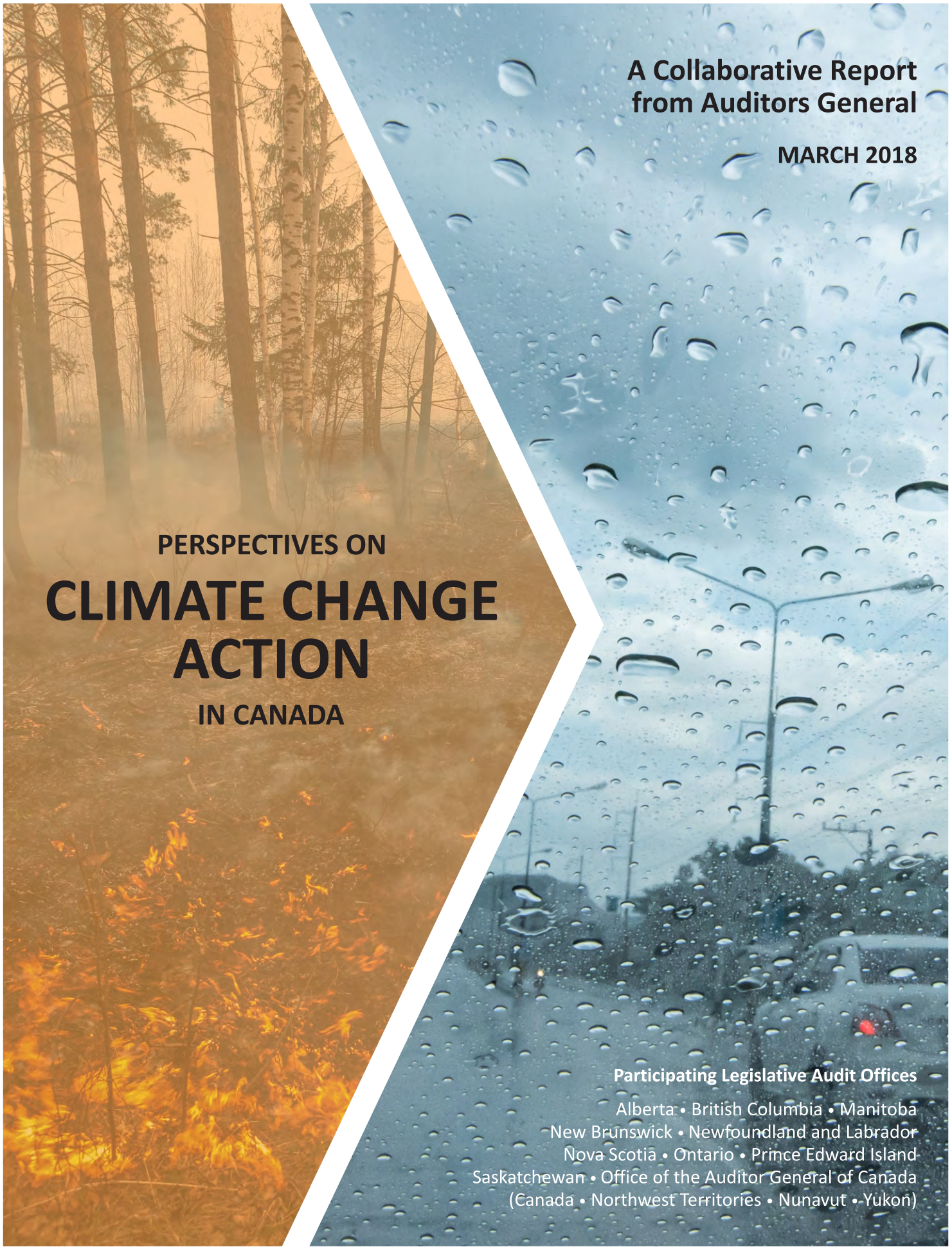

A Collaborative Report from Auditors General

MARCH 2018

PERSPECTIVES ON

CLIMATE CHANGE ACTION

IN CANADA

Participating Legislative Audit Offices

Alberta • British Columbia • Manitoba
New Brunswick • Newfoundland and Labrador
Nova Scotia • Ontario • Prince Edward Island
Saskatchewan • Office of the Auditor General of Canada
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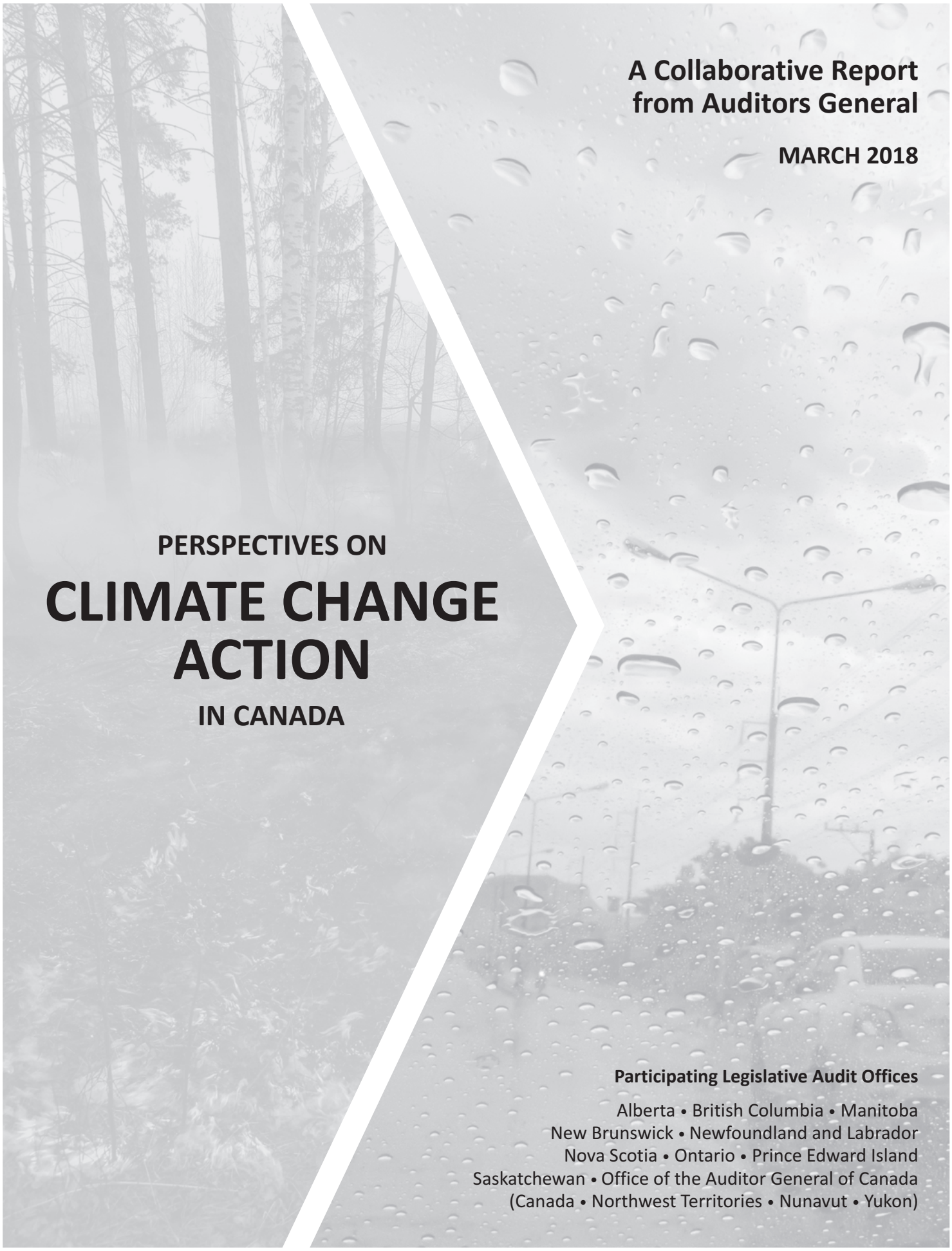

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Climate change has been identified as one of the defining challenges of our time. The impacts of a warming climate and extreme weather events are already being felt in Canada and are forecast to become more severe and more frequent. For example, an increase in the frequency and severity of wildfires and floods is expected. Beyond environmental and physical impacts, climate change is also expected to have significant economic and social impacts.

At the same time, Canada has missed two separate emission reduction targets (the 1992 Rio target and the 2005 Kyoto target) and is likely to miss the 2020 Copenhagen target as well. In fact, emissions in 2020 are expected to be nearly 20 percent above the target.

Given the importance of this issue and its relevance to all provinces and territories, Canada's auditors general agreed to work together to collaboratively examine government responses to climate change. This report is made possible by the substantial work of legislative audit offices across Canada and is the first time that nearly all legislative audit offices in Canada have coordinated their work in this way.

The participating audit offices worked together to develop a set of common questions related to mitigating and adapting to climate change. These questions were included as part of the audit work carried out. From 2016 to 2018, audit offices carried out this work and issued reports to their respective governments. The coordination of this work was done through the Office of the Auditor General of Canada by the Commissioner of the Environment and Sustainable Development.

We are pleased to make this summary of climate change action in Canada available to all legislators and Canadians on behalf of Canada's auditors general. Overall, we found that actions taken by governments to date to address climate change across the country have fallen short of the governments' commitments. This report identifies a number of key issues that exist in many jurisdictions across the country and provides critical questions that may be useful to consider as governments across Canada move forward on their climate change commitments.

We would like to thank the staff who participated in this project for their very important work.

A collaborative approach to assess climate change action in Canada

For more information on greenhouse gas emissions in Canada and on the current and future impacts of climate change across the country, see the **Background: Climate change in Canada** section of this report.

Governments across Canada consider climate change a defining challenge of the 21st century. Provincial, territorial, and federal governments have committed to taking significant steps to tackle climate change. Among other things, Canada has committed to meeting international agreements to reduce greenhouse gas emissions by certain levels by 2020 and 2030. The federal government has also worked with provinces and territories to create the Pan-Canadian Framework on Clean Growth and Climate Change, which is intended to provide a national plan to meet Canada's 2030 emission reduction target. Canadian governments have stated that creating an effective response to climate change requires the collaboration of all levels of government across Canada. This work includes

- creating long-term detailed action plans,
- actively involving partners and stakeholders in developing and implementing these action plans,
- implementing policies and practices across governments, and
- monitoring and reporting on progress.

Auditors general have an important role to play in promoting accountability in virtually all areas of government activity. Climate change is no exception. To assess climate change action in Canada, provincial auditors general, except the Auditor General of Québec,[1] partnered with the federal Commissioner of the Environment and Sustainable Development and the Office of the Auditor General of Canada, which carried out audit work for the three territories in its role as independent auditor for Canada's northern legislatures.

The overall objective of this collaborative project was to assess whether the federal, provincial, and territorial governments had met their commitments to reducing greenhouse gas emissions and adapting to climate change. Although each audit office performed its work independently, the offices worked together to develop a set of common questions related to climate change action to be included in the auditors' individual reports. This is the first time that so many legislative audit offices in Canada coordinated their work in this way. For details about the common questions and approach, see the **About the report** section.

This report summarizes audit findings from the reports presented by the provincial audit offices and the Office of the Auditor General of Canada to the provincial, territorial, and federal legislatures. The reports of the participating audit offices

[1] The Auditor General of Québec chose not to conduct new audit work on climate change because the office had recently published reports on the provincial government's measures for reducing greenhouse gas emissions. Therefore, in this report, participants refer to the auditors general of the federal government and the provinces excluding Quebec.

were completed between November 2016 and March 2018 and are available online (see Exhibit 10 in the **About the report** section). The purpose of this summary report is to

- provide a snapshot of key issues that are common across governments; and
- highlight findings and examples of climate change action from the federal, provincial, and territorial audit work.

Key issues identified in audits of climate change action in Canada

Canada's auditors general found that most governments in Canada were not on track to meet their commitments to reducing greenhouse gas emissions and were not ready for the impacts of a changing climate. On the basis of current federal, provincial, and territorial policies and actions, Canada is not expected to meet its 2020 target for reducing greenhouse gas emissions. Meeting Canada's 2030 target will require substantial effort and actions beyond those currently planned or in place. Most Canadian governments have not assessed and, therefore, do not fully understand what risks they face and what actions they should take to adapt to a changing climate.

The federal, provincial, and territorial audit work conducted found similar key issues. Although not necessarily reflective of all governments, these following key issues can be obstacles to Canada's overall efforts to respond to climate change and to deliver on its international climate change commitments.

More than half the governments did not have overall targets for reducing greenhouse gas emissions, and of those that did, only two were on track to meet their targets

Through their work, auditors found that **7 out of 12 provinces and territories** did not have an overall target for reducing greenhouse gas emissions by 2020 (Exhibit 2). Of the jurisdictions that had 2020 reduction targets, only 2—New Brunswick and Nova Scotia—were on track to meet them with current actions, based on domestic emission reductions. In addition, governments were using different baseline years for their targets or were setting different types of targets, such as overall emission reduction targets versus targets for specific sectors of the economy. Furthermore, governments were using different approaches for reducing emissions and different sources for estimating annual emissions. As a result, it was unclear how the federal, provincial, and territorial governments would measure, monitor, and report on their individual contributions to meeting Canada's national 2030 target.

Seven out of 12 provinces and territories did not have an overall target for reducing greenhouse gas emissions by 2020:

- Alberta
- Manitoba
- Northwest Territories
- Nunavut
- Prince Edward Island
- Saskatchewan
- Yukon

Many governments did not have detailed implementation plans to reduce greenhouse gas emissions. For the most part, auditors found that governments' plans to reduce greenhouse gas emissions consisted of high-level goals, with little guidance on how to implement actions. Details often missing from the plans included timelines, estimates of the reductions expected from individual action items, and information about funding (Exhibit 4).

Most governments had not fully assessed climate change risks and had not developed detailed adaptation plans

Auditors found that most governments had not fully assessed the risks of climate change across their jurisdictions. A lack of clear direction and guidance on assessing risk contributed to assessments that were neither consistent nor comparable across departments and jurisdictions. It is important for governments to systematically assess their risks in order to adapt to the changes to come and to allocate resources to the most pressing concerns.

Most provinces and territories had not developed detailed adaptation plans. Common shortcomings of the plans included no interim steps for reaching high-level commitments, no timelines indicating when actions would be accomplished, and no stated funding sources for planned actions (Exhibit 6).

There was limited coordination of climate change action within most governments

Audits at federal, provincial, and territorial levels found that there was limited coordination within governments around climate change action. For instance, departments that were assigned leadership roles on climate change often did not provide sufficient information, guidance, and training to the rest of the government. In many cases, limited coordination led to an ad hoc response to climate change. Without effective coordination, governments might overlook important opportunities or challenges, or develop redundant or contradictory policies.

Some governments were not reporting on progress in a regular and timely manner

Auditors from across the country found that some governments were not providing elected officials and the public with regular and timely progress reports on reaching the goals in their climate change action plans (Exhibit 8). Without regular monitoring and reporting on progress, the government cannot assess the effectiveness of plans, and Canadians cannot hold governments to account for their commitments.

Summarized findings about climate change actions in Canada

Mitigation
A human intervention to reduce the sources or enhance the **carbon sinks** of greenhouse gases.

Carbon sink
A natural or artificial reservoir that absorbs more carbon than it releases as carbon dioxide. Forests can be both carbon emitters and carbon sinks.

Adaptation
Actions to prevent or reduce the negative impacts of climate change and/or build on the positive impacts.

The following summarized findings reflect the results of the audit work of participating auditors general across the country on a set of common questions related to **mitigation** and **adaptation** actions. This summary report is based on assessments made independently by each audit office for its own government. Audit offices may have approached the common questions differently. The period covered by the audit work varied for each report. (See the **About the report** section for information on the offices' audit work, including the list of common questions.)

Reducing greenhouse gas emissions

Audit offices examined whether their governments had detailed action plans and targets for reducing greenhouse gas emissions, were on track to meet those targets, and were monitoring and reporting on progress. Audit offices used information from Environment and Climate Change Canada, their governments' own estimates of future emissions if available, and publicly available estimates of future emissions to determine whether governments were on track. A clear and measurable emission reduction target provides a benchmark against which progress can be measured. Targets also help promote transparency and accountability.

The federal government collaborated with provinces and territories to develop a national climate change framework. The Pan-Canadian Framework on Clean Growth and Climate Change, announced in December 2016, is intended to provide a national plan to meet Canada's 2030 emission reduction target. The framework takes an economy-wide approach to reducing emissions and includes carbon pricing (Exhibit 1), complementary policies across governments, and regular reporting on progress. At the time that the provincial audit reports were tabled, Saskatchewan and Manitoba had not signed the framework. In February 2018, Manitoba announced that it would sign the framework. Provincial and territorial audits did not assess the framework, because audit work began before the framework was released.

Exhibit 1
Some provinces have put a price on carbon

A key initiative in the Pan-Canadian Framework on Clean Growth and Climate Change is the use of carbon pricing. Carbon pricing is an economic mechanism intended to reduce greenhouse gas emissions. Common forms of carbon pricing are a carbon tax and a cap-and-trade system. Examples of both are in use in Canada.

Carbon taxes, or carbon levies, are typically applied to diesel fuel, gasoline, natural gas, and propane at the gas station and to heating bills. The rate is based on the amount of carbon pollution that is released by the fuel.

In 2008, British Columbia implemented a revenue-neutral carbon tax. This tax applies to the combustion or use of fuels in the province and is for emissions from both businesses and consumers. Given that different fuels emit different amounts of greenhouse gases, the tax rate varies by the type of fuel used. When implemented in 2008, the carbon tax rate

Exhibit 1
Some provinces have put a price on carbon (continued)

was $10 per tonne of carbon dioxide equivalent, and at the time of the provincial audit, the tax rate was $30 per tonne. The Government of British Columbia has committed to increasing the carbon tax to $50 per tonne by 2021.

In Alberta, under the Climate Leadership Plan released in 2015, the government implemented an economy-wide price on carbon that is expected to generate over $5 billion from 2017 to 2020. The carbon price has two components: a carbon levy applied to all transportation and heating fuels that emit greenhouse gases when burned, and carbon pricing applied to large industrial facilities. The government committed to fully reinvesting the revenue into Alberta's economy through actions that aim to reduce emissions while diversifying the economy.

Both Quebec and Ontario have cap-and-trade systems for reducing greenhouse gas emissions. Under these systems, businesses that emit greenhouse gases are required to buy "allowances" to cover those emissions. These allowances can be bought from the government or from other businesses that have extra allowances on hand. Each year, the total amount of allowances decreases, so emissions should decrease as well. As allowances become scarcer, they also become more expensive to acquire. Consequently, it becomes more and more cost-effective for a business to reduce its emissions. Ontario and Quebec have decided to link their cap-and-trade systems with each other and with California's, which means that businesses in all three jurisdictions will be able to trade allowances with each other. This could lead one province or state to claim an emission reduction that was achieved in another. This is expected to reduce the overall cost, because businesses could buy allowances at prices lower than it costs to make reductions, while others could sell excess allowances.

The Quebec cap-and-trade system was implemented in January 2013. It covers nearly 85 percent of greenhouse gas emissions from Quebec while limiting the number of targeted businesses. The prices of emission allowances are among the highest in North America. According to the government, the system is expected to generate approximately $3 billion from 2013 to 2020, to be deposited into the provincial government's Green Fund, which helps, among others, public organizations (including municipalities), companies, and citizens reduce emissions. In January 2014, Quebec linked its cap-and-trade system to California's.

Ontario launched its cap-and-trade system in January 2017, which it expects to cover around 80 percent of greenhouse gas emissions counted by the province. The government expects to raise about $8 billion between 2017 and 2020 from selling allowances. Although it expects to include emission reductions achieved outside of Canada in its estimated reductions, at the time of this report, the federal government measured historical emissions for Canada through its National Inventory Report, which measures only domestic, not international, emissions. Although Ontario's system was not linked to other jurisdictions at the time of the provincial audit, the government linked its system with California's and Quebec's in 2018.

The federal government developed a climate change charter, which outlines how it will keep track of its progress in implementing the framework. However, the federal government did not yet know how it would measure the contribution of each territory and province toward meeting the national 2030 emission reduction target. All provinces and territories stated in the Vancouver Declaration on Clean Growth and Climate Change, an agreement reached in 2016, that they intended to contribute to Canada's 2030 target. However, auditors found that only 3—New Brunswick, the Northwest Territories, and Ontario—had a 2030 emission target specific to their province or territory. In addition, governments were using different baseline years for their targets or were setting different types of targets, such as overall emission reduction targets versus targets for specific sectors of the economy.

In addition, of the 5 provinces that had overall reduction targets for 2020, only 2—New Brunswick and Nova Scotia—were on track to meet them, based on domestic emission reductions (Exhibit 2). In 2015, Nova Scotia reduced its greenhouse gas emissions by an amount greater than what was required by its 2020 greenhouse gas emission target. The provincial audit reported that some of the success was due to the government, such as setting targets for reducing emissions and increasing the use of renewable energy sources. External factors, such as the shutdown of two mills in 2012 and an increase in oil prices, likely also contributed.

Exhibit 2

Governments in Canada were aiming at different greenhouse gas emission targets, and few governments were on track to meet their targets

Jurisdiction[1]	Overall emission target for 2020	On track to meet 2020 reduction target[2]	Overall emission target for 2030
Canada	17% below 2005 emissions	⊗	30% below 2005 emissions
Alberta	None[3]	N/A	None[3]
British Columbia	33% below 2007 emissions	⊗	None
Manitoba	None	N/A	None[4]
New Brunswick	14.8 megatonnes of emissions (equivalent to 10% below 1990 emissions)	✓	10.7 megatonnes of emissions (equivalent to 35% below 1990 emissions)
Newfoundland and Labrador	10% below 1990 emissions	⊗	None
Northwest Territories	66% above 2005 emissions	N/A[5]	0% above 2005 emissions
Nova Scotia	10% below 1990 emissions	✓	6
Nunavut	None	N/A	None
Ontario	15% below 1990 emissions	7	37% below 1990 emissions
Prince Edward Island	None	N/A	None
Saskatchewan	None	N/A	None
Yukon	None[8]	N/A	None

✓ On track to meet 2020 target
⊗ Not on track to meet 2020 target

[1] The Auditor General of Québec chose to not conduct new audit work on climate change because the office had recently published reports on the provincial government's measures for reducing greenhouse gas emissions. See the **About the report** section for more information.

Exhibit 2

Governments in Canada were aiming at different greenhouse gas emission targets, and few governments were on track to meet their targets (continued)

[2] By using data from Environment and Climate Change Canada or their government's own estimates, audit offices assessed whether their governments were on track to meet their targets, if any. Audit offices conducted assessments independently for their governments on the basis of evidence available during the audit periods. Audit periods had varying end dates (between June 2016 and December 2017). See the **About the report** section for information on the audit work.

[3] Although Alberta does not have an overall target for reducing greenhouse gas emissions, the province set a cap on emissions from the oil sands sector and a target for methane emissions from the upstream oil and gas sector. The province also set targets for phasing out emissions from coal-generated electricity and for increasing renewable electricity to 30 percent of generation by 2030. A 2020 legislated target currently exists but is not used for Alberta's Climate Leadership Plan.

[4] The 2030 target established in December 2015 (33 percent below 2005 emissions) was under review at the time of the Manitoba audit.

[5] The Northwest Territories' 2020 emission target allows for an increase in greenhouse gas emissions.

[6] The Office of the Auditor General of Nova Scotia's audit did not consider targets beyond 2020.

[7] Ontario meeting its 2020 target depends on whether reductions achieved in Quebec and California under their linked cap-and-trade systems will be included. Such reductions are currently not included in Canada's historical emission reporting. To recognize emission reductions from Quebec and California, Ontario intends to separately report on progress toward meeting its 2020 target, apart from the National Inventory Report (an annual report on Canada's greenhouse gas emissions and sources). In this regard, Ontario, Quebec, and California have agreed to develop and implement a mechanism for accounting and reporting such reductions.

[8] Yukon did not have a territory-wide target but, instead, had sector-specific targets.

The federal government produces annual estimates of greenhouse gas sources and sinks in its National Inventory Report. Most provinces and territories use these estimates in their climate change planning. However, some governments have generated their own emission estimates that are different from the federal estimates. For instance, according to the Yukon government, officials determined on the basis of their analysis that the federal government had underestimated their territory's emissions. Therefore, officials calculated their own estimates of emissions, primarily from fuel consumption for transportation, heating, and electricity generation. Audit work in Nunavut found discrepancies between Nunavut's estimated greenhouse gas emissions and those reported in the National Inventory Report. In British Columbia, the provincial government compared the numbers in the National Inventory Report with those in provincial reporting and replaced data that was inconsistent.

Some provinces intended to include emission reductions achieved outside of their jurisdictions toward meeting their own provincial targets. For instance, Ontario, under its cap-and-trade system linked with Quebec and California, intends to include reductions achieved in those jurisdictions in its own emission accounting. At the time of this summary report, the federal government measured historical emissions for Canada through its National Inventory Report, which measures only domestic, not international, emissions. In the Pan-Canadian Framework on Clean Growth and Climate Change, the federal government committed to working with Ontario, Quebec, and other interested provinces and territories and international

partners to ensure that allowances purchased through international cap-and-trade systems can be counted toward Canada's target and are not double-counted. This will add to the complexities that the governments face when trying to measure contributions of provinces and territories.

Audit work shows that almost all provinces and territories, except Saskatchewan and the Northwest Territories, developed high-level mitigation strategies that included actions to reduce emissions. However, many governments did not know whether their planned actions would be enough to meet their emission reduction targets, or they knew that the planned actions would not be enough to do so. In addition, auditors of **eight provinces and territories** found that action items did not have all accompanying details, such as timelines, detailed implementation plans, and cost estimates. For example, although New Brunswick planned to have 20,000 electric vehicles on the road by 2030, it did not have a detailed implementation plan and timeline for achieving this goal, nor did it explain how the needed infrastructure would be developed. In another example, Manitoba announced plans to reduce emissions from the agricultural and waste sectors but provided few details as to how those goals would be achieved.

Eight provinces and territories' mitigation plans did not include details such as timelines, detailed implementation plans, and cost estimates:

- Alberta
- British Columbia
- Manitoba
- New Brunswick
- Nunavut
- Ontario
- Prince Edward Island
- Yukon

Saskatchewan and the Northwest Territories did not have a strategy.

As well, governments often did not estimate the reductions expected from individual action items. Such estimates would allow governments to show how each could contribute to reaching their provincial or territorial reduction targets.

An action that some provincial governments plan to use to reduce their greenhouse gas emissions is to expand forests and other sinks to remove greater amounts of carbon dioxide from the atmosphere (Exhibit 3).

Exhibit 3

Some governments plan to use carbon sinks to reduce greenhouse gas emissions

Climate change can be mitigated through enhancing carbon sinks. Carbon sinks absorb more carbon from the atmosphere than they release as carbon dioxide. British Columbia's 2016 Climate Leadership Plan included enhancing the carbon storage potential of the province's forests as a key action item. The government estimated that this initiative would result in nearly 12 megatonnes of reductions by 2050. This is almost 50 percent of the total reductions in the 2016 plan. However, auditors found that, given wildfire and other potential forest disturbances, there were risks that these reductions might not be achieved.

A forest can be a carbon sink

Photo: © karamysh / Shutterstock.com

A summary of the audit work on the governments' plans to reduce greenhouse gas emissions is in Exhibit 4.

Exhibit 4

Most governments' plans to reduce greenhouse gas emissions consisted of high-level goals, with little guidance on how to implement actions

Audit offices assessed whether governments had documented plans to meet commitments made to reduce greenhouse gas emissions. In general, auditors also assessed whether those plans included the following:

- a description of actions to be taken under the plan,
- a clear timeline for carrying out actions, and
- a clear description of roles and responsibilities.

Government[1]	Assessment by the audit office[2]
Federal	✓ Environment and Climate Change Canada worked collaboratively with provinces, territories, and other federal departments and agencies to develop a national climate change plan. ✗ The federal government did not show that existing regulations to reduce emissions would be enough to meet its 2020 reduction target. The government shifted its focus to meeting its 2030 target.
Alberta	✓ In 2015, the government released a climate change strategy called the Climate Leadership Plan. It includes four main policy areas, each with a target and timelines. ✓ Initially, an overall implementation plan was created and included expected outcomes for the four main policy areas; planned deliverables with timelines and forecasted funding for key actions; and information on governance, including some roles and responsibilities. ✗ The overall implementation plan did not include an overall emission target or rationale for not having one; expected results; clear roles and responsibilities, and mechanisms for coordination; significant areas of risk; or mechanisms to monitor and evaluate progress. ✗ The Alberta Climate Change Office stopped using the overall implementation plan but developed other planning tools, and only some lead departments have implementation plans for programs. ✓ Oversight processes, involving both senior management and Cabinet, supported the implementation of the Climate Leadership Plan.
British Columbia	✓ In August 2016, the government released the Climate Leadership Plan, which outlined the government's planned actions to reduce emissions. ✗ The plan did not build a clear and measurable pathway to meeting the province's emission reduction targets. ✗ The mitigation plan did not include a clear schedule for carrying out actions or detailed information about implementation.

[1] The Auditor General of Québec chose to not conduct new audit work on climate change because the office had recently published reports on the provincial government's measures for reducing greenhouse gas emissions. See the **About the report** section for more information.

[2] Audit offices conducted assessments independently for their government on the basis of evidence available during the audit periods. Audit periods had varying end dates (between June 2016 and December 2017). Assessments are summaries of findings from the audit work performed. See the **About the report** section for information on the audit work.

✓ Positive finding

✗ Negative finding

Exhibit 4

Most governments' plans to reduce greenhouse gas emissions consisted of high-level goals, with little guidance on how to implement actions (continued)

Government[1]	Assessment by the audit office[2]
Manitoba	✓ In 2008, the government issued a plan with a legislated target: to reduce greenhouse gas emissions to 6 percent below the 1990 level by 2012. ✗ The 2012 target was not met. The government was aware by the fall of 2009 that it would not be met, but it did not update the 2008 plan or the 2012 target until December 2015. ✗ The 2015 plan had only high-level strategies. The strategies lacked accompanying details, as well as estimates of expected emission reductions and costs. ✗ There was no comprehensive analysis of the benefits, risks, and costs of different approaches and policy tools to support either the 2008 or 2015 plan. The associated targets with both plans were not supported by scientific or economic analyses. ✗ In April 2016, the government announced that the targets set in the December 2015 plan were under review and that it was developing a new plan (which had not yet been released at the time of the provincial audit report's tabling).
New Brunswick	✓ Compared with previous versions of the province's climate change plans, the 2016 plan had many important updates and enhanced action items. ✗ Very few action items had timelines attached to them.
Newfoundland and Labrador	✓ The Office of Climate Change developed a Climate Change Action Plan intended to make progress toward achieving its greenhouse gas emission reduction targets. ✓ Most action items to reduce emissions that were examined were implemented by the government department or agency responsible. ✗ The mitigation action items outlined in the 2011 Climate Change Action Plan were not sufficient to allow the province to meet its 2020 target for reducing greenhouse gas emissions.
Northwest Territories	✗ The Department of Environment and Natural Resources, as the lead department for climate change, developed a territorial greenhouse gas strategy that expired in 2015. The emission targets in the strategy did not focus on reducing territorial emission levels nor set targets for major emitters. ✗ The strategy did not have an accompanying implementation plan or a clear description of roles and responsibilities. ✓ A new strategy was to be included in the Climate Change Strategic Framework and was scheduled to be released in 2018.
Nova Scotia	✓ In 2009, the government developed a climate change action plan, which included actions to meet the province's 2020 target for reducing greenhouse gas emissions. ✓ By 2015, most actions defined in the action plan were complete, and the province's greenhouse gas emissions were reduced below the 2020 target level.

[1] The Auditor General of Québec chose to not conduct new audit work on climate change because the office had recently published reports on the provincial government's measures for reducing greenhouse gas emissions. See the **About the report** section for more information.

[2] Audit offices conducted assessments independently for their government on the basis of evidence available during the audit periods. Audit periods had varying end dates (between June 2016 and December 2017). Assessments are summaries of findings from the audit work performed. See the **About the report** section for information on the audit work.

✓ Positive finding

✗ Negative finding

Exhibit 4

Most governments' plans to reduce greenhouse gas emissions consisted of high-level goals, with little guidance on how to implement actions (continued)

Government[1]	Assessment by the audit office[2]
Nunavut	✓ In 2007, the government released an energy strategy with a commitment to reducing greenhouse gas emissions. The strategy outlined over 40 actions designed to fulfill its objectives. ✗ Roles and responsibilities were not assigned to two thirds of actions, and there was no schedule or timelines for carrying out actions. There was also no implementation plan for the strategy. ✓ The government took actions to improve the energy efficiency of some government assets, such as power plants and public housing units. Improving the energy efficiency of government assets can help reduce demand for fossil fuels and help reduce greenhouse gas emissions.
Ontario	✓ The government released its first action plan for mitigating climate change in 2007, which contained targets for reducing greenhouse gas emissions. ✓ The government had various initiatives in the 2007 action plan to meet its 2014 target. By 2014, the Ministry of the Environment and Climate Change achieved significant reductions in greenhouse gas emissions, by closing all coal-fired power plants. ✗ Although Ontario had met its 2014 target, it had not measured the success of other initiatives in the action plan in achieving the expected emission reductions. ✓ In May 2016, Ontario legislated targets for reducing greenhouse gas emissions for 2020, 2030, and 2050. ✓ In June 2016, the government released a new five-year emission reduction plan, with a cap-and-trade system as the cornerstone. In the plan, revenues from cap-and-trade would fund various emission reduction initiatives. Subsequent to the provincial audit, the province announced the start of some of these initiatives. ✗ The estimated emission reductions from the initiatives in the 2016 plan were not supported by a thorough analysis or detailed plans. The estimated reductions were measured in isolation, and the government did not consider the overlapping effects when estimating the impact of the various initiatives on emissions.
Prince Edward Island	✓ The government had a 2008 strategy to reduce greenhouse gas emissions, which contained mitigation action items. ✗ The government did not update its 2008 strategy. ✗ There was a lack of formal coordination and unclear lines of authority and responsibility. ✗ Many action items did not have assigned timelines. ✓ During the audit, the Department of Communities, Land and Environment advised that a new provincial mitigation strategy was under development.

[1] The Auditor General of Québec chose to not conduct new audit work on climate change because the office had recently published reports on the provincial government's measures for reducing greenhouse gas emissions. See the **About the report** section for more information.

[2] Audit offices conducted assessments independently for their government on the basis of evidence available during the audit periods. Audit periods had varying end dates (between June 2016 and December 2017). Assessments are summaries of findings from the audit work performed. See the **About the report** section for information on the audit work.

✓ Positive finding

✗ Negative finding

Exhibit 4

Most governments' plans to reduce greenhouse gas emissions consisted of high-level goals, with little guidance on how to implement actions (continued)

Government[1]	Assessment by the audit office[2]
Saskatchewan	⊗ The government had not implemented a provincial mitigation plan. ✓ The Ministry of Environment was developing policies related to reducing greenhouse gas emissions, using the direction set in the government's October 2016 Climate Change White Paper.
Yukon	✓ The government had a 2009 Climate Change Action Plan, along with 2012 and 2015 progress reports, which identified commitments to reducing greenhouse gas emissions. ⊗ Milestones or completion dates were missing for most commitments. The plan and progress reports had no cost estimates for meeting the commitments or the plan overall. Many of the targets did not include estimates of reductions in greenhouse gas emissions. ✓ The plan set out overall roles and responsibilities of departments and corporations for climate change.

[1] The Auditor General of Québec chose to not conduct new audit work on climate change because the office had recently published reports on the provincial government's measures for reducing greenhouse gas emissions. See the **About the report** section for more information.

[2] Audit offices conducted assessments independently for their government on the basis of evidence available during the audit periods. Audit periods had varying end dates (between June 2016 and December 2017). Assessments are summaries of findings from the audit work performed. See the **About the report** section for information on the audit work.

✓ Positive finding

⊗ Negative finding

Adapting to a changing climate

Audit offices examined whether governments had adaptation action plans to respond to the impacts of climate change. Key elements of an adaptation action plan include

- a detailed government-wide assessment of climate change risks to support decision making,
- specific and measurable actions to respond to those risks, and
- regular monitoring and reporting on the progress in fulfilling the action plan.

Federal auditors found that the government's adaptation action plans fell short. The Federal Adaptation Policy Framework, announced in 2011, requires the federal government to effectively integrate climate change issues into its operations. However, auditors found that, even though Environment and Climate Change Canada was the federal lead on climate change, the Department did not provide the leadership, guidance, and tools to other departments and agencies to help them assess their risks and adapt to climate change. Moreover, only **5 federal departments and agencies** of the 19 examined undertook comprehensive assessments of the climate change risks to their mandates.

Five federal departments and agencies out of the 19 examined undertook comprehensive assessments of the climate change risks to their mandates:

- Fisheries and Oceans Canada
- Health Canada
- Indigenous and Northern Affairs Canada
- Natural Resources Canada
- Transport Canada

Similarly, in provinces and territories, auditors found that most governments had not fully assessed the risks of climate change across their jurisdictions. Of the audit offices that assessed whether their governments had undertaken a detailed, government-wide assessment of the risks, only Nova Scotia found that this had taken place. In 2005, the Government of Nova Scotia assessed how likely and severe climate change impacts could be, but it had not reviewed the assessment since 2005. The Government of Newfoundland and Labrador assessed the risks and opportunities associated with climate change impacts; however, the audit

office did not examine whether the risk assessment was detailed and government-wide.

In most other provinces and territories, risk assessments were completed for individual communities, sectors, or government departments. For example, the Government of Nunavut assessed the risks of climate change to sources of drinking water in communities and to the mining industry, and the Government of British Columbia assessed the risks to specific sectors, such as mining and agriculture. However, without a government-wide assessment, governments cannot prioritize and assign resources to manage risks efficiently. As a result, auditors found that adaptation actions were often case by case or ad hoc.

Northern Canada is particularly vulnerable to the impacts of climate change. One of the risks that governments in Canada's north must assess is permafrost degradation (Exhibit 5).

Exhibit 5
Permafrost degradation in Canada's north is a significant risk

Varying types of permafrost underlie Canada's northern regions, including most of the communities in the three territories and the northern regions of several provinces. As the climate has warmed, permafrost has begun to thaw, creating risks for infrastructure. Permafrost degradation has contributed to structural problems in buildings, such as shifting, distress and settlement of foundations, cracking of walls, and warping of doors. Permafrost degradation has also contributed to shifting, slumping, and sinkholes for roads.

In 2017, the Office of the Auditor General of Canada reported on the impact of permafrost on government buildings and roads and highways in an audit of capital asset management in Yukon. Auditors found that the Department of Highways and Public Works had taken action to evaluate, monitor, and remediate roads and highways that were affected by the degradation of thaw-sensitive permafrost. However, auditors also found that the Department had not conducted geotechnical, geophysical, and engineering investigations on buildings that had been identified as at risk because of permafrost degradation.

In the Northwest Territories, the Department of Infrastructure did not consistently follow its own maintenance practices for managing permafrost risks to public buildings. Inspections of thermosyphon systems (systems used to keep a foundation and surrounding permafrost cold) were not always conducted as required. In contrast, the Department did routinely inspect buildings with wooden foundations affected by permafrost degradation.

In Nunavut, audit work found that the Department of Community and Government Services, along with various partners, had developed maps for seven communities identifying areas unsuitable for development due in part to risks from changing permafrost. The audit also found that the Department and the Nunavut Housing Corporation had measures to safeguard government buildings from the impact of climate change on permafrost; however, these measures were not fully implemented. For example, building assessments that can identify problems due to permafrost degradation were not conducted as scheduled, while best practices for managing snow and water around buildings were not fully reflected in these organizations' operations and maintenance procedures.

At the federal level, thawing permafrost was also identified as a high risk. Both Natural Resources Canada and Transport Canada identified thawing permafrost as posing risks to their respective program areas, including natural resource development and northern airports. In response, Natural Resources Canada provided geoscientific expertise to land-use planners, and industry partners and Transport Canada conducted infrastructure engineering assessments of three northern airports to identify vulnerabilities.

There is no one approach to assessing climate change risks. There are a number of models and methods that can be used. Auditors reviewed available guidance from the Treasury Board of Canada Secretariat, Environment and Climate Change Canada, and non-governmental organizations, and looked for similarities when developing expectations. Auditors of the federal adaptation plans found that departments needed clear direction and standardized guidance on conducting climate change risk assessments and that the lack of this information contributed to the limited risk assessment work done. In British Columbia, the risk assessments that were completed all had different methodologies and approaches, leading to a lack of comparability or understanding of how the assessments work together.

At the provincial and territorial level, auditors found that **8 out of 12 provinces and territories** developed high-level climate change adaptation strategies, but most had not developed a detailed adaptation plan. There were a number of common shortcomings with the adaptation strategies. Many of the adaptation strategies outlined high-level commitments, but few had an implementation plan that spelled out the more manageable interim steps needed to reach these commitments. Some audits also raised concerns that planned actions did not have stated funding sources, and there was no timeline indicating when action items would be accomplished. In Prince Edward Island's climate change strategy, the timeline, estimated financial costs, method for measuring results, and assignment of responsibility were not outlined for each adaptation action item.

A summary of the audit findings on the governments' plans to adapt to climate change is in Exhibit 6.

Eight out of 12 provinces and territories had high-level climate change adaptation strategies:

- British Columbia
- New Brunswick
- Newfoundland and Labrador
- Nova Scotia
- Nunavut
- Ontario
- Prince Edward Island
- Yukon

Alberta, Manitoba, the Northwest Territories, and Saskatchewan did not have an adaptation strategy.

Exhibit 6

Most governments had not fully assessed climate change risks and had not developed a detailed plan to adapt to the impacts of a changing climate

Most audit offices assessed whether governments had conducted a detailed, government-wide assessment of climate change risks, including the identification and prioritization of risks.[1]

Audit offices also assessed whether governments had documented plans to adapt to possible impacts of climate change. In general, auditors also assessed whether those plans included the following:

- a description of actions to be taken under the plan,
- a clear timeline for carrying out actions, and
- a clear description of roles and responsibilities.

Government[2]	Assessment by the audit office[3]
Federal	⊗ Few federal departments and agencies assessed or acted on the climate change risks related to their areas of responsibility. ⊗ Environment and Climate Change Canada did not develop an adaptation action plan. ⊗ Environment and Climate Change Canada did not provide adequate leadership and guidance to other federal organizations to achieve adaptation objectives. ✓ The federal government began to make progress under the Pan-Canadian Framework on Clean Growth and Climate Change.
Alberta	✓ In 2016, the Alberta Climate Change Office commissioned work to compile research from over 300 studies on the climate change risks to Alberta and to recommend adaptation strategies for the key areas affected. ⊗ A comprehensive summary of risks exists, but the risks have not been assessed to provide a basis for developing an adaptation strategy. ⊗ The government had not developed a strategy outlining the approach for Alberta to adapt to a changing climate.
British Columbia	✓ The government completed risk assessments for different sectors in the province, such as agriculture, mining, and specific road segments. ⊗ There was no government-wide comprehensive risk assessment, and the government had not prioritized the risks. ✓ In 2010, the government released Preparing for Climate Change: British Columbia's Adaptation Strategy, which provides general direction for adaptation in the province. ⊗ The strategy did not include clear deliverables, roles and responsibilities, timelines, and dates of completion.

[1] The Office of the Auditor General of Newfoundland and Labrador's assessment was limited to determining whether the government had assessed the risks and opportunities associated with the impacts of climate change.

[2] The Auditor General of Québec chose to not conduct new audit work on climate change because the office had recently published reports on the provincial government's measures for reducing greenhouse gas emissions. See the **About the report** section for more information.

[3] Audit offices conducted assessments independently for their governments on the basis of evidence available during the audit periods. Audit periods had varying end dates (between June 2016 and December 2017). Assessments are summaries of findings from the audit work performed. See the **About the report** section for information on the audit work.

✓ Positive finding

⊗ Negative finding

Exhibit 6

Most governments had not fully assessed climate change risks and had not developed a detailed plan to adapt to the impacts of a changing climate (continued)

Government[2]	Assessment by the audit office[3]
Manitoba	✗ There had been no systematic identification of risks, nor was there a comprehensive adaptation plan with coordinated priorities and funding. ✓ In 2011, Cabinet tasked an interdepartmental working group, chaired by the Department of Sustainable Development, with assessing provincial climate change risks and developing comprehensive adaptation strategies. ✗ As of July 2017, the Department had made little progress. It had developed a template and guide to help departments identify risks, but it had not yet shared these with the departments. ✓ Some adaptation activities were under way because departments were generally aware of and beginning to plan for potential climate change impacts and opportunities on their own.
New Brunswick	✓ Vulnerability assessments had been completed in 46 communities. ✗ No provincial comprehensive risk assessment was conducted. ✓ The province had a fairly comprehensive adaptation plan that outlined many clear and important actions to be taken. ✗ However, the plan lacked details on how the targets would be achieved, and most actions did not have associated timelines.
Newfoundland and Labrador[1]	✓ The Office of Climate Change assessed risks and opportunities associated with the impacts of climate change. ✓ The Office of Climate Change developed a Climate Change Action Plan to support the province's adaptation to the impacts of climate change. ✓ The government had implemented all adaptation action items examined. ✓ The Office of Climate Change monitored progress of all adaptation action items. However, the effectiveness of the adaptation action items will be determined in the future.
Northwest Territories	✗ There was no comprehensive risk assessment for the territory. ✗ There was no territorial adaptation plan despite long-standing commitments to developing one. ✓ A territorial adaptation plan was to be included in the Climate Change Strategic Framework, which was planned to be issued in 2018.
Nova Scotia	✓ The government assessed climate change risks (in 2005), developed a provincial action plan (2009), and developed a process to promote climate change planning in government departments (2014). ✓ Most actions from the 2009 plan were completed by 2015. ✗ The government had not reviewed the assessment since 2005 to see whether changes to risk ratings were needed, and not all departments were involved in the adaptation planning process. ✗ Further plans and actions were needed.

[1] The Office of the Auditor General of Newfoundland and Labrador's assessment was limited to determining whether the government had assessed the risks and opportunities associated with the impacts of climate change.

[2] The Auditor General of Québec chose to not conduct new audit work on climate change because the office had recently published reports on the provincial government's measures for reducing greenhouse gas emissions. See the **About the report** section for more information.

[3] Audit offices conducted assessments independently for their governments on the basis of evidence available during the audit periods. Audit periods had varying end dates (between June 2016 and December 2017). Assessments are summaries of findings from the audit work performed. See the **About the report** section for information on the audit work.

✓ Positive finding

✗ Negative finding

Exhibit 6

Most governments had not fully assessed climate change risks and had not developed a detailed plan to adapt to the impacts of a changing climate (continued)

Government[2]	Assessment by the audit office[3]
Nunavut	✗ The government had identified potential climate change risks but did not rank the risks in terms of impact or likelihood. ✓ The government assessed some risks, such as the impact of climate change on sources of drinking water and on the mining sector. ✓ In 2011, the Department of Environment released an adaptation strategy. ✗ The strategy lacked clear and measurable commitments, timelines, and roles and responsibilities. The government did not have an implementation plan.
Ontario	✓ In 2007, the Ministry of the Environment and Climate Change assembled an Expert Panel on Climate Change Adaptation to consider the potential climate change risks to Ontario. ✓ In 2011, the Ministry released an adaptation strategy and action plan for 2011 to 2014 in response to a 2009 report of the Expert Panel. The plan listed actions to be undertaken by various ministries. ✗ In 2016, only 30 percent of the action plan items had been completed. The Ministry did not have the authority to require other ministries to complete the actions in the plan. ✗ At the time of the audit, the Ministry also had not reviewed the 2011 action plan to determine whether it should be updated to reflect current information.
Prince Edward Island	✓ Some adaptation work was completed. ✗ The government had no documented comprehensive risk assessment. ✗ Adaptation action items did not have assigned responsibilities and timelines. ✓ During the audit, the Department of Communities, Land and Environment advised that a new provincial adaptation strategy was under development.
Saskatchewan	✗ The Ministry of Environment had not completed a provincial risk assessment. It was in the process of collecting risk assessment information from other government agencies. ✗ The government had not implemented a provincial adaptation plan. ✓ The Ministry of Environment was leading the development of a coordinated provincial adaptation plan, using the direction set in the government's October 2016 Climate Change White Paper.
Yukon	✗ The government did not complete a comprehensive, territory-wide risk assessment before it developed any of its adaptation commitments. ✓ The 2009 Climate Change Action Plan and the 2012 and 2015 climate change action plan progress reports identified commitments to adapting to climate change. ✗ Milestones or completion dates were missing for most commitments and had no cost estimates. ✓ The 2009 action plan set out overall roles and responsibilities of departments and corporations for matters related to climate change.

[1] The Office of the Auditor General of Newfoundland and Labrador's assessment was limited to determining whether the government had assessed the risks and opportunities associated with the impacts of climate change.

[2] The Auditor General of Québec chose to not conduct new audit work on climate change because the office had recently published reports on the provincial government's measures for reducing greenhouse gas emissions. See the **About the report** section for more information.

[3] Audit offices conducted assessments independently for their governments on the basis of evidence available during the audit periods. Audit periods had varying end dates (between June 2016 and December 2017). Assessments are summaries of findings from the audit work performed. See the **About the report** section for information on the audit work.

✓ Positive finding

✗ Negative finding

Coordinating climate change action

Federal auditors found that Environment and Climate Change Canada worked collaboratively with provinces and territories to develop the Pan-Canadian Framework on Clean Growth and Climate Change, released in December 2016, which is intended to provide a national plan to meet Canada's 2030 emission reduction target. The framework also focused on increasing clean technologies and adapting to climate change. In addition, federal, provincial, and territorial ministers agreed to discuss climate change on an ongoing basis at the Canadian Council of Ministers of the Environment. Coordination on climate change is critical given that substantial emission reductions are needed to meet national targets and that climate impacts will be felt across Canada.

Findings on coordination within the federal government were mixed. Environment and Climate Change Canada coordinated with other federal departments to implement actions to reduce greenhouse gas emissions outlined in the framework. However, they did not provide adequate leadership and guidance to other federal organizations to achieve adaptation objectives. For example, the Department did not coordinate resource sharing and best practices among federal departments and agencies.

Out of the 10 audit offices that assessed whether government departments had coordinated their actions, **7 audit offices** found that the departments had challenges. In some cases, a "lead" department or agency on climate change was established, but that lead did not provide the required leadership, expertise, or advice to other departments or to municipal governments. For instance, in Prince Edward Island, the lead department on climate change was not always involved in, and sometimes was not aware of, the actions of other departments. Similarly, in Ontario, the Ministry of Environment and Climate Change was the lead for coordinating and reporting on the progress of climate change initiatives, but it did not have the authority to require ministries to take specific actions to reduce emissions or reduce harm caused by climate change. In another example, in the Northwest Territories, although the Department of Environment and Natural Resources was assigned a leadership role on climate change, it did not determine what resources and authorities it would need to provide effective leadership to other departments. Alberta was one of the three governments where auditors found that climate change action was coordinated across government departments. A Cabinet committee was created to support the implementation of the province's Climate Leadership Plan. Given the cross-ministry involvement in implementing Alberta's climate change programs, committees of deputy ministers and assistant deputy ministers were also formed to review advice to the Cabinet committee and monitor implementation activities.

Audit work found that coordination is also required with other levels of government in Canada (Exhibit 7).

Seven audit offices found challenges with coordination:

- British Columbia
- Manitoba
- Northwest Territories
- Nova Scotia
- Ontario
- Prince Edward Island
- Saskatchewan

Alberta, New Brunswick, and Yukon coordinated climate change action across government departments.

Exhibit 7

Governments could better support communities to adapt to the impacts of climate change

Climate change could affect many Canadian communities, where local governments are responsible for things such as roads and buildings. In Nova Scotia, the Department of Municipal Affairs required municipalities to submit climate change action plans. The Office of the Auditor General of Nova Scotia examined five plans and found that they aligned well with the significant risks identified in the province's 2005 risk assessment and that they contained actions to reduce the impacts.

Auditors in Ontario and British Columbia found that local governments needed more support to adapt to climate change. In Ontario, the Ministry of the Environment and Climate Change had not provided sufficient tools, such as weather modelling, or adequate guidance to help municipalities address their respective risks. In British Columbia, the provincial government provided local governments with limited and inconsistent support for adapting to climate change. Auditors also found that the Northwest Territories Department of Environment and Natural Resources had not identified the climate change information that communities required to make effective adaptation decisions or had not done enough to help communities access the significant amount of information that already existed for the territory.

Reporting on progress

Audit work showed limited monitoring and reporting on progress on actions to mitigate or adapt to climate change (Exhibit 8). As part of the requirements under the United Nations Framework Convention on Climate Change, the federal government produces annual and semi-annual reports on greenhouse gas emissions and actions. **Six out of 12 provinces and territories** were regularly informing the public on the status and results of their actions taken to reduce emissions. The Ontario government did not report regularly; however, the province's Environmental Commissioner reported annually to the Legislative Assembly on Ontario's progress in reducing greenhouse gas emissions. Although Prince Edward Island's climate change strategy called for the government to prepare an annual climate change report beginning in 2009, as of the date of the province's audit report, the government had not done so. For transparency and accountability, it is important that governments monitor and regularly report on their progress toward accomplishing the items in their climate change action plans.

Six out of 12 provinces and territories were regularly informing the public on the status and results of their actions taken to reduce emissions:

- Alberta
- British Columbia
- New Brunswick
- Newfoundland and Labrador
- Nova Scotia
- Yukon

Some audits at the provincial and territorial level found that governments were not reporting on costs. Manitoba's Department of Sustainable Development reported on climate change progress achieved by the end of 2010 and 2012, but the reporting did not include the cost of the actions. While Alberta's first progress report showed the expected emission reductions up to 2030, it did not clearly state the expected and actual costs of the overall Climate Leadership Plan. Also missing for each program was the expected cost needed to achieve those reductions.

Many offices found a gap in public reporting on adaptation actions. For example, in Manitoba, the 2012 public report on climate change progress, which was the most recent public report at the time of the provincial audit, mostly focused on progress on reducing greenhouse gas emissions. It had only a small section devoted to Manitoba's progress in adapting to climate change impacts.

Nova Scotia's Minister of Environment reported annually to the House of Assembly on progress on environmental goals and environmentally sustainable economic development, but these reports did not include updates on most adaptation actions.

A summary of the audit findings on the government's reporting on climate change progress is in Exhibit 8.

Exhibit 8
Most governments were not reporting on progress in a regular and timely manner

Audit offices assessed whether governments had developed adequate processes to monitor progress on achieving the goals of their climate strategies and had provided timely and public reporting on that progress. In general, auditors assessed whether governments had monitoring and reporting procedures that included the following:

- procedures for monitoring actual results to determine whether strategies were having their intended impacts,
- timely and regular public reports on progress on actions to mitigate and adapt to climate change, and
- regular estimates of greenhouse gas emissions.

Government[1]	Assessment by the audit office[2]
Federal	✓ The federal government annually reported on historical and projected greenhouse gas emissions. ✗ The government did not consistently report publicly on the results of implementing its regulations for reducing emissions. ✗ The government did not clearly indicate how it would measure, monitor, and report on provincial and territorial contributions to meet Canada's 2030 target. ✓ The government made progress on its national and international reporting on projected greenhouse gas emissions.
Alberta	✓ The first progress report contained overall expected benefits, key policies and action areas, and detailed information on programs, including the programs' actual costs and achievements for the 2016–17 fiscal year. ✗ Clear and complete information on the cost of the Climate Leadership Plan was missing. ✗ Processes to monitor progress were not sufficiently rigorous or efficient. There was no consolidated tracking system that contained all the information needed to effectively monitor and report on progress for all programs under the Climate Leadership Plan.
British Columbia	✓ The government issued reports on progress to reduce emissions according to its legislated requirements. ✗ Reporting done in 2016 provided less detail than reporting in 2012 and 2014. ✗ Public reporting on adaptation has been limited.

[1] The Auditor General of Québec chose to not conduct new audit work on climate change because the office had recently published reports on the provincial government's measures for reducing greenhouse gas emissions. See the **About the report** section for more information.

[2] Audit offices conducted assessments independently for their governments on the basis of evidence available during the audit periods. Audit periods had varying end dates (between June 2016 and December 2017). Assessments are summaries of findings from the audit work performed. See the **About the report** section for information on the audit work.

✓ Positive finding

✗ Negative finding

Exhibit 8

Most governments were not reporting on progress in a regular and timely manner (continued)

Government[1]	Assessment by the audit office[2]
Manitoba	✗ The Department of Sustainable Development did not report annually on climate change progress or disclose related costs. ✓ As required by legislation, the Department reported on the climate change results achieved by the end of 2010 and 2012. It is also required to report every fourth year thereafter (within one year of the year to which the report relates). ✗ The 2010 and 2012 reports focused mostly on progress in reducing emissions and had little information on progress in adapting to climate change impacts.
New Brunswick	✓ The province regularly reported to the public on progress toward greenhouse gas reduction targets. ✗ The reports were not always timely. As of May 2017, the 2015–16 progress report had not been published.
Newfoundland and Labrador	✓ The Office of Climate Change reported to the public on progress of mitigation action items and progress toward achieving the government's 2020 target for reducing greenhouse gas emissions. ✓ The Office of Climate Change reported to the public on adaptation action items.
Northwest Territories	✗ The Department of Environment and Natural Resources did not monitor or report on progress against commitments or results of the territorial greenhouse gas emission strategy.
Nova Scotia	✓ The government regularly reported on progress toward greenhouse gas reduction targets and other actions to reduce emissions. ✗ There was limited public reporting on progress toward completing the climate change action plan and what the government was doing to address climate change.
Nunavut	✗ There was little monitoring of the implementation of climate change strategies. ✗ There was no public reporting against climate change strategies.
Ontario	✓ As of the 2007–08 fiscal year, the Ministry of the Environment and Climate Change committed to reporting annually on emission levels and its plans to reduce emissions. ✓ In 2009, the government amended the Environmental Bill of Rights to require Ontario's Environmental Commissioner to report annually to the Legislative Assembly on Ontario's progress in reducing greenhouse gas emissions. ✗ Although the Ministry published its own annual reports in 2008 to 2010, and in 2012 and 2014, it did not publish annual reports in 2011 or 2013. In the years that the Ministry did report, its reporting did not link reductions in emissions to individual initiatives, making it difficult to evaluate the effectiveness of those initiatives. ✗ At the time of the 2016 audit, the Ministry had publicly reported on the status of its 2011 adaptation plan only once, in 2012.

[1] The Auditor General of Québec chose to not conduct new audit work on climate change because the office had recently published reports on the provincial government's measures for reducing greenhouse gas emissions. See the **About the report** section for more information.

[2] Audit offices conducted assessments independently for their governments on the basis of evidence available during the audit periods. Audit periods had varying end dates (between June 2016 and December 2017). Assessments are summaries of findings from the audit work performed. See the **About the report** section for information on the audit work.

✓ Positive finding

✗ Negative finding

Exhibit 8

Most governments were not reporting on progress in a regular and timely manner (continued)

Government[1]	Assessment by the audit office[2]
Prince Edward Island	⊗ The government did not regularly report to the public on progress in reducing greenhouse emissions and implementing adaptation action items.
Saskatchewan	⊗ The government did not implement a provincial mitigation plan or a provincial adaptation plan. ⊗ The Ministry of Environment did not publish reports on the province's greenhouse gas emissions, because it recognized that Canada's public reports included specific information on Saskatchewan's greenhouse gas emissions.
Yukon	✓ The Climate Change Secretariat monitored and documented progress on the government's outstanding commitments every 6 to 12 months. ⊗ In its 2009 action plan, the government committed to reporting on progress regularly; however, it did not define what "regularly" meant. The government produced progress reports in 2012 and in 2015. ⊗ There were weaknesses in reporting on the government's progress on its commitments. For example, the reports did not include the costs of carrying out commitments, and it was difficult for readers to follow their progress. ✓ The government tracked territory-wide emission levels over time.

[1] The Auditor General of Québec chose to not conduct new audit work on climate change because the office had recently published reports on the provincial government's measures for reducing greenhouse gas emissions. See the **About the report** section for more information.

[2] Audit offices conducted assessments independently for their governments on the basis of evidence available during the audit periods. Audit periods had varying end dates (between June 2016 and December 2017). Assessments are summaries of findings from the audit work performed. See the **About the report** section for information on the audit work.

✓ Positive finding

⊗ Negative finding

Moving forward on climate change

A number of critical questions arise from the audit results that may be useful to consider as governments across Canada move forward on their climate change commitments. The following are some questions that legislators and Canadians can ask of their governments.

Mitigation

A national 2030 target for reducing greenhouse gas emissions has been established; however, it is unclear how Canada will meet this target. Although it is important for governments to set broad goals around climate change, they must also provide detailed timelines and interim steps for achieving these goals.

- How will federal, provincial, and territorial governments collaborate to reach Canada's national 2030 target for reducing greenhouse gas emissions?
- Should emission reductions achieved in other jurisdictions be counted as part of Canada's greenhouse gas emission reductions?
- What will governments do to demonstrate that they will be able to reach their goals?
- How will these actions be funded?
- How will the costs of action and lack of action be calculated and reported to the public?
- When will each step be completed?

Adaptation

Although most governments had high-level adaptation strategies, auditors found little evidence that governments were systematically evaluating the risks posed by a changing climate or were prioritizing risks for action. This means that governments may not know if resources are being directed to the most important risks.

- What steps will governments take to ensure that they have a solid understanding of their climate change risks?
- Is common guidance or direction needed for assessing climate change risks?
- As they dedicate resources to adaptation actions, how will governments across Canada ensure that the most pressing risks are being prioritized?

Coordination

Most auditors across the country found that there was limited coordination among government departments and agencies, and where included in the audit scope, between provinces or territories and local governments. Without effective coordination, government responses to climate change may be ad hoc and inefficient.

- How will governments ensure that all the relevant players are involved in developing climate change strategies?
- How will governments ensure that lead departments on climate change are given the resources and authority they need to provide leadership to other departments and agencies?
- How will governments ensure that policies within different jurisdictions are complementary rather than redundant or contradictory?

Monitoring and reporting

Auditors found that governments were often not monitoring their progress on climate change and not reporting regularly to the public on that progress.

- What steps will governments take to regularly keep the public informed of their progress toward meeting their climate change commitments?
- What measures will governments use to assess their progress?

Response from the Deputy Ministers of the Canadian Council of Ministers of the Environment

This collaborative report reaffirms that climate change is a significant global challenge that requires close collaboration across all levels of government and among jurisdictions around the world. The report was compiled to provide an independent review of climate action.

The scope of the report in some cases dates back to 2006. Although many jurisdictions undertook important work during the audit periods, action on climate change has significantly accelerated and grown in recent years. Since 2016, jurisdictions have made important progress toward advancing action on climate change, and notable recent developments are not captured in the underlying audits. Federal, provincial, and territorial governments acknowledge the issues and recommendations in the report and have already addressed many of them.

The Paris Agreement signalled a global consensus on the urgent need for action on climate change. The Pan-Canadian Framework on Clean Growth and Climate Change, adopted in December 2016, is Canada's collective federal-provincial-territorial plan to grow the economy while reducing emissions and building resilience to a changing climate. Recognizing the importance of public engagement on climate action, the development of the framework involved extensive engagement with Canadians, businesses, non-governmental organizations, and others. Indigenous peoples also provided important considerations and recommendations that helped shape the framework. It includes more than 50 concrete measures spanning all sectors of the economy. Jurisdictions have their own respective climate change strategies, and significant funding has been mobilized at all levels.

Mitigation

Through the Vancouver Declaration on Clean Growth and Climate Change, first ministers agreed to take ambitious action in support of meeting or exceeding Canada's 2030 target of a 30 percent reduction below 2005 levels of greenhouse gas emissions. They also agreed to increase the level of ambition of environmental policies over time in order to drive greater greenhouse gas emission reductions, consistent with the Paris Agreement. Several jurisdictions have established more ambitious targets, supported by action plans.

In 2017, governments took the necessary steps to reduce greenhouse gas emissions, building on the leadership and actions already taken by provinces and territories. Funding has been mobilized, greenhouse gas regulations have been drafted and consulted on, and new policies and programs are being established and implemented in all jurisdictions.

Although the focus of mitigating climate change has been on reducing domestic emissions, governments committed through the Pan-Canadian Framework on Clean Growth and Climate Change to exploring international collaborative mechanisms, as anticipated in the Paris Agreement, and to working with international partners to ensure trade rules support climate policy.

Canada's Seventh National Communication and Third Biennial Report, submitted in December 2017 to the United Nations, shows that Canada is making strong progress toward its 2030 climate target. The report shows the biggest improvement in Canada's emission outlook since reporting began—a widespread decline in projected emissions across all economic sectors, reflecting the breadth and depth of the framework and actions being taken by individual jurisdictions. In jurisdictions that are part of the Western Climate Initiative (the linked cap-and-trade systems of Ontario, Quebec, and California), the transfer of international allowances will contribute to these reductions.

Adaptation

Increasing resilience to climate change is a priority. Building on actions already under way in individual jurisdictions, the Pan-Canadian Framework on Clean Growth and Climate Change identifies priority actions for governments to collectively build resilience and respond to climate change impacts. New investments in adaptation and climate resilience have been announced, new programs are being established, codes and standards for climate resilience are under development, and initiatives to build regional capacity for adaptation action have been launched. Various governments across the country have also committed to completing climate change risk assessments, a vital tool for informing adaptation strategies and action.

Coordination

The Pan-Canadian Framework on Clean Growth and Climate Change is a collaborative effort, requiring coordination across all sectors of the economy and implicating multiple governmental portfolios. A governance structure was established to support coordination, including nine federal-provincial-territorial ministerial tables responsible for delivering and reporting on framework measures. The Canadian Council of Ministers of the Environment plays a key role in this coordination.

Monitoring and reporting

To enhance transparency and effective communication to Canadians, the work of the nine ministerial tables culminates in publishing an annual report for first ministers. The first annual report was released in December 2017. These reports supplement other reporting, including by provinces and territories.

Although good progress has been made to date, governments are committed to continuing to work together to maintain momentum and achieve results. This continued work includes implementing carbon pricing systems across Canada in 2018. It also includes developing and finalizing a variety of regulations, policies, and programs, including a pan-Canadian collaboration on electricity grid interconnections, building codes, and a zero-emission vehicle strategy. Other work includes launching new programs to support adaptation and climate resilience, investing in green infrastructure, deepening engagement on clean technology innovation, and ensuring effective implementation of clean technology investments. In taking action, jurisdictions will continue to take into account, as applicable, issues raised during the audit process.

About the report

This report summarizes audit findings from the reports presented by provincial audit offices and the Office of the Auditor General of Canada to the provincial, territorial, and federal legislatures. The overall objective of this project was to determine the extent to which federal, provincial, and territorial governments in Canada were meeting commitments to reducing greenhouse gas emissions and adapting to climate change. Considering the shared responsibilities for climate change in Canada, auditors general agreed that, by working together, they could examine these issues more comprehensively. This project is the first time that so many audit offices in Canada coordinated their work in this way.

The collaborative approach draws on methodology developed for international collaborative audits as well as previous work completed in Canada in 2010, where six provincial audit offices and the federal audit office conducted audit work on electronic health records. The approach was a flexible model whereby each participating audit office chose its own objectives and incorporated a set of common questions to report on its government's climate change actions, including adaptation strategies, and targets for reducing greenhouse gas emissions.

The participating audit offices worked together to develop a set of common questions related to mitigation and adaptation actions that could be included in their individual reports. In some cases, audit work covered more than the minimum questions. For example, Ontario looked in detail at the province's cap-and-trade system, and New Brunswick examined the provincial power utility, NB Power. The common questions are in Exhibit 9.

Exhibit 9
Common mitigation and adaptation questions

Mitigation	What targets related to mitigation of greenhouse gas emissions has the government adopted? Do documented strategies or plans exist to meet these commitments? Is the government on track in meeting intended targets? Which ones have been met and which ones have not been met? Does the government have an adequate process to monitor progress? Are there regular reports to the public or to other stakeholders? What elements are being reported on? Is the reporting regular and timely? What policy instruments, actions, or initiatives are expected to result in significant greenhouse gas emission reductions?
Adaptation	Has the government produced a national/provincial/territorial specific risk assessment? Has the government developed a policy/plan/strategy on adaptation? Has the government implemented their actions as outlined in their policy/plan/strategy? Does the government know whether they are on track to implement their policy/plan/strategy?

Audits were conducted by the Office of the Auditor General of Canada and participating audit offices from 2016 to 2018 in accordance with the reporting schedules of their respective legislatures. This report is a summary of audit work, and not all statements apply to all governments. This summary report does not take into account any progress made by a government following the tabling of its audit office's report. The audit reports are available online (Exhibit 10).

Exhibit 10
Information on offices' audit work

Office	Report title, publication date, and focus of audit work	Period covered by the audit
Federal	2017 Fall Reports of the Commissioner of the Environment and Sustainable Development to the Parliament of Canada, Report 1—Progress on Reducing Greenhouse Gases—Environment and Climate Change Canada (October 2017) To determine whether Environment and Climate Change Canada, with support from other government departments and agencies, made progress toward meeting Canada's commitments to reducing greenhouse gas emissions.	January 2006–June 2017
	2017 Fall Reports of the Commissioner of the Environment and Sustainable Development to the Parliament of Canada, Report 2—Adapting to the Impacts of Climate Change (October 2017) To determine whether departments and agencies took action and considered climate change impacts in their programs, policies, and operations.	June 2010–June 2017
Alberta	Alberta Environment and Parks: Design of Systems to Manage the Climate Leadership Plan and Adaptation (February 2018) To determine whether the Department of Environment and Parks implemented well-designed systems and processes to lead and coordinate the implementation of the Climate Leadership Plan, including planning, monitoring progress, and reporting on results, and developing Alberta's approach to adapting to climate change risks.	April–December 2017
British Columbia	Managing Climate Change Risks: An Independent Audit (February 2018) To determine whether the government is adequately managing climate change risks. This included both responses to climate change: adaptation and mitigation.	June 2008–February 2017

Exhibit 10
Information on offices' audit work (continued)

Office	Report title, publication date, and focus of audit work	Period covered by the audit
Manitoba	Department of Sustainable Development: Managing Climate Change (October 2017) To determine whether the Department of Sustainable Development was adequately leading the province's response to climate change. This included examining its processes and progress with respect to reducing greenhouse gas emissions and adapting to climate change impacts. The office conducted the audit by updating its December 2010 audit report, Managing Climate Change, which examined the management processes supporting Manitoba's response to climate change between April 2007 and April 2010.	April 2010–July 2017
New Brunswick	2017 Report of the Auditor General of New Brunswick—Volume 1, Chapter 3—Department of Environment and Local Government & NB Power: Climate Change (June 2017) To determine whether the province has made progress toward commitments to reducing greenhouse gas emissions, adapting to climate change, and establishing effective internal governance and coordination arrangements. The primary focus of the report was the Department of Environment and Local Government and the province's power utility, NB Power.	As at April 2017
Newfoundland and Labrador	Report to the House of Assembly on Performance Audits of Departments and Crown Agencies (June 2017) To determine whether the government has made progress toward its commitments to reducing greenhouse gas emissions and has taken measures to adapt to the impacts of climate change. The primary focus of the audit was the Office of Climate Change.	January 2010–December 2016
Northwest Territories	Report of the Auditor General of Canada to the Northwest Territories Legislative Assembly—2017, Climate Change in the Northwest Territories (October 2017) To determine whether the Department of Environment and Natural Resources and the Department of Infrastructure took adequate steps to meet their commitments to reducing territorial greenhouse gas emissions and to adapting to climate change impacts.	April 2013–June 2017

Exhibit 10
Information on offices' audit work (continued)

Office	Report title, publication date, and focus of audit work	Period covered by the audit
Nova Scotia	Report of the Auditor General to the Nova Scotia House of Assembly, Chapter 3: Environment—Climate Change Management (November 2017) To determine whether the province has developed and implemented strategies to address climate change, is making progress in meeting its commitments to reducing greenhouse gas emissions, and effectively coordinates efforts to achieve emission reduction targets and implement its strategies. The primary focus of the audit was Nova Scotia Environment.	January 2009–June 2016
Nunavut	Report of the Auditor General of Canada to the Legislative Assembly of Nunavut—2018, Climate Change in Nunavut (March 2018) To determine whether selected Government of Nunavut organizations took measures to reduce the territory's emissions of greenhouse gases and to adapt to climate change impacts, taking into account these impacts on current and future generations.	January 2011–May 2017[1]
Ontario	2016 Annual Report of the Office of the Auditor General of Ontario, Section 3.02—Climate Change (November 2016)[2] To determine whether the Ministry of the Environment and Climate Change has effective systems and processes in place to ensure • efforts to mitigate greenhouse gas emissions are sufficient, comprehensive, and coordinated, and are undertaken and assessed using accurate and timely information; • relevant government programs have integrated climate-change mitigation and adaptation plans and actions, where relevant, and are assessed to ensure achievement of appropriate results on an ongoing basis; and • a climate-change strategy is developed and followed for achieving short-, medium-, and long-term mitigation and adaptation goals.	January 2006–August 2016
Prince Edward Island	Report of the Auditor General of Prince Edward Island to the Legislative Assembly—2017 (March 2017) To determine whether government has made progress toward commitments to reducing greenhouse gas emissions and has taken action to adapt to climate change risks.	November 2008–December 2016

[1] To gain a more complete understanding of the subject matter of the audit, the Nunavut audit also examined certain matters that preceded the starting date of this period and certain matters that followed the ending date of the period up until October 2017.

[2] A follow-up to Ontario's 2016 audit was under way as of March 2018.

Exhibit 10
Information on offices' audit work (continued)

Office	Report title, publication date, and focus of audit work	Period covered by the audit
Saskatchewan	2017 Report of the Provincial Auditor to the Legislative Assembly of Saskatchewan—Volume 1, Chapter 4: Environment—Climate Change (June 2017) To complete specified procedures on the Ministry of Environment's activities to mitigate greenhouse gas emissions and to adapt to climate change in Saskatchewan. The office conducted specified procedures to answer the common questions established in the collaborative audit related to mitigation and adaptation.	As at January 2017
Yukon	Report of the Auditor General of Canada to the Yukon Legislative Assembly—2017, Climate Change in Yukon (December 2017) To determine whether the Department of Environment; the Department of Energy, Mines and Resources; the Department of Highways and Public Works; and the Department of Community Services of the Government of Yukon had worked to reduce greenhouse gas emissions and to adapt to the impacts of climate change, taking into account the effects on present and future generations.	July 2006–July 2017

Although the Auditor General of Québec was a partner in this project and sat on the working group to advise, the office did not conduct new audit work to contribute to this project and thus was not a participant. A part of its study on the Quebec cap-and-trade system for greenhouse gas emission allowances is cited in this summary report. That study was not an audit. The objective of that report was to explain the fundamentals and concepts of the carbon market and how it operates and to provide a better understanding of this market's issues. The Auditor General of Québec chose not to conduct new audit work on climate change because it was not timely when the agreement to undertake the collaborative project came about. The office had already published three reports on the Quebec government's measures related to reducing greenhouse gas emissions, in addition to the study noted above, and had planned other reports beyond 2017. See the Auditor General of Québec's website for more details (vgq.gouv.qc.ca).

Background: Climate change in Canada

Canada's climate is changing. According to Natural Resources Canada, it is becoming warmer and wetter, and extreme weather events are becoming more frequent. **Climate change** impacts are felt across Canada and pose significant risks to Canadians and the economy. The federal, provincial, and territorial governments recognize the threat posed by climate change. Most governments have made commitments to reducing **greenhouse gas** emissions, which are thought to be the biggest contributor to climate change.

This section provides an overview of greenhouse gas emissions in Canada and the current and future potential impacts of climate change seen across the country. Although the rest of the report is based on the audit offices' reports, information in this section is from publicly available sources and includes the most recent emission data from Environment and Climate Change Canada.

Climate change—A long-term shift in weather conditions identified by changes in temperature, precipitation, winds, and other indicators. Climate change can involve both changes in average conditions and changes in variability, including, for example, extreme events.

Greenhouse gases—Gases in the atmosphere that warm the earth by trapping solar radiation. Increases in greenhouse gases, which include carbon dioxide, methane, nitrous oxide, and ozone, are a primary cause of climate change. Because different greenhouse gases have different effects on the atmosphere, for measurement purposes, emissions are usually converted to the equivalent in carbon dioxide, the most common greenhouse gas.

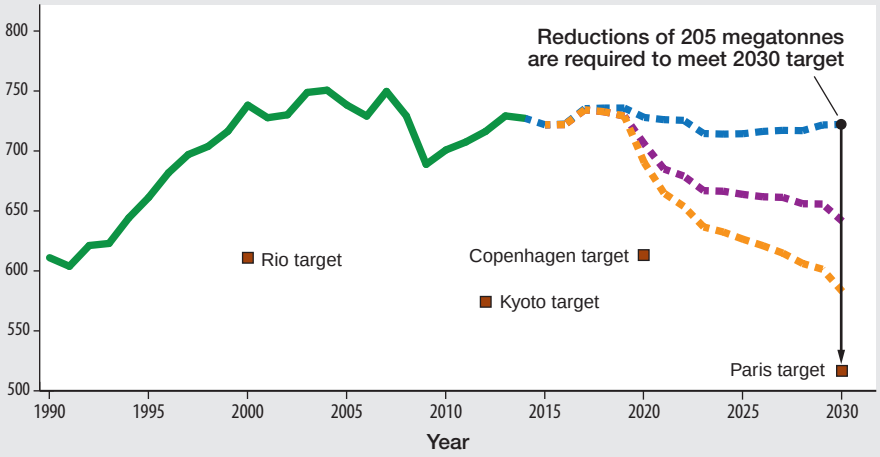
Greenhouse gas emissions

According to the Intergovernmental Panel on Climate Change, the international body for assessing the science related to climate change, climate change is largely caused by the global burning of fossil fuels that emit greenhouse gases, such as carbon dioxide, into the atmosphere.

Canada's greenhouse gas emissions, shown in Exhibit 11, increased through the 1990s and have remained relatively steady since 2000. Over the last 25 years, the international community has produced several United Nations agreements aimed at reducing global greenhouse gas emissions. These agreements include the 1992 Rio Earth Summit, the 2005 Kyoto Protocol, the 2009 Copenhagen Accord, and the 2015 Paris Agreement.

Exhibit 11

Canada's actual and projected greenhouse gas emissions and emission reduction targets (in megatonnes of carbon dioxide equivalents)



Historical domestic emissions.

Projected domestic emissions with actions in place as of September 2017.

Projected domestic emissions with additional actions that are under development, but not yet implemented.

Projected emissions with additional actions that are under development, but not yet implemented. Includes emission reductions achieved outside Canada through allowances that would be purchased internationally under the Quebec, California, and Ontario joint cap-and-trade program. At the time of the Ontario audit, no agreement had been reached with the United States government for emission reductions purchased from California to be counted toward Canada's emission targets.

Sources: National Inventory Report 1990–2015: Greenhouse Gas Sources and Sinks in Canada, Environment and Climate Change Canada, 2017; Canada's Seventh National Communication on Climate Change and Third Biennial Report—Actions to meet commitments under the United Nations Framework Convention on Climate Change, Environment and Climate Change Canada, 2017

As a signatory to these agreements, Canada has committed to four separate targets for reducing greenhouse gas emissions. Canada failed to reach the first two reduction targets that have passed—the 2000 Rio target and the 2008–2012 Kyoto target. Moreover, Environment and Climate Change Canada predicted that current provincial and federal policies and regulations mean that Canada will also fail to meet its 2020 Copenhagen target (reducing greenhouse gas emissions to 17 percent below 2005 levels). As part of their efforts to reach the 2030 Paris target, the federal, provincial, and territorial governments developed the Pan-Canadian Framework on Clean Growth and Climate Change. If all of the greenhouse gas reduction actions in the framework are implemented in a timely manner, Environment and Climate Change Canada estimates that Canada would still need to reduce emissions by a further 66 megatonnes to meet the 2030 target.

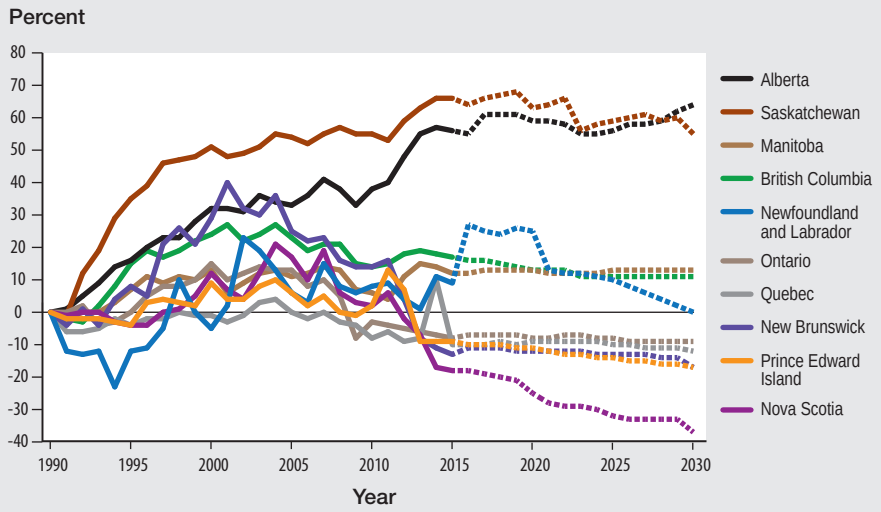
Since 1990, some provinces have seen their greenhouse gas emissions increase, while others have remained steady or decreased (Exhibit 12). For instance, most of the Atlantic provinces, along with Ontario and Quebec, are emitting lower levels of greenhouse gases now than they were in 1990, while Saskatchewan and Alberta have both seen increases of over 50 percent relative to their 1990 emissions.

Did you know?

1 megatonne of carbon dioxide equivalent is the same as what is emitted by nearly 215,000 passenger vehicles driven for one year.

Exhibit 12

Provinces' actual and projected domestic greenhouse gas emissions relative to 1990 levels



Emissions from 1990 to 2015 are historical. Emissions from 2016 to 2030 are projections. Some governments disagree with the emission estimates produced by Environment and Climate Change Canada. The territorial emissions have not been included because not all estimates were available in 1990. These estimates represent domestic emissions only. As such, they do not include emission reductions achieved outside Canada that may result from the impact of potential allowances purchased internationally, such as those under the Quebec, California, and Ontario joint cap-and-trade program.

Sources: National Inventory Report 1990–2015: Greenhouse Gas Sources and Sinks in Canada, Environment and Climate Change Canada, 2017; Canada's Seventh National Communication on Climate Change and Third Biennial Report—Actions to meet commitments under the United Nations Framework Convention on Climate Change, Environment and Climate Change Canada, 2017

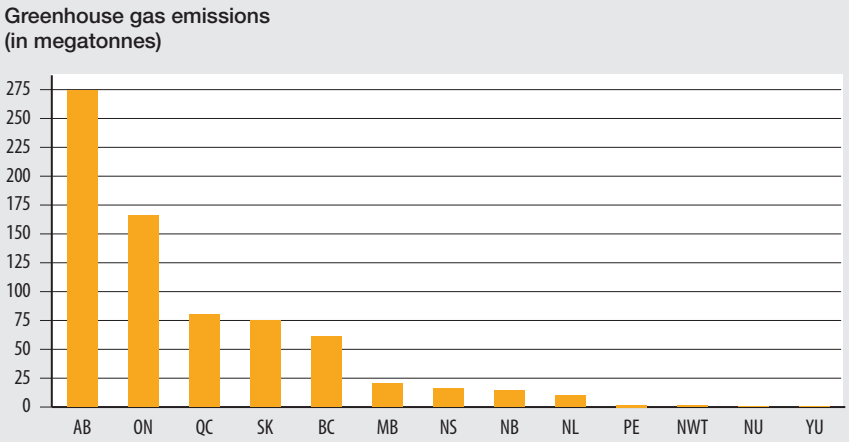
Exhibit 13 shows that a large portion of Canada's emissions come from the more populous provinces or provinces with significant industrial sectors—Alberta, Ontario, Quebec, Saskatchewan, and British Columbia—while Manitoba, the Atlantic provinces, and the territories emit a much smaller portion. Alberta and Saskatchewan have the highest levels of emissions per capita due to the oil and gas sector and the provinces' use of fossil fuels to generate electricity. This is in contrast to Quebec and Ontario, where a smaller oil and gas sector and the use of hydroelectric and nuclear power contribute to lower levels of emissions per capita.

Did you know?

According to the Organisation for Economic Co-operation and Development, Canada is the third-highest emitter of greenhouse gases per person of the 33 countries in the Organisation, behind only Australia and the United States.

Exhibit 13

Total greenhouse gas emissions by province and territory in 2015



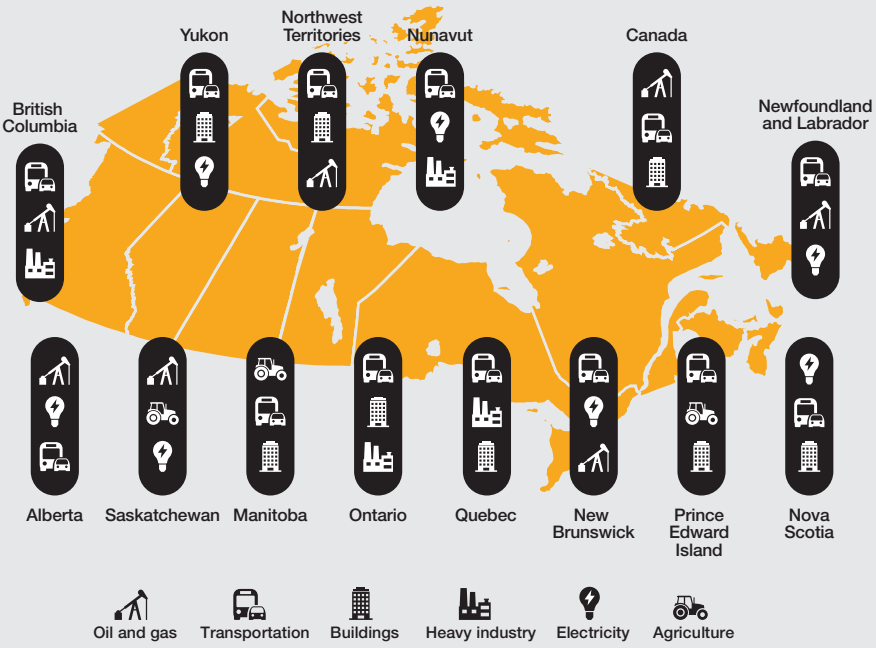
Note: Some governments disagree with the emission estimates within the National Inventory Report (an annual report on Canada's greenhouse gas emissions and sources).

Source: National Inventory Report 1990–2015: Greenhouse Gas Sources and Sinks in Canada, Environment and Climate Change Canada, 2017

Transportation and the oil and gas sector are the two largest sources of greenhouse gases in Canada and together account for one half of the country's emissions. Electricity generation, heavy industry, and buildings account for another third. Exhibit 14 shows the top three sources of greenhouse gas emissions for each of the provinces and territories and for Canada as a whole.

Exhibit 14

Largest sources of greenhouse gas emissions by economic sector in each province and territory and in Canada as a whole



Note: Some governments disagree with the emission estimates within the National Inventory Report (an annual report on Canada's greenhouse gas emissions and sources). Emissions are allocated to the economic sector from which they originate, as defined by Environment and Climate Change Canada.

Source: National Inventory Report 1990–2015: Greenhouse Gas Sources and Sinks in Canada, Environment and Climate Change Canada, 2017

Climate change impacts in Canada

The impacts of climate change have already been felt across the globe, and Canada is no exception. According to Environment and Climate Change Canada, temperatures across the country have increased, on average, by 1.7 degrees Celsius since 1948. Climate change has had a host of impacts on Canada, some of which are summarized in Exhibit 15.

Exhibit 15
Examples of climate change impacts in Canada

Floods

The 2013 Alberta floods cost $1.7 billion. The frequency of similar floods is expected to increase as extreme precipitation events become more frequent.

Melting sea ice

The extent of summer Arctic sea ice has decreased by nearly a third since 1980. This reduction means less protection from waves and storm surges, which increases the risk of coastal erosion and flooding. This also threatens traditional food sources of northern communities.

Rising sea levels

Global sea level has risen around 19 centimetres since 1900. More than a third of this rise has occurred since 1993. In some areas of Canada's 243,000-kilometre-long coastline, sea levels could further rise by over 75 centimetres by 2100. By 2050, these changes could cost Canada billions of dollars a year.

Forest fires

Climate change has already made extreme fire conditions more likely. For example, in the summer of 2017, wildfires burned a record 1.2 million hectares of forest in British Columbia, with the largest covering an area roughly the size of Prince Edward Island. This trend is expected to continue in the future. Canada could experience twice the number of fires by 2100.

Thawing permafrost

More than half of Canada is underlain by varying types of permafrost, much of which is degrading, causing land deformations and landslides that in turn have affected roads, buildings, and other infrastructure. In the Northwest Territories, roads have shifted and slumped, and sinkholes have developed.

Heat waves

Canadians are expected to experience heat waves more often. By 2100, the number of days above 30 degrees Celsius in Canadian cities is expected to double and a 1-in-20-year hottest day may become a 1-in-2-year event.

Sources: Based on information in Canada in a Changing Climate, Natural Resources Canada, 2014; Canada's Marine Coasts in a Changing Climate, Natural Resources Canada, 2016; Climate Change and Biodiversity, Convention on Biological Diversity; Paying the Price: The Economic Impacts of Climate Change for Canada, National Round Table on the Environment and the Economy, 2011; various Working Group II contribution reports to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, 2014; and some provincial and territorial climate change audits