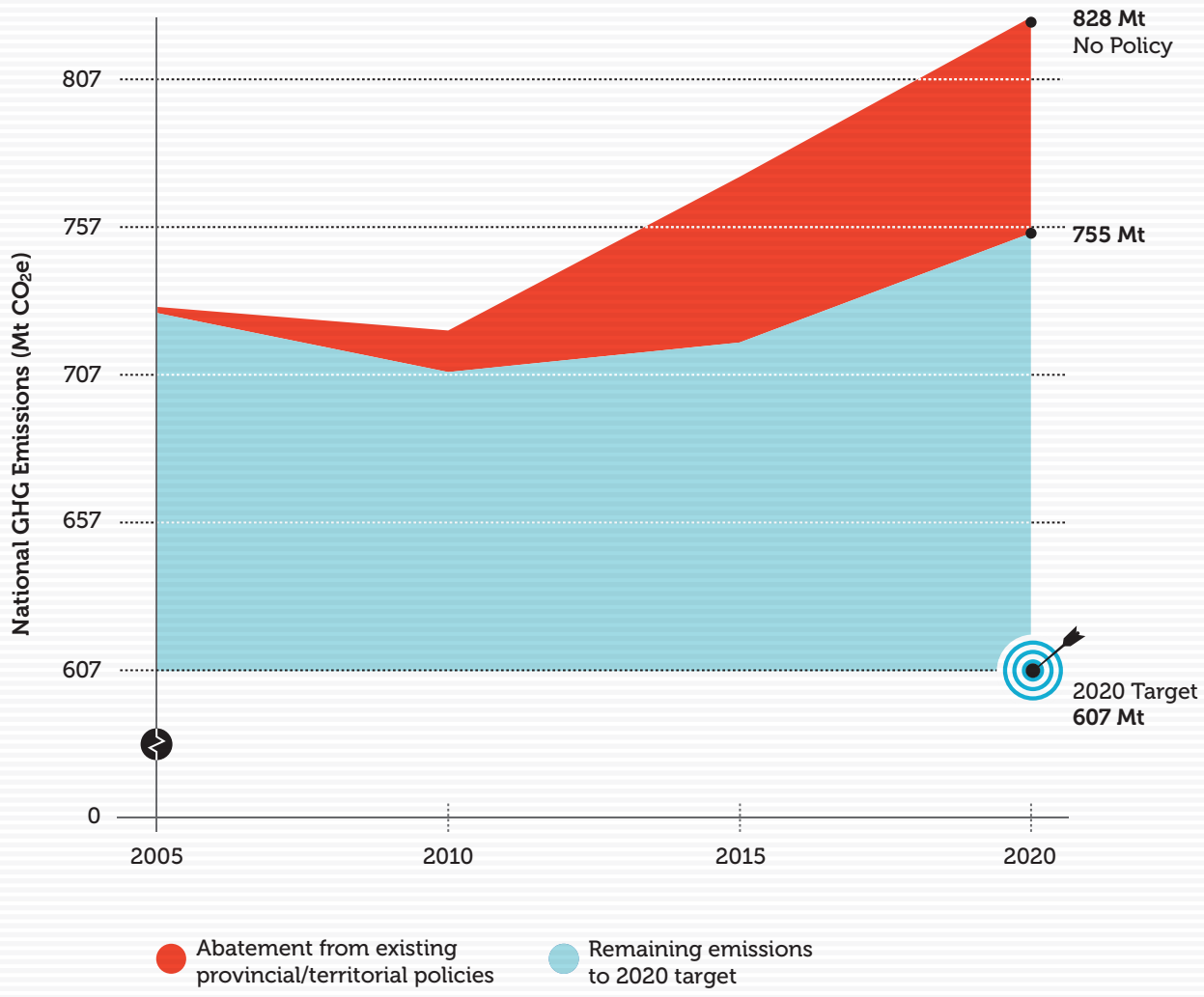
Canada has a stated emission reductions target for 2020 of 17% below 2005 levels. To achieve this target, Canadian emissions must drop to 607 Mt CO_2e in 2020. As seen in earlier chapters, the federal, provincial, and territorial governments have all implemented climate plans and policies to drive emission reductions in Canada. This section adds up the national emissions trajectory to 2020 based on these actions. It assesses how much progress Canada has made in meeting the 2020 target and how much of an emissions gap likely still remains.

EFFECTS OF EXISTING PROVINCIAL/TERRITORIAL POLICIES

To assess the impact of existing provincial and territorial policies, GHG forecasts are compared under two scenarios. The differences in emissions or abatement between the *No Policy* scenario — which includes no new policies since 2005 — and the *Existing Provincial and Territorial* scenario reflect the impact of this set of policies. Figure 8 below illustrates the forecasted emission reductions.

h The NRT has extensive experience in qualitatively assessing the likely impacts of policies through its annual assessment of government forecasts under the Kyoto Protocol Implementation Act.

FIGURE 8: EMISSION REDUCTIONS FROM EXISTING PROVINCIAL/TERRITORIAL POLICIES

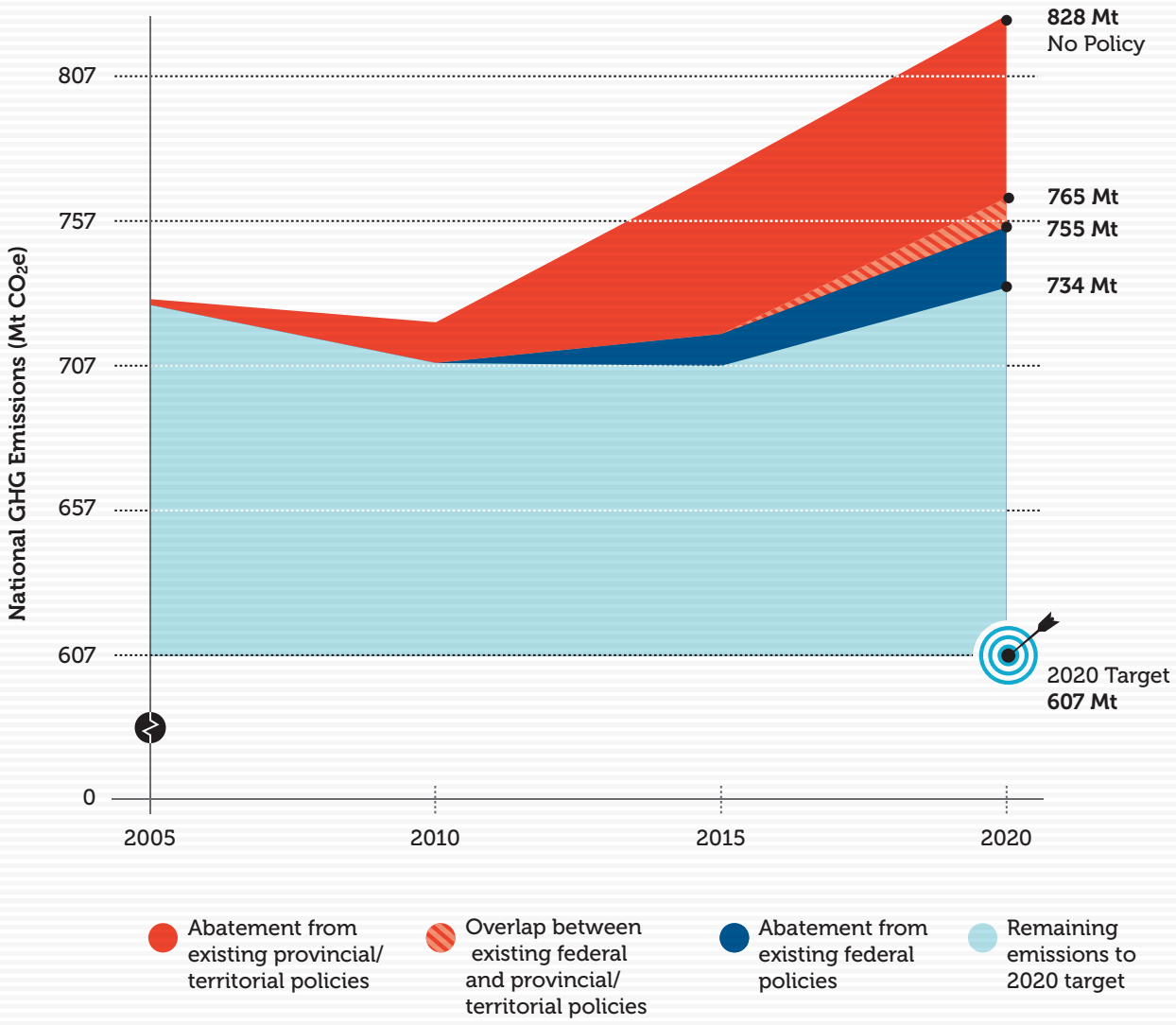


As illustrated in the figure, the *No Policy* scenario forecasts that Canada's emissions would have risen to 828 Mt CO_2e by 2020. This trend would have placed Canada about 221 Mt CO_2e above its target in 2020. Existing P/T policies implemented since 2005 put Canada on the path toward significant progress in closing the gap to the target, leading to an expected 73 Mt CO_2e of emission reductions in 2020.

EFFECTS OF EXISTING FEDERAL POLICIES

Now we present the effects of existing federal policies. Figure 9 illustrates the incremental abatement existing federal policies, notably including regulations for vehicles and coal-fired electricity, would add to reductions from existing P/T policies, by layering these additional policies onto the previous scenarios.

FIGURE 9: EMISSION REDUCTIONS FROM EXISTING PROVINCIAL/TERRITORIAL AND FEDERAL POLICIES



As illustrated, federal polices will result in 21 Mt CO_2e of incremental emission reductions by 2020, less than one-third of reductions compared to P/T policies. Together, however, emission reductions from both federal and P/T existing policies amount to 94 Mt CO_2e of expected emission reductions in 2020. Our forecast suggests an emissions gap to the Canadian target of about 127 Mt CO_2e based only on existing policies.

Emissions are not actually "federal" or "provincial." Some overlap between existing federal and existing P/T policies will exist as policies chase some of the same emissions.

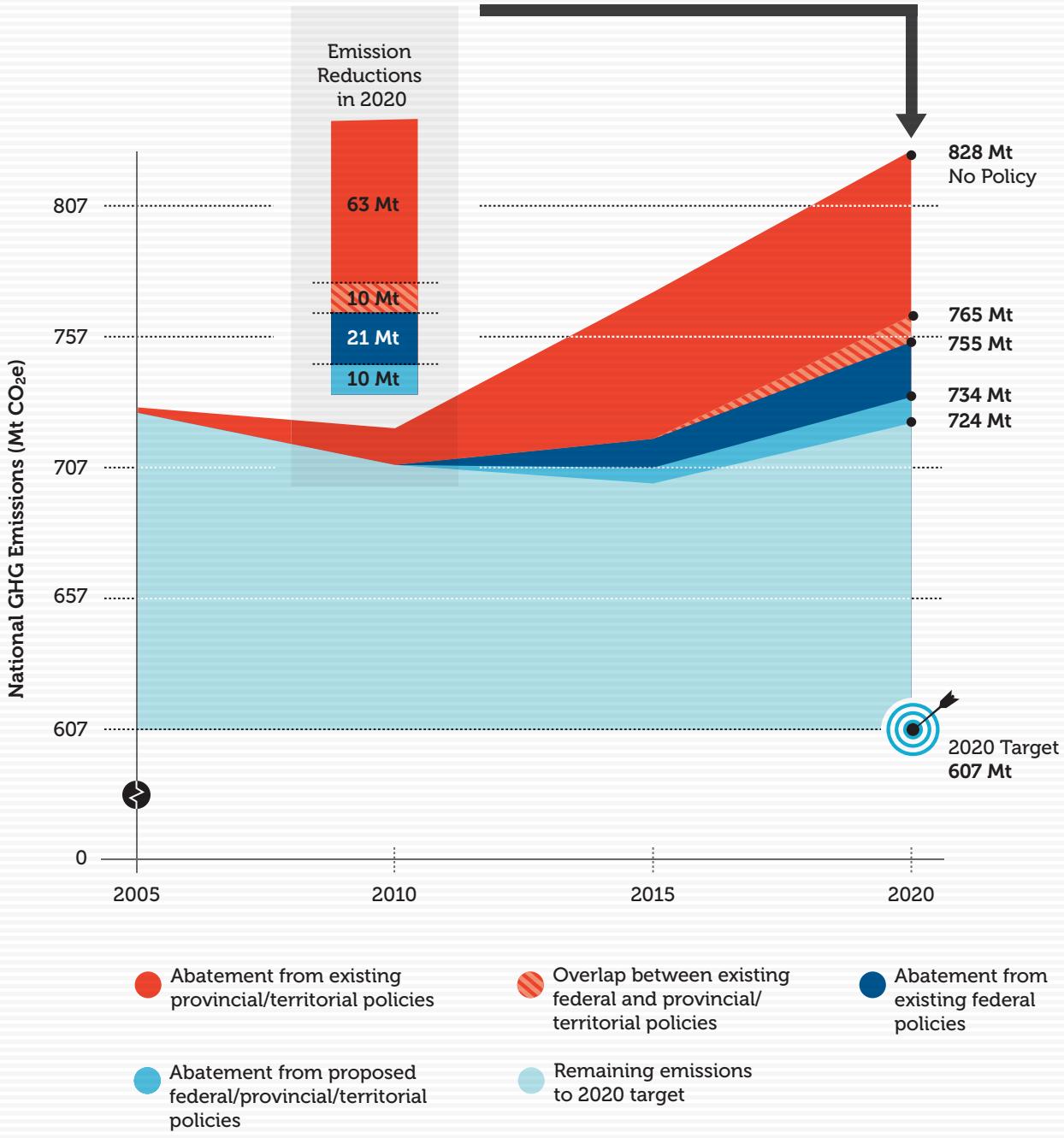
Emissions are not actually "federal" or "provincial." Some overlap between existing federal and existing P/T policies will exist as policies chase some of the same emissions. Policies with areas of overlap include the federal electricity regulations and the coal phase-out in Ontario as well as energy efficiency and demand-side programs for energy-use in buildings from both levels of government. To avoid double-counting of abatement, Figure 9 illustrates this overlap in efforts that amount to about 10 Mt CO_2e of emission reductions in 2020.

Existing federal policies layered on top of P/T policies achieve an *incremental* 21 Mt CO_2e of emission reductions. If existing federal policies were modelled on their own, they would achieve 31 Mt CO_2e of emission reductions in 2020. The NRT followed Environment Canada's standard modelling practice in how it conducted its scenario modelling to determine this.

EFFECTS OF PROPOSED FEDERAL AND PROVINCIAL/TERRITORIAL POLICIES

Both the federal and P/T governments have announced their intent to move forward with additional policies to reduce emissions. Our final scenario explores the potential impact of these proposed policies on GHGs to 2020 to determine if they could further close the emissions gap to the 2020 target. Even though these policies have not been implemented at the time of this report, governments have clearly stated their intention to move forward with them and have provided sufficient detail to define their nature. Figure 10 shows the incremental emission reductions from these proposed federal and P/T policies.

FIGURE 10: EMISSION REDUCTIONS UNDER EXISTING AND PROPOSED FEDERAL, PROVINCIAL, TERRITORIAL POLICIES



The proposed policies scenario would likely result in an additional 10 Mt CO_2e of reductions by 2020, about 10% more abatement than currently expected. These additional emission reductions are relatively small partly because existing policies have already driven substantial reductions and make up most of the effort by governments, but also because only a few policies likely to make a substantial impact have actually been proposed. Federal regulations for emissions on heavy vehicles will have an impact across the country. A proposed cap-and-trade policy under the Western Climate Initiative in British Columbia, Ontario, Manitoba, and Québec will also help reduce emissions, but the stringency of the cap is essentially the same as the existing carbon tax in British Columbia, so it has no incremental impact in British Columbia. Overall, the forecast suggests that together, the proposed policies will likely have only small impacts and will be insufficient to close the gap to the 2020 target. Should governments not go ahead and implement these policies then even fewer emission reductions will occur as can be seen below in our uncertainty analysis.

THE REMAINING GAP TO 2020

The NRT forecasts presented above suggest that existing and proposed federal, provincial, and territorial polices will together lead to substantial emission reductions of 104 Mt CO_2e in 2020. However, even considering all these policies, an additional 117 Mt CO_2e of emission reductions will be required by 2020 to achieve the target.

A key factor in the explaining this gap is the growth in emissions, largely resulting from growth in the Canadian economy, and in particular, in emissions-intensive sectors such as oil and gas. As Figure 10 shows, all sets of policies have an increasing impact through time — the coloured wedges of emission reductions grow wider and wider. Consequently, the gap to the target continually narrows to 2015, before again widening between 2015 and 2020, as growth in emissions from emissions-intensive sectors begins to again outpace emission reductions induced by policy. Still, existing and proposed policies provide a foundation for achieving Canada's 2020 emissions goal. Our analysis suggests that almost half the required reductions are likely to be achieved through existing and proposed government measures.

The NRT forecasts presented above suggest that existing and proposed federal, provincial, and territorial polices will together lead to substantial emission reductions of 104 Mt CO_2e in 2020. However, even considering all these policies, an additional 117 Mt CO_2e of emission reductions will be required by 2020 to achieve the target.

UNCERTAINTY IN THE REMAINING GAP

Exploring potential uncertainty in our assessment can be useful to illustrate how different assumptions can lead to different estimates for remaining emissions to the 2020 target. In the core analysis presented above, we have generally assumed that new policies will be implemented as stated and old policies remain in effect. We consider both an *optimistic* and a *pessimistic* scenario to better indicate the possible range of the size of the remaining gap.

TEXT BOX 4

GOVERNMENT POLICIES NOT REPRESENTED IN THE MODELLING

The NRT worked with representatives of provincial and territorial governments to ensure that the NRT's economic modelling includes the most significant programs and policies to reduce GHG emissions. However, while the modelling includes a large number of government measures, practical limitations prevented the NRT from including every single measure. As noted in this report, policies not modelled were either likely to result in less than 1 Mt CO_2e of emission reductions annually or had insufficient detail to quantitatively simulate their likely impacts. But what emission reductions might be expected collectively from the numerous smaller policies that were not modelled?

The NRT qualitatively assessed the remaining provincial, territorial, and federal policies to examine the likelihood for the un-modelled policies to provide emission reductions incremental to the policies that have been modelled. We consider policies solely by their potential to contribute to emissions abatement by 2020. To assess their potential, we applied three tests to filter the policies:

1. **Is the policy voluntary or mandatory?** We identify the type of each policy according to where it falls on the spectrum between completely voluntary (e.g., information programs) and absolutely coercive (e.g., command and control). To be considered, a policy has to be a financial disincentive or a regulation, i.e., "mandatory."

2. **Is there overlap with already modelled policies?** Our concurrent quantitative analysis suggests significant overlap exists among policies designed to reduce greenhouse gas emissions in Canada. For each policy, we identify whether we modelled another policy at the federal or provincial level that covers the same sector. To be considered to generate incremental abatement, a policy must not have significant overlap.

3. **Does the policy cover a significant portion of national emissions?** To be considered, a policy has to have reasonable potential to add a significant amount of emission reductions.

Based on these filters, several additional policies emerge as potentially important contributors to overall Canadian emission reductions, as illustrated in the table below. In most cases, the estimate is an upper bound estimate derived from government claims that have not been independently verified or assessed in context. Therefore we assume that these estimates present an optimistic assessment of emission-reduction potential. In total, we estimate incremental emissions abatement from these remaining quantifiable policies of up to 2.3 Mt CO_2e in 2020.

POLICY	JURISDICTION	SECTOR	EMISSIONS IN 2020 (Mt CO_2e)	MAXIMUM EXPECTED ABATEMENT IN 2020 (Mt CO_2e)
Provincial Transit Plan	BC	Transportation Personal	9.1	0.4
Green Trips	AB	Transportation Personal	9.7	Unknown
Sustainable Agricultural Practices	MB	Agriculture	7.1	0.4
Landfill Biogas Capture	MB	Waste	0.9	0.2
Public Transit Expansion	ON	Transportation Personal	30.1	0.3
Halocarbon Regulations	QC	Industry & Consumer Products	2.8	0.7
Voluntary Industry Agreements	QC	Metal Smelting	8.3	0.2
Landfill Gas	NL	Waste	0.7	0.1
Marine Shore Power Program	Canada	Transportation Freight — Marine	11.1	< 0.1
TOTAL				2.3

** See, for example, Jaccard and Bataille 2004; Jaffe, Newell, and Stavins 1999; Khanna 2001.*

Our *optimistic* case includes some additional possible sources of emission reductions. First, as noted, the modelling analysis includes all major government policies and programs, but excludes government measures likely to have small impacts or that have insufficient detail available for modelling. The NRT's qualitative assessment of these policies, however, suggests that they could lead to up to 2.3 additional Mt CO_2e of emission reductions in 2020 (See Text Box 4 for details of this qualitative analysis). Second, the core analysis described above does not include the effects of investments under the *Climate Change and Emissions Management Corporation* (CCEMC) in Alberta. As discussed in Text Box 5, this mechanism could lead to up to an additional 6 Mt CO_2e of reductions in 2020. Under this *optimistic* scenario, the remaining gap in 2020 to the Canadian target would be 109 Mt CO_2e, rather than 117 Mt CO_2e; Canada would be slightly more than 50% of the way to achieving the target.

Yet proposed policies may not be implemented and existing policies may be weakened or cancelled. We considered a pessimistic case in which we assumed the following:

- All proposed policies (the Western Climate Initiative, CCS projects in Alberta,[i] proposed industrial regulations in Saskatchewan, federal heavy duty freight truck regulations) do not move forward;
- Federal Electricity Performance Standards, which are not yet finalized, are not implemented; and
- Ontario coal phase-out, which has been delayed in the past, does not proceed beyond what has already occurred to date.

Under this *pessimistic* scenario, national abatement would be reduced by about 32 Mt CO_2e in 2020, and the remaining gap in 2020 to the Canadian target would be 149 Mt CO_2e instead of 117 Mt CO_2e. Instead of being halfway to the target in 2020, Canada would be about one-third of the way there.

Many sources of uncertainty exist when forecasting future impacts of policies. The extent to which existing and proposed policies will close the gap to the 2020 target depends on factors such as economic and population growth, prices of natural gas and other energy sources, and technology deployment.

TABLE 7: EMISSIONS GAP TO 2020 TARGET BY SCENARIO MODELLED

SCENARIO	GAP (Mt CO_2e)
NRT Forecast	117 Mt
Optimistic Scenario	109 Mt
Pessimistic Scenario	149 Mt

i Carbon capture and storage is an example of a technology that may prove challenging to implement, as evidenced by TransAlta's recent cancellation of the $1.4 billion Pioneer carbon capture and storage project due to a low price on emissions (O'Meara 2012).

TEXT BOX 5

EMISSION REDUCTIONS FROM TECHNOLOGY FUND EXPENDITURES

A key element of Alberta's *Specified Gas Emitters* policy is the Technology Fund administered by the *Climate Change and Emissions Management Corporation* (CCEMC). One compliance option for industrial emitters is to contribute to this fund. The CCEMC then invests these funds in projects to reduce GHG emissions elsewhere in the province. Saskatchewan's proposed policy for industrial emitters will include a similar mechanism.

While the NRT's modelling does represent the incentive the Specified Gas Emitters policy provides for firms to reduce emissions (to avoid contributing to the technology fund), modelling the likely effects of CCEMC *expenditures* is challenging. The specific projects in which the CCEMC will invest is uncertain, as is the timing of these investments and the extent to which the funding from CCEMC is the key driver for the project. The CIMS model is not equipped to represent the possible effects of these expenditures on GHGs.

Consequently, the NRT implemented additional, complementary analysis to assess the likely reductions. We first drew on CIMS forecast data to identify the share of emitters' compliance achieved through offsets or direct emission reductions. We could then identify remaining compliance as contributions to the technology fund and so assess the revenue the CCEMC would be likely to generate from compliance payments by 2020. We then — drawing on assumptions generated from engagement with Alberta provincial government officials about the typical projects funded and typical project timelines — estimated the likely additional emissions by 2020. This analysis also accounted for *additionality* effects (i.e., the extent to which projects would have been developed even without CCEMC funding support). The analysis is likely optimistic, but does provide an assessment of additional potential emission reductions in Alberta.

This analysis suggests that CCEMC will receive around $1.8 billion between 2011 and 2020 through contributions to the technology fund, and this could lead to up to an additional 6 Mt CO_2e of reductions in 2020 in Alberta beyond the reductions shown in the figures in this chapter. This estimate is separate from the main analysis presented in this report because it is generated using a different methodology, and the sectors in which these reductions occur are not known. However, these reductions would further serve to reduce the expected emissions gap to the 2020 target.

Applying a similar analysis for the proposed Technology Fund in Saskatchewan indicates that no additional emissions would result because the Fund would not generate any revenue. Given that our forecast shows that Saskatchewan is likely to achieve its 2020 emission-reduction target, firms will not have significant compliance obligations under the policy, and so will not need to purchase credits from the Fund. If the Fund does not generate revenue, it cannot invest in low-carbon activities.

4.3 A REGIONAL PERSPECTIVE

Given the importance of provincial and territorial policies in driving Canada's emission reductions, what is the regional story behind 2020 emission reductions? To what extent are provinces likely to achieve their own targets? How are emission reductions from both provincial and federal policies distributed across Canada? This section explores these questions and builds upon our assessment of provincial plans from chapter 3.

The fact that no formal federal/provincial burden-sharing protocol on GHG emission reductions has ever been negotiated helps explain why Canada has difficulty assessing progress toward individual provincial targets and continues to have a 2020 gap.

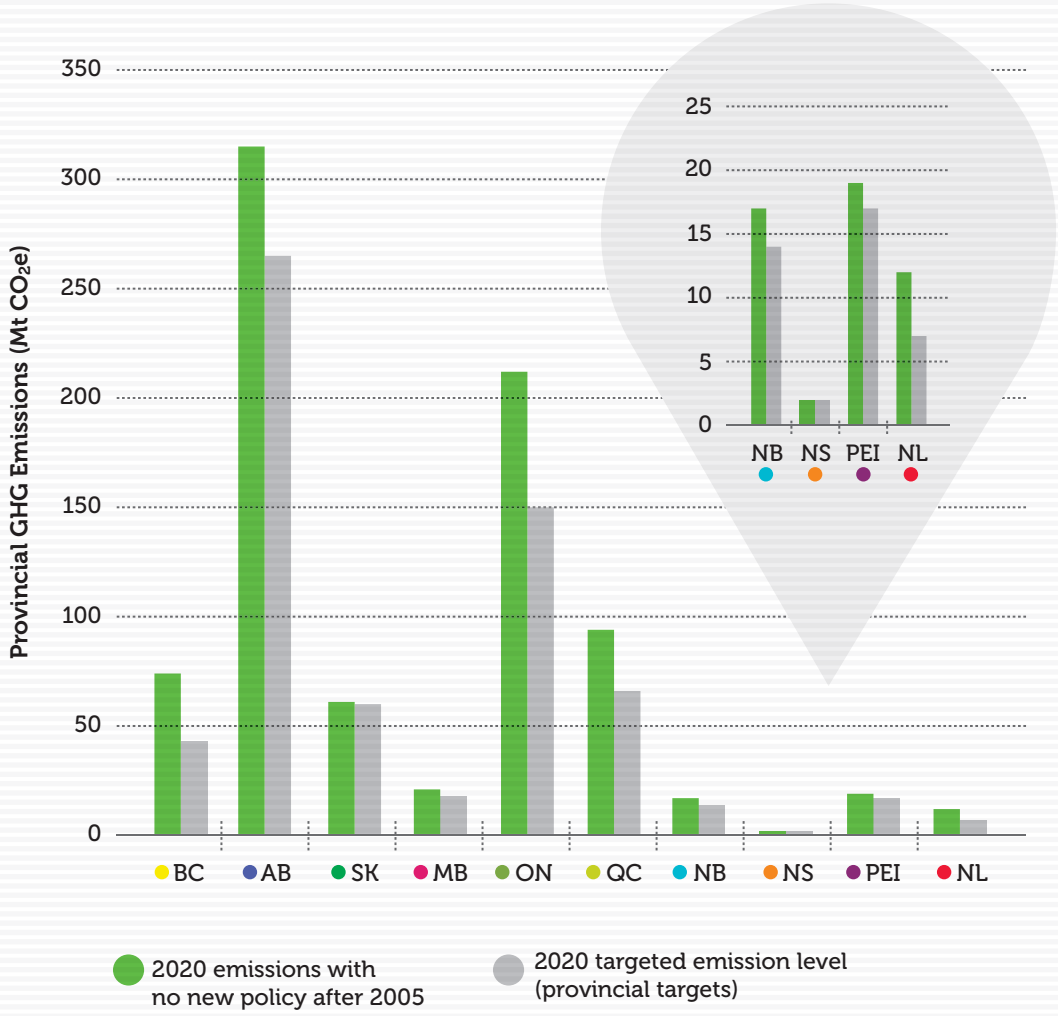
PROVINCIAL/TERRITORIAL TARGETS

As noted in Chapter 3, if all provinces and territories achieved their own 2020 targets, federal policies would only need to achieve about an additional 41 Mt CO_2e of emission reductions to reach the national 2020 target. The fact that no formal federal/provincial burden-sharing protocol on GHG emission reductions has ever been negotiated helps explain why Canada has difficulty assessing progress toward individual provincial targets and continues to have a 2020 gap.

Figure 11 situates the provincial targets with the model forecasts.[j] The figures shows 1) projected emissions in 2020 if no polices had been implemented after 2005, and 2) the targeted level of emissions under each provincial 2020 target.

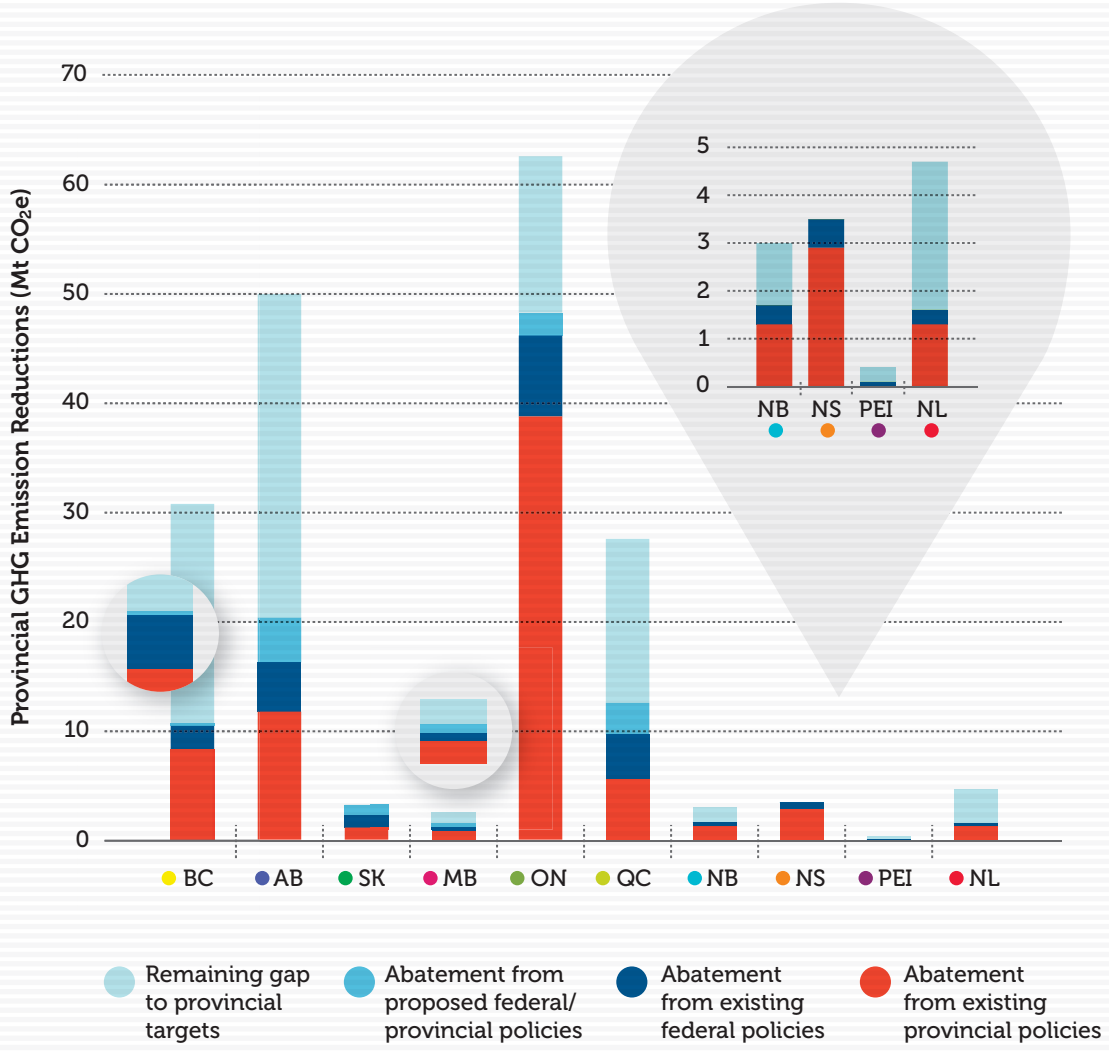
j Note that quantitative results for the territories are grouped with British Columbia in this report, but do not significantly affect British Columbia's results.

FIGURE 11: COMPARING 2020 PROVINCIAL EMISSIONS TARGETS



Note: Figure 12 explains the difference between 2020 provincial emissions and targets.

FIGURE 12: DETAILS ON 2020 EMISSION REDUCTIONS AND GAP TO TARGET



The figure highlights the challenge for each province in the context of both the magnitude of targets and the projected growth of emissions to 2020. Ontario and Québec have deep 2020 targets, for example, while according to the NRT forecast, Saskatchewan, Manitoba,[k] and Prince Edward Island would likely come close to achieving targets even without policy. On the other hand, even though Alberta's target actually allows for emission growth relative to 2005 levels, it faces a significant challenge in meeting its target as a result of sharply higher projected emissions growth.

PROVINCIAL EMISSION REDUCTIONS

The set of existing and proposed federal and provincial policies modelled by the NRT will likely have significant impacts on provincial emissions. Figure 12 illustrates the forecasted impacts for each province relative to the *No Policy* scenario and highlights remaining gaps to provincial targets. This figure illustrates how current and proposed policies reduce each province's emissions toward their provincial targets. As in our above modelling, the impacts of each policy scenario are incremental to the reductions from the previous scenario.[l]

As illustrated in the national forecast scenarios, *existing* provincial policies drive the largest share of expected emission reductions in each province. Policies like British Columbia's carbon tax, Alberta's Specified Gas Emitter program,[m] the coal-fired electricity phase-out in Ontario, and Nova Scotia's renewable electricity sector policies all help reduce emissions. The model allocates overlaps between existing federal policies and existing provincial policies to the provinces to avoid double counting. This means that existing federal policies like the coal-fired electricity standard have reduced incremental impact in the provincial results shown here given coal-focused policies by Ontario and Nova Scotia.

Expected abatement from proposed federal and provincial policies meanwhile is distributed across Canada but mostly in Alberta, Saskatchewan, Ontario, and Québec. The most substantial impact of proposed policies occurs in Alberta as a result of carbon capture and storage (CCS) project proposals. The forecast suggests these projects could lead to around 5 Mt CO_2e of reductions in 2020.

k The NRT's analysis of Manitoba assumes a 2020 target of 15% below 2005 levels by 2020, as per Environment Canada 2011a.

l To assess policy impacts in the Atlantic Provinces, we disaggregated individual provinces from an aggregate, regional representation in the CIMS model. This breakout was based on Environment Canada data and a detailed look at electricity systems in the four Atlantic Provinces.

m Additional reductions could also be expected from Alberta's Climate Change and Emissions Management Corporation, which is not included in the CIMS modelling shown here, but assessed separately in Box 4.2.

CHARACTERISTIC 4
ENVIRONMENTAL EFFECTIVENESS

As described in Chapter 3, our fourth key element of an effective provincial climate change plan is the inclusion of sufficient measures to achieve the GHG reduction targets established.

The NRT forecast illustrated in Figure 12 shows that Nova Scotia and Saskatchewan[n] are the only provinces expected to achieve their 2020 targets under the current set of existing and proposed policies. Existing and proposed policies for Ontario, Manitoba and New Brunswick are expected to bring these provinces more than 50% of the way to closing the gap and achieving targeted emission reductions in 2020. For the remaining provinces, existing and proposed policies are expected to make less than 50% of the progress necessary to close the gap and achieve targeted emission reductions by 2020.

It is important to emphasize that these conclusions are based on the forecast gap between 2020 emissions in the *No Policy* scenario and the 2020 emissions target (as set out in Figure 11) and the extent to which the policies modelled in the NRT analysis are expected to close that gap in 2020 (as set out in Figure 12). Table 8 situates progress for each province toward meeting its own GHG target based on this assessment.

TABLE 8: CONTRIBUTION OF EXISTING AND PROPOSED POLICIES TOWARD MEETING PROVINCIAL TARGET

BC	AB	SK	MB	ON	QC	NB	NS	PEI	NL
35%	41%	100%	62%	77%	46%	56%	100%	30%	35%

n Representatives from the Government of Saskatchewan's Department of Environment have noted that, in their view, the NRT's forecast likely underestimates economic growth in Saskatchewan, and thus the extent to which emissions are likely to increase. This concern may be legitimate; recent trends in Saskatchewan have shown rapid growth in Saskatchewan in both population and economic activity. A recent short-term RBC forecast suggests that Saskatchewan could have the highest growth rates of all provinces by 2013 (RBC Economics 2012). However, we did not have alternative, long-term macro-economic assumptions that could be utilized for this modelling. Our forecast is rooted in consistent assumptions about regional and sector-level growth in production drawn from Environment Canada's modelling, which is in turn based on macro-economic forecasts from Informetrica.

4.4 A SECTOR-LEVEL PERSPECTIVE

Our sector-level story of emission reductions under proposed and existing policies further describes the nature of the impacts of federal and P/T policies. It not only illustrates the primary focus of emission reductions from government policies, but also highlights where additional emission reductions might be found.

SECTOR-LEVEL REDUCTIONS

The policies in the three scenarios modelled include measures that affect multiple sectors and those that affect emissions only in a single sector. Some provincial policies are more market-based like the British Columbia carbon tax, the proposed WCI cap-and-trade system, and to a lesser extent, the Québec gas levy. Others are regulatory in nature with compliance options and focused on large emitters, such as Alberta's existing and Saskatchewan's proposed industrial emitter regulations. Finally, some policies are more sector-based such as the federal light- and heavy-vehicle regulations and coal-fired electricity generation, or landfill gas regulations in Ontario, Québec, and British Columbia, and building codes in multiple provinces and territories.

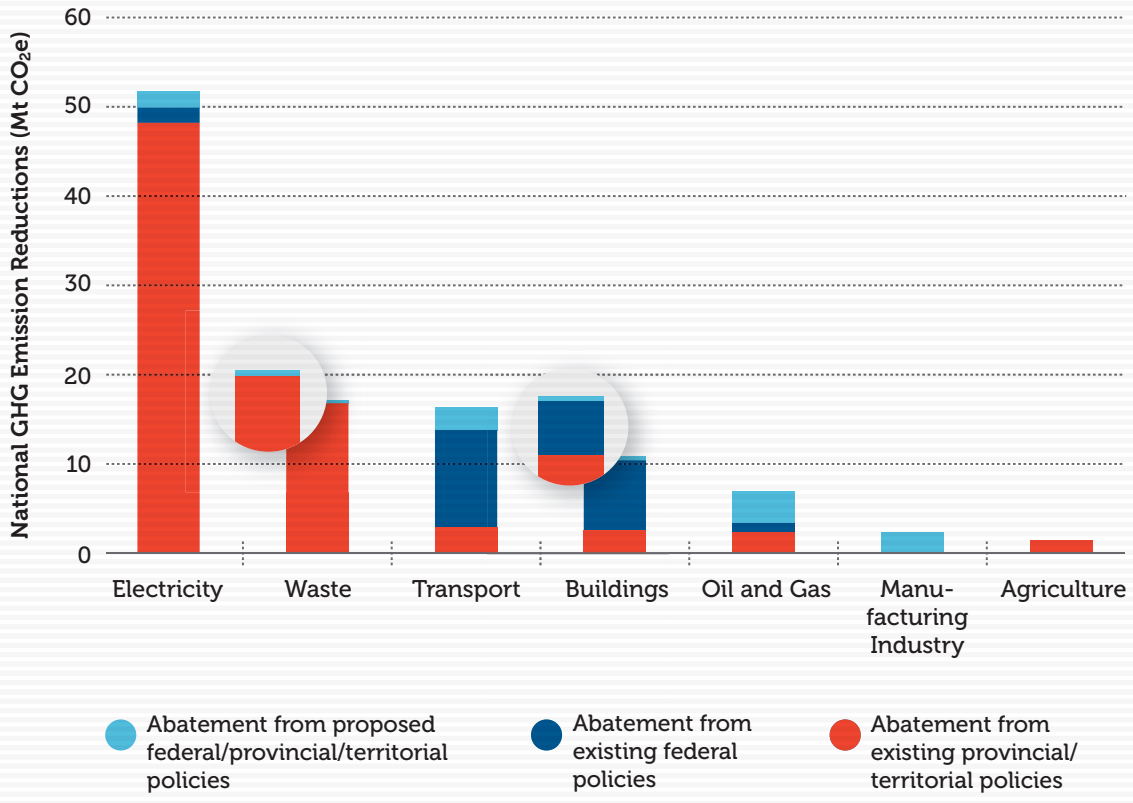
Figure 13 shows expected reductions from existing and proposed polices by sector.[o] It demonstrates that electricity generation is the largest source of emission reductions with 48 Mt CO_2e in 2020, principally because of existing provincial policies. Many provinces have targeted electricity generation directly as a key source of emissions: Ontario is phasing out coal plants, Prince Edward Island has a renewable portfolio standard and incentives for wind power, Nova Scotia has a cap on electricity-sector emissions, and British Columbia has a zero-emissions electricity objective. A focus on electricity makes sense since it is a high-emitting sector and reducing the carbon intensity of electricity supply can enable fuel switching to electricity to reduce emissions associated with consuming energy. Note that the overlap between federal and provincial policies is not illustrated here; overlap is allocated to provincial policies to avoid double-counting. Consequently, the *incremental* impacts of the federal coal-fired electricity standards are small because provincial policies such as the Ontario coal phase-out have already incented some of these emission reductions.

Waste is another sector that will see substantial expected emission reductions — about 17 Mt CO_2e in 2020 — as a result of provincial regulations and policies for landfill gas emissions. As we will explore in Chapter 5, capturing methane emissions is often a relatively low-cost source of emission reductions.

Finally, the forecast suggests that federal light-vehicle standards will have a substantial impact, with savings of close to 11 Mt CO_2e of emissions in 2020 in the transportation sector under existing policies. The proposed heavy-duty freight transport regulations have a relatively small forecasted impact of about 3 Mt CO_2e in 2020.

o Note that the sectoral breakdown provided here is a function of the CIMS structure and not entirely consistent with the activity-based breakdown used in Canada's *National Inventory Report*.

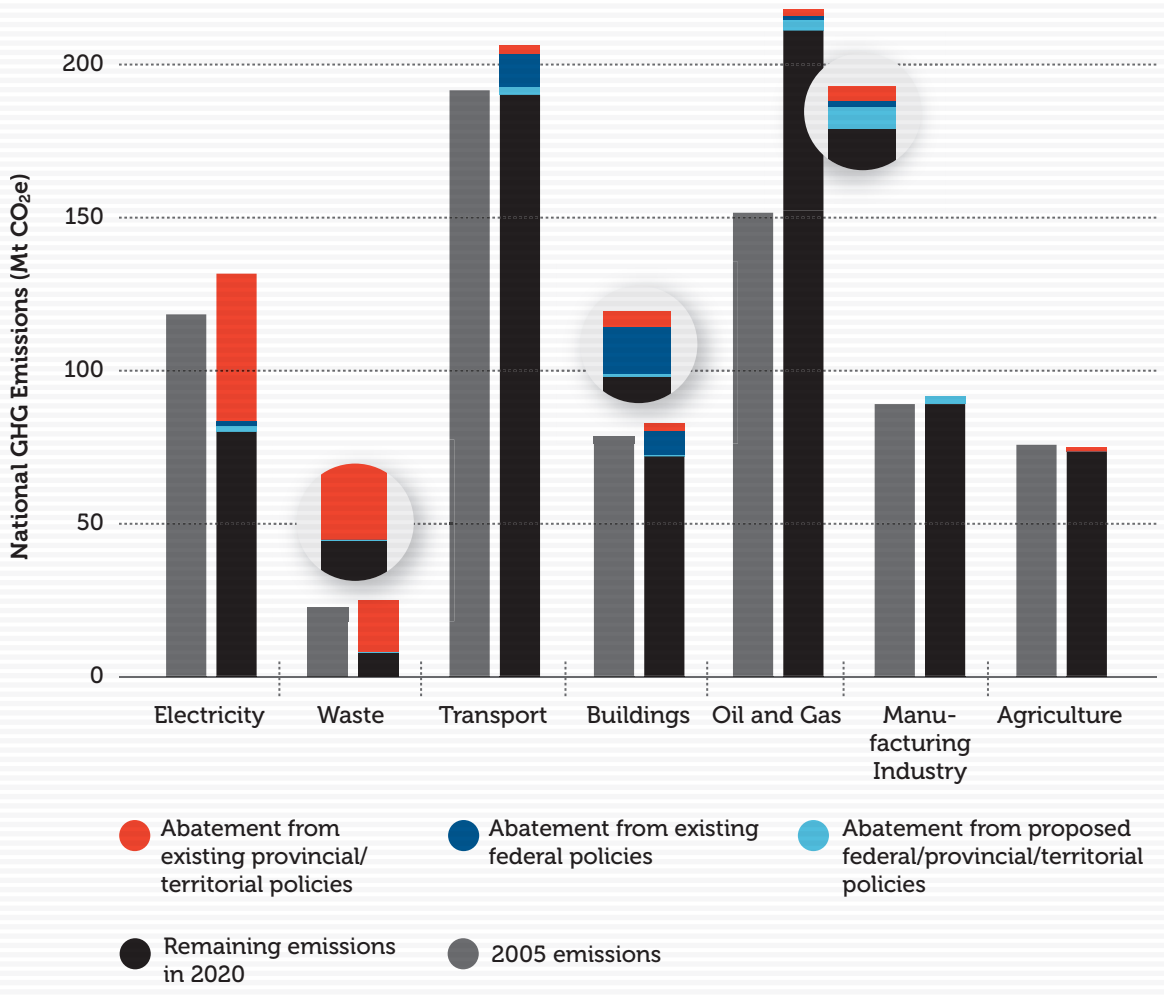
FIGURE 13: EMISSION REDUCTIONS FROM EXISTING AND PROPOSED POLICIES BY SECTOR IN 2020



KEY REMAINING SECTOR-LEVEL EMISSIONS

The emission reductions from the policies modelled also look quite different in the context of total emissions in the sector. Figure 14 stacks the estimated emission reductions from all existing and proposed policies set out in Figure 13 on top of all emissions from that sector, and compares them to 2005 emission levels. The figure therefore illustrates forecasted progress toward reducing emissions in each sector.

FIGURE 14: EMISSION REDUCTIONS FROM EXISTING AND PROPOSED POLICIES BY SECTOR IN 2020 AND REMAINING EMISSIONS

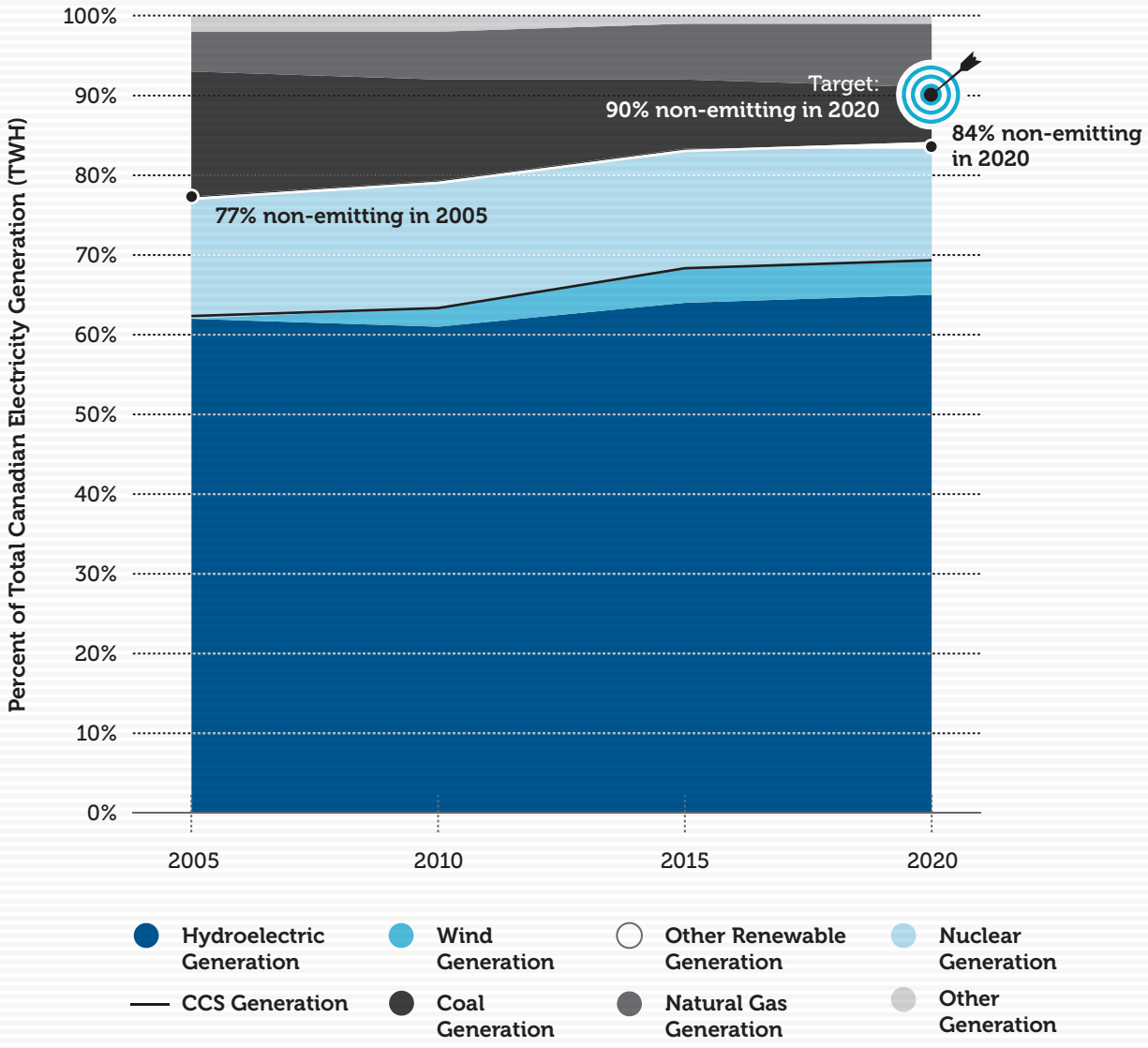


The forecast suggests that current and proposed policies will reduce emissions to 2005 levels or further in all sectors but oil and gas. This demonstrates the centrality of reducing emissions in this sector in order to achieve the 2020 target. Emissions in the waste sector are reduced by 66% from 2005 levels and electricity generation by 32%. While transportation policies are expected to drive some substantial emission reductions from forecasted growth, this same growth in the sector keeps overall emissions from dropping below 2005 levels. In Chapter 6, we will explore the costs of achieving further emission reductions in each sector.

CANADA'S TARGET FOR LOW-EMISSIONS ELECTRICITY GENERATION

The federal government also has a stated target of 90% of electricity generated from non-emitting sources by 2020.[70] The NRT's modelling assesses Canada's progress toward this goal. Figure 15 illustrates Canada's projected electricity mix under a scenario including all existing and proposed policies from federal, provincial, and territorial policies. It shows that the country will increase its non-emitting electricity share from 77% in 2005 to 84% in 2020. By 2020, hydroelectricity, wind, and other renewable generation are likely to make up about 69% of Canadian electricity generation. If nuclear generation and fossil-fuel-generated electricity equipped with CCS is included in this mix, Canada is projected to have about 84% carbon-emissions-free electricity by 2020. Canada is not on track to achieve this 90% target but is positioned to make progress.

FIGURE 15: ELECTRICITY GENERATION IN CANADA BY TYPE AND 2020 TARGET FOR NON-EMITTING SOURCES



4.5 EMISSION REDUCTIONS TO 2030

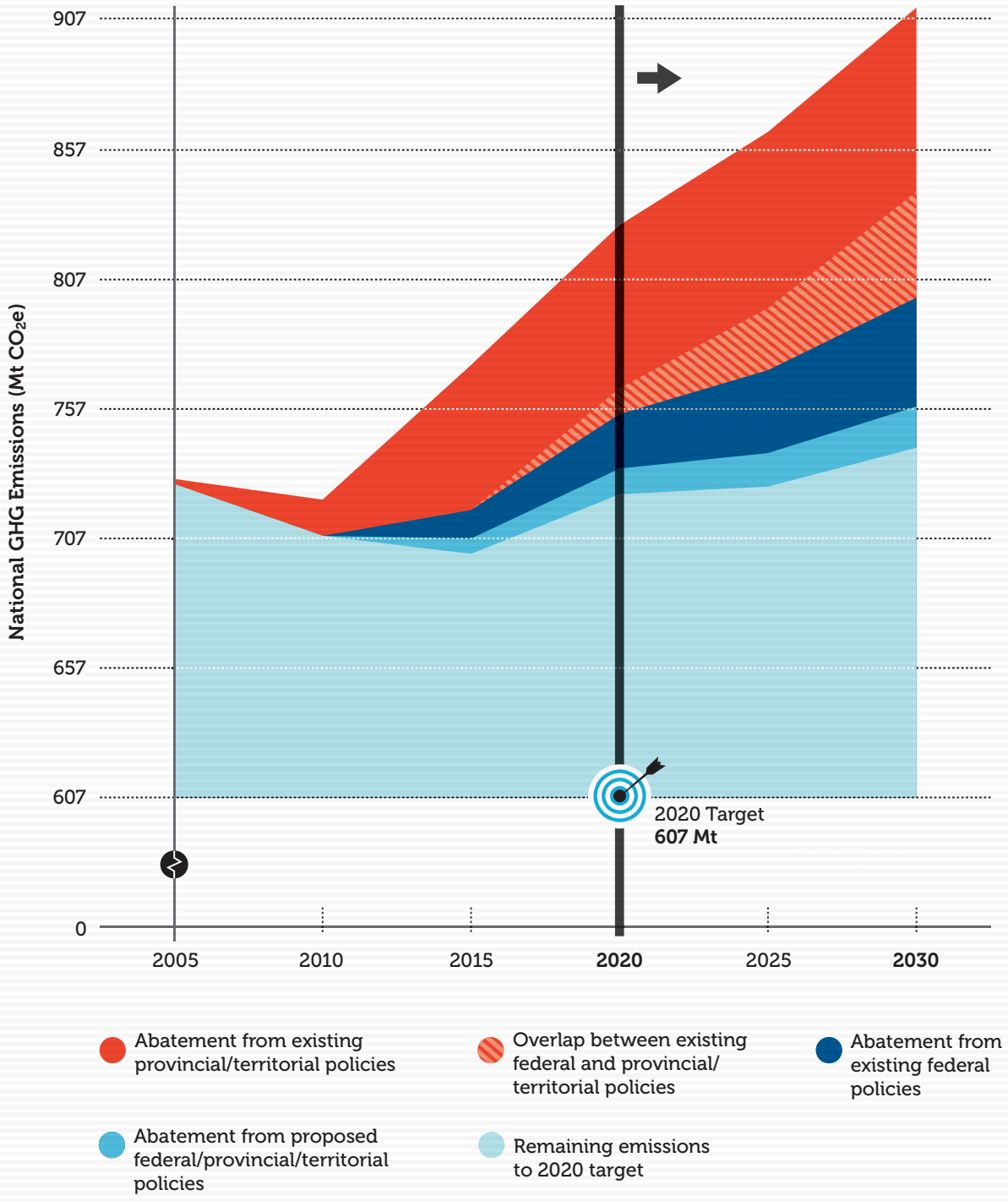
Even though the main focus of this report is on Canadian emissions to 2020, the longer-term story cannot be ignored. Cumulative GHG emissions matter for climate change. While short-term targets like 2020 are important in themselves, they are most significant as waypoints on a path toward long-term decarbonization. If Canada is not on a path for 2020, it will not be on path for 2030 or beyond. We therefore consider the likely impacts of existing and proposed policy in the longer term as well. Figure 16 shows the expected emission reductions under the different policy scenarios in our forecasts extended out to 2030.

Overall, the forecast indicates that all existing and proposed policies together will result in emission reductions of 169 Mt CO_2e in 2030. Despite this higher amount of reductions Canada is in fact further away from the 2020 target in 2030 due to increased overall growth in emissions.

The impacts of policies grow through time; by 2030, existing P/T policies are likely to lead to around 110 Mt CO_2e of reductions (including overlap with federal polices) from 2005 levels. Existing federal policies add an incremental 42 Mt CO_2e of emission reductions in 2030. Overall, the forecast indicates that all existing and proposed policies together will result in emission reductions of 169 Mt CO_2e in 2030. Despite this higher amount of reductions Canada is in fact further away from the 2020 target in 2030 due to increased overall growth in emissions.

Many of the policies modelled have greater impacts through time because they affect new investments. More time allows these policies to work with the pace of capital-stock turnover. For example, carbon pricing policies like British Columbia's carbon tax, Alberta's Specified Gas Emitter policy or the WCI primarily affect new investment decisions, incenting investment in lower-emissions equipment. Similarly, the federal coal-fired regulations have stronger impacts through time because they affect new plants coming on stream, not existing facilities. The federal vehicle standards also have growing impact as old vehicles are replaced, and only more efficient new vehicles are available in the market to replace them.

FIGURE 16: EMISSION REDUCTIONS FROM EXISTING AND PROPOSED POLICIES IN 2020 AND 2030



4.6 CONCLUSION

This chapter presents five key findings that are useful for informing future policy development:

- Based on existing and proposed federal and P/T policies, Canada is currently on track to achieve just under half of the emission reductions required to meet its 2020 target. A national emissions gap exists and additional policies will be required to drive further emission reduction in order to achieve the 2020 target.
- Existing and proposed measures by all governments will likely generate emission reductions of 104 Mt CO_2e in 2020. Provincial policies account for most of these emission reductions – 73 Mt CO_2e or approximately 75% of forecasted reductions in 2020.
- Most provinces are not currently in a position to achieve their provincial targets for 2020 based on existing and proposed provincial and federal policies. Our modelling suggests that only Nova Scotia and possibly Saskatchewan are on track to achieve their targets.
- Canada is positioned to partly close the gap on its target of 90% non-emitting electricity generation in 2020. The NRT's forecasts suggest that all current and proposed policies will lead to close to 84% of electricity coming from non-emitting sources in 2020 if nuclear and fossil-fuel facilities equipped with CCS are included.
- Reductions from electricity emissions account for most of all projected emission reductions by 2020, followed by waste emission reductions. Most of these reductions are, in turn, incented by provincial policies. Emission reductions incented by federal policies are concentrated in the transport and buildings sectors.
- Policies take time to have full impact. We expect the effects of existing federal and P/T policies to grow, driving 60% more emission reductions in 2030 than in 2020. Federal policies are more effective after 2020 because there is more time for the capital stock to transition to lower-emitting equipment.

5.0 COST-EFFECTIVE CLIMATE POLICY

WHEN IT COMES TO CLIMATE POLICY, COUNTRIES SEEK THE SAME THING: GETTING THE MOST GHG EMISSION REDUCTIONS AT THE LEAST ECONOMIC COST. HOW DOES CANADA FARE IN THIS CALCULUS?

This chapter ascertains just how cost-effective Canadian climate policies are today and the costs of additional policies needed to close the emissions gap. We begin by estimating the costs of emission reductions expected under existing and proposed measures by governments and then estimate the costs of additional measures that would be needed to close the gap to the 2020 target. To what extent is the existing combination of federal and P/T policies driving low-cost emission reductions? And perhaps more importantly, how can Canada most cost-effectively achieve the additional emission reductions required to close the gap to the 2020 target? By answering these questions, our analysis provides a foundation for advice for future climate policies, informing the Government of Canada's strategy of sector-by-sector regulations.

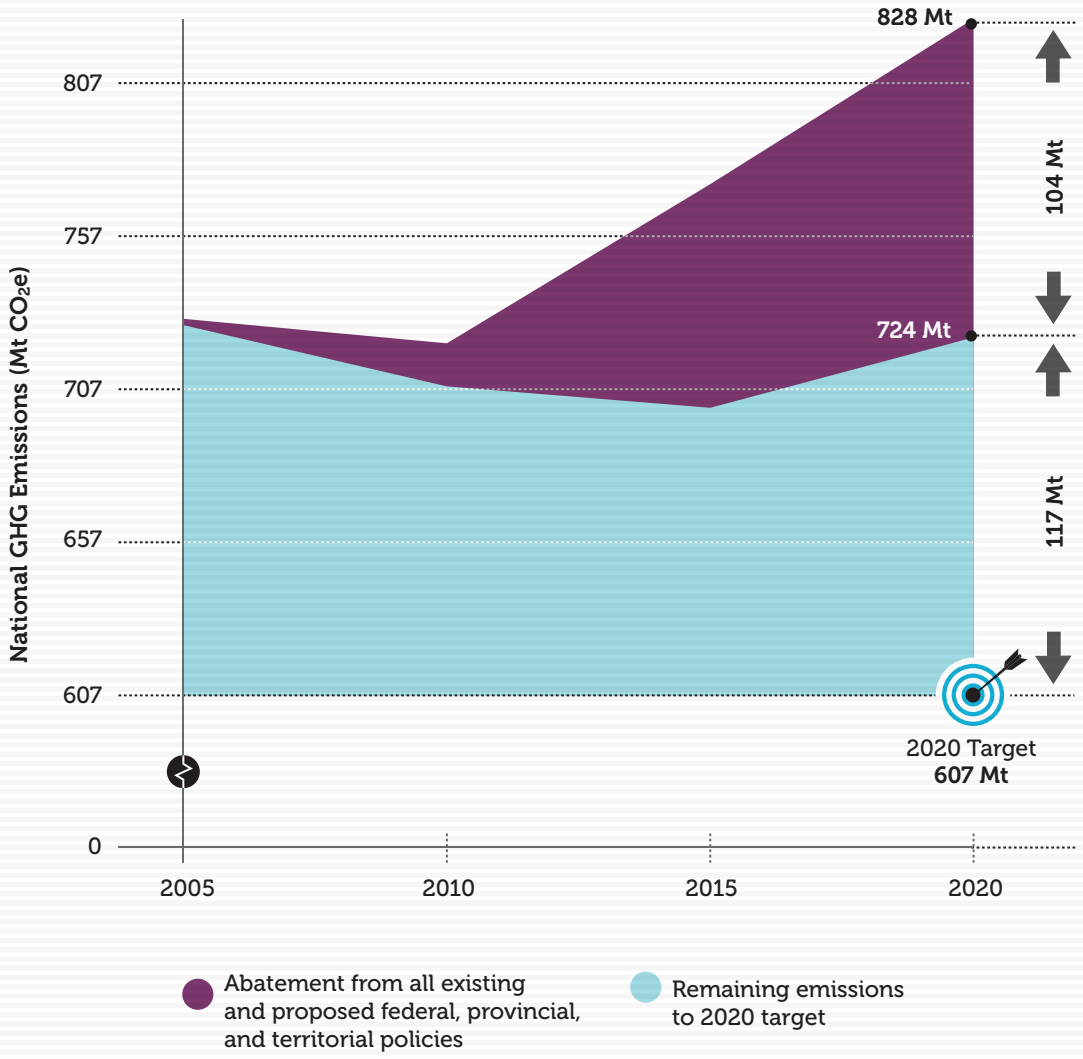
5.1 ECONOMIC ANALYSIS APPROACH

The economic analysis in this chapter builds on the previous chapter, which explored expected emission reductions from existing and proposed federal, provincial, and territorial policies and programs in 2020. Figure 17 simplifies the overall emissions forecast into two categories: the expected emission reductions from all existing and proposed federal and P/T policies (about 104 Mt CO_2e in 2020) and the additional emissions required to meet Canada's 2020 target (another 117 Mt CO_2e in 2020).

These two sets of 2020 emission reductions — the 104 Mt CO_2e Canada is currently positioned to achieve and the 117 additional Mt CO_2e required to meet the 2020 target — bookend the economic analysis in this chapter. We first explore the costs of expected emission reductions from existing and proposed policies (that is, the extent to which Canada is on track to achieve the 104 Mt CO_2e of emission reductions in 2020 at lowest cost). We then assess the potential for additional policies to meet the remaining 117 Mt CO_2e of emission reductions as cost-effectively as possible.

This chapter moves our assessment beyond the *environmental effectiveness* of existing and proposed policies — how much abatement they achieve — to their *cost-effectiveness*, or how much of that abatement is at what cost. To do so, we categorize expected emission reductions according to their *marginal cost of abatement*, or the incremental cost of achieving those additional reductions under the policy in dollars per tonne. See Appendix 7.2 for a short description of the technical modelling methodology used to categorize emission reductions by cost.

FIGURE 17: EMISSION REDUCTIONS FROM EXISTING AND PROPOSED POLICIES AND THE GAP TO CANADA'S 2020 TARGET



This analysis can provide useful insight for policy makers, but the findings must be applied while transparently recognizing its limitations:

- Cost-effectiveness is not the only important factor in policy design. Other key considerations could include co-benefits such as reduced air pollution, health, equity between regions or between households with different income levels, and longer-term transitional issues (i.e., emission reductions targeted in 2050). These other considerations are not the focus of the analysis in this chapter.
- It should be noted as well that the modelling does not provide a perfect representation of the economy. While models can be useful in identifying potential sources of cost-effective emission reductions, the findings presented here do have uncertainty. They are intended to help inform policy design but should not be interpreted as a definitive or prescriptive road map.

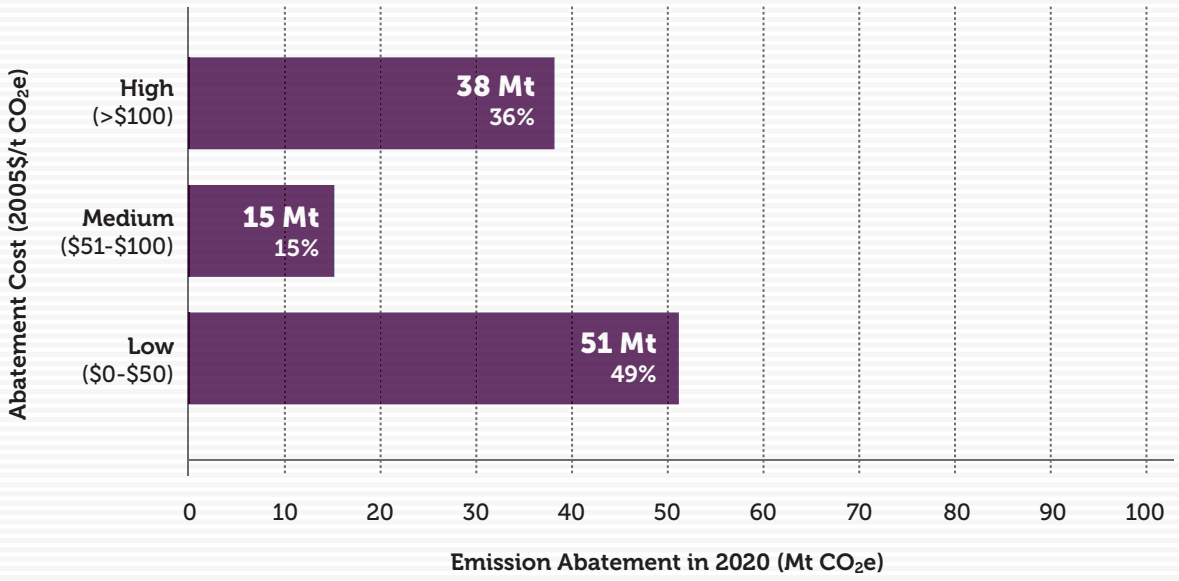
This chapter moves our assessment beyond the *environmental effectiveness* of existing and proposed policies — how much abatement they achieve — to their *cost-effectiveness*, or how much of that abatement is at what cost.

5.2 ABATEMENT COSTS FROM EXISTING AND PROPOSED POLICIES

Existing and proposed federal, provincial, and territorial policies have positioned Canada for significant emission reductions of 104 Mt CO_2e in 2020. But what are the costs of these expected emission reductions? Figure 18 provides an economic assessment that includes the expected 2020 emission reductions and categorizes them according to abatement cost. We categorize each Mt CO_2e of GHG emissions reduced in 2020 as a result of policy as *low cost* (i.e., less than $50/tonne), *medium cost* (i.e., between $50 and $100/tonne), or *high cost* (i.e., more than $100/tonne).[p] The lengths of each bar indicate the magnitude of emission reductions likely to be achieved in 2020 in each cost range. All the emission reductions shown in Figure 18 add up to the 104 Mt CO_2e of reductions from existing and proposed policies in our original analysis; we have simply disaggregated this 104 Mt CO_2e of emission reductions by abatement cost.

p All dollar values in this chapter are stated in 2005 Canadian dollars $ (2005).

FIGURE 18: EMISSION REDUCTIONS FROM EXISTING AND PROPOSED POLICIES IN 2020 BY ABATEMENT COST



CHARACTERISTIC 5
COST-EFFECTIVENESS

As described in Chapter 3, the final element in our assessment of provincial plans is cost-effectiveness. Cost-effectiveness considers both the emission reductions likely to result from a government measure and the cost of achieving these reductions. Therefore, an action is more cost-effective if it achieves emission reductions at a lower cost per tonne CO_2e than other actions.

First, as seen in Figure 18, almost half the expected emission reductions from existing and proposed policy in 2020 — 51 Mt CO_2e — are low-cost emission reductions. Market-based policies such as British Columbia's carbon tax, Alberta's specific gas emitter program and the Western Climate Initiative all generate low-cost-abatement. Policies based on market incentives are designed to simulate lowest-cost emission reductions. Similarly, electricity policies that are timed with the natural turnover of capital stock — such as the federal government's electricity performance standards and some portion of Ontario's coal phase-out — tend to generate low-cost abatement as well because they don't require capital investments to shut down before the end of their useful life. Policies in the waste sector (mainly provincial landfill gas regulations) and agriculture sector (included as offsets in Alberta's Specified Gas Emitter policy) also tend to access low-cost abatement opportunities.

Second, our analysis suggests about 15 Mt CO_2e of the reductions in 2020 are valued between $50 and $100 per tonne CO_2e, which we have classified as medium-cost reductions. Most medium-cost emission reductions come from the electricity sector and are weighted toward Ontario. The Ontario coal-fired electricity phase-out is therefore likely a significant driver of these reductions, as it accelerates the retirement of some plants ahead of their normal project life.

Finally, our analysis suggests that about 38 Mt CO_2e — or just over one-third — of emission reductions in 2020 from existing and proposed policies will be high cost at over $100 per tonne CO_2e. These higher cost emission

reductions come from a range of sectors across all P/Ts, but have substantial contributions from transportation, building, electricity, and oil and gas sectors in particular. Emission reductions from vehicles — such as those induced by the federal vehicle standard — tend to have high marginal abatement costs overall, because individuals require strong incentives to switch to smaller, more fuel-efficient vehicles or vehicles that use alternative technologies like hybrid or electric engines. Emission reductions in commercial and residential buildings also tend to be largely high cost on a dollar per tonne basis, partly because buildings and appliances tend to become more efficient over time even in the absence of policies, thus reducing the incremental effect of policies implemented across all provinces to increase efficiency. Replacing more carbon-intensive electricity generation with low-carbon sources can have high costs as well, though as discussed below, electricity reductions are spread across all three cost levels. Finally, CCS projects in Alberta and Saskatchewan are estimated to drive both medium- and high-cost reductions, depending on the specific project.

Despite the concentration of low-cost reductions, the pursuit of some high-cost emission reductions suggests that governments have been willing — knowingly or not — in some cases to implement policies that tackle more than just the "low-hanging fruit."

5.3 ABATEMENT COSTS TO ACHIEVE 2020 TARGETS

As discussed in the previous chapter, existing and proposed policies are likely to lead to significant emission reductions, but will only achieve about half the emission reductions required to meet Canada's 2020 target. Additional government policies are required to induce the remaining 117 Mt CO_2e of emission reductions. This analysis assesses the cost implications of closing the gap. Figure 19 shows the costs of the *additional* 117 Mt CO_2e of emission reductions required to meet the 2020 target. Similar to the previous figure, it categorizes these additional emission reductions according to their economic cost of abatement. Our analysis suggests that *all* emission reductions available in Canada up to $150 per tonne must be achieved to meet the 2020 target.

FIGURE 19: POTENTIAL EMISSION REDUCTIONS REQUIRED TO CLOSE THE GAP TO CANADA'S 2020 TARGET BY ABATEMENT COST

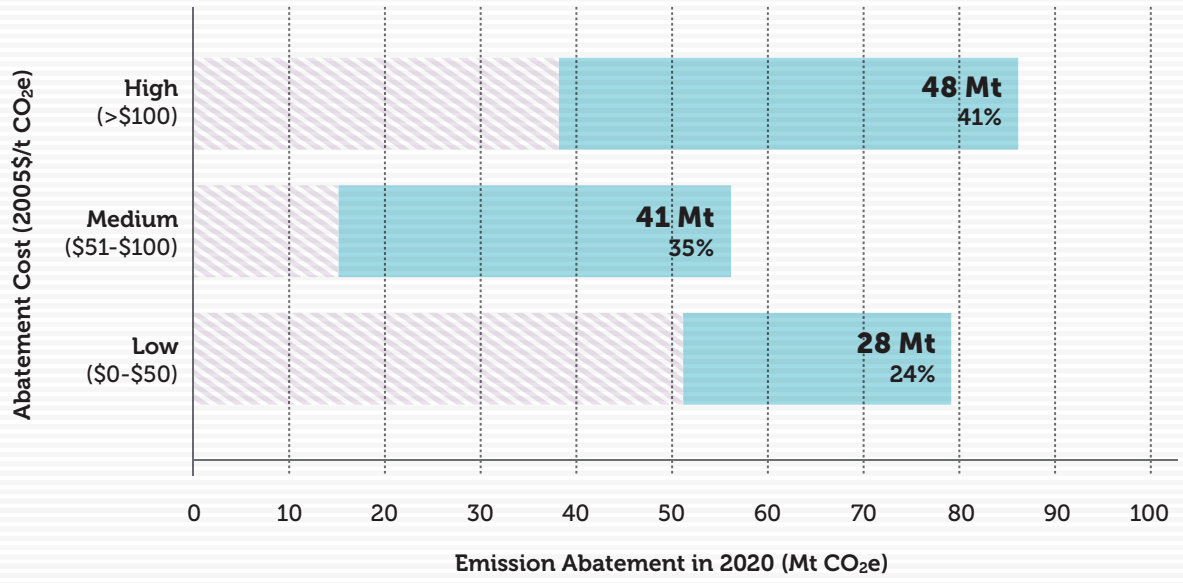
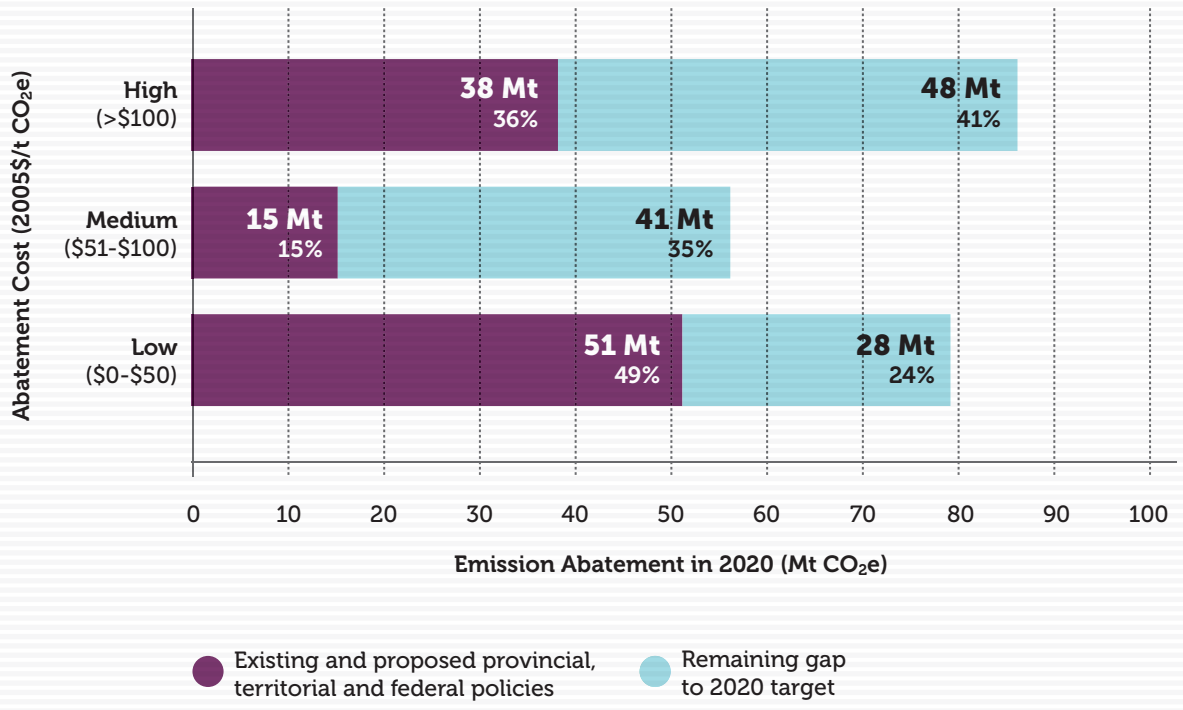


Figure 19 illustrates that about 75% of the gap between expected emissions in 2020 and the federal target for emission reductions can be closed only through medium- or high-cost emission reductions. These reductions are all cost-effective since they are the least expensive way to achieve the 2020 target. Almost 48 Mt CO_2e of reductions falls into the "high-cost" classification (which does not exceed $150 per tonne in this case), while about 41 Mt CO_2e of medium-cost reductions and 28 Mt CO_2e of low-cost reductions are available. The figure suggests that low-cost abatement opportunities are becoming limited in the context of the federal targets in 2020. Essentially, with only eight years to go until 2020, the opportunities for lower-cost abatement in the energy supply and industrial sectors are smaller because firms and households have already made investment decisions that have committed them to a certain level of emissions in 2020.

Figure 20 illustrates the cost profile of Canadian policies necessary to achieve the 2020 target. Essentially, the figure combines Figure 18 and Figure 19, stacking the required additional emission reductions to reach the 2020 target from Figure 19 onto the actual emission reductions expected to result from existing and proposed government polices as presented in Figure 18; again, these are classified as low, medium, or high cost.

FIGURE 20: EMISSION REDUCTIONS FROM EXISTING AND PROPOSED POLICIES IN 2020 AND POTENTIAL EMISSION REDUCTIONS TO CLOSE THE GAP TO CANADA'S 2020 TARGET BY ABATEMENT COST



In addition to the reductions expected from existing and proposed policies, *additional* policies are required to incent emission reductions equal to the remaining emissions gap. To meet Canada's 2020 target, *all* the emission reductions in the figure must be achieved. Our analysis shows that additional abatement is available at all cost levels. Though current and existing policies have targeted emissions across the cost spectrum, potential low- and medium-cost reductions still remain that are not yet targeted by any policy. Increasingly, however, Canadian climate policy will have to focus on medium- and high-cost emission reductions if Canada is to achieve its 2020 target.

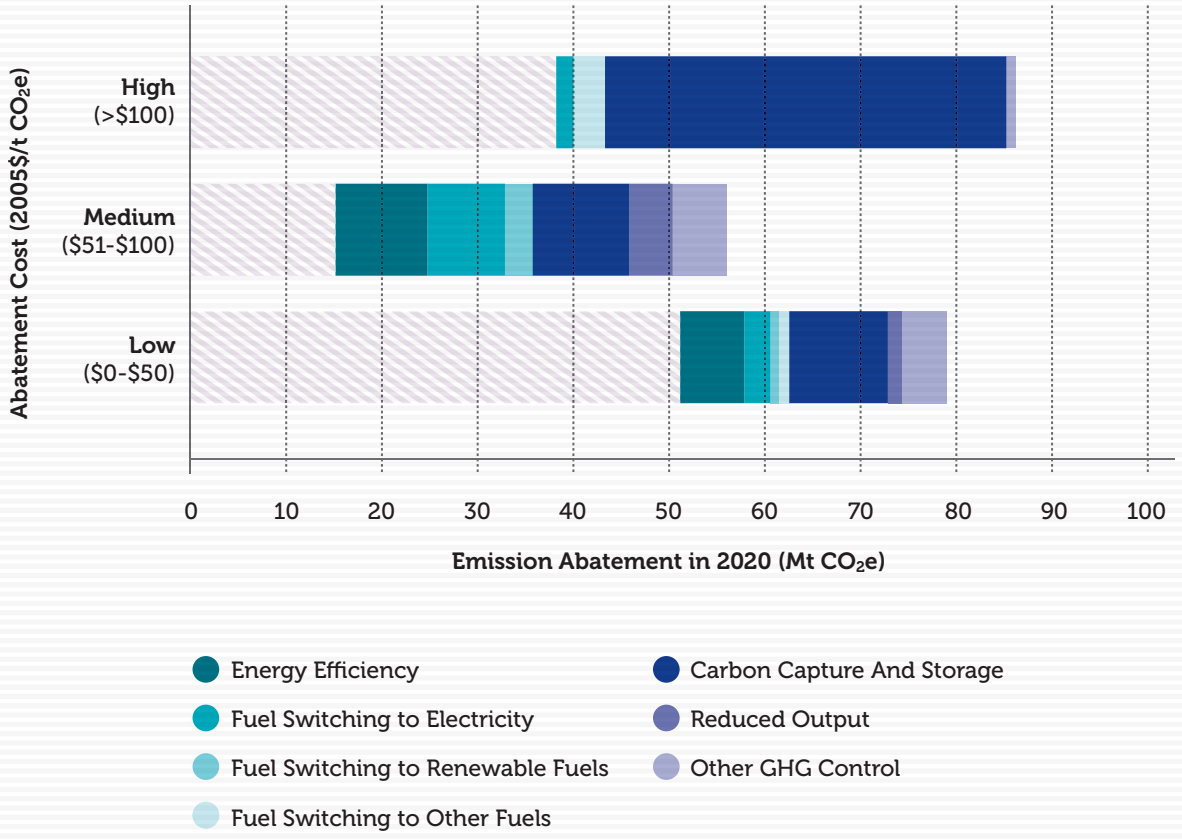
5.4 COST-EFFECTIVE EMISSION REDUCTIONS

How then should policy seek to achieve the additional cost-effective emission reductions required to meet the 2020 target? The high-, medium-, and low-cost reductions can now be disaggregated by the type of action that leads to reduced emissions by sector and by region to help inform the design of additional policies that federal and P/T governments could implement to incent these emission reductions. Note that the modelling analysis here does not make any assumptions about specific policies as drivers for the emission-reduction actions described. Governments could implement a range of possible policies to induce the cost-effective emission reductions described here. Of most interest is how the analysis could inform the federal government's sector-by-sector approach to regulation.

THE REMAINING EMISSIONS GAP DISAGGREGATED BY ACTION

Actions are the decisions that firms and households take to reduce emissions in response to government policy. For example, they can use energy more efficiently; use alternative fuels that produce fewer emissions (known as *fuel switching*); reduce production, producing less emissions but also less output; or implement CCS to capture and sequester CO_2 emissions. It is important to remember that all emission-reducing actions described here will occur only *in response to policy*. High-cost abatement actions will result from high-stringency policy by government. Figure 21 shows the low-, medium-, and high-cost components of the 117 Mt CO_2e emissions gap, disaggregated by action.

FIGURE 21: EMISSION REDUCTIONS TO CLOSE THE GAP TO CANADA'S 2020 TARGET BY ABATEMENT COST AND BY ACTION



The NRT analysis shows that CCS likely represents a key component of a cost-effective strategy to reduce emissions. In total, we show about 62 Mt CO_2e worth of carbon capture in 2020, representing more than 50% of additional emission reductions required, and while costs span a range of abatement costs, the emission reductions mostly occur at a marginal cost of greater than $100 per tonne CO_2e (though some lower-cost CCS is available where a pure stream of CO_2 can be captured). The CCS-intensive scenario shown here is credible given that in response to sufficiently strong policy signals (like a constant, steady carbon price of $100 to $150 per tonne CO_2e, for example) firms would quickly move to implement CCS. The very substantial investment

in CCS projects required to achieve these reductions by 2020 would also require an accelerated permitting and construction environment enabled by government along with a clear policy signal about future carbon costs.[q]

The next most significant action is improving energy efficiency, which accounts for 16 Mt CO_2e of reductions in 2020. Potential energy efficiency improvements driving these reductions are concentrated in transport and buildings. However, gains in efficiency are partially offset by the increased energy demand coming from increased deployment of CCS.

Fuel switching to electricity accounts for about 13 Mt CO_2e of potential abatement in 2020. Electrification occurs in buildings and light industry at relatively low abatement cost. Some additional electrification is possible in transport, although its potential is constrained by the short time frame to 2020. Over the longer term, electrification is likely to play a much more significant role in cost-effective deep emissions abatement across the economy because equipment can be converted to electricity in pace with natural stock turnover, electric technologies such as heat pumps and batteries can be improved, and the electricity sector can fully decarbonize.

Remaining actions to close the gap include adopting other GHG control measures, fuel switching to renewable and other fuels, and reducing output. Collectively, these actions account for 26 Mt CO_2e of incremental abatement in 2020. Other GHG control measures include instituting changes to industrial processes and minimizing venting and flaring of emissions from the oil and gas sector. These actions are typically possible at low- and medium-cost thresholds.

Finally, we find that some abatement occurs in response to decreased industrial output of key energy-intensive products. Note that we assume that production of crude oil does not vary in response to climate policy. Though many facilities could potentially implement CCS and maintain production, as a result of this assumption the analysis likely underestimates the impacts of reduced output in contributing to a cost-effective approach to achieving 2020 targets.

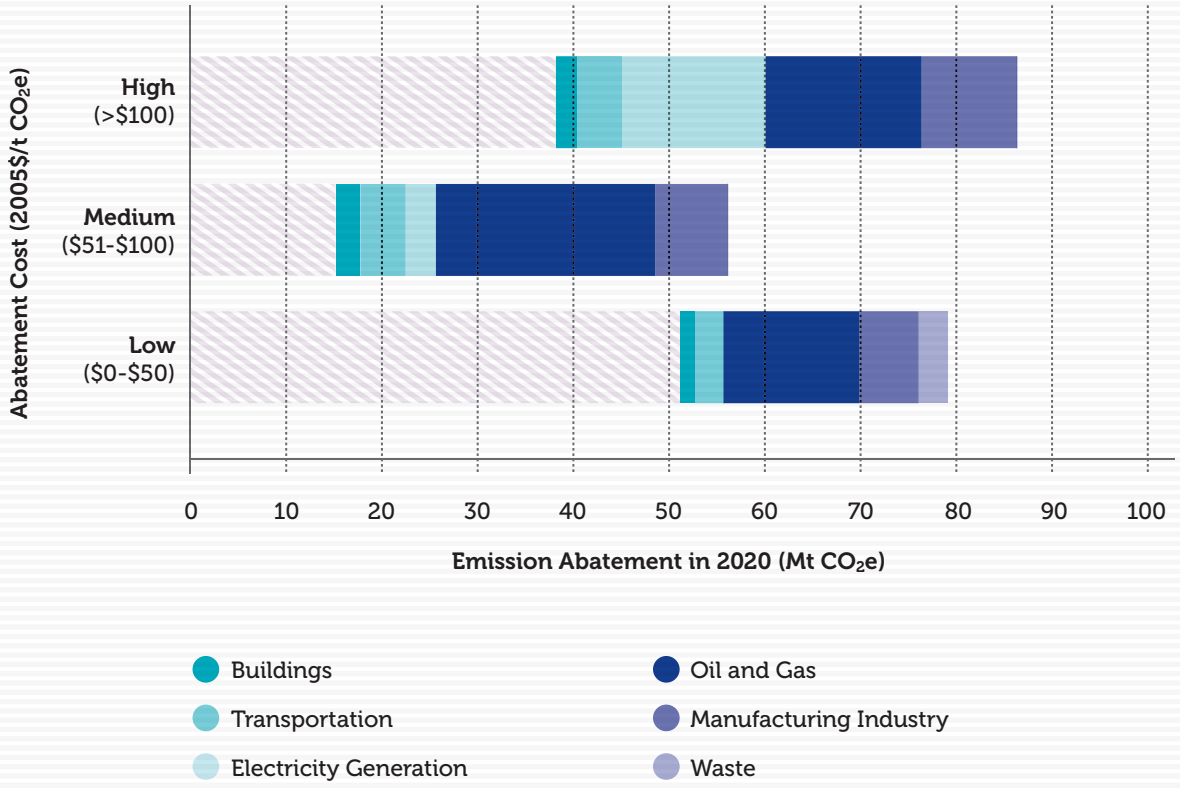
THE REMAINING EMISSIONS GAP DISAGGREGATED BY SECTOR

Exploring potential sector-level emission reductions is also illustrative, particularly given the federal government's stated intentions to move forward with sector-specific GHG regulations. Figure 22 breaks up the required emission reductions shown in Figure 19 by sector.[r] Again, the total emission reductions in the figure equal the 117 Mt CO_2e required to close the emissions gap. The figure therefore differentiates the low-, medium-, and high-cost emission reductions required to meet Canada's 2020 target in each sector of the economy.

q We also explored an alternative scenario that assumed CCS could not be broadly deployed by 2020. With less CCS, the gap to the 2020 target must be filled with much more high-cost abatement from energy efficiency improvements and reduced output. To achieve the 2020 target, abatement with costs up to $300 per tonne must be explored. The core scenario described above, however, with extensive CCS is consistent with Environment Canada's own modelling analysis of the potential for CCS, based on information exchanged with Environment Canada.

r Note that the sectoral breakdown provided here is a function of the CIMS structure and not entirely consistent with the activity-based breakdown used in Canada's National Inventory Report.

FIGURE 22: EMISSION REDUCTIONS TO CLOSE THE GAP TO CANADA'S 2020 TARGET BY ABATEMENT COST AND BY SECTOR



Sectors with larger potential reductions at lower costs should be prioritized, though to meet the 2020 target, all the additional emission reductions shown in Figure 22 must be incented by policy. A few notable findings emerge from the analysis:

This finding lends support to Environment Canada's consideration for oil and gas regulations as a next step in its sector-by-sector approach to emission reductions.

First, Figure 22 suggests that almost half the abatement required to close the gap could come from the oil and gas sector, and that most of this abatement could occur from this sector at relatively low and medium costs. This finding lends support to Environment Canada's consideration for oil and gas regulations as a next step in its sector-by-sector approach to emission reductions. It also makes sense that cost-effective reductions would exist in this sector: since it is poised to grow substantially, new production capacity can be built with lower emitting equipment if the correct policy incentives are in place. Lower-cost abatement actions in the oil and gas sector include energy efficiency improvements, fuel switching to electricity, and some CCS.

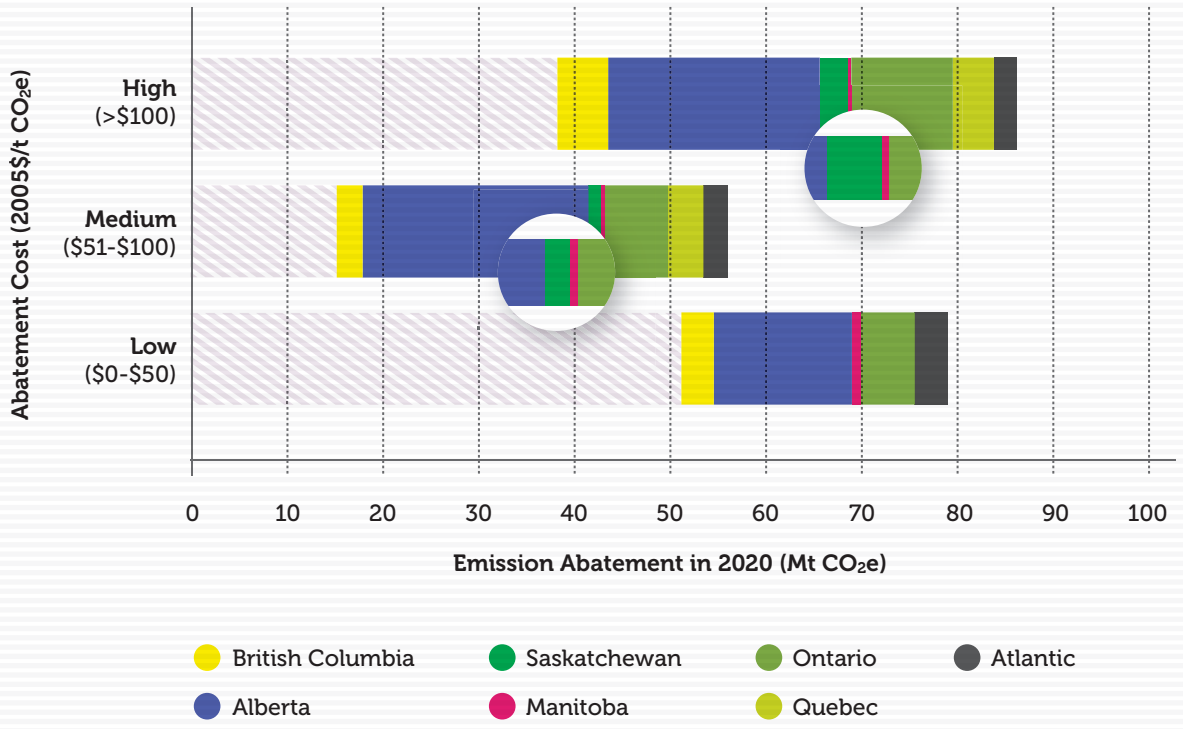
Second, some significant potential abatement from manufacturing sectors is likely available at low and medium cost. This potential for low-cost abatement likely exists because existing and proposed federal and P/T policies have not focused extensively on this sector.

Finally, additional potential abatement from electricity generation is also available in 2020 but is mostly high cost. This is due in part to the strong progress made to date in reducing emissions from this sector from low- and medium-cost measures, increasingly leaving higher cost emission reductions on the table. Additional reductions in the electricity sector largely come from retrofitting thermal coal facilities (with CCS mostly in Alberta and Saskatchewan), or shutting these facilities down and replacing them with less emitting sources including renewable energy. To meet the target, demand for electricity will likely increase further as a result of other policies that incent fuel switching away from oil and gas and toward electricity, making it more difficult for the electricity sector to abate over this time period.

THE REMAINING EMISSIONS GAP DISAGGREGATED BY REGION

Figure 23 illustrates that emission reductions are required across all regions and over a range of abatement costs in order to cost-effectively meet Canada's 2020 target.

FIGURE 23: EMISSION REDUCTIONS TO CLOSE THE GAP TO CANADA'S 2020 TARGET BY ABATEMENT COST AND BY PROVINCE

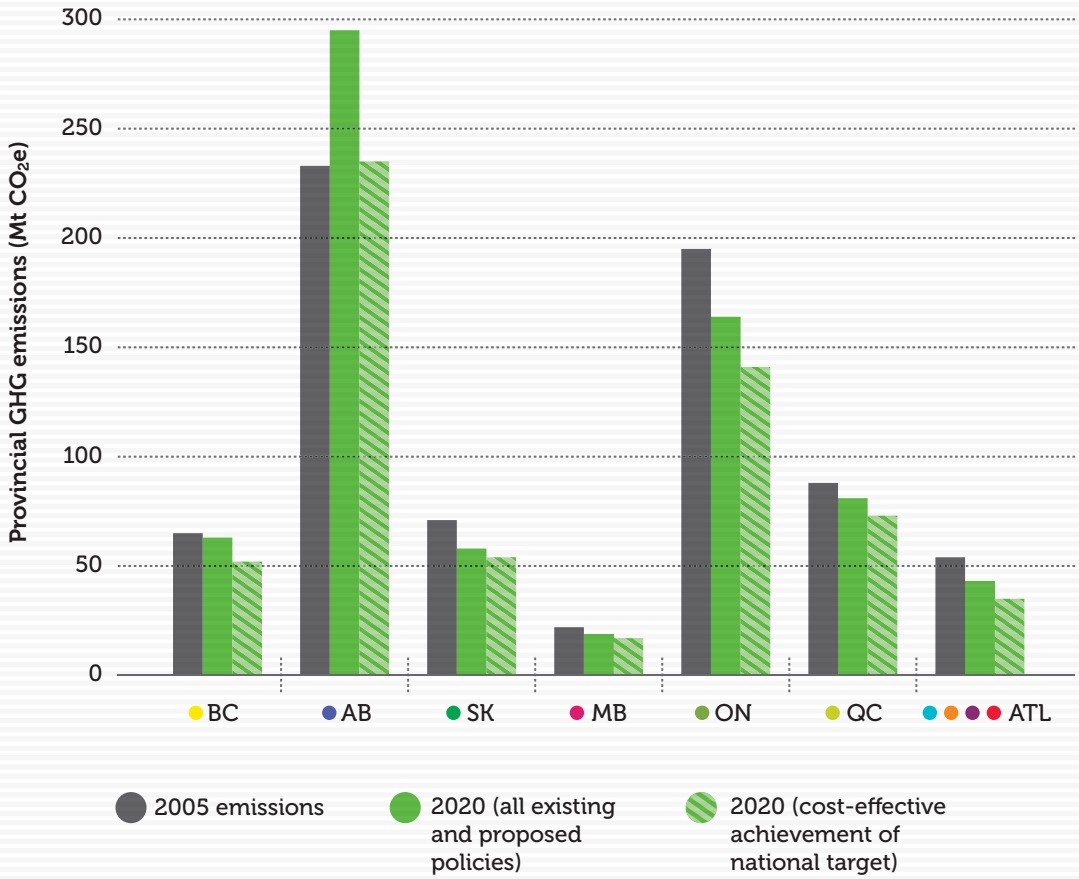


A few specific results are notable. More cost-effective emission reductions are available in Alberta than in any other region, including about 22 Mt CO_2e of high-cost reductions, 24 Mt CO_2e of medium-cost reductions, and 15 Mt CO_2e of low-cost reductions. This finding matches the sector-level results discussed above, since many of the potential reductions in Alberta are in the oil and gas sector. Other provinces that require significant emission reductions are Ontario and British Columbia. British Columbia's low-cost reductions largely come from the natural gas sector. Ontario has about 6 Mt CO_2e of potential low-cost reductions — with a significant share in manufacturing sectors — and another 7 Mt CO_2e of potential medium-cost reductions. Almost all provinces have a share of required high-cost emission reductions; a large share of these high-cost potential reductions come from the transportation and building sectors, important in all regions of Canada. Overall, these findings reflect the challenge of the 2020 target: emission reductions must come from multiple sources across Canada, but most must occur in Alberta according to our analysis.

The results highlight the challenges of sharing the burden of national emission reductions across provinces. The distribution of potential emission reductions across Canada illustrated here is an economically efficient

one. As noted earlier, to achieve the 2020 target cost-effectively, each province would need to achieve all emission reductions available that cost up to $150 per tonne CO_2e. Under this approach, the marginal cost of abatement is effectively equalized across the country with no emission reductions in any province costing more than $150 per tonne CO_2e. The total costs of abatement, however, will not be equalized given that provinces like Ontario and especially Alberta will contribute a large absolute share of emission reductions. This greater share of reductions is consistent with the larger total emissions and/or the faster emissions growth in these provinces. Figure 24 illustrates three snapshots of regional emissions. It shows actual emissions in 2005, emissions in 2020 accounting for all existing and proposed policies, and emissions in 2020 assuming that the remaining gap has been cost-effectively filled.

FIGURE 24: PROVINCIAL EMISSIONS IN 2020 AND COST-EFFECTIVE ACHIEVEMENT OF CANADA'S 2020 TARGET



Even though Alberta contributes the largest share of emission reductions in the cost-effective scenario, its emissions still grow by 1% from 2005 levels, whereas all other provinces see decreases between 17% and 36% relative to 2005 levels. Still, the distribution of reductions noted here is illustrative only. While it estimates the least-cost distribution of emission reductions across Canada, these results should not be interpreted as a fully prescriptive recommendation for policy. Burden sharing is complex and must reflect other factors in addition to economic efficiency, such as inter-regional equity considerations. GHG reductions in any one province are not just the responsibility of that province. But it paints the picture with which policy makers must grapple to make progress toward achieving any of our climate goals. Put succinctly, Canada's target cannot be achieved without emission reductions in Alberta, but Alberta alone cannot achieve Canada's target.

Put succinctly, Canada's target cannot be achieved without emission reductions in Alberta, but Alberta alone cannot achieve Canada's target.

5.5 THE EMISSIONS GAP IN 2030

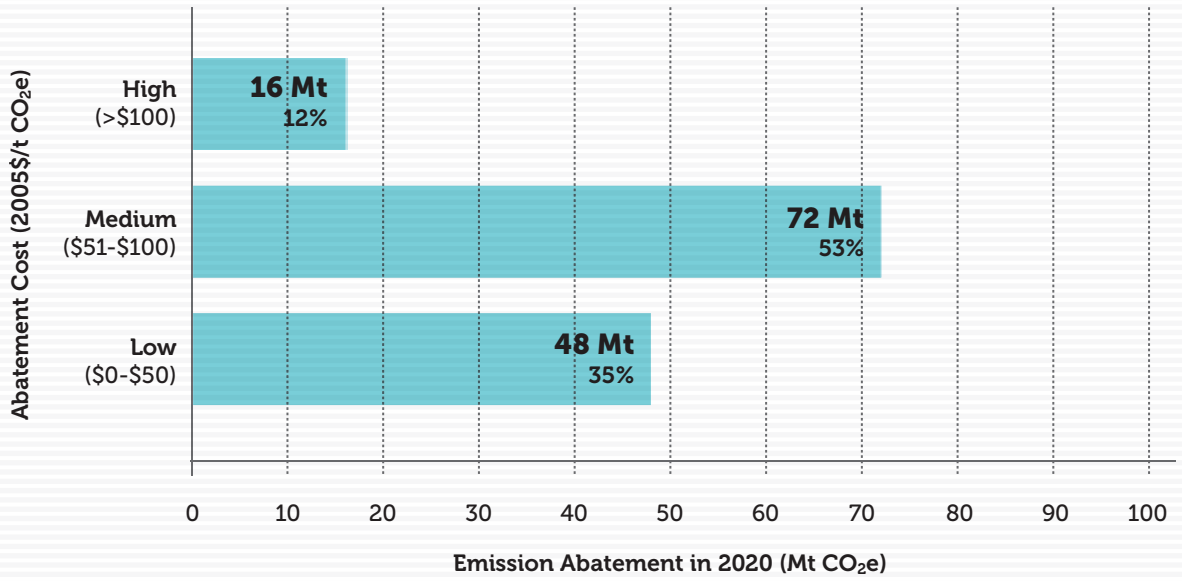
As noted, one of the main reasons Canada faces mostly high-cost potential abatement is the short period of time available between now and the 2020 target year. Limited time means limited opportunities to make emission reductions that coincide with normal capital stock turnover. Instead, the short time period requires a high level of emission reductions to be achieved by retrofitting or shutting down existing facilities or reducing output. These actions are more expensive than replacing old equipment as it is retired with lower-emitting options. To underline the importance of timing and delay, Figure 25 illustrates the low-, medium-, and high-cost potential emission reductions required for Canada to meet its 2020 target later, by 2030.

With a longer time period, the nature of the gap changes significantly. First, the overall size of the gap is larger (136 Mt CO_2e rather than 117 Mt CO_2e), given that emissions continue to grow between 2020 and 2030 even under all existing and proposed policies. Further, much more low- and medium-cost emission reductions are available because the longer time frame allows for reductions to take advantage of natural stock turnover as more emissions-intensive capital is retired and replaced with low-carbon alternatives.

The 2030 analysis has two main policy implications. First, it indicates that more lead time allows for emission reductions to match the normal speed of capital stock turnover, achieving reductions at lower cost. About 30 Mt CO_2e less high-cost reductions and about 20 Mt CO_2e more low-cost reductions are available to achieve the target over a longer time frame.

Second, more time should not be considered a panacea for containing costs. High- and medium-cost reductions can still not be avoided. And delay, of course, results in more cumulative emissions being produced in the meantime. Less lead time to meet the target because of delays in policy action inevitably leads to increased costs of "catching up" to meet the target.

FIGURE 25: POTENTIAL EMISSION REDUCTIONS REQUIRED TO MEET CANADA'S 2020 TARGET IN 2030



5.6 CONCLUSION

These findings build on our previous assessment in Chapter 4 of likely emission reductions which concluded that Canada required additional climate action policies if it was to meet the federal 2020 target. This chapter provides insight as to how Canada might close the gap as cost-effectively as possible. It illustrates the sectors and regions in which opportunities for potentially low-cost emission reductions are likely available. Here are the key findings:

- Most importantly, the analysis shows that Canada's 2020 target is a challenging goal that will require significant and more stringent policies to drive increasingly high cost reductions. A gradual process of trying to capture only the lowest cost emission reductions will not be successful. Yet the analysis also suggests that the target is not yet out of reach. Policies to incent reductions over the full spectrum of costs up to $150 per tonne over all regions and all major sectors could close the gap to 2020.
- A few key sectors, regions, and actions emerge as particularly important contributors to cost-effective emission reductions in 2020. The analysis clearly suggests the oil and gas sector, and Alberta in particular, have a significant role to play. This finding lends credence to Environment Canada's intention to regulate emissions in this sector. CCS shows as a key contributor to emission reductions in the sector.
- Yet the results also suggest that no one sector, region, or action is a silver bullet for achieving targets. A cost-effective approach to achieving targets requires emission reductions across all sectors and jurisdictions in Canada. This insight highlights a *policy gap* for Canada that parallels the *emissions gap*. To achieve all the required least-cost emission reductions, Canada therefore requires either 1) an economy-wide national policy approach or 2) coordination between different levels of government and among different policy mechanisms. Neither approach currently exists in Canada.
- Finally, the analysis also highlights that the short time frame to 2020 is a challenge for Canada. Because 2020 is only eight years away, many of the emission reductions required to meet the target are high-cost reductions. In the context of 2030, for example, substantially more low-cost reductions are available. This finding illustrates the challenge for Canada, but also an important lesson: delays to a coordinated approach with abatement coming from all provinces and all sectors, will only increase the final costs of achieving Canadian climate goals and targets.

6.0 GETTING TO 2020 – CONCLUSIONS AND ADVICE

CANADA STANDS AT A DECISION POINT FOR ACHIEVING ITS 2020 GREENHOUSE GAS REDUCTION TARGET. THE NRT'S ORIGINAL AND COMPREHENSIVE ANALYSIS DEMONSTRATES A LARGE GAP BETWEEN CANADA'S EMISSIONS TRAJECTORY AND THE FEDERAL GOVERNMENT'S TARGET OF 17 PER CENT BELOW 2005 LEVELS BY 2020. FURTHER, WE SHOW THAT THE COST OF ACHIEVING THE CANADIAN CLIMATE POLICY TARGET IS HIGH OWING TO THE SHORT TIME FRAME REMAINING TO MEET THE TARGET, A LACK OF COORDINATION BY GOVERNMENTS, AND THE GROWING EMISSIONS FROM SOME ECONOMIC ACTIVITIES. IT IS GETTING HARDER, NOT EASIER, TO ACHIEVE CANADA'S CLIMATE POLICY GOALS THE LONGER TIME GOES ON.

This chapter sets out the main conclusions from our qualitative assessment of provincial plans and our original modelling analysis of federal and provincial emission reductions measures. It provides advice and recommendations on steps that Canadian governments should take to put us on a realistic, achievable path to our 2020 target.

6.1 WHERE ARE WE?

ASSESSING THE GAP

CANADA IS MAKING PROGRESS TOWARD ITS 2020 TARGET BUT WILL NOT GET THERE WITH ONLY THE EXISTING AND PROPOSED MEASURES.

There is some good news in our analysis. Progress has been made and Canada will likely achieve almost half of its 2020 target, taking into account all existing and proposed emission-reduction measures. This is significantly better than previously projected by Environment Canada.[71] However, given that our full analysis includes all likely policy actions by governments — large and small — the NRT can also conclude that Canada will not achieve its 2020 GHG emission reductions target unless significant new, additional measures are taken. More will have to be done. No other conclusion is possible.

PROVINCIAL POLICIES ARE DRIVING THE LARGEST PORTION OF EMISSION REDUCTIONS TO DATE.

Climate policy actions by provincial governments account for almost three-quarters of estimated emission reductions in 2020, with only about one-quarter being derived from existing federal measures. This proportion changes somewhat leading to 2030 when existing federal measures are forecasted to account for about one-third of emission reductions.

THE PROVINCES ARE MAKING PROGRESS TOWARD THEIR OWN TARGETS BUT ALMOST ALL WILL NEED TO INTRODUCE ADDITIONAL MEASURES TO MEET THEM.

Despite significant progress overall, only Nova Scotia and Saskatchewan[s] are likely to achieve their targets as of now with Ontario coming close. Progress by provinces toward their own emission-reduction targets reinforces in part why Canadian progress overall is insufficient. Gaps provincially contribute to gaps nationally. This further reinforces the need for better coordination of emission-reduction actions by both levels of government since efforts by both have contributed to progress to date and will be needed to do more.

Canada will not achieve its 2020 GHG emission reductions target unless significant new, additional measures are taken. More will have to be done. No other conclusion is possible.

SOME PROPOSED FUTURE MEASURES HOLD POTENTIAL TO CLOSE PART OF THE GAP TO FEDERAL AND PROVINCIAL TARGETS.

The federal government has indicated an intention to develop regulatory measures to reduce emissions from the burgeoning oil and gas sector as part of its sector-by-sector regulatory approach and has begun consultations with industry. As the NRT analysis shows, this sector is an important source of emission-reductions opportunities, either in terms of slowing growth trends or driving absolute reductions at some point in the future. Indeed, our cost-effectiveness analysis shows that there are emission-reduction opportunities in this sector at low, medium, and high costs that could occur over the next eight years. Given that no details exist publicly on this possible measure from the federal government, it is impossible, however, to assess its effectiveness in reducing emissions from this sector by 2020. This will depend on when the regulations come into force and how stringent they are. No other sectors have been formally identified for regulatory action by the federal government as of 2012 so again, it is impossible to forecast a better outcome than we have currently modelled or to state with confidence that Canada will meet its 2020 target once other measures or actions are put in place.

Some provinces have indicated additional measures may be forthcoming from them. Next-generation climate policy plans will come forward from Québec for 2013 and possibly Manitoba and New Brunswick. But these actions alone will not bridge the national gap, however useful they are at the provincial level and in the longer run.

s Representatives from the Government of Saskatchewan's Department of Environment have noted that, in their view, the NRT's forecast likely underestimates economic growth in Saskatchewan, and thus the extent to which emissions are likely to increase. This concern may be legitimate; recent trends in Saskatchewan have shown rapid growth in both population and economic activity. A recent short-term RBC forecast suggests that Saskatchewan could have the highest growth rates of all provinces by 2013 (RBC Economics 2012). However, we did not have alternative, long-term macro-economic assumptions that could be used for this modelling. Our forecast is rooted in consistent assumptions about regional and sector-level growth in production drawn from Environment Canada's modelling, which is in turn based on macro-economic forecasts from Informetrica.

CLOSING THE GAP

THE FRAGMENTED NATIONAL AND PROVINCIAL APPROACH HAS CREATED LIMITED OVERLAP TO DATE BUT WILL LIKELY BE MORE PROBLEMATIC IN THE FUTURE.

Shifts in federal policy — first away from Kyoto to an industrial emitters' cap-and-trade program called *Turning the Corner*, then to the Copenhagen Accord and U.S. alignment, and now a regulatory sector-by-sector approach — have created uncertainty for provinces as to the national policy framework within which to undertake their own actions. Responding to their own perceived need and opportunity for actions, provinces have all established their own independent climate policy plans and goals. Inter-provincial coordination has occurred in Atlantic Canada on targets and with Ontario, Québec, British Columbia, and Manitoba on the Western Climate Initiative. Recent decisions by the federal government to accommodate provincial actions though equivalency agreements on the coal-fired electricity generation regulation[72] is another example of coordination, if after the fact.

Does this fragmented "go-it-alone" approach matter? Our conclusion: not that much so far, but a lot more in the years ahead. Our analysis shows a limited amount of duplication and overlap between federal and P/T actions in emission-reduction efforts to date. In 2020, this will amount to about 10 Mt CO_2e. Looking ahead, however, is a different story as this amount is expected to rise to 41 Mt CO_2e by 2030. Chasing the same emission reductions by both levels of government is both inefficient and ineffective; Canada will realize fewer reductions at potentially higher costs.

THE COST OF ADDITIONAL POLICIES TO CLOSE THE GAP WILL BE HIGHER ON AVERAGE THAN POLICIES PURSUED TO DATE.

Our analysis shows that while almost half the emission reductions to date from existing and proposed measures have been in the low-cost range of $50 per tonne and under, achieving our 2020 target will require an increasing share of emission reductions to come from medium- and high-cost measures. A clear consequence of failing to develop a coordinated economy-wide, pan-Canadian approach to climate change is that governments have for the most part focused on the least-cost emission reductions first. As the cheapest opportunities for emission reductions are exhausted, higher cost measures will be necessary for most of the emission reductions ahead if we are to meet our 2020 target.

The NRT analysis for Environment Canada reinforces a central conclusion of all our work and many other independent sources: delay is costly. Put directly, time is money. The closer the target date approaches, the higher the carbon prices will have to be to incent investment in capital stock turnover, develop and deploy and new technologies, and change firm and household energy-use behaviour. This was a conclusion we reached in our 2008 report for the Minister of the Environment at the time, called *Getting to 2050*, as well as our 2010 report *Achieving 2050: A Carbon Pricing Policy for Canada*. High projected carbon prices and resultant economic consequences played a key part in the federal government's decision not to meet Canada's Kyoto Protocol target and ultimately to announce withdrawal from the treaty. Now, several years later, high carbon prices needed to achieve the more modest but still stringent 2020 target may once again discourage governments from taking effective action.

ADDITIONAL CONSULTATION MECHANISMS ARE NEEDED.

The sole formal mechanism for intergovernmental collaboration on the environment is the Canadian Council for the Ministers of the Environment (CCME); however, similar intergovernmental fora relating to energy and transportation may also be a useful location to discuss sector-specific aspects of climate policy. Operating by consensus, the CCME has done useful work on technical and regulatory issues such as waste and wastewater (and possibly clean air, which it is now engaged in), but has not recently been used as a forum for either discussing or engaging in broader climate policy discussions. Participants at the NRT's Canadian Climate Policies Dialogue concluded that to date, no effective federal/provincial/territorial engagement exists for developing and implementing pan-Canadian climate policies. Concerns were raised that CCME may not be an effective vehicle to take on this role in part because of the prospect of a "joint decision trap" whereby collaboration and consensus leads to outcomes supporting the lowest common denominator. Provincial governments are concerned about the lack of provincial-federal coordination given the federal sector-by-sector regulatory approach to emission reductions. Two concerns were expressed: first, that sector-by-sector regulations would have an effect on provincial energy and climate policies already in place or underway and their regulated power utilities; and second, that the absence of any intergovernmental forum or mechanism meant that other, more effective policies such as carbon pricing were not being explored or were being effectively precluded. Bilateral equivalency agreements between the federal and provincial governments of Nova Scotia, British Columbia, and Saskatchewan (although details are lacking) may address some of these policy coordination issues.

Provinces echoed the desire for greater certainty in federal and, by extension, national policy approaches. Shifts in past federal policy, from Kyoto to *Turning the Corner* to Copenhagen, created a policy vacuum that provinces have partly filled within their jurisdictional competence. Complicating any cohesive national approach is provincial natural resource ownership and the provinces' right to determine exploitation and receive royalties from that development. With energy and emission patterns so different across the country, climate policy targets, timelines, and actions supporting emission reductions are as much a function of Canada's political economy as its is energy economy. Reducing emissions in every other province but Alberta, for example, given its growing oil and gas sector's contribution to forecasted emissions growth, will leave Canada short of achieving its stated target. So, what provinces do on their own matters. And, how the federal government either fills that gap with its own measures or seeks to coordinate climate policies across the country in some fashion definitely matters.

ALL GOVERNMENTS WILL NEED TO PARTICIPATE TO SUCCESSFULLY MEET THE 2020 TARGET.

The NRT analysis shows that in order for Canada to achieve its 2020 target as cost-effectively as possible, all governments, all provinces, and all sectors will need to contribute. No one sector and no one province can make up all the difference. This puts a premium on intergovernmental collaboration and coordination of measures. But our findings demonstrate that the most important sector to contribute in this period will be oil and gas with almost half the cost-effective abatement by 2020 coming from this sector alone. Therefore the most significant province for future emission reductions will be Alberta. But this will be insufficient by itself. Other sectors such

as electricity generation, manufacturing, transportation, buildings, and waste will all need to reduce emissions. This means all other provinces, notably Ontario, British Columbia, Saskatchewan, and Québec, will need to contribute additional emission reductions.

6.2 HOW DO WE MOVE AHEAD?

KEY ELEMENTS

To achieve the 2020 target, Canada has a choice to make, a choice that principally lies with the federal government. That choice is either to "go it alone" or "work together." The choice is "more of the same" or "regulations plus." The federal government need not fundamentally alter its current regulatory, sector-by-sector approach. But it will need to accelerate and complement it. To be sure it meets the 2020 target it needs to supplement current policy with a more coordinated F/P/T approach to drive additional near-term reductions. It needs to consider how to achieve this with a more collaborative process with provinces to discuss — beginning soon and continuing regularly — how to avoid costly duplication and overlap, realize more efficient and cheaper emission reductions, and enable other tools, namely carbon pricing, to be used in conjunction with current and future policies by the federal government, a province, or a group of provinces under the framework of equivalency or memorandums of understanding.

The federal government need not fundamentally alter its current regulatory, sector-by-sector approach. But it will need to accelerate and complement it.

Let's look at each key element for developing additional policies.

Timing — The 2020 target is eight years away. This is long in terms of political cycles (two full electoral terms) but short in terms of investment and innovation cycles where capital stock can take decades to turn over. The sooner regulatory and market signals are available, the sooner the capital stock will transform to lower-emitting technologies and drive down GHG emissions. The sooner emissions begin to fall, the greater the contribution will be to limiting the cumulative stock of emissions in the atmosphere, which is better for both the environment and the economy.

Certainty — "Long, loud, and legal" is a term researchers in the United Kingdom have used to describe good climate policy signals.[73] Transparent and long-term rules and stringent and enforceable policy are all essential parts of developing policy certainty in our Canadian climate framework. Provinces stated this at the NRT dialogue session was a desirable and necessary condition to their own planning and actions (see Appendix 7.8).

Flexibility — Successful climate policy balances the need for long-term policy certainty with the need to be responsive to changing developments. As the NRT set out in *Achieving 2050: A Carbon Pricing Policy for Canada*, key sources of uncertainty include policies of Canada's trading partners, economic development, and distributional effects of policies.[74] Observing changes over time and adjusting policies in response will enhance the success of future policies.

Price — Given the remaining gap to achieving the 2020 target, there is strong interest in finding ways to achieve the best environmental outcomes at the least economic cost. Devising policies that are

market-based, coincide with capital stock turnover cycles, and allow industry and others to innovate and invest in effective technologies rather than prescribing specific technological solutions are strategies to keep costs low. Finding the right price signal is key.

Burden — Climate policy, given its interconnections between energy, natural resource exploitation, and environment, is impossible to compartmentalize effectively in a federal state. Emissions are neither exclusively federal nor provincial. Yet the federal government is uniquely positioned to influence the actions of provinces, by acting or not acting itself, and by favouring some policy instruments over others. As we have seen, Canada's emissions profile is not an even one across the country. Sources of emissions vary with Alberta, Ontario, and Québec being the largest overall contributors, but Alberta, Saskatchewan, New Brunswick, and Nova Scotia being the largest per capita contributors. This uneven distribution of emissions makes our challenge not just a significant energy/emissions one, but also a significant political economy one. An equal reduction across all provinces at this stage would be neither fair nor effective. Yet, burden-sharing in Canada is a hallmark of our unique brand of federalism and suits this policy challenge well. It is clear that a lack of it will hinder effective progress on the file. In time, there is a risk that no further action will be taken individually, if not taken collectively. Similarly, the fiscal transfer prospect of reducing emissions in one province while seemingly distributing the benefits financially to another could be perceived as unfair and likely prevent progress from occurring.
Yet, jurisdictions that benefit from the exploitation of the natural resources in their jurisdiction have an obligation to contribute to addressing the environmental consequences of that exploitation. If Canada is to meet its 2020 target, then all Canadians must play their part.

Collaboration — Canada's 2020 target is a target on behalf of all Canadians. It has been committed to internationally. In theory, it can be achieved by the federal government acting alone or by the provinces and territories acting alone. In fact, this will never occur in our federation given the history of climate actions to date and the constitutional jurisdiction each level of government has in the areas of natural resources, energy, and environment. Both levels of government need to fully contribute because of the policy instruments each has and the different emission profiles across the country. Collaboration is essential going forward unless the federal government takes full and complete responsibility for all remaining emission reductions to get to the 2020 target. Its regulatory instrument can be effective in getting new emission reductions but it will have to extend its reach to include many sectors in a short time period.

Policy — While each province has a range of actions under its climate policy plans, a few key policies are driving the majority of actual emission reductions to date (e.g., phasing out coal-generated electricity plants in Ontario, a legislated renewables target in Nova Scotia, carbon tax in British Columbia). Provinces expressed the desire for more policy flexibility from the federal government in two areas: first, in terms of how its regulatory approach is being applied through better coordination via advance consultation and possible equivalency agreement; and second, in considering a modest but real national carbon pricing policy that would allow them to take more cost-effective actions in response.

Assessment — Knowing where Canada is at any one time and regularly forecasting ahead to estimate future progress is basic to any sound evaluation of climate policy effectiveness. Adapting policy actions in response to regular assessments is just common sense. The NRT was asked formally by the federal minister of the environment to conduct this analysis. It is the first such forecasting analysis done and released publicly. This should be normal not exceptional. Regular presentations, analysis, and forecasts of progress under various scenarios and policy actions are a key tool for decision makers.

Actions across each of these key elements are the best guarantee not just of achieving Canada's 2020 climate policy target but also of ensuring longer-term emission reductions after 2020, which remains a global imperative to limit the dangerous consequences of climate change.

We recommend that advances in future Canadian climate policy meet three tests: they should be collaborative, coherent, and considered. We call it *3C*.

6.3 NRT ADVICE

The NRT offers the following advice to the Minister of the Environment, the Government of Canada, and provincial and territorial governments. We recommend that advances in future Canadian climate policy meet three tests: they should be collaborative, coherent, and considered. We call it *3C*. **Collaborative** across governments by meeting regularly and specifically on climate policy; **Coherent** by acting together in a coordinated way to reinforce each other's policies and determine who is best positioned to act in one area over another; and **Considered** by undertaking regular progress reports and assessments of how well Canada is meeting targets and forecasting to help consider future actions.

COLLABORATIVE

Canada needs greater intergovernmental collaboration to make sustained progress toward its climate policy goals. There is a need for a regular forum for governments to engage together on developing and implementing climate policies and actions.

- To ensure ongoing political engagement across governments, establish a federal/provincial/territorial ministerial-level climate policy forum led by environment ministers, and joined by energy ministers, to meet annually to discuss trends and issues in Canadian and international climate policy development.
- To ensure ongoing technical engagement across government and support the work of ministers, establish a federal/provincial/territorial working group of climate policy officials to meet annually to discuss trends and issues in Canadian and international climate policy development.
- To foster greater interprovincial, regional, and provincial/state collaboration on climate change, the Council of the Federation should highlight and share success stories, lessons, and policy tools by governments and others.

COHERENT

Canada needs stronger coordination of climate policy measures between governments to choose a coherent and cost-effective means of achieving targets. This will foster more policy certainty, mutually reinforcing policies; reduced duplication and overlap in efforts; and consideration of alternative policy actions over time.

- To bring greater certainty to Canada's climate policy efforts, the federal government should release a plan detailing sectors and timing for future regulatory action under its sector-by-sector approach, setting out time frames, expected emission reductions and cost-benefit information and highlighting complementarity with current federal/provincial/territorial efforts.
- To encourage continued federal/provincial/territorial actions that avoid duplication and overlap of policies, the federal government should set out the principles and process for using equivalency agreements or other intergovernmental protocols such as MOUs, based on innovation, flexibility, and agreed emission-reduction outcomes and time frames.
- To complement the federal government's sector-by-sector regulatory approach and ensure the most effective and lowest cost emission reductions are sought to benefit the Canadian economy as a whole, a base-level carbon pricing regime should be considered upon which governments could add additional measures, with any and all revenue recycling being returned to the jurisdiction in question.

CONSIDERED

Canada needs better climate policy data, information, and forecasts for governments to use that allow for regular evaluation of progress toward its climate policy goals. Independent, transparent, and regular reporting of progress toward targets and goals, and effectiveness of policies and measures is a basic foundation of sound climate policy development that can adapt to changing circumstances.

- To ensure access to high-quality data for effective policy making, an independent federal/provincial/territorial climate and emissions information group should be established, funded equitably by all governments and managed collectively by governments, to ensure more regular and accurate inputs to both emissions reporting, modelling, and forecasting.
- To set the stage for regular reviews of climate progress by intergovernmental ministers and Parliament, Environment Canada should add a regular forecasting component based on results from either its own projections or from the independent intergovernmental climate information group to its annual Emissions Trends report detailing short-, medium-, and longer-term projections under various climate policy scenarios.
- To provide citizens, taxpayers, and policy makers with up-to-date progress on achieving climate policy targets and goals, governments should produce and publish a regular, independent assessment of progress and challenges within their jurisdiction and nationally for the country as a whole.

7.0 APPENDICES

7.1
MINISTERIAL REFERENCE LETTER

Minister of the Environment Ministre de l'Environnement

Ottawa, Canada K1A 0H3

Mr. Robert Page
Chair
National Round Table on the Environment
and the Economy
344 Slater Street, Suite 200
Ottawa ON K1R 7Y3

Dear Mr. Page:

I am writing to request that the National Round Table on the Environment and the Economy (NRTEE) provide advice to the Government in support of its environmental agenda.

As an independent advisory agency which reports to Parliament through the Minister of the Environment, the NRTEE is in a unique position to advise the federal government on sustainable development solutions.

The Government of Canada has in the past asked the NRTEE to conduct research and provide advice on key and emerging issues, and today, I am seeking advice on two important issues that will help guide future federal government environmental policies.

1. Comprehensive Review of Provincial and Territorial Climate Change Plans and Policies

As you know, the Government of Canada has a plan to address climate change and meet its 2020 greenhouse gas (GHG) reduction target by pursuing a systematic approach of regulating GHG emissions sector by sector. Environment Canada recently released *Canada's Greenhouse Gas Target and Emissions Projections* indicating that federal government actions to date, combined with provincial and territorial government measures, are expected to result in 65 megatonnes of GHG emissions reductions by 2020, or roughly one quarter of the emissions reductions needed to achieve the 2020 target of 17 percent below 2005 emissions.

.../2

Canada

In its recent report from the Climate Prosperity series, *Parallel Paths: Canada-U.S. Climate Policy Choices*, the NRTEE references Environment Canada's projections. While Environment Canada's emissions outlook projections have been reviewed by independent experts, I believe that there would be merit in in-depth analysis of provincial and territorial climate change plans, as well as the measures that provincial and territorial governments have taken and are preparing to take, and their expected contribution to the 2020 target of 17 percent below 2005 emissions.

Specifically, an analysis of the provincial plans to reduce emissions, progress to date in implementing their plans, and an estimate of the emissions reductions expected from current and future provincial and territorial climate change initiatives by 2020 would provide a better understanding of their likely contribution to the Government's 2020 emissions reduction target. Such an analysis would inform the Government's overall effort to achieve its 2020 target for GHG emissions through a sector-by-sector regulatory approach.

2. Assessment of Potential Life Cycle Approaches to Enhance Environmental Sustainability

Life cycle techniques have been utilized since the mid-1980s by the private sector to manage costs, including those of an environmental and social nature. The ability to analyze the costs of a product from design, production, distribution and finally, as a waste product, allows a firm to identify areas for cost reduction or for making productivity gains.

Life Cycle has not been as well integrated within the public sector despite the potential advantages afforded in developing environmental policy. The design of policy need not solely be based on reacting to, or regulating, an isolated negative environmental outcome that lies within a government's purview. Knowledge of the entire production chain from design to waste might allow government to step beyond its traditional role and to try to mitigate environmental impacts before they manifest in the form of a public/private partnership. For example, a simple intervention at the design phase of a product could yield positive environmental outcomes downstream, particularly at the waste and recycle stage.

In Europe, there have been several initiatives that attempt to effect change over the course of a product's or service's life cycle. One of the most notable, Extended Producer Responsibility, appears to have had much success, particularly in the automotive sector.

.../3

What would the implications be of applying this kind of approach? Is the life cycle approach a useful technique for integrating economic and environmental costs so as to recognize the real value of environmental goods and services? Is there a way to advance a life cycle approach to environment stewardship in Canada that supports economic competitiveness?

I am requesting that this advice be provided to the Government no later than March 2012. I expect the process to be carried out within the current budget of the National Round Table.

Environment Canada and other departments and agencies of the Government are prepared to contribute to the work of the Round Table as required.

Thank you in advance for your members' commitment and their contribution to the environment, the Canadian economy, and the health of Canadians.

Sincerely,

The Honourable Peter Kent, P.C., M.P.

7.2
CIMS MODEL

CIMS is an energy-economy model that is maintained by Navius Research, Inc. and the Energy and Materials Research Group at Simon Fraser University.[t] CIMS has a detailed representation of technologies that produce goods and services throughout the economy and attempts to simulate capital stock turnover and choice between these technologies realistically. It also includes a representation of equilibrium feedbacks, such that supply and demand for energy intensive goods and services adjusts to reflect policy.

CIMS simulations reflect the energy, economic and physical output, GHG emissions, and CAC emissions from its sub-models as shown in Table 9. CIMS does not include adipic and nitric acid, solvents or hydrofluorocarbon (HFC) emissions. CIMS covers nearly all CAC emissions except those from open sources (e.g., forest fires, soils, and road dust).

t For more information, please visit www.NaviusResearch.com

TABLE 9: SECTOR SUB-MODELS IN CIMS

SECTOR	BC	AB	SK	MB	ON	QC	ATLANTIC
Residential	✓	✓	✓	✓	✓	✓	✓
Commercial/ Institutional	✓	✓	✓	✓	✓	✓	✓
Personal Transportation	✓	✓	✓	✓	✓	✓	✓
Freight Transportation	✓	✓	✓	✓	✓	✓	✓
Industry							
Chemical Products	✓	✓	✓		✓	✓	
Industrial Minerals	✓	✓			✓	✓	✓
Iron and Steel			✓		✓	✓	
Non-Ferrous Metal Smelting*	✓			✓	✓	✓	✓
Metals & Mineral Mining	✓		✓	✓	✓	✓	✓
Other Manufacturing	✓	✓	✓	✓	✓	✓	✓
Pulp and Paper	✓	✓			✓	✓	✓
Energy Supply							
Coal Mining	✓	✓	✓				✓
Electricity Generation	✓	✓	✓	✓	✓	✓	✓
Natural Gas Extraction	✓	✓	✓	✓	✓	✓	✓
Pet. Crude Extraction	✓	✓	✓		✓		✓
Petroleum Refining	✓	✓	✓		✓	✓	✓
Agriculture & Waste	✓	✓	✓	✓	✓	✓	✓

** Metal smelting includes Aluminium.*

MODEL STRUCTURE AND SIMULATION OF CAPITAL STOCK TURNOVER

As a technology vintage model, CIMS tracks the evolution of capital stocks over time through retirements, retrofits, and new purchases, in which consumers and businesses make sequential acquisitions with limited foresight about the future. This is particularly important for understanding the implications of alternative time paths for emission reductions. The model calculates energy costs (and emissions) for each energy service in the economy, such as heated commercial floor space or person kilometres travelled. In each time period, capital stocks are retired according to an age-dependent function (although retrofit of un-retired stocks is possible if warranted by changing economic conditions), and demand for new stocks grows or declines depending on the initial exogenous forecast of economic output, and then the subsequent interplay of energy supply-demand with the macroeconomic module. A model simulation iterates between energy supply-demand and the macroeconomic module until energy price changes fall below a threshold value, and repeats this convergence procedure in each subsequent five-year period of a complete run.

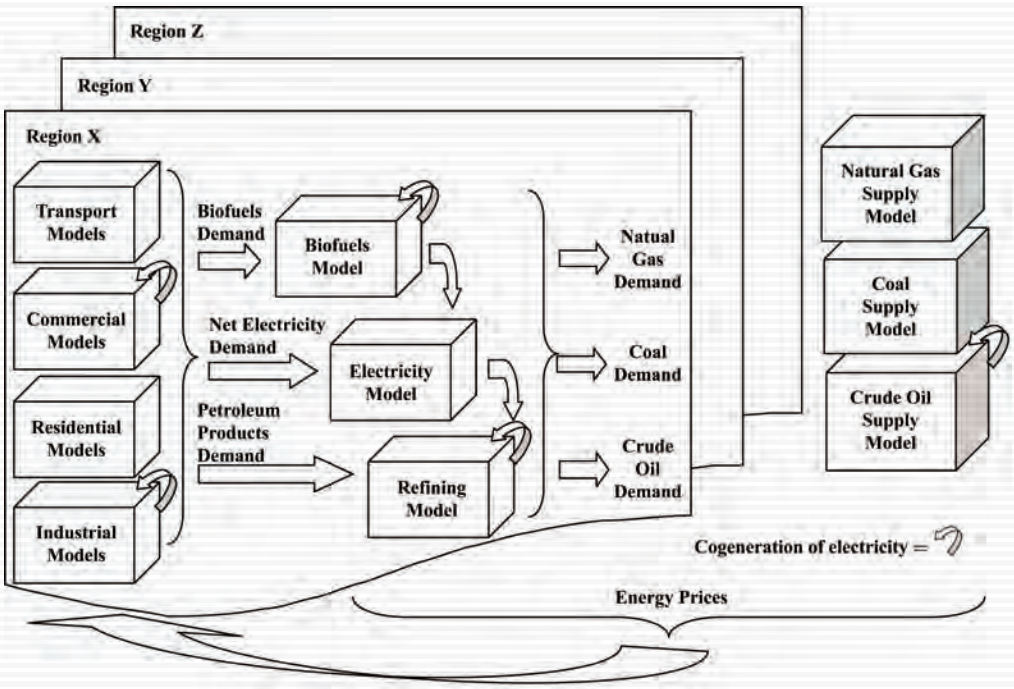
CIMS simulates the competition of technologies at each energy service node in the economy based on a comparison of their life cycle cost (LCC) and some technology-specific controls, such as a maximum market share limit in the cases where a technology is constrained by physical, technical or regulatory means from capturing all of a market. Instead of basing its simulation of technology choices only on financial costs and social discount rates, CIMS applies a definition of LCC that differs from that of bottom-up analysis by including intangible costs that reflect consumer and business preferences and the implicit discount rates revealed by real-world technology acquisition behaviour.

EQUILIBRIUM FEEDBACKS IN CIMS

CIMS is an integrated, energy-economy equilibrium model that simulates the interaction of energy supply-demand and the macroeconomic performance of key sectors of the economy, including trade effects. Unlike most computable general equilibrium models, however, the current version of CIMS does not equilibrate government budgets and the markets for employment and investment. Also, its representation of the economy's inputs and outputs is skewed toward energy supply, energy intensive industries, and key energy end-uses in the residential, commercial/institutional and transportation sectors.

CIMS estimates the effect of a policy by comparing a business-as-usual forecast to one where the policy is added to the simulation. The model solves for the policy effect in two phases in each run period. In the first phase, an energy policy (e.g., ranging from a national emissions price to a technology specific constraint or subsidy, or some combination thereof) is first applied to the final goods and services production side of the economy, where goods and services producers and consumers choose capital stocks based on CIMS' technological choice functions. Based on this initial run, the model then calculates the demand for electricity, refined petroleum products and primary energy commodities, and calculates their cost of production. If the price of any of these commodities has changed by a threshold amount from the business-as-usual case, then supply and demand are considered to be out of equilibrium, and the model is re-run based on prices calculated from the new costs of production. The model will re-run until a new equilibrium set of energy prices and demands is reached. Figure 26 provides a schematic of this process. For this project, while the quantities produced of all energy commodities were set endogenously using demand and supply balancing, endogenous pricing was used only for electricity and refined petroleum products; natural gas, crude oil and coal prices remained at exogenously forecast levels (described later in this section), since Canada is assumed to be a price-taker for these fuels.

FIGURE 26: CIMS ENERGY SUPPLY AND DEMAND FLOW MODEL



In the second phase, once a new set of energy prices and demands under policy has been found, the model measures how the cost of producing traded goods and services has changed given the new energy prices and other effects of the policy. For internationally traded goods, such as lumber and passenger vehicles, CIMS adjusts demand using price elasticities that provide a long-run demand response that blends domestic and international demand for these goods (the "Armington" specification).[u] Freight transportation is driven by changes in the combined value added of the industrial sectors, while personal transportation is adjusted using a personal kilometres-travelled elasticity (-0.02). Residential and commercial floor space is adjusted by a sequential substitution of home energy consumption vs. other goods (0.5), consumption vs. savings (1.29) and goods vs. leisure (0.82). If demand for any good or service has shifted more than a threshold amount, supply and demand are considered to be out of balance and the model re-runs using these new demands. The model continues re-running until both energy and goods and services supply and demand come into balance, and repeats this balancing procedure in each subsequent five-year period of a complete run.

EMPIRICAL BASIS OF PARAMETER VALUES

Technical and market literature provide the conventional bottom-up data on the costs and energy efficiency of new technologies. Because there are few detailed surveys of the annual energy consumption of the individual capital stocks tracked by the model (especially smaller units), these must be estimated from surveys at different levels of technological detail and by calibrating the model's simulated energy consumption to real-world aggregate data for a base year.

Fuel-based GHGs emissions are calculated directly from CIMS' estimates of fuel consumption and the GHG coefficient of the fuel type. Process-based GHGs emissions are estimated based on technological performance or chemical stoichiometric proportions. CIMS tracks the emissions of all types of GHGs, and reports these emissions in terms of carbon dioxide equivalents.[v]

u CIMS' Armington elasticities are econometrically estimated from 1960–1990 data. If price changes fall outside of these historic ranges, the elasticities offer less certainty.

v CIMS uses the 2001 100-year global warming potential estimates from Intergovernmental Panel on Climate Change, 2001, "Climate Change 2001: The Scientific Basis," Cambridge, UK, Cambridge University Press.

Both process-based and fuel-based CAC emissions are estimated in CIMS. Emissions factors come from the U.S. Environmental Protection Agency's FIRE 6.23 and AP-42 databases, the MOBIL 6 database, calculations based on Canada's National Pollutant Release Inventory, emissions data from Transport Canada, and the California Air Resources Board.

Estimation of behavioural parameters is through a combination of literature review and judgment, supplemented with the use of discrete choice surveys for estimating models whose parameters can be transposed into CIMS behavioural parameters.

SIMULATING ENDOGENOUS TECHNOLOGICAL CHANGE WITH CIMS

CIMS includes two functions for simulating endogenous change in individual technologies' characteristics in response to policy: a declining capital cost function and a declining intangible cost function. The declining capital cost function links a technology's financial cost in future periods to its cumulative production, reflecting economies-of-learning and scale (e.g., the observed decline in the cost of wind turbines as their global cumulative production has risen). The declining capital cost function is composed of two additive components: one that captures Canadian cumulative production and one that captures global cumulative production. The declining intangible cost function links the intangible costs of a technology in a given period with its market share in the previous period, reflecting improved availability of information and decreased perceptions of risk as new technologies become increasingly integrated into the wider economy (e.g., the "champion effect" in markets for new technologies); if a popular and well respected community member adopts a new technology, the rest of the community becomes more likely to adopt the technology.

METHODOLOGY TO CATEGORIZE ABATEMENT COST OF EXISTING AND PROPOSED POLICIES

To categorize the abatement cost of existing and proposed policies, we compare their abatement in 2020 with that induced by carbon pricing. Using the method described below, we categorize abatement as occurring in one of three thresholds:

R_p^{low} = low cost reduction (\$0-50/t CO_2e)

R_p^{med} = medium cost reduction (\$51-100/t CO_2e)

R_p^{high} = high cost reduction (>\$100/t CO_2e)

Assuming the following simulations,

R_p = reductions in 2020 from all existing and proposed policies

R_{50} = reductions from \$50/t CO_2e alone (constant price from 2005)

R_{100} = reductions from \$100/t CO_2e alone (constant price from 2005)

R_{p+50} = reductions from all policies plus \$50/t CO_2e

R_{p+100} = reductions from all policies plus \$100/t CO_2e

Reductions from all policies are categorized as follows:

R_p^{low} = reductions from existing policy in low-cost category
= $R_p - (R_{p+50} - R_{50})$

R_p^{med} = reductions from existing policy in medium-cost category
= $R_p - (R_{p+100} - R_{100}) - R_p^{low}$

R_p^{high} = reductions from existing policy in high-cost category
= $R_{p+100} - R_{100}$

METHODOLOGY TO QUANTIFY ABATEMENT GAPS

A similar approach was taken to quantify the gap between expected emissions in 2020 and the federal target for emission reductions.

G_p^{low} = low cost gap (\$0-50/t CO_2e)

G_p^{med} = medium cost gap (\$51-100/t CO_2e)

G_p^{high} = high cost gap (\$101-150/t CO_2e)

Assuming the following simulations,

R_p = reductions in 2020 from all existing and proposed policies

$R_{p+50Gap}$ = reductions from all policies plus \$50/t CO_2e from 2015 to 2020

$R_{p+100Gap}$ = reductions from all policies plus \$100/t CO_2e from 2015 to 2020

$R_{p+150Gap}$ = reductions from all policies plus \$150/t CO_2e from 2015 to 2020, the price required to achieve 607 Mt CO_2e in 2020.

The gap is characterized as follows:

G_p^{low} = potential reductions to close gap in low-cost category
= $R_{p+50Gap} - R_p$

G_p^{med} = potential reductions to close gap in medium-cost category
= $R_{p+100Gap} - R_{p+50Gap} - R_p$

G_p^{high} = potential reductions to close gap in high-cost category
= $R_{p+150Gap} - R_{p+100Gap} - R_{p+50Gap} - R_p$

7.3
CLIMATE POLICIES ANALYZED

	EXISTING	PROPOSED	EXCLUDED FROM MODELLING BECAUSE UNDER 1 Mt CO_2e OR NOT POSSIBLE TO MODEL	EXCLUDED FROM MODELLING BECAUSE POLICY NOT DEFINED IN SUFFICIENT DETAIL
Federal	• ecoEnergy for Renewable Power • ecoEnergy for Buildings and Houses (subsidies only) • Renewable Fuels Content Regulation • Passenger Automobile and Light-Duty Truck Emissions Regulations • Reduction of Carbon Dioxide Emissions from Coal-Fired Generation of Electricity Regulations • Strengthened Energy Efficiency Standards	• Heavy Duty Vehicle Emission Standards	• ecoEnergy for Industry • ecoFreight Program • Pulp and Paper Green Transformation Program • ecoEnergy for Fleets Program • Green Levy • ecoEnergy for Personal Vehicles Program • ecoTechnology for Vehicles Program • ecoMobility • ecoEnergy for Renewable Heat • Public Transit Tax Credit • ecoEnergy for Aboriginal and Northern Communities • ecoAUTO rebate Program • National Vehicle Scrappage Program • ecoEnergy Retrofit Initiative • Marine Shore Power Program • Renewable Fuels Development • ecoEnergy for Biofuels Initiative • ecoAgriculture Biofuels Capital Initiative • Technology Deveopment and Deployment • ecoEnergy Technology Initative	

	EXISTING	PROPOSED	EXCLUDED FROM MODELLING BECAUSE UNDER 1 Mt CO_2e OR NOT POSSIBLE TO MODEL	EXCLUDED FROM MODELLING BECAUSE POLICY NOT DEFINED IN SUFFICIENT DETAIL
BC	• Carbon Tax • Zero Emission Electricity • Green Building Code • Renewable and Low-Carbon Fuel Standard • Landfill Gas Regulation • Passenger Automobile and Light-Duty Truck Emissions Regulations • LiveSmart Efficiency Incentive Program	• WCI Cap and trade system (assuming permit price of 2007USD 33/t CO_2e as estimated by ICF).	• Provincial Transit Plan • Many Smaller Policies	
AB	• Specified Gas Emitters Regulation • Climate Change and Emissions Management Fund • Renewable Fuel Standard • Energy Efficiency Rebates	• Carbon Capture and Storage Projects, including: (1) Shell QUEST project (oil sands upgrader), (2) Swan Hills Synfuel Project (coal gasification) (3) Alberta Carbon Trunk Line (capture and a large-scale transport network to serve enhanced oil recovery) and (4) Project Pioneer (coal power plant CCS retrofit).	• One Simple Act • Biorefining Commercialization and Market Development Program and Bioenergy Infrastructure Development Program • Bioenergy Producer Credit Program • Green Trips • Government purchase of green power • Micro-generation regulation • On-farm energy management • Initiative for public buildings	• Energy Efficiency Act
SK	• Boundary Dam Integrated Carbon Capture and Storage Demonstration Project • Energy Efficiency Rebates	• Regulated Emitters and GHG Reduction Program (including Technology Fund)		• Landfill gas capture offset protocols

	EXISTING	PROPOSED	EXCLUDED FROM MODELLING BECAUSE UNDER 1 Mt CO_2e OR NOT POSSIBLE TO MODEL	EXCLUDED FROM MODELLING BECAUSE POLICY NOT DEFINED IN SUFFICIENT DETAIL
MB	• Biodiesel Tax Exemption • Green Building Policy • Furnace standards • Ethanol Sales Mandate • Biodiesel Sales Mandate • Regulation to restrict use of the coal-fired electrical generating station in Brandon • Coal reduction strategy and coal tax • Enhanced Incentives for geothermal heat pump installations	• WCI Cap and trade system (assuming permit price of 2007USD 33/t CO_2e as estimated by ICF).	• Manitoba Climate Investment Pilot Program • Power Smart Incentive Program • Biodiesel Production Credit • Landfill Biogas Capture • Provincial landfill gas (LFG) management • Hybrid Car Rebate • Enhanced Oil Recovery Demonstration Project • Ethanol Production Grant • Sustainable Agricultural Practices	
ON	• Coal Phase-Out • Feed-In-Tariff • Residential Building Code • Landfill gas capture regulation • Energy Efficiency Incentives • Renewable Fuels Standard	• WCI Cap and trade system (assuming permit price of 2007USD 33/t CO_2e as estimated by ICF). • Passenger Automobile and Light-Duty Truck Emissions Regulations	• Public Transit Expansion • Freight truck speed limiter regulation • Hybrid buses and Green Commercial Vehicle Program	• Natural gas utility conservation programs
QC	• Carbon Tax • Landfill gas capture regulation • Energy efficiency incentives	• WCI Cap and trade system (assuming permit price of 2007USD 33/t CO_2e as estimated by ICF). • Passenger Automobile and Light-Duty Truck Emissions Regulations • Ethanol Fuel Content	• Residual biomass • energy efficiency in the merchandise transportation sector • energy efficiency financing program • Voluntary industry agreements • Halocarbon regulations • Landfill and incineration regulations • Municipal program support • Mandatory speed limiting devices on trucks • improve energy efficiency of public buildings by 10% to 14% under the 2003 level • Building Code	

	EXISTING	PROPOSED	EXCLUDED FROM MODELLING BECAUSE UNDER 1 Mt CO_2e OR NOT POSSIBLE TO MODEL	EXCLUDED FROM MODELLING BECAUSE POLICY NOT DEFINED IN SUFFICIENT DETAIL
NB	• Efficiency NB	• Renewable Portfolio Standard • Renewable Fuel Standard • Passenger Automobile and Light-Duty Truck Emissions Regulations		
NS	• Cap on Electricity Sector Emissions • Passenger Automobile and Light-Duty Truck Emissions Regulations • Electricity Sector RPS • Energy Efficiency Incentives • eco Nova Scotia • Electricity Sector DSM programming			
NL	• Build Better Buildings Policy • Residential Energy Efficiency Program • Muskrat falls		• EnerGuide for Houses • 2011 plan • Green Fund • Landfill Gas	• GHG reduction framework for large industrial sector
PEI	• Renewable Portfolio Standard (Wind) • Other energy efficiency programs	• Passenger Automobile and Light-Duty Truck Emissions Regulations		• Renewable Fuel Standard • Low Carbon Fuel Standard
YK			• Investment in renewable electricity • A variety of actions listed in the action plan, including (many actions in preliminary form, i.e. commitment to investigate, etc.): • Targets for government operations (direct investment in buildings and transport) • Carbon offset policy • Building Codes • Biomass strategy	
NWT	• Building Codes • The Energy Efficiency Incentive Program			
NV	• None			

7.4 FEDERAL POLICY SUMMARY

The federal government is implementing a sector-by-sector regulatory approach to drive emission reductions through the establishment of sectoral emissions performance standards. In addition, the government is developing performance requirements for various products, which are referred to as product performance standards.

EMISSIONS PERFORMANCE STANDARDS

The first sector targeted under the current federal sector-by-sector regulatory approach is the electricity sector. The electricity sector contributed 120 Mt CO_2e to Canada's total emissions, or 16%, in 2008. Within that sector, coal-fired electricity generation was responsible for 93 Mt of GHG emissions, or over three quarters, of the emissions.[75] The Government of Canada is pursuing regulations for coal-fired electricity generation through the *Reduction of Carbon Dioxide Emissions from Coal-Fired Generation of Electricity Regulations* (Coal-Fired Regulations).[76]

Under the proposed regulation, an emissions performance standard has been established for new coal-fired units and coal-fired units past the end of their "useful life." This standard is designed so that the emissions released are equivalent to those from high-efficiency natural gas electricity generation.[77] It is expected that the regulation will encourage a transition from current coal-fired electricity to more efficient and renewable sources. The final regulations are expected to come into effect in 2015. These regulations are expected to reduce 175 Mt CO_2e cumulatively between 2015 and 2030.[78] Annual reductions will ramp up over time.

The electricity mix varies significantly between provinces. These regulations will primarily impact Alberta, Saskatchewan, Nova Scotia and New Brunswick where coal is currently a major electricity source. In contrast, provinces which greatly rely on hydro power such as British Columbia, Manitoba, Québec and Newfoundland and Labrador will be virtually unaffected by the Coal-Fired Regulations. Ontario will also not be affected by these federal regulations because its coal phase-out is expected to have eradicated coal-fired electricity generation by 2014.[79]

Separate sector-specific regulations are anticipated for all other major emissions sources[80], including for the upstream oil and gas industry. The quantity of emissions being driven through the Coal-Fired Regulations suggest that planned reductions from other sector-specific regulations could also play an important role in driving future emission reductions in Canada.

PRODUCT PERFORMANCE STANDARDS

Vehicle emissions are a key source in Canada, with passenger cars and light trucks accounting for 12% of total emissions in 2007. The *Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations* prescribe mandatory GHG emission standards for vehicles produced in 2011 and later years, with the stringency of the emission standards increasing over time. The regulations are designed to require manufacturers to meet a set emissions standard across the entire fleet, and they provide flexibility through banking and trading emission credits over time and across manufacturers. Environment Canada anticipates that as a result of these regulations, vehicles from model years 2011 to 2016 will, over their lifetime, yield 92 Mt of GHG reductions.[81]

Heavy-duty vehicles contributed just over 6% of Canada's GHG emissions in 2009.[82] The federal government is developing *Heavy Duty Vehicles Regulations* to regulate emissions from this source consistent with U.S. regulations. The proposed regulations would apply to vehicle manufacturers. A vehicle-based emission standard would incent emission reductions from engines and other components of the vehicle. As is the case with light-duty vehicles, emission standards would increase over time, starting with the model year 2014. Compliance flexibility could be offered through banking and trading emission credits. Examples of vehicles to be covered under these regulations include full-size pick-up trucks, tractor-trailers, cement trucks, and buses.[83]

The *Renewable Fuels Regulations* were established to mandate fuel producers and importers to ensure gasoline contain an average of at least 5% renewable fuels. The regulations provide compliance flexibility through trading credits across regulatees. The government anticipates that this regulation will drive an incremental GHG emission reductions of approximately 1 Mt per year. These regulations took effect on December 15, 2010.[84] A later amendment to these regulations requires 2% renewable content in diesel fuel and heating oil, coming into force on July 1, 2011.[85]

7.5 CLIMATE POLICY OVERLAP

CASE 1: A FEDERAL EMISSION PERFORMANCE STANDARD OVERLAPS WITH A PROVINCIAL QUANTITY MEASURE[w]

Overlap does not present any difficulty if the provincial regulation is stringent enough that the federal regulation is non-binding. However, if the federal regulation is binding, additional reductions required from covered firms will mean that other firms do not need to reduce as much as they would have done (instead, they would purchase additional credits from the firm subject to the overlapping regulation). Overall emissions in the regulated sectors are unchanged but the addition of the federal standard produces additional cost.

CASE 2: A FEDERAL EMISSION PERFORMANCE STANDARD OVERLAPS WITH A PROVINCIAL PRICE MEASURE[x]

In this case, overlap does not create problems. If the provincial regulation is stringent enough then the federal regulation is non-binding. If the federal standard is binding, total emissions in the province will fall.

CASE 3: A FEDERAL PRODUCT PERFORMANCE STANDARD OVERLAPS WITH ANY PROVINCIAL POLICY

Overlap does not present any difficulty if the federal regulation is stringent enough that the provincial regulation is non-binding. If the provincial policy is binding, it will cause increased emission reductions from regulated emitters but also yield unintended consequences that may be problematic. Regulated entities within the province will reduce their emissions, but others outside the province will be able to expand emissions in response (since the federal product performance standards allow credits to be traded between firms). Ultimately, overall emissions are unchanged, the burden of emission reductions is shifted to the regulating province, and overall costs of achieving emission reductions increase.

When there is a risk of running up against these unintended consequences of overlapping policies, three strategies can be employed to improve the outcome. First, make additional efforts to coordinate policies between levels of government. Second, rely on price-based policies. They achieve additional reductions even when several policies overlap since they do not result in the unintended consequences described above. Finally, if quantity-based targets are used, consider introducing mechanisms to ensure additionality of reductions when policies overlap.

Source: Wigle and Rivers 2012 (available upon request)

w i.e., a market-based measure that restricts total quantity of emissions such as a cap and trade system

x i.e., a market-based measure that imposes a financial penalty on emissions such as a carbon tax

7.6
PROVINCIAL SUMMARIES

The purpose of the following provincial summaries is to provide a snap-shot of current emissions profiles by activity, emissions trends over the past two decades, and key economy-wide and sector-specific emission reductions policies (both proposed and existing). It is not a comprehensive account of all provincial policies and measures.

BRITISH COLUMBIA

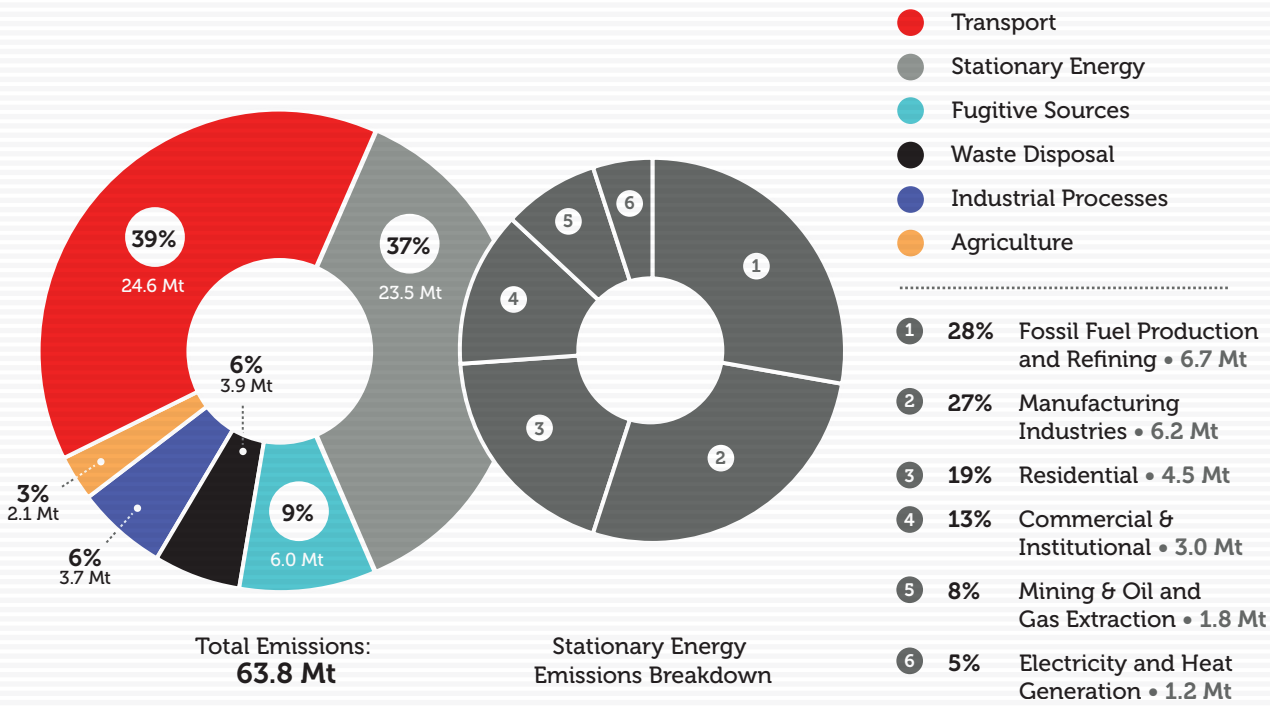
Climate Plan
British Columbia's Climate Change Action Plan (2008)

Governing Body
Ministry of Environment – Climate Action Secretariat

Interim Target:[86]	>>	6% below 2007 levels by 2012 18% below 2007 levels by 2016
2020 Target	>>	**33% below 2007 levels by 2020**
2050 Target	>>	80% below 1990 levels by 2050

- **5TH HIGHEST TOTAL EMISSIONS**
- **4TH LOWEST PER CAPITA EMISSIONS**
- **EXISTING AND PROPOSED POLICIES ARE EXPECTED TO CLOSE 35% OF THE GAP TO THE PROVINCE'S 2020 TARGET**

FIGURE 27: EMISSIONS SOURCES (2009)[87]



EMISSIONS PROFILE

In 2009 British Columbia (BC) emitted 63.8 Mt CO_2e, a 28% increase in emissions since 1990.[88] A breakdown of 2009 emission by source is provided in Figure 27.

NRT
NATIONAL ROUND TABLE ON THE ENVIRONMENT AND THE ECONOMY

ECONOMY-WIDE MEASURES

Chief among BC's emission reductions measures is the BC Carbon Tax, implemented in 2008 as a revenue-neutral carbon tax on fossil fuels.[y] The tax was introduced at $10/tonne CO_2e, and rises annually by $5 to reach $30/tonne by 2012. Revenues from the tax are recycled through tax reductions, credits or dividends with special provisions for low-income families.

BC has committed to make its government carbon neutral (discussed in more detail in Chapter 3). The province also sees potential in generating alternative energy and forest-based offsets to support global emission-reduction efforts.

EMISSION-REDUCTION MEASURES BY SOURCE

BC has implemented four main initiatives targeting transportation emissions. First, renewable fuels standards on diesel and gasoline have been put in place.[89] Second, in 2008, the province implemented a standard of 10% reduction in average carbon intensity of transportation fuels by 2020. Third, tailpipe emission standards exist to decrease GHG emissions. By 2016 the adoption of tailpipe emissions standards is expected to eliminate close to 1 Mt of GHGs annually and promote the development of more fuel-efficient vehicles. Fourth, there are public awareness campaigns and regulations for vehicle idling.

Measures to address stationary energy emissions are also in place. Within the electricity and heat generation sub-sector, emissions are only 1.2 Mt CO_2e due to the province's reliance on hydroelectricity.[90] The *Clean Energy Act* (2010) established a renewable energy requirement of a minimum of 93% total electricity generation.[91] As outlined in the *BC Energy Plan*, all new electricity generation projects were required to have zero net GHG emissions as of 2007. Existing thermal power plants are required to have zero net GHG emissions by 2016.[92]

Residential emissions are stable and relatively low due to the moderate climate in the Vancouver area where the largest population lives. The province has implemented various energy standards and conservation and efficiency plans that target the residential and commercial building sector. In 2008, BC put in place its *Green Building Code* that requires residential and commercial buildings to meet specific energy and water certification standards.

Fossil fuel production and refining accounts for 6.7 Mt of GHG emissions and stems mostly from natural gas production and processing.[93] BC set a target to reduce flaring of natural gas by 50% by 2011 - success can be assessed once 2011 data is available. Due to the small number and large size of natural gas plants in the province, CCS from a few key locations could yield significant reductions. The Fort Nelson processing plant could capture 1.3-1.6 Mt of CO_2 per year through CCS technology.[94]

Waste disposal in BC accounted for 3.9 Mt CO_2e in 2009.[95] In 2009, the province put in place landfill gas regulations that ensure that landfills producing more than 1000 tonnes of methane annually have landfill gas management facilities installed and operational in capturing and combusting methane emissions.[96]

PROVINCIAL EVALUATION OF EMISSION REDUCTIONS MEASURES

BC releases a bi-annual *GHG Inventory Report* using data from the NIR. The most recent inventory was released in 2010 detailing the province's 2008 GHG emissions. The Ministry of the Environment applies a quality assurance/quality control process to ensure that data presented is accurate and representative.[97]

BC has a reporting regulation that requires facilities emitting 10,000 tonnes or more of GHGs to report those emissions to the Ministry of the Environment.[98] This information is compiled in a provincial emissions inventory and used to support the development and implementation of climate action policies and programs such as the cap and trade program.

In addition to mandatory reporting requirements, voluntary emissions tracking and reporting can be done through the province's *Community Energy and Emissions Inventory* (CEEI).[99]

INTER-JURISDICTIONAL MEASURES

In 2009, BC approved the *Greenhouse Gas Reduction (Cap and Trade)* Act in support of its plans to implement a cap and trade system under the Western Climate Initiative (WCI) (see Chapter 3).[100]

In 2010, BC signed an Agreement in Principle on efforts to address climate change with the federal government to avoid regulatory overlap.[101]

y Information included in this appendix is sourced from Government of British Columbia 2008 unless otherwise indicated.

ALBERTA

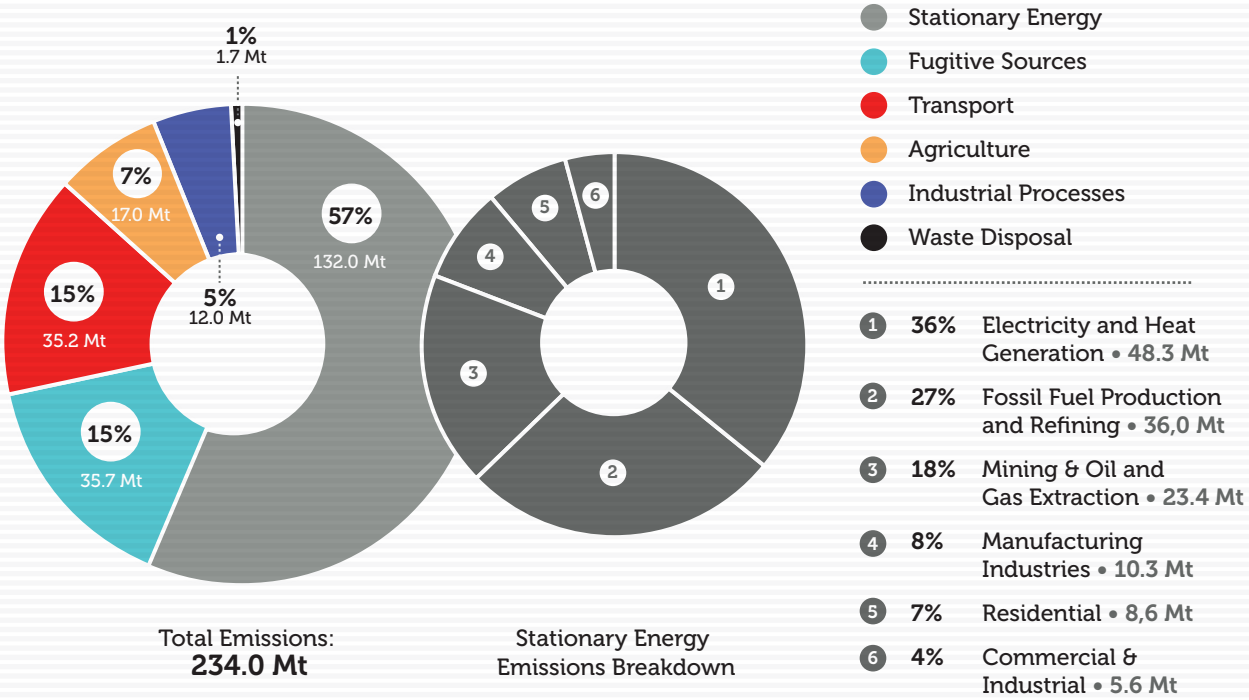
Climate Plan
Alberta's 2008 Climate Change Strategy responsibility/leadership/action.[102]

Governing Body
Department of Environment and Water - Climate Change Secretariat

Interim Target	>>	reduce 20 Mt of emissions by 2010
2020 Target	>>	**50 Mt below BAU by 2020**
2050 Target	>>	200 Mt below BAU by 2050

- **HIGHEST TOTAL EMISSIONS**
- **2ND HIGHEST PER CAPITA EMISSIONS**
- **EXISTING AND PROPOSED POLICIES ARE EXPECTED TO CLOSE 41% OF THE GAP TO THE PROVINCE'S 2020 TARGET**

FIGURE 28: EMISSIONS SOURCES (2009)[103]



EMISSIONS PROFILE

In 2009 Alberta emitted 234 Mt CO_2e, a 37% increase in emissions since 1990.[104] A breakdown of 2009 emission by source is provided in Figure 28.

NRT
NATIONAL ROUND TABLE ON THE ENVIRONMENT AND THE ECONOMY

ECONOMY-WIDE MEASURES

The three main approaches of Alberta's climate plan are: energy conservation and efficiency, CCS and greening energy production.[z]

Alberta's *Specified Gas Emitter Regulation* - the first legislation of its kind in Canada – limits the intensity of emissions in the province.[aa] Large final emitters [bb] were required to reduce combustion, venting and fugitive GHG intensities by 12% between 2003 and 2005. Facilities built after 2000 receive a three-year grace period after which they must reduce intensities by 2% annually until they reach the 12% reduction. *The Emissions Trading Regulation* provides compliance flexibility for the Specified Gas Regulations. Permits can be traded between firms and offsets can be purchased from sectors not covered by the regulation. Compliance credits can also be purchased from the Climate Change and Emissions Management Fund (CCEMF) (see Chapter 3). Under this regulation, in 2010, a reduction of 6.5 Mt of emissions was achieved from large facilities and over $70 million was contributed into the (CCEMF).[105]

EMISSION REDUCTIONS MEASURES BY SOURCE

Overall, total energy emissions have increased 37% since 1990; however, emissions have decreased 5% since 2007. This shift was caused by decreased use of coal in power generation, but also because of a slowdown in oil and gas activity due to the economic downturn.[106] Through conservation and energy efficiency, Alberta seeks to reduce emissions by 24 Mt by 2050. Increased energy efficiency incentive programs, efficiency standards, and an *Energy Efficiency Act* are all part of Alberta's efficiency strategy. CCS is expected to reduce emissions by 139 Mt by 2050. Finally, Alberta has a goal of reducing 37 Mt of GHG emissions by 2050 through greening energy production using clean burning coal technologies, wind energy projects and deep geothermal energy production.

Since 1990, transportation emissions have increased almost 60% in Alberta.[107] Renewable fuel standards in the province require a 2% renewable fuel content in diesel and 5% alcohol content in gasoline, with all renewable fuel emitting 25% less GHGs than equivalent petroleum fuel.[108]

Agriculture emissions in Alberta increased around 30% from 1990 to 2009 to reach 17 Mt CO_2e. Under Alberta's GHG Regulations, agriculture emission reductions are encouraged through carbon offsets.

PROVINCIAL EVALUATION OF EMISSION REDUCTIONS MEASURES

The Ministry of Environment conducts an annual report. In 2010-2011, the report included, an overview of annual efforts under the *Specified Gas Emitters Regulation* and a performance measure tracking the success in meeting the GHG emissions growth targets outlined in the Climate Change Strategy.[109]

Alberta's Auditor General evaluated the Climate Change Strategy in 2009 with a follow-up report in 2011. It was recommend that the Department of Environment and Water clarify the guidance it provides to facilities, verifiers, offset project developers and offset protocol developers, to ensure they consistently follow the requirements in place to achieve the Alberta government's emission reductions targets.[110]

z Information included in this appendix is sourced from Government of Alberta 2008 unless otherwise indicated.

aa Emissions intensity refers to the emissions relative to production or economic output such as GDP.

bb Those emitters producing 100,000 tonnes CO2e or more annually. Collectively, these facilities account for approximately half of the GHGs in Alberta.

SASKATCHEWAN

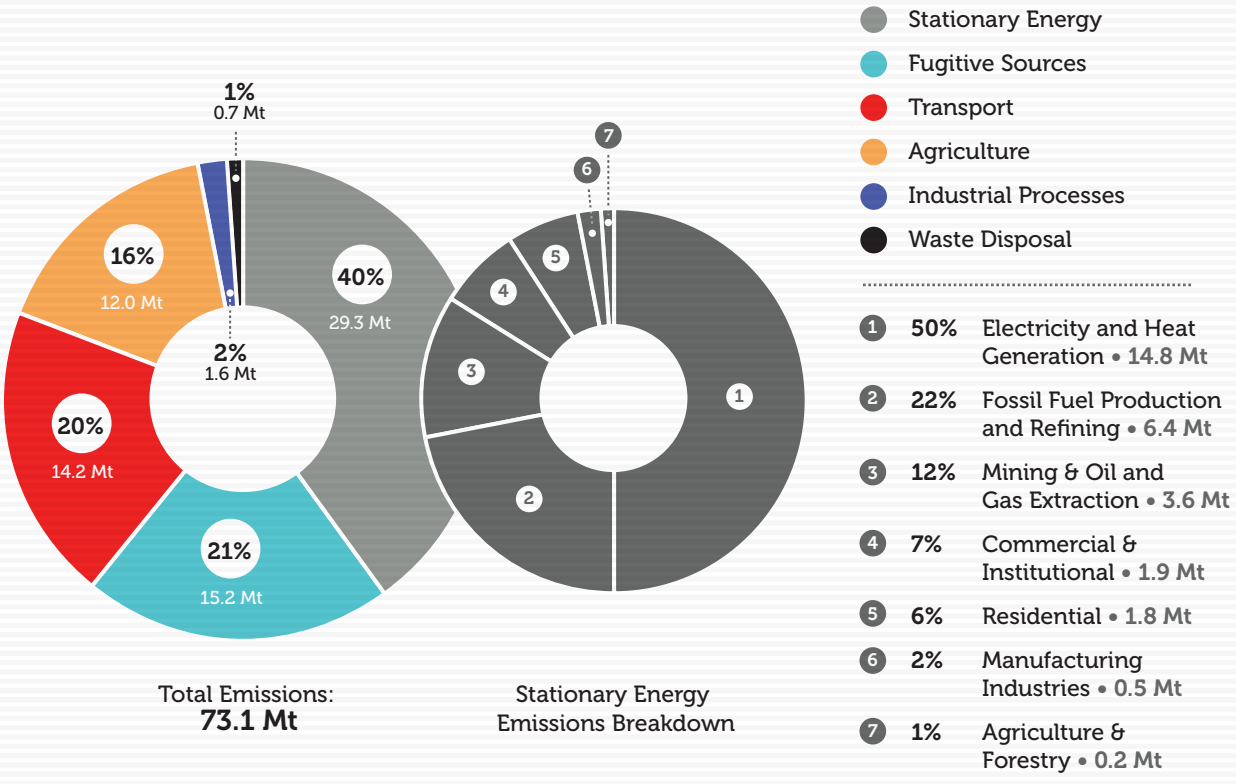
Climate Plan
Energy and Climate Change Plan (2007)

Governing Body
Ministry of Environment - Office of Climate Change

2020 Target:[111] >> **20% below 2006 levels**

- **4TH HIGHEST TOTAL EMISSIONS**
- **HIGHEST PER CAPITA EMISSIONS**
- **EXISTING AND PROPOSED POLICIES ARE EXPECTED TO CLOSE THE GAP TO THE PROVINCE'S 2020 TARGET**

FIGURE 29: EMISSIONS SOURCES (2009)[112]



EMISSIONS PROFILE

In 2009, Saskatchewan emitted 73.1 Mt CO_2e, a 69% increase since 1990.[113] A breakdown of 2009 emission by source is provided in Figure 29.

NRT
NATIONAL ROUND TABLE ON THE ENVIRONMENT AND THE ECONOMY

ECONOMY-WIDE MEASURES

The major tool under development to address GHG emissions is *The Management and Reduction of Greenhouse Gases Act.*[cc] This act has received Royal Assent but has yet to be enacted as law. Under the act, regulated emitters[dd] are required to reduce emissions by 2% per year over the baseline level from 2010 to 2019 in order to achieve a net reduction of 20% below baseline levels by 2020.[114] There will be provisions for establishment of a carbon compliance price schedule; offsets and 'performance credits' earned when actual emissions are less than prescribed levels; and credit for early action. The act proposes the creation of a technology fund that will collect carbon compliance payments from large emitters to invest in low-emitting technologies and processes that reduce greenhouse gas emissions; and a Climate Change Foundation that promotes research and development of low-carbon technologies, promotes adaptation and fosters public education and awareness.[115]

CCS is seen as an important technical innovation to support GHG emission reductions. The Government of Saskatchewan approved construction of a CCS project at Boundary Dam that is expected to commence operation in 2014 and capture 1 million tonnes of CO_2 annually.[116] The Weyburn-Midale project is the largest CCS demonstration site in the world. Since 2002, it has stored approximately 20 million tonnes of CO_2.[117] (See Chapter 3).

EMISSION REDUCTIONS MEASURES BY SOURCE

The stationary energy and fugitive sources of GHG emissions in the province each increased by almost 10 Mt since 1990.[ee] While the economy-wide efforts outlined above will address these sources, more focused measures are also in place. Existing residential emission reductions programs include financial assistance for energy efficient retrofits (the *Saskatchewan Home Energy Improvement Program (SHEIP) for Low and Moderate-Income Homeowners*), an Energy Efficient Rebate for New Homes, a geothermal and self-generated renewable power loan program, and provincial sales tax exemptions on specified energy efficient appliances.[118]

GHG emission reductions in the commercial and institutional sectors are supported by several programs. This includes funding for solar water heating systems (*Solar Heating Initiative for Today* [*SHIFT*]) and rebates for geothermal system installations.[119] Through the *Commercial Boiler Program*, Saskatchewan also supports the use of high-efficiency natural gas hydronic space-heating systems in commercial new construction and retrofit applications.[120]

Saskatchewan has the 2nd highest agricultural emissions in Canada.[121] The Saskatchewan Biofuels Investments Opportunity Program (SaskBIO), a four year program which ended on March 31, 2012, encouraged farmers and communities to participate in biofuels production to lower transportation emissions.[122]

At 14.2 Mt CO_2e, transportation emissions represent 20% of Saskatchewan's emissions.[123] The province has implemented an *Idle Free Zone* programs and offers rebates to owners of hybrid and fuel-efficient vehicles.[124]

The Red Lily Wind Project is one of Saskatchewan's renewable energy measures. Wind power from the project is expected to contribute 8.5% to SaskPower's total generating capacity and wind power expansion will reduce the emissions by approximately 225,000 tonnes per year.[125]

PROVINCIAL EVALUATION OF EMISSION REDUCTIONS MEASURES

The province's *State of the Environment Annual Report* includes a brief review of climate change mitigation progress.

An *Environmental Code* to be completed in 2012 sets out requirements to be followed by those conducting activities regulated by *The Environmental Management and Protection Act*, (2010), *The Forest Resources Management Act*, and *The Management and Reduction of Greenhouse Gases Act*. These three acts and the recently revised *Environmental Assessment Act* are the initial building blocks for Saskatchewan's regulatory framework for environmental management and protection.[126] The *Code* will set out expectations for proponents and will make them accountable for achieving results set out in the legislation.

The Management and Reduction of Greenhouse Gases Act requires regulated emitters to obtain third party verification of their baseline emissions and the first year of their reported emissions.[127]

INTER-JURISDICTIONAL MEASURES

An *Agreement in Principle on Efforts to Address Climate Change* between the federal government and Saskatchewan was signed in May 2009 which would help to avoid any regulatory overlap.[128]

Saskatchewan has also taken on international partnerships. A Memorandum of Understanding between the province and the State of Victoria, Australia was signed to encourage collaboration and sharing of information on the research and development of new and emerging technologies related to climate change.[129] Also, a Memorandum of Understanding was signed between Saskatchewan and Montana in 2009 for the construction of CCS plant in Saskatchewan, a CO_2 storage facility in Montana, and a pipeline for transporting CO_2 between the projects.[130]

cc Information included in this appendix is sourced from Government of Saskatchewan 2007 unless otherwise indicated.

dd Those with an emissions threshold of 50,000 tonnes of CO_2e in any year.

ee The largest percent change was in the industrial processes sector at 438%, but the absolute increase was only 1.3 Mt.

MANITOBA

Climate Plan
Beyond Kyoto, Next Steps: Action on Climate Change, 2008

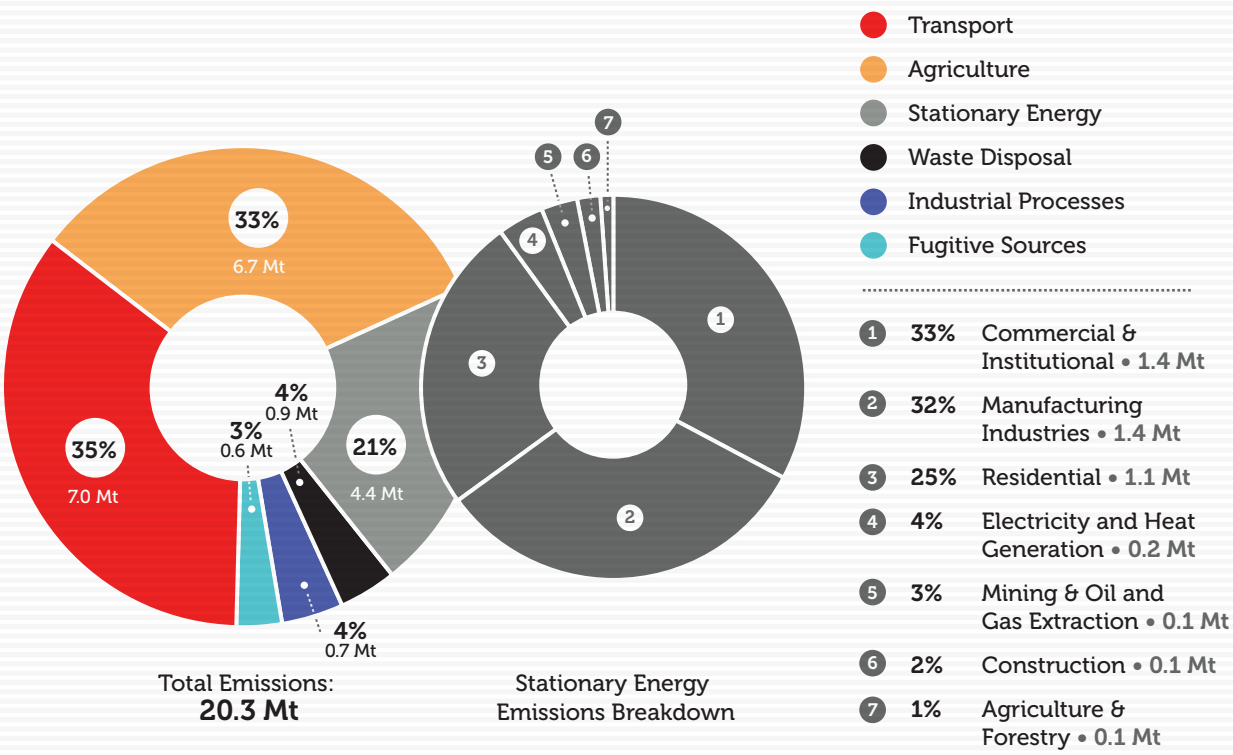
Governing Body
Manitoba Conservation - Climate and Green Initiatives Branch

Interim Target >> 6% below 1990 by 2012

2020 Target >> Under Development

- **4TH LOWEST TOTAL EMISSIONS**
- **5TH LOWEST PER CAPITA EMISSIONS**
- **EXISTING AND PROPOSED POLICIES ARE EXPECTED TO CLOSE 62% OF THE GAP TO THE PROVINCE'S 2020 TARGET**

FIGURE 30: EMISSIONS SOURCES (2009)[131]



EMISSIONS PROFILE

In 2009 Manitoba emitted 20.3 Mt CO_2e, representing a 10% increase in emissions since 1990. A breakdown of 2009 emission by source is provided in Figure 1.

NRT
NATIONAL ROUND TABLE ON THE ENVIRONMENT AND THE ECONOMY

EMISSION REDUCTIONS MEASURES BY SOURCE

The majority of Manitoba's GHG emissions come from many smaller emitters in a wide range of sectors.[132]

Transportation is the largest emitting activity in Manitoba. In 2009 the GrEEEn (economically and environmentally efficient) Trucking Program came into effect.[ff] It provides incentives to Manitoba's commercial trucking industry for installing various emission-reduction technologies. Under the program, companies are eligible for rebates of up to 25 per cent, to a maximum of $2,500 per unit, per tractor or trailer. In 2010, GHG reductions from this program were estimated at 1.5 Kt.[133] There is also an ethanol sales mandate requiring gasoline to contain at least 8.5% ethanol, and a *Biodiesel Mandate Regulation* requiring an average of 2% biodiesel content in annual diesel fuel sales.[134] The Centre for Sustainable Transportation and The Vehicle Standards Advisory Board promote public awareness on transportation emissions and provide recommendations to help the province develop appropriate, vehicle-emission standards.

The percent of emissions from agriculture in the province is almost equal to that of transportation emissions, but emissions from agriculture have increased by 31% since 1990. In 2009, to address agricultural emissions, the Manitoba Sustainable Agriculture Practices Program came into effect. This program provided funding and technical assistance to carry out sustainable agriculture projects; however this funding ends after 2012.

The significant reliance on hydro for electricity generation in the province plays a large role in limiting stationary energy emissions both within the province and in jurisdictions that purchase power from Manitoba (see Chapter 3).

Electricity and heat generation only produces 0.2 Mt of GHG emissions in the province. Manitoba Hydro *Power Smart* programs are demand side management initiatives which help green public buildings through increased energy efficiency, improved energy performance, energy conservation and load management activities. *Power Smart* Programs saved an estimated 112 kt in 2010. In 2009, the province implemented the *Energy Efficiency Standards for Replacement Forced Air Gas Furnaces and Small Boilers Regulation* - the first regulation of its kind in Canada. The regulation sets minimum annual fuel use efficiency standards for replacement gas furnaces and small boilers. Also in 2009, Manitoba's *Coal-Fired Emergency Operations Regulation* came into effect under its *Climate Change and Emission Reductions Act*. This regulation restricts Manitoba Hydro's use of coal to generate power to emergency operations. Further, in 2012 a tax on coal is supposed to come into effect. The tax, based on the grade of coal, is imposed on those who purchase more than one tonne of coal per year for use in Manitoba.

Residential and commercial and institutional emissions contribute 2.5 Mt CO_2e in Manitoba. The province will adopt the 2011 *National Energy Code of Canada for Buildings* that will provide minimum requirements for the design and construction of energy-efficient buildings, and will apply to new buildings and substantial renovations to existing buildings. Energy efficiency programs exist for lower-income households and have been piloted for First Nations reserves.

Waste disposal is only 4% of the province's total GHG emissions, but under its *Climate Change and Emission Reductions Act*, Manitoba requires the submission of an assessment of prescribed landfills' potential for its emissions mitigation. A plan for monitoring, controlling, collecting or using GHG emissions before they are released must be considered as well.

The Manitoba government is also taking a leadership role in mitigating GHG emissions by measures focusing on public buildings and government fleet, and minimizing air and land travel.

PROVINCIAL EVALUATION OF EMISSION REDUCTIONS MEASURES

The Manitoba Report on Climate Change for 2010 was a requirement under *The Climate Change and Emission Reductions Act*. This 2010 Report included a description of the province's progress on emission reductions, its current measures, future emission reductions to 2025, and efforts to reduce emissions in other jurisdictions. Sixty action measures were outlined in the 2008 climate plan and the 2010 Report provides updates on these activities.

Manitoba's Green Registry exists so Manitobans can go online to get the necessary information to measure, reduce and report their emissions.

INTER-JURISDICTIONAL MEASURES

Manitoba has been a member of WCI since 2007. In 2009, Manitoba committed to legislation enabling the creation of a cap-and-trade system (see Chapter 3).

Because of Manitoba's wealth of renewable resources the province has taken to helping other jurisdictions reduce GHG emissions through energy transmission (see Chapter 3).

ff Information included in this appendix is sourced from Government of Manitoba 2010 unless otherwise indicated.

ONTARIO

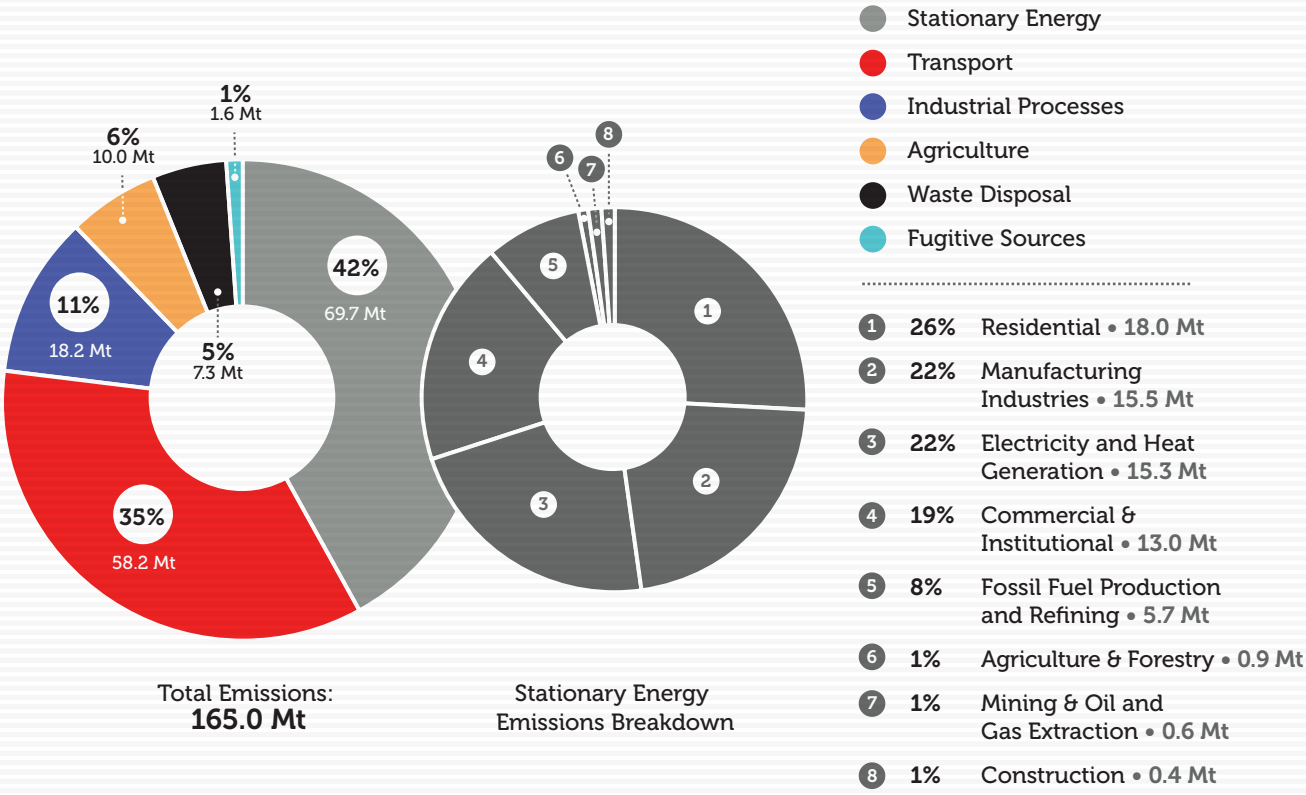
Climate Plan
Go Green – Ontario's Action Plan on Climate Change (2007)

Governing Body
Ministry of Environment – Climate Change Secretariat

Interim Target	>>	6% below 1990 by 2012
2020 Target	>>	**15% below 1990 levels by 2020**
2050 Target	>>	80% below 1990 levels by 2050

- **2ND HIGHEST TOTAL EMISSIONS**
- **2ND LOWEST PER CAPITA EMISSIONS**
- **EXISTING AND PROPOSED POLICIES ARE EXPECTED TO CLOSE 77% OF THE GAP TO THE PROVINCE'S 2020 TARGET**

FIGURE 31: EMISSIONS SOURCES (2009)[135]



EMISSIONS PROFILE

Ontario emitted 165 Mt CO_2e in 2009, almost 1/4 of Canada's total emissions.[136] Emissions have been reduced by over 6% since 1990 levels of 177 Mt, allowing the province to meet its interim 2014 target 5 years ahead of schedule.[99] A breakdown of 2009 emission by source is provided in Figure 1.

NRT
NATIONAL ROUND TABLE ON THE ENVIRONMENT AND THE ECONOMY

EMISSION REDUCTIONS MEASURES BY SOURCE

Almost half of Ontario's emissions come from stationary energy. Ontario developed a coal phase-out strategy to reduce coal-fired generation emissions to zero by the end of 2014. From 2008 to 2009 provincial emissions from electricity and heat generation decreased 44%.[137] Ontario aims to use clean energy to replace coal, increasing clean renewable electricity capacity by 50% by 2015.[hh] The Feed-in Tariff program for renewable sources of energy and the Renewable Energy Standard Offer Program are both incentives for renewable energy in the province (see Chapter 3).[138] The coal phase-out and related energy policies are expected to yield annual emission reductions of 29.1 Mt by 2020.

In addition to introducing new clean energy sources, the province is encouraging energy efficiency. It has created *The Green Energy and Green Economy Act* which seeks to bring more renewable energy sources to the province and to create of more energy efficiency measures to help conserve energy.[139] The province has also made revisions to the building code, used education programs to reduce energy use, and offered energy rebates. The provincial government is aiming to reduce its own electricity consumption by 10% to 2012. Ontario has estimated that Government leadership would account for 30,000 tonnes of GHG emission reductions to contribute to their 2020 goals.[140]

In 2009 emissions from manufacturing industries totalled 15.5 Mt CO_2e and 18.2 Mt CO_2e from industrial processes. But emissions from these sources have fallen substantially since 1990 – by 30% and 41%, respectively.[141] Ontario's Conservation Fund encourages energy conservation and efficiency within the industrial sector and supports clean technology development.[142]

In 2009, transportation emissions contributed 58.2 Mt CO_2e to Ontario's total emissions with 55% of those emissions coming from light-duty gasoline vehicles and trucks.[143] In the highly populated Greater Toronto and Hamilton Area a Regional Transit Plan – "The Big Move" - has been developed and implemented in conjunction with land-use planning policies aimed at decreasing vehicle kilometres travelled.[144] Speed limits have been placed on Heavy-Duty Trucks under the *Highway Traffic Act* and are projected to limit GHGs by 280,000 tonnes per year.[145] In addition, the province has a number of programs that address sustainable transportation relating to commuting. Federal and provincial initiatives including the Big Move, passenger vehicle efficiency regulation, truck speed limits, and a program to support hybrid buses and green commercial vehicles is expected to result in a 3.0 Mt total reduction in transportation emissions by 2020.[146]

Emissions resulting from waste in the province account for 7.3 Mt.[147] The province has introduced regulatory amendments to require the installation of methane capture in smaller capacity landfills and stated a preference for using landfill methane for energy production.[148]

PROVINCIAL EVALUATION OF EMISSION REDUCTIONS MEASURES

The Environmental Commissioner of Ontario (ECO) is responsible for reporting annually on the progress of the province's activities to reduce GHG emissions. The ECO reviews any annual report on GHG reductions or climate change published by the government.[149] The Ontario government used to release a CCAP Annual Report, with the last report being issued in December 2009.

The *Energy Efficiency Act* requires affected facilities to report GHG emissions, thereby facilitating monitoring and evaluation.

INTER-JURISDICTIONAL MEASURES

Ontario is a member of WCI and prepared for a cap-and-trade system under its *Environmental Protection Amendment Act* in 2009 (see Chapter 3).

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gg According to ECO, with economic growth predicted to increase, the challenge of meeting Ontario's 2014 and 2020 targets will become more acute. Furthermore, GHG emissions are projected to rise between 2014 and 2020 because of a shift to natural gas when nuclear facilities are retired and measures have not been planned to address this (see Environmental Commissioner of Ontario 2011).

hh Information included in this appendix is sourced from Government of Ontario 2007 unless otherwise indicated.

QUÉBEC

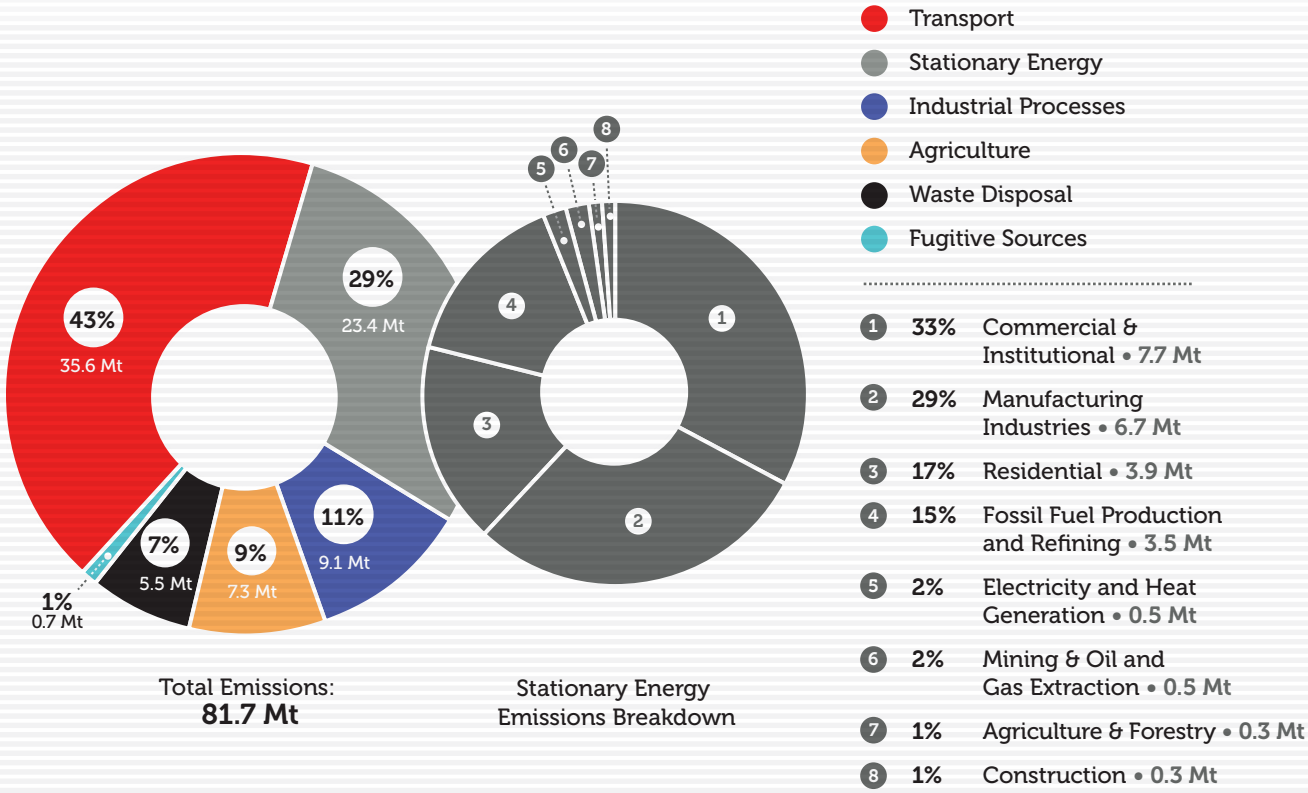
Climate Plan
Québec and Climate Change: A Challenge for the Future - 2006-2012 Action Plan

Governing Body
Ministry of Sustainable Development, Environment and Parks

Interim Target >>	6% below 1990 levels by 2012
2020 Target >>	**20% below 1990 levels by 2020**

- **3RD HIGHEST TOTAL EMISSIONS**
- **LOWEST PER CAPITA EMISSIONS**
- **EXISTING AND PROPOSED POLICIES ARE EXPECTED TO CLOSE 46% OF THE GAP TO THE PROVINCE'S 2020 TARGET**

FIGURE 32: EMISSIONS SOURCES (2009)[150]



EMISSIONS PROFILE

In 2009, Québec contributed roughly 12% of Canada's overall emissions (82 Mt CO_2e) - a 2% reduction in the province's emissions levels since 1990.[151] A breakdown of 2009 emissions by source is provided in Figure 32.

NRT
NATIONAL ROUND TABLE ON THE ENVIRONMENT AND THE ECONOMY

ECONOMY-WIDE MEASURES

Québec's GHG reduction policies over the last several years have been guided by the *2006-2012 Climate Change Action Plan*. The province is now transitioning to a *2013-2020 Action Plan*, which is expected to be released soon.[ii]

Since 2007, the provincial government has imposed a fuel duty on energy distributors that generates $200 million per year in funds that are directed back into GHG reduction measures.[152] In addition, beginning in 2013, the first phase of a cap and trade system will be implemented to limit emissions from the main sources in the province (see Chapter 3). The fuel duty will continue to apply until the end of 2014, but it will not be imposed on firms covered under the trading scheme.[153]

Québec's 2013-2020 climate plan will be financed using the $2.7 billion in revenues generated from the provincial cap and trade system and the existing fossil fuel duty to fund other emission-reduction measures and adaptation.[154]

EMISSION REDUCTIONS MEASURES BY SOURCE

Transportation is a growing emissions source for the province, having rose 28% since 1990.[155] Through Québec's *Policy Respecting Public Transit, the province* invested $4.5 billion in mass transit and alternative transportation between 2006 and 2012. Expenditures include the purchase of buses and trains and expansion of services.[156] Other measures targeting transportation included imposition of vehicle emissions standards on light-duty vehicles and 5% ethanol fuel content requirement. The 2013-2020 plan will dedicate two-thirds of the $2.7 billion in revenues expected from the fuel duty and emission allowances toward further actions to reduce emissions from transportation. $1.5 billion will be used to fund mass transit and alternative transportation. For freight vehicles, there will also be support for the conversion to other sources (e.g., electricity) and enhanced intermodal transportation alongside adoption of new vehicle emissions standards beyond 2017.[157]

Stationary energy emissions are already moving in the right direction, having fallen 21% since 1990.[158] These emissions are low relative to other provinces due in large part to a heavy reliance on non-emitting sources of electricity through hydropower. The province has pursued reductions in this sector through developing new hydroelectric and wind capacity and a strong focus on energy efficiency. Further measures are being developed through the 2013-2020 plan including programs to support energy efficiency and converting homes and businesses to rely more on renewable energy.[159]

Emissions from industrial processes are relatively small at 9.1 Mt and have fallen by 30% since 1990.[160] Large sources from this sector will be covered under the emissions trading scheme. The 2013-2020 Action Plan will support research and development into green technologies that may support emission reductions efforts in this sector.[161]

Agricultural emissions were 7.3 Mt in 2009, equivalent to a 1% increase since 1990.[162] The government has supported emission reductions efforts in this sector through funding for manure management and extracting energy from biomass. Going forward, there will be financial support for farmers to convert to more GHG efficient farming practices and further support for bioenergy sources.[163]

PROVINCIAL EVALUATION OF EMISSION REDUCTIONS MEASURES

Annual progress reports were issued on the 2006-2012 Action Plan. While details of the 2013-2020 plan are not yet available, there are plans to review progress at the mid-way point to ensure efficacy of measures and make sure funds are being used in the best way possible.[164]

INTER-JURISDICTIONAL MEASURES

Québec has been an active participant in the Western Climate Initiative (WCI) since joining in 2008 (see Chapter 3). The hallmark of this initiative has been the development of provincial and state-level emissions trading schemes that could eventually be interlinked to create a wider market, reduce leakage and drive costs down. Québec and California are both moving forward to implement trading schemes in the coming year.

Québec is also a member of the New England Governors/Eastern Canadian Premiers and has created its own targets that reach beyond the NEG/ECP Climate Change Action Plan 2001 target for regional GHG emissions of 1990 levels by 2010 and 10% below 1990 levels by 2020.

ii Information included in this appendix is sourced from Government of Québec 2008 (on measures to date) and Finances Québec 2012 (on future plans) unless otherwise indicated.

NEW BRUNSWICK

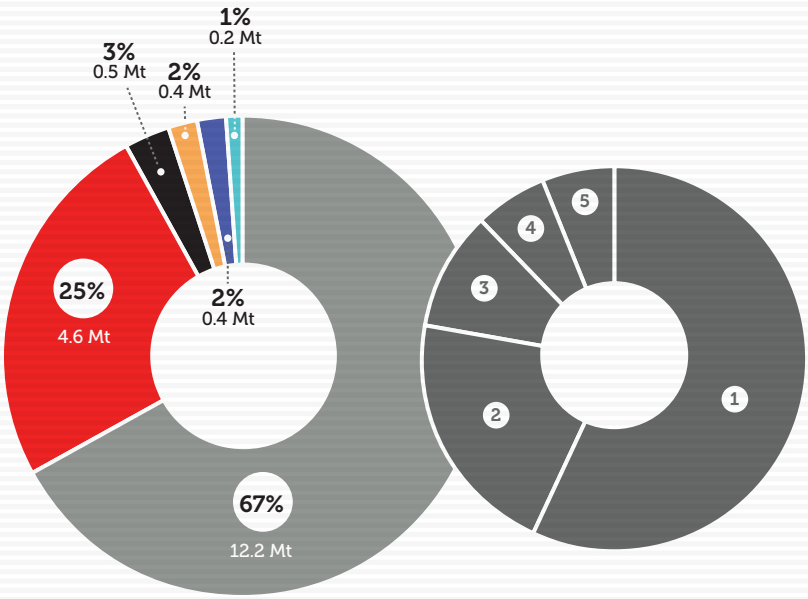
Climate Plan
Take Action - Climate Change Action Plan 2007-2012

Governing Body
Department of Environment – Climate Change Secretariat

Interim Target >>	Reach 1990 levels by 2010 5.5 Mt below 2007 levels in 2012
2020 Target >>	**10% below 1990 levels by 2020**

- **3RD LOWEST TOTAL EMISSIONS**
- **3RD HIGHEST PER CAPITA EMISSIONS**
- **EXISTING AND PROPOSED POLICIES ARE EXPECTED TO CLOSE 56% OF THE GAP TO THE PROVINCE'S 2020 TARGET**

FIGURE 33: EMISSIONS SOURCES (2009)[165]



Total Emissions:
20.3 Mt

Stationary Energy Emissions Breakdown

- Stationary Energy
- Transport
- Waste Disposal
- Agriculture
- Industrial Processes
- Fugitive Sources

1. 57% Electricity and Heat Generation • 6.9 Mt
2. 21% Fossil Fuel Production and Refining • 2.5 Mt
3. 10% Manufacturing Industries • 1.3 Mt
4. 6% Commercial & Institutional • 0.7 Mt
5. 6% Residential • 0.7 Mt

EMISSIONS PROFILE

New Brunswick emitted 18.4 Mt CO_2e in 2009, a 15% increase since 1990. A breakdown of 2009 emission by source is provided in Figure 33.

NRT
NATIONAL ROUND TABLE ON THE ENVIRONMENT AND THE ECONOMY

EMISSION REDUCTIONS MEASURES BY SOURCE

Electricity generation is the largest emissions source, but lower energy demand, growth in wind energy, and electricity purchases from neighbouring utilities are all helping to reduce this emissions source.[166] The government created a renewable portfolio regulation in 2006 that identified a target of an additional 10% of electricity sold in the province by 2016 be generated from renewable sources.[jj] In 2009-2010 renewable sources contributed 20% of the total production in the province.[167] The province plans to support development of wood-based biomass resources (primarily pellets) through standards development, expanded use of biomass to heat government buildings, financial incentives and other measures.[168]

Energy efficiency and renewable energy measures implemented in its 2007–2012 climate plan have contributed to emission reductions from residential, and commercial and industrial activities.[169]

New Brunswick's transportation emissions represented a quarter of the province's total emissions in 2009. Speed limits for the trucking industry, incentives for fuel efficient vehicles, minimum emissions standards for vehicle registration, and anti-idling policies are all part of the government's transportation emission reductions strategy.

Waste disposal, at 3% of total emissions, is the third largest emitting activity in the province. Emissions from waste disposal have decreased 10% since 1990. In 2006, Fredericton began collecting and flaring landfill gas. The province aims to support further landfill gas capture where feasible.

Agricultural emissions accounted for 0.4 Mt CO_2e in New Brunswick in 2009. A farm energy efficiency program was put in place that supported several on-farm energy audits and funded a number of energy efficiency upgrades.[170]

The New Brunswick government is aiming to reduce emissions from public operations by 25% below 2001 levels by 2012. Specified procurement, low-emitting fleet, idling restrictions, sustainable building practices, and energy management and reporting all are intended to aid in reaching this target.

The New Brunswick climate plan addressed initiatives for 2007 to the current year. A new plan has not yet been put in place; however the province has stated that it will span to 2020 and that it will expand upon existing initiatives with new actions.[171] Similar to the 2007-2012 climate plan, the 2013-2020 climate plan is expected to address renewable energy and energy efficiency, transportation, waste reduction and diversion, industrial sources, government leading by example, adaptation, and partnerships and communication.[172]

PROVINCIAL EVALUATION OF EMISSION REDUCTIONS MEASURES

New Brunswick has released a Progress Report annually since 2007 detailing the progress of its climate plan each year. Initially, the province's focus was on the foundations laid for meeting the goals of the climate plan and has developed in nature to state the progress and results realized by the plan. The Department of Energy also has annual reports that include progress related to climate change concerns, energy efficiency, and renewables.[173]

The Department of Environment has monitored and measured various New Brunswick Climate Change Action Fund[kk] projects in support of public-sector, private-sector and not-for-profit initiatives which are expected to result in GHG reductions.[174]

Additionally, in order to track and report energy consumption and corresponding emissions the Department of Environment developed a model which will allow key departments to better manage their energy consumption, and will provide a baseline estimate of the province's emissions for future mitigation policies.

INTER-JURISDICTIONAL MEASURES

As a member of the New England Governors and Eastern Canadian Premiers (NEG/ECP), New Brunswick adopted the shared goal of stabilization of GHGs at 1990 levels by 2010 with additional reductions of 10% below 1990 levels by 2020.

Targeting electricity generated emissions is a key component of New Brunswick's climate plan. As a result, the interconnectivity of electricity transmission is also an important focus. The Atlantic Energy Gateway Initiative is one partnership that fosters this effort.

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jj Information included in this appendix is sourced from Government of New Brunswick 2007 unless otherwise indicated.

kk This fund was announced in 2007 and provided $34 million in funding over three years to support emission reductions projects.

NOVA SCOTIA

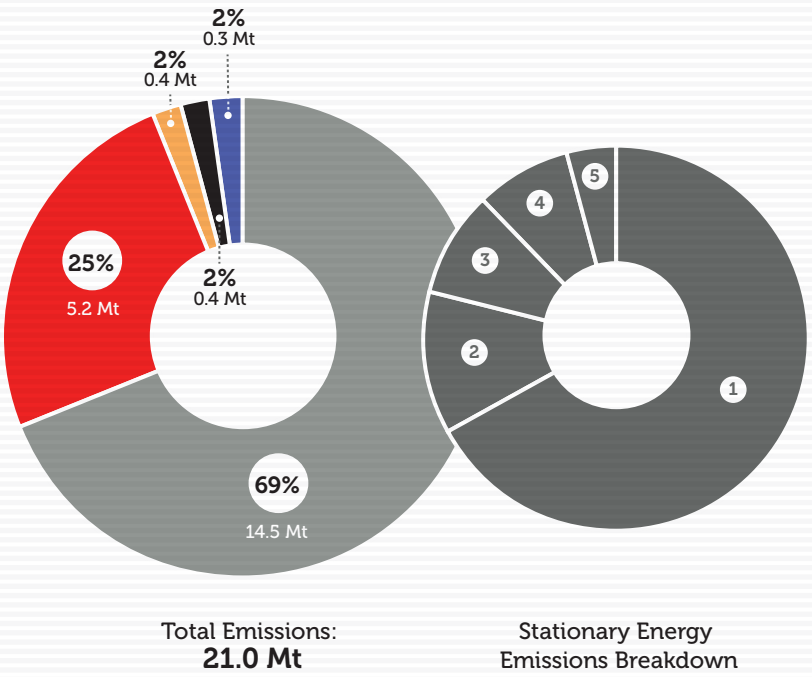
Climate Plan
Toward a Greener Future: Climate Change Action Plan

Governing Body
Department of Environment – Climate Change Directorate

Interim Target	>>	2.5 Mt below 2009 levels by 2015
2020 Target	>>	**10% below 1990 levels by 2020**
2050 Target	>>	up to 80% below 2009 levels by 2050

- **5TH LOWEST TOTAL EMISSIONS**
- **4TH HIGHEST PER CAPITA EMISSIONS**
- **EXISTING AND PROPOSED POLICIES ARE EXPECTED TO CLOSE THE GAP TO THE PROVINCE'S 2020 TARGET**

FIGURE 34: EMISSIONS SOURCES (2009)[175]



- Stationary Energy
- Transport
- Agriculture
- Waste Disposal
- Industrial Processes

1. 67% Electricity and Heat Generation • 9.8 Mt
2. 12% Commercial & Institutional • 1.7 Mt
3. 9% Fossil Fuel Production and Refining • 1.3 Mt
4. 8% Residential • 1.1 Mt
5. 4% Manufacturing Industries • 0.5 Mt

EMISSIONS PROFILE

In 2009, Nova Scotia contributed 21 Mt CO_2e to Canada's total emissions, an 11% increase in emissions since 1990. A breakdown of 2009 emissions by source is provided in Figure 34.

NRT
NATIONAL ROUND TABLE ON THE ENVIRONMENT AND THE ECONOMY

EMISSION REDUCTIONS MEASURES BY SOURCE

Stationary energy emissions contribute 69% of Nova Scotia's total emissions and within that, electricity and heat generation is responsible for two thirds of emissions. About 75% of electricity comes from burning coal. In 2009, Nova Scotia created legislation to regulate power generating facilities emitting 10,000 tonnes per year or higher.[ii] Existing coal plants will have to be shut down at the end of their 40-year commercial lifespan unless they can be refitted with carbon-capture-and-storage equipment. Nova Scotia is the first province to put hard caps on GHG emissions for the electricity sector. A cap on total emissions from regulated facilities was imposed at 19.22 Mt through the province's *Greenhouse Gas Emissions Regulations*. Nova Scotia's Energy Strategy and its climate plan have a shared goal of reducing GHG emissions, and expect to drive about 5 Mt of emission reductions through initiatives such as energy efficiency and conservation, renewables and air quality, and future cleaner energy actions.

Nova Scotia's Renewable Electricity Plan proposes the use of 25% renewable electricity by 2015 and 40% renewable electricity by 2020 (see Chapter 3).[176] By 2020, the province is committed to increasing its energy efficiency by 20% from 2008 levels by giving people and businesses access to information, providing more money for energy efficiency and conservation, supporting more home energy audits, ensuring that more homes undergo efficiency upgrades, offering interest-free loans to increase the efficiency of existing housing, ensuring that new housing and buildings are more energy efficient, and providing incentives for more energy-efficient heating.[177]

Residential, and Commercial and Institutional emissions together contribute 2.8 Mt CO_2e. The *Nova Scotia Building Code Act* requires all buildings to meet certain energy efficiency standards. By 2020, all government-owned buildings constructed before 2001 are required to reduce energy consumption by 30%, and all new government-owned buildings are required to meet certain standards, including being carbon-neutral after 2020.

Transportation emissions constitute a quarter of Nova Scotia's total emissions, and efforts to reduce emissions include increasing vehicle efficiency, encouraging sustainable travel, and community land-use planning.

In 2010, the government passed a bill, entitled "An Act to Establish the Nova Scotia Voluntary Carbon Emissions Offset Fund" to support the development of offset projects within the province.[178]

PROVINCIAL EVALUATION OF EMISSION REDUCTIONS MEASURES

The Department of Environment produces an annual progress report of GHG emissions in the province as part of their *Environmental Goals and Sustainable Prosperity Act*. The effectiveness of measures to date in achieving the provincial 2020 target is to be assessed every five years through a public review by the Nova Scotia Round Table on Environment and Sustainable Prosperity.

The province monitors its emissions caps through an Emission reduction Schedule that requires five compliance periods from 2010 to 2020 under the regulations. If the electricity sector fails to meet the emissions cap for any individual compliance period, it is an offense punishable under the *Nova Scotia Environment Act*. Fines can be imposed by the Court for non-compliance of up to $500,000 daily, and are to be paid into the Nova Scotia Environmental Trust Fund.[179]

INTER-JURISDICTIONAL MEASURES

In 2010 Nova Scotia and the federal government signed an Agreement in Principle on efforts to address climate change. In March 2012, a commitment to an equivalency agreement was announced by the province and the federal government.[180] The equivalency agreement will avoid duplication of effort to control GHGs and ensure that industries do not face dual regulations. The federal regulations will stand down in favour of the provincial regulation, provided that the provincial regulations achieve equivalent outcomes. The federal regulations are to come into effect mid-2012, at which time the equivalency agreement can be finalized.

Nova Scotia is a member of the New England Governors and Eastern Canadian Premiers (NEG/ECP), and has adopted the shared goal of emission reductions of 10% below 1990 levels by 2020. It is also a member of the Atlantic Energy Gateway, a mechanism to foster the growth of clean and renewable energy supplies in Atlantic Canada and promoting this energy to new markets.[181]

ii Information included in this appendix is sourced from Government of Nova Scotia 2009 unless otherwise indicated.

PRINCE EDWARD ISLAND

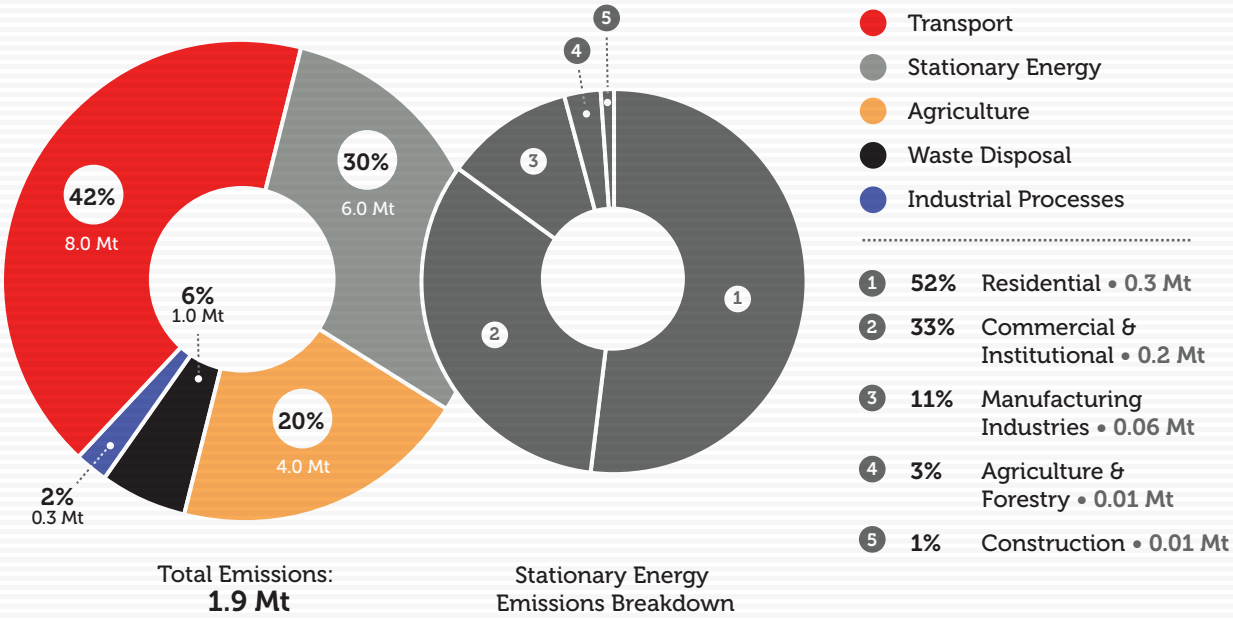
Climate Plan
Prince Edward Island and Climate Change: A Strategy for Reducing the Impacts of Global Warming

Governing Body
Department of Environment, Energy and Forestry

2020 Target >> **10% Below 1990 levels by 2020**

- **LOWEST TOTAL EMISSIONS**
- **3RD LOWEST PER CAPITA EMISSIONS**
- **EXISTING AND PROPOSED POLICIES ARE EXPECTED TO CLOSE 30% OF THE GAP TO THE PROVINCE'S 2020 TARGET**

FIGURE 35: EMISSIONS SOURCES (2009)[182]



EMISSIONS PROFILE

Prince Edward Island (PEI) has the lowest number of total emissions in Canada at 1.9 Mt CO_2e, and reduced its emissions by 4% from 1990 to 2009. A breakdown of 2009 emissions by source is provided in Figure 35.

NRT
NATIONAL ROUND TABLE ON THE ENVIRONMENT AND THE ECONOMY

ECONOMY-WIDE MEASURES

PEI has a three-pronged Environment and Energy Policy Series called "Securing Our Future" that includes a 10-point wind energy plan; an energy strategy focusing on conservation and renewables; and its climate plan focusing on reducing GHG emissions, enhancing carbon sinks, improving adaptation, and increasing public awareness.

EMISSION REDUCTIONS MEASURES BY SOURCE

Transportation is the largest emitting activity in PEI, contributing 42% to its total emissions, and having increased 14% since 1990. Over 80% of vehicles in PEI are classified as light-duty. PEI has acted to green its government fleet and has offered rebates for hybrid vehicles.[mm] Future planning is underway for technology funding, renewable fuel and vehicle efficiency standards, a public transit plan, and public education campaigns. PEI's Energy Strategy commits the province to introducing a renewable fuel content mandate by 2013 and engaging with neighbouring provinces and states to adopt low-carbon fuel standards.

PEI is committed to replacing thermal electricity that it imports to the province with wind power (see Chapter 3). Given the rural nature of much of the province, the PEI government is evaluating how best to facilitate the development of community-based renewable energy projects in PEI. Further efforts to reduce emissions from stationary energy are being planned through the implementation of new energy efficiency standards and building codes prior to 2018.

Agriculture emissions in the province represent 20% of its GHG emissions. Incentives are offered for the removal of marginal land from agricultural production if it is coupled with approved reforestation programs. The government has committed to promoting the use of reduce tillage management, cover crops, improved manure storage systems, and nutrient management systems to reduce GHGs. Moreover, biomass from agricultural sectors has been identified as available energy sources for biofuel development. The province intends to expand methane biogas capture and use it to generate heat for urban and local community district heating systems, thereby displacing fossil fuels.

PROVINCIAL EVALUATION OF EMISSION REDUCTIONS MEASURES

An annual climate change report is prepared that highlights progress on efforts to reduce GHG emissions provincially and in government operations.

INTER-JURISDICTIONAL MEASURES

Prince Edward Island is a member of the New England Governors and Eastern Canadian Premiers (NEG/ECP), and has adopted the shared goal of GHGs reductions of 10% below 1990 levels by 2020.

PEI is also a member of the Atlantic Energy Gateway that fosters the growth of clean and renewable energy supplies in Atlantic Canada and will promote this energy to new markets.[183]

mm Information included in this appendix is sourced from Prince Edward Island Department of Environment Energy and Forestry 2008 unless otherwise indicated.

NEWFOUNDLAND AND LABRADOR

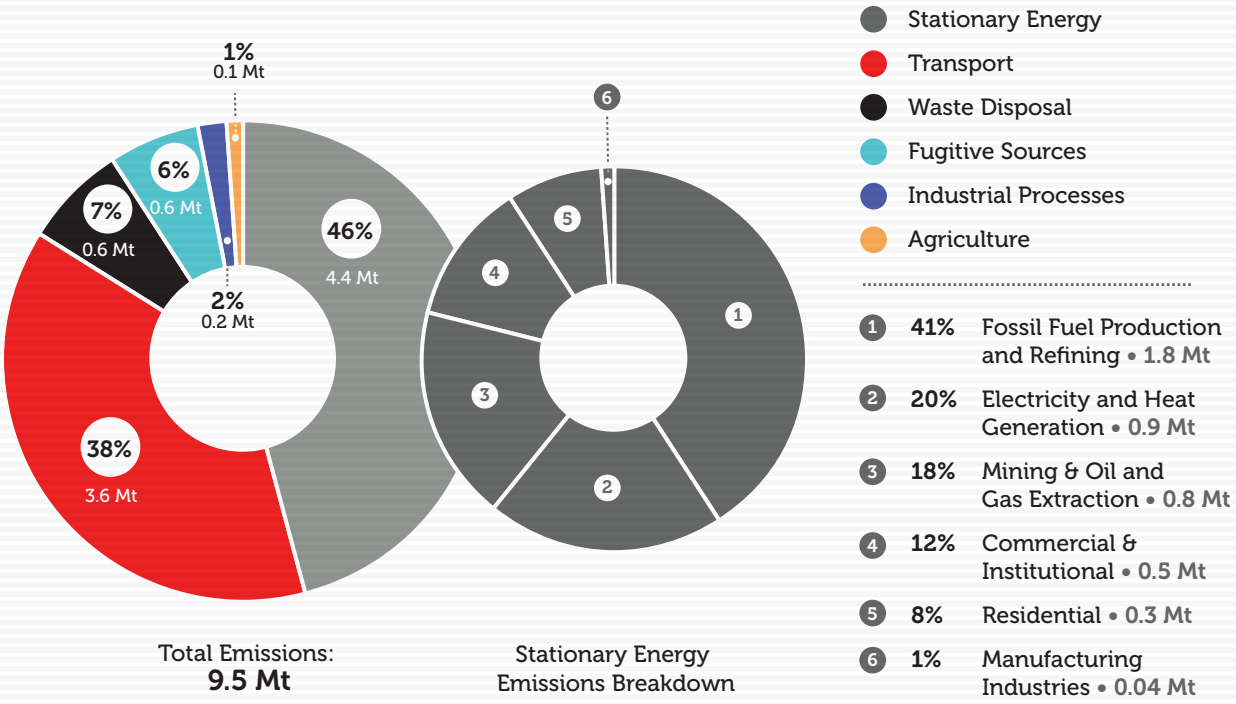
Climate Plan
Charting our Course: Climate Change Action Plan 2011

Governing Body
Office of Climate Change, Energy Efficiency and Emissions Trading

Interim Target	>>	reduce to 1990 levels by 2010
2020 Target	>>	**10% Below 1990 levels by 2020**
2050 Target	>>	75-80% below 2001 levels by 2050

- **2ND LOWEST TOTAL EMISSIONS**
- **5TH HIGHEST PER CAPITA EMISSIONS**
- **EXISTING AND PROPOSED POLICIES ARE EXPECTED TO CLOSE 35% OF THE GAP TO THE PROVINCE'S 2020 TARGET**

FIGURE 36: EMISSIONS SOURCES (2009) [62]



EMISSIONS PROFILE

Newfoundland and Labrador's GHG emissions have increased 3% since 1990 to a total emission level of 9.5 Mt CO_2e. A breakdown of 2009 emissions by source is provided in Figure 36.

NRT
NATIONAL ROUND TABLE ON THE ENVIRONMENT AND THE ECONOMY

EMISSION REDUCTIONS MEASURES BY SOURCE

Stationary energy in the province represents almost half of its GHG emissions. Currently approximately 85% of the electricity in Newfoundland and Labrador comes from clean energy, and the province is working to enhance that capacity. Developing the Muskrat Falls hydroelectric project will allow for a provincial electricity system that will be almost completely non-GHG-emitting. Muskrat Falls, would yield an estimated 1.2 Mt displacement of GHG emissions from the Holyrood oil-fired thermal generating station which currently emits over 10% of the province's GHG emissions (see Chapter 3).[nn] The province intends to use profits from investments in non-renewable resources, conventional light crude oil for example, to develop the renewable energy potential of the province. Oil-fired electricity from the Holyrood generating station also will be displaced by the two wind projects on the island that reduces GHG emissions by about 0.14 Mt annually. The province is also focusing on energy efficiency to simultaneously lower GHG emissions while supporting the economy.

Mining and oil and gas extraction is a large contributor to stationary energy. This is primarily because of offshore oil operations like Hibernia. The fugitive emissions in the province have increased exponentially from 0.04 Mt to 0.6 Mt per year since 1990 as a result of oil and natural gas. Hebron is another offshore oil operation that will come into operation over the next few years and is expected to raise the number of GHG emissions in the province. Newfoundland and Labrador plans to require the application of best available control technology requirements for new investments in the industrial sector to limit GHG emissions.

Emission reductions from the residential, and commercial and institutional sectors are encouraged through fuel switching and energy conservation. Efficiency programs exist for new buildings and retrofits, low-income residences, public buildings, and public housing. Specific focus has been placed on energy efficiency projects in coastal Labrador.

Transportation accounts for 38% of the province's emissions. An energy efficiency initiative for fishing vessels has been implemented in the province. Given the highly rural population distribution, mass transit alternatives are limited and reductions in this sector will be highly dependent on consumer-driven decisions.

Waste disposal contributes 0.6 Mt CO_2e to the province's total emissions. This number has increased 12% since 1990. The province's Solid Waste Management Strategy has attempted to divert landfill-bound materials, to reduce the number of waste disposal sites, and to eliminate open burning and phase out incinerators.

The provincial government intends to pursue its own reductions through procurement, energy audits, new government building and retrofit measures, and continuing to green government fleet.

PROVINCIAL EVALUATION OF EMISSION REDUCTIONS MEASURES

An Accountability Framework is being implemented by the Office of Climate Change, Energy Efficiency and Emissions Trading which establishes annual performance measures and targets, determines performance monitoring and reporting requirements, and assesses the need for program evaluations. The Premier will outline progress annually in the House of Assembly.

Regular monitoring and evaluation will document program impacts. A report will be released at the end of the plan and in 2.5 years (at the half-way mark) outlining progress on its commitments.

INTER-JURISDICTIONAL MEASURES

As a member of the New England Governors and Eastern Canadian Premiers (NEG/ECP), Newfoundland and Labrador adopted the shared goal of stabilization of GHGs at 1990 levels by 2010 with additional reductions of 10% below 1990 levels by 2020.

Newfoundland and Labrador is also a member of the Atlantic Energy Gateway, a mechanism to foster the growth of clean and renewable energy supplies in Atlantic Canada and to promote this energy to new markets.[185]

Collaboration with the federal government and other provinces and territories is an overarching theme of Newfoundland and Labrador's climate plan. The province intends to become an official observer of WCI to be involved with its emissions trading scheme without having to adopt the commitment of full membership status.

nn Information included in this appendix is sourced from Government of Newfoundland and Labrador 2011 unless otherwise indicated.

7.7 MEETINGS WITH PROVINCES AND TERRITORIES

PROVINCIAL/TERRITORIAL CONTACT LETTER

Dear…

I am writing to advise you that the National Round Table on the Environment and the Economy is conducting analysis on provincial / territorial climate change policies and plans in order to assess their likely contribution to Canada's 2020 greenhouse gas emission reductions target. We have been asked to do so by the federal Minister of Environment in order to better inform future federal regulatory policy actions on a sector-by-sector basis.

We would like you to participate directly in our consultation process to ensure we hear first-hand from the Government of (xxx) on progress and issues on your climate change plan and mitigation efforts. This will be of great value to us in our analysis and assessment so we can be sure of receiving all relevant information as well as direct feedback to inform our work. In turn, we will be seeking your suggestions and input on how federal/provincial/territorial climate policy efforts can be improved on a collaborative and coordinated basis so Canada achieves its 2020 GHG target in as effective a manner as possible.

Canada's 2020 GHG target is to reduce emissions by 17% below 2005 levels. As the attached backgrounder shows, forecasted federal and provincial/territorial measures together (based on Environment Canada data) should reduce domestic emissions by about 65 megatonnes in 2020, approximately one-quarter of the way towards the Canadian target (Figure 1). Analysis by the NRTEE shows that currently, this forecast results almost equally from both federal and provincial/territorial measures (Figure 2). As you can also see, forecasted emissions growth under baseline scenarios means additional measures are required to meet our 2020 target, less than ten years away (Figure 3). We are interested in receiving information on emission reductions achieved to date and forecasted from your respective plans and actions and to what extent they can be expected to contribute to Canada's 2020 target.

Provincial and territorial governments have been leading forces in developing and implementing novel and effective GHG reduction plans and measures. We wish to document this progress and learn from it. At the same time, federal and provincial/territorial efforts have, by choice and circumstance, resulted in a fragmented approach. Consideration of how more coordinated or collaborative efforts, where realistic and sensible, could jointly benefit jurisdictions in their own climate policy efforts and reduce duplication and overlap in policies and actions, could pay off for Canada as a whole in maximizing progress towards our 2020 domestic GHG reduction target.

The NRTEE has extensive experience in assessing and analyzing GHG emissions forecasts and policies. Over the past few years, we have issued detailed reports containing original modelling and policy recommendations on meeting both 2020 and 2050 national GHG reduction targets, harmonizing climate policy with the United States, carbon pricing, low-carbon performance, and best international practices in emissions forecasting. Our research and analysis has been relied upon and cited by numerous policy organizations, business and environmental groups, and government entities. We plan to be open and thorough as we undertake this new policy research project given its importance to you and the country's climate policy efforts.

As you may be aware, the NRTEE is an independent federal public policy advisory agency. We report to the Government of Canada and Parliament of Canada through the Minister of Environment. Our mission is to find sustainable pathways that advance integrated policy solutions benefitting both the environment and the economy. We do so by engaging governments, stakeholders, and experts in our independent and collaborative research and convening processes. Your direct participation in this important policy initiative will help make our analysis stronger and any advice we offer more relevant and useful to all.

Therefore, I am requesting the opportunity to meet bilaterally with you or designated officials in your government over the course of August, September and October to receive needed information that will assist us in our analysis and assessment. As series of questions to inform our conversation is contained in the attached backgrounder. We then plan to meet a second time bilaterally with officials to share and review our findings together and seek further input from you to ensure we have your full and considered information and comments before our work is completed. It is also our intention to commission independent academic and expert research from a national and intergovernmental perspective to assist us meeting our report goals. A stakeholder forum may take place early next year to offer further commentary and perspectives of value, to which you will be invited.

The attached backgrounder sets out specific questions and information requests needed to complete our task and to serve as a basis for our discussion. I hope you find it helpful.

My Executive Assistant, Ms. Helena Botelho, will be contacting you shortly to schedule a meeting.

I look forward to working with you on this initiative. In the meantime, please do not hesitate to contact me directly at any time.

Sincerely,

David McLaughlin
President and CEO

DATE	PROVINCE/TERRITORY	NAMES	
August 18, 2011	Prince Edward Island	John MacQuarrie, Erin Taylor, Jim Young,	DM Environment Climate Change Coordinator Director of Environment
August 23, 2011	New Brunswick	Perry Haines, Dean Mundee,	DM Environment Director of the Climate Change Secretariat
August 24, 2011	Nova Scotia	Jason Hollett, Lorrie Roberts,	Acting Director of Climate Change Director of Policy & Corporate Services
September 7, 2011	Manitoba	Fred Meier, Neil Cunningham,	DM Environment Acting Director of Climate Change and Green Strategy
September 20, 2011	Ontario	Gail Beggs, Jim Whitestone, Sarah Paul	DM Environment Director, Air Policy Instrument and Programs Design Branch Staff
September 21, 2011	Saskatchewan	Liz Quarshie, Donna Johnson, Ed Dean	DM Environment Acting Assistant DM Staff
September 22, 2011	Alberta	Jim Ellis, Ernie Hui, Bob Savage,	DM environment at that time ADM Environment at that time Acting Director, Climate Change Secretariat
September 23, 2011	British Colombia	Cairine MacDonald, James Mack, Jeremy Hewitt,	DM Environment Acting Head, Climate Action Secretariat Manager, Intergovernmental Relations
October 4, 2011	Québec	Diane Jean, Charles Larochelle, Genevieve Moisan,	DM Environment ADM Environment Director of Climate Change
October 27, 2011	Newfoundland and Labrador	Jackie Janes, Gerald Crane,	ADM / Senior Policy Advisor, Office of Climate Change, Energy Efficiency and Emissions Trading Director of Evidence
October 31, 2011	Yukon	Kelvin Leary, Eric Schroff, Harley Trudeau,	DM Environment Director Climate Change Yukon Government (Ottawa)

7.8 CANADIAN CLIMATE POLICIES DIALOGUE

On March 5–6, 2012, the NRT, in conjunction with the Queen's Institute of Intergovernmental Relations, held the Canadian Climate Policies Dialogue Session in Kingston, Ontario to present preliminary research, to receive feedback in response, and to engage participants in discussions on what this means to meeting Canada's 2020 target, with ideas and solutions for moving forward. The NRT chose to partner with the Queen's Institute because of its impeccable knowledge and credentials in working with governments, as well as academics and public policy experts, to host events and foster considered dialogue.

This invitation-only session was designed to offer a safe space for open discussion by governments. All provincial and territorial governments, the federal government, and noted climate and intergovernmental relations policy experts, including former senior officials, were invited to give their perspectives (see the Participants List in this Appendix).

This process allowed for our work to be well grounded in national, provincial, and regional realities, and it benefitted from top expert input and advice.

The dialogue session began with a reception and dinner on March 5th, with former Clerk of the Privy Council of Canada and Deputy Minister of Environment Canada, speaker Mel Cappe addressing the audience with a speech entitled "Federal/Provincial Relations and Climate Change: Change the Climate". On March 6th there were three facilitated roundtable discussions that focused on specific research topic areas allowing for a more detailed discussion on the subject matter. Topic areas included: NRT modelling analysis on Canadian emission reductions to 2020; climate policy experiences by provincial/territorial governments; and prospects and ideas for future climate policy approaches and steps.

Overall, the session confirmed some key conclusions:

- We have made progress as a country to achieve emission reductions but not enough based on existing and likely measures to close the gap.
- There is diversity in approaches by governments between federal and provincial governments and between provincial governments themselves. This is to be expected and has value. But it has also complicated efforts at a more pan-Canadian approach and created some duplication, overlap, and economic inefficiencies in the way climate actions have been implemented. Policy certainty from the federal government was strongly desired.

- Concerns exist about federal sectoral and regulatory approaches within some provinces; while the current federal approach has been accepted as inevitable, it meant national carbon pricing a more desirable approach for many provinces and experts, was not being considered.
- There has been emerging co-operation between levels of government on climate change policy action - namely, reviewing baseline numbers and having a single window approach for businesses to report to both levels of government.
- No effective mechanisms or processes for F/P/T collaboration exist to engage in policy development or dialogue to consider different approaches.
- Targets versus time frames came out as an important difference in detail. While all had targets and needed to move toward them, the time frames to do so was not always aligned. This disconnect was noted several times.
- All provincial representatives asserted a pretty clear determination to keep going with their climate plans. Links between climate policy and a transition to a low-carbon economy were noted by some.

AGENDA - CANADIAN CLIMATE POLICIES DIALOGUE SESSION

DONALD GORDON CONFERENCE CENTRE
421 UNION STREET - KINGSTON, ONTARIO
Conference Room B

Monday, March 5th, 2012

18:00 - 19:00	Reception – Cash Bar	*Coach House Pub* *At Donald Gordon Centre*
19:00 – 20:30	Dinner	*Conference Room B*
	Opening Remarks	*André Juneau* *David McLaughlin*
	Speaker	*Mel Cappe, Professor, School of Public Policy and Governance, University of Toronto*

Tuesday, March 6th, 2012

8:00 – 8:30	Continental Breakfast	
8:30 – 9:00	Opening Remarks	*André Juneau* *David McLaughlin*
9:00 – 9:15	Presentation	***Table 1: NRT Modelling Analysis on Canadian emission reductions to 2020***
9:15 – 10:15	Round Table Discussion	
10:15 – 10:30	Questions & Comments	
10:30 – 11:00	Break	
11:00 – 11:15	Presentation	***Table 2: Climate Policy Experiences by Provincial / Territorial Governments***
11:15 – 12:15	Provincial / Territorial representatives Discussion	
12:15 – 12:30	Questions & Comments	
12:30 – 13:30	Lunch	
13:30 – 13:45	Presentation	***Table 3: Prospects and Ideas for Future Climate Policy Approaches and Steps***
13:45 – 14:45	Round Table Discussion	
14:45 – 15:00	Questions & Comments	
15:00 – 15:15	Closing Remarks	*André Juneau* *David McLaughlin*

PARTICIPANTS

Barbara Anderson
Retired ADM
Finance Canada

Chris Bataille
Senior Managing Partner
Navius Research Inc.

Jonah Bernstein
Senior Policy Advisor,
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Government of Nova Scotia

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St. Francis Xavier University

Mel Cappe
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School of Public Policy
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University of Toronto

Jean Cinq-Mars
Assistant Auditor General
Sustainable Development
Commissioner
Auditor General of Québec

Gerald Crane
Director of Research and Analysis
Government of Newfoundland
and Labrador

Dianne Cunningham
NRT Member
NRT

Neil Cunningham
Director, Climate Change
and Environmental Protection
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Marc DeBlois (observer)
Géographe
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Rachel Faulkner
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Kim Graybiel
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Christopher Hilkene
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Andrew Leach
Assistant Professor
University of Alberta

Nick Macaluso
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Doug Macdonald
Professor
University of Toronto

Cairine MacDonald
Deputy Minister of Environment
Government of British Columbia

James Mack
Head, Climate Action Secretariat
Government of British Columbia

David McLaughlin
President and CEO
NRT

Noel Melton
Partner
Navius Research Inc.

Gord Miller
Environmental Commissioner of Ontario
ECO Office

Robert Mills
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Katherine Monahan
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Environment Canada

Mark Parent
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Heather Pearson
Acting Director, Air Policy Instruments and Program Design Branch
Ontario Ministry of the Environment

Barry G. Rabe
Professor Public Policy, Environmental Policy School of Natural Resources & Environment
University of Michigan

Adam Redish
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Ontario Ministry of the Environment

Nic Rivers
Consultant
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David Runnalls
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Distinguished Fellow
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Guy Saint-Jacques
Ambassador for Climate Change and Chief Negotiator
Environment Canada

Bob Savage
Section Head, Regulatory & Mitigation Policy
Alberta Department of Environment
Government of Alberta

Eric Schroff
Director, Climate Change Secretariat
Government of Yukon

Julie St-Amour
Members Services Liaison
NRT

Scott Vaughan
Commissioner of the Environment and Sustainable Development
Office of the Auditor General of Canada

Randall Wigle
Professor
Wilfred Laurier University

NATIONAL ROUND TABLE ON THE ENVIRONMENT AND THE ECONOMY

ENDNOTES

1 *The Changing Atmosphere: Implications for Global Security - Conference Statement* 1988

2 Jaccard et al. 2006

3 Environment Canada 1990; as cited in Harrison 2012;

4 Harrison 2012; Liberal Party of Canada 1993

5 Environment Canada 1995

6 Jaccard et al. 2006

7 Environment Canada 2007

8 Environment Canada 2008

9 Environment Canada 2010a

10 Environment Canada 2007

11 Government of Canada 2000

12 Government of Canada 2002

13 Government of Canada 2005

14 Number 016, 1st Session, 39th Parliament, Thursday, October 5 2006

15 Environment Canada 2008

16 Environment Canada 2011b

17 Environment Canada 2010a

18 Environment Canada 2011b

19 Environment Canada NDa

20 Environment Canada 2011d

21 National Round Table on the Environment and the Economy 2011

22 Government of Canada 2009

23 Harrison 2012

24 Lucas and Yearsley 2011

25 Chalifour 2008

26 Chalifour 2008

27 Environment Canada 2011b

28 Environment Canada 2011b

29 Environment Canada 2011b

30 Environment Canada 2011b

31 Environment Canada 2011b

32 Environment Canada 2011b

33 Environment Canada 2011b

34 Environment Canada 2011b

35 Environment Canada 2011b

36 Environment Canada 2011a; Climate Change and Emissions Management Corporation ND

37 National Round Table on the Environment and the Economy 2009a

38 Intergovernmental Panel on Climate Change 2007

39 The Pembina Institute 2011

40 Environmental Commissioner of Ontario 2011

41 National Round Table on the Environment and the Economy 2007

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