Ministry of the Environment and Climate Change

Climate Change

1.0 Summary

Scientific studies indicate increased emissions of greenhouse gases, such as carbon dioxide and methane, from human activities have warmed the Earth's atmosphere and altered climate patterns around the world. Scientists have documented the effects of climate change including the melting of the polar ice caps, rising sea levels, and an increased number of extreme weather events.

The international community has highlighted climate change as an urgent and potentially irreversible threat to humans and the environment, and agreed an international response is required to reduce greenhouse-gas emissions.

Ontario accounts for less than 1% of the world's annual greenhouse-gas emissions, but Ontario's annual average emissions per person is higher than the global average, though lower than the Canadian average.

The Ministry of the Environment and Climate Change (Ministry) has also identified climate change as a critical global environmental and economic challenge that will bring increasingly severe weather to Ontario in coming years.

The Ministry has a mandate to lead Ontario's efforts to reduce greenhouse gases and adapt to the effects of climate change. To do this, it has defined emission-reduction targets and introduced policies and programs, one of the most significant of which is a cap-and-trade system set to commence in 2017. The rules for how cap and trade will operate in Ontario as well as how cap-and-trade revenues are to be spent have been set out in the *Climate Change Mitigation and Low-carbon Economy Act, 2016* and its regulations.

Under cap and trade, businesses that emit greenhouse gases will have to obtain "allowances" equal to their annual emissions—effectively a licence to emit. One allowance would permit the emission of one tonne of carbon dioxide, or its equivalent in other greenhouse gases.

These allowances can be provided free by the government, sold at government auctions, or bought and sold between emitters—the "trade" in cap and trade. "Cap" refers to the limited total number of allowances the government releases into the market annually.

In theory, as the government reduces the supply of allowances each year, the price would rise. Over time, therefore, businesses would find it more economical to develop ways to cut their emissions rather than buy increasingly costly allowances. Also, a business whose emissions are less than its allowances could generate revenues by selling those surplus allowances to other businesses that need them to continue operating.

Instead of an Ontario-only system, the province plans to link its cap-and-trade system to existing ones in Quebec and California, which means that businesses in all three jurisdictions will be able to trade allowances with each other. This would also allow one jurisdiction to claim an emissions reduction that was actually achieved in another.

The Ministry has said Ontario's cap-and-trade program and the revenue it generates for other initiatives will be key to Ontario's fight against climate change. It has also said that Ontario is on track to achieve its target to reduce 2020 emissions by 15% from 1990 levels. The Ministry has not finalized the design of Ontario's cap-and-trade system beyond 2020 and told us that its estimates and projections related to the impact of cap and trade beyond 2020 are very preliminary.

Our audit indicates that the cap-and-trade system will result in only a small portion of the required greenhouse-gas reductions needed to meet Ontario's 2020 target. Among our findings:

- **It is likely that less than 20% of reductions required to meet the province's 2020 target will be achieved in Ontario:** Of the 18.7 megatonnes (Mt) of greenhouse-gas emissions that will have to be cut to achieve the 2020 target, only 3.8 Mt (20%) are expected to be in Ontario. The remaining 80%—about 14.9 Mt—is actually forecast to be reduced in California and/or Quebec, yet Ontario plans to take credit for both its own 20% (3.8 Mt) reduction and this 80% (14.9 Mt) reduction occurring outside of Ontario. We note that the 2015 Paris Agreement allows one country to claim another's emissions reductions, but only if both federal governments (e.g., Canada and the United States) have formally agreed to such an exchange. At present, no such agreement exists. Further, the final determination of whether Ontario has met a given target is based on the National Inventory Report prepared by the federal government, which also does not count reductions occurring outside Ontario.
- **Small reductions in emissions in Ontario expected to come at significant cost to Ontario businesses and households:** Under the linked cap-and-trade system that the province plans to implement, Ontario businesses are expected to pay up to $466 million by 2020 to Quebec and California for allowances. Based on preliminary estimates by the Ministry in 2015 used to inform program design, that amount could rise to $2.2 billion in 2030—all of it money that will leave the Ontario economy. If initiatives outlined in the Government's Climate Change Action Plan are successful at reducing emissions over the long term, this number may be lower. In addition, Ontario households and businesses are forecast to pay about $8 billion more to the Ontario government over four years beginning in 2017 for fossil fuels such as gasoline and natural gas. The Ministry estimates households are expected to face an average increase in these direct yearly costs of $156 in 2017. Preliminary estimates by the Ministry of Finance indicate that this amount will rise to $210 in 2019 and that households are also expected to face additional yearly indirect costs on goods and services of $75 in 2019.
- **The Ontario Energy Board has ruled not to separately disclose the cost of cap and trade on natural gas bills despite stakeholder groups' interest in disclosure:** The Ontario Energy Board ruled that separate disclosure on natural gas bills is not necessary despite 75 of 80 stakeholder groups indicating a preference for such disclosure. Additionally, our survey of natural gas ratepayers found that 89% of respondents also thought it was important to disclose the impact of cap and trade on natural gas bills.
- **Under the linked system, Ontario's cap does not actually control the amount of greenhouse gases that can be emitted in Ontario:** Because Ontario has chosen to link with California and Quebec, Ontario

may exceed its own emissions cap if Ontario emitters decide to purchase allowances from Quebec or California. The cap on emissions set by the Ontario government consequently does not actually control Ontario emissions.

- **Ontario is not expected to help cut significant emissions in Quebec and California in the short term:** The Ontario government has said that this province's involvement in a linked cap-and-trade system will help reduce emissions in Quebec and California as businesses there become aware of a market in Ontario for their allowances. However, the Ministry has no evidence of this. In fact, allowance-trading information for Quebec and California as of August 2016 indicates there may currently be a surplus of allowances—over 60 Mt of allowances went unsold in the last auction, indicating that well over the 14.9 Mt of allowances that will be needed by Ontario companies are *already* available. This makes it unlikely that, in the short term, there will be any significant decrease in Quebec and California emissions as a result of Ontario businesses buying these allowances.
- **More emissions reductions may be reported than actually achieved:** No formal agreements or rules have been established among the three jurisdictions to prevent a reduction of emissions from being reported in more than one jurisdiction. For example, if an Ontario company buys an allowance from California, that allowance could be reported by the Ontario government as a reduction in Ontario, thereby helping Ontario meet its target. However, California may also count the same reduction toward its target—meaning more reductions overall would be claimed than were actually achieved.

In the four-year period from 2017 to 2020, the Ministry expects to raise about $8 billion in revenues from the sale of cap-and-trade allowances, and it has committed this revenue largely to emission-reduction initiatives.

These initiatives are identified in the Climate Change Action Plan (Action Plan) that the Ministry released in June 2016. The Action Plan estimates that these initiatives will collectively reduce emissions by 9.8 Mt—yet we noted that the Ministry's own environmental consultant estimated cap and trade and the spending of cap-and-trade revenues on these types of initiatives would yield reductions of only 3.8 Mt—slightly more than one-third the Ministry's estimate. Based on our review of the Action Plan, we noted that:

- **Action Plan contains unrealistic or unsubstantiated assumptions:** These include:
  - *Electricity price reductions will have marginal impact:* Cap and trade is expected to bring higher electricity prices, which may lead people to switch to cheaper natural gas—a fossil fuel that also produces greenhouse gases. Between 2017 and 2020, the Ministry plans to spend up to $1.32 billion of cap-and-trade revenues to address this issue. The Action Plan indicates that this will result in 3 Mt of reductions. However, neither the Ministry nor the provincial agency that oversees Ontario's electricity system could show how they arrived at the 3-Mt estimate. In addition, the $1.32 billion is expected to have only a small impact on reducing the expected electricity price increases. In particular, electricity prices are projected to increase by 14% for businesses and 25% for households; after applying the $1.32 billion, businesses will still face a 13% increase and households 23%.
  - *No plan for achieving renewable natural gas goal:* $100 million of cap-and-trade revenues is to be used to help natural gas distributors increase their use of biogas, a "renewable" natural gas made from the decomposition of organic materials. The Action Plan indicates this initiative will reduce emissions by 1 Mt. However, our review of information from the Biogas Association of Canada indicates that the

current production capacity for biogas is insufficient to meet this proposed demand. In fact, the required capacity to achieve the 1 Mt is 500 times more than what is currently available. The Action Plan does not indicate how this shortfall will be met.

- **Action Plan commits about $1 billion to previously approved initiatives:** Some initiatives, such as the Regional Express Rail transit project, were approved years before the Action Plan was created. By including these projects in the Action Plan, the Province has found an alternative way to fund their costs—but will not achieve any additional emissions reductions.

Our other findings include:

- **The Ministry achieved its 2014 emissions reduction target:** The Ministry achieved significant reductions in greenhouse gases by 2014, primarily due to closing all coal-fired power plants. The Ministry has also said that, had it not been for the 2008 economic downturn, Ontario would likely not have met its 2014 emission target.
- **Greenhouse-gas reductions not a priority elsewhere in government:** The reduction of greenhouse gases is not an established priority of many ministries, and there is no government-wide process to ensure climate change is adequately considered in decision-making processes. The mandates and key priorities of some ministries are in conflict with the goal of reducing emissions, and these divergent goals have not been addressed to ensure emissions reduction is considered in decision-making.
- **Many items from the 2011 Adaptation Plan never carried out:** The Ministry has taken little action to identify or follow up on key risks Ontario faces from the anticipated future effects of climate change. Although the Ministry issued an Adaptation Plan in 2011 that was to have been fully implemented by 2014, many of the actions set out in the Plan had not been completed as of August 2016. In addition, the Ministry had not reviewed this Plan to determine whether it should be updated to reflect current information. Areas that require significantly more action include:
  - strengthening winter ice roads to northern communities to protect the communities from increasing isolation caused by climate change; for example, the communities were more reliant on air transport last winter to bring in essential supplies such as food;
  - developing a Growth Plan to support northern community decision-making and monitoring on the impact of climate change, as well as measures to protect and preserve air and water quality;
  - updating provincial building codes to ensure that buildings can resist such effects of climate change as storm water flooding;
  - carrying out a Ministry commitment to review all the different types of buildings owned or controlled by the government to assess them for their resilience to the effects of climate change; instead, the Ministry reviewed only three of the almost 5,000 buildings directly owned or controlled by the Province; and
  - carrying out an assessment of energy infrastructure to ensure it can continue to produce and distribute power during increasingly extreme weather.

Subsequent to our audit, in October 2016, the federal government announced its intention to implement a minimum national carbon price, starting in 2018. The federal proposal is preliminary and, at the time of the completion of our audit, further details were not available to fully assess the impact of this new federal policy on Ontario's projected emissions reductions.

This report contains 16 recommendations with 28 action items.

OVERALL MINISTRY RESPONSE

The Ministry appreciates the Auditor General's report and its recognition of the importance of fighting climate change given its impact on Ontario's environment, economy and way of life.

Under our new climate change legislation, the Ministry will report to the public on progress in achieving targets and how cap-and-trade proceeds will be invested.

Cap and trade is an internationally recognized program for reducing greenhouse-gas emissions and achieving targets, including in the Paris Agreement. The ability to link our program to those in Quebec and California will enable Ontario to realize reductions at the lowest cost to business and consumers. The compliance period under Ontario's program starts January 2017. Ontario will negotiate an agreement with Quebec and California in 2017 to link its cap-and-trade programs under Western Climate Initiative, Inc. (WCI, Inc.) in 2018 in a way that meets its objective of meeting emissions reductions targets at the lowest cost to households and businesses. Ontario continues to work closely with the federal government to shape a national approach to pricing carbon emissions through the development of a pan-Canadian framework that aligns with the Paris Agreement on global climate change action.

Ontario will invest the proceeds of cap and trade into initiatives that will reduce or support the reduction of greenhouse gases. Estimated investments in the Climate Change Action Plan continue to be refined as detailed program design takes place across government. These investments, which will start in 2017, will reduce greenhouse-gas emissions, create new jobs, generate opportunities for investment in Ontario, and help people and businesses transition to a low-carbon economy.

As of October 2016, Ontario has implemented some of the actions in its first climate change adaptation plan and is developing a new plan, to be released in 2017, that will set out the priorities and actions Ontario will take to become more resilient to the effects of climate change.

2.0 Background

2.1 Global Warming and Climate Change

Science indicates that increased concentrations of greenhouse gases in the Earth's atmosphere, resulting primarily from the burning of fossil fuels, have contributed to an increase in the planet's surface temperature. This is referred to as global warming.

It does not matter where emissions occur; it is the global total of emissions that has an impact on global warming. Global warming has led to unprecedented changes such as rising sea levels, changing weather patterns, and increasingly frequent extreme weather.

Appendix 1 provides more information on global warming and climate change, including the types of greenhouse gases, and the risks attributed to global warming.

2.1.1 Ontario's Emissions

As **Figure 1** shows, the average emissions per person in Ontario are more than in some developed countries—and more than twice the world average. On the other hand, the Ontario average was less than the national Canadian average, and about 60% of the U.S. average (13 tonnes per Ontarian versus 20 tonnes per American, as seen in **Figure 1**).

Figure 2 shows Ontario's 2014 emissions by sector, according to the most recent data from Environment and Climate Change Canada, a department of the federal government, which compiles all emissions information for Canada through its National Inventory Report. Ontario relies on the National

Figure 1: Comparison of Greenhouse Gas Emissions by Jurisdiction, 2012

Source of data: World Resources Institute, Environment and Climate Change Canada

Jurisdiction	Emissions (megatonnes)	Population (million)	Emissions Per Person (tonnes)
World			
World	44,816.0	7,043.2	6
China	10,975.0	1,350.7	8
United States	6,235.0	313.9	20
European Union	4,399.0	501.3	9
India	3,014.0	1,236.7	2
Russia	2,322.0	143.2	16
Japan	1,345.0	127.6	11
Brazil	1,013.0	198.7	5
Germany	887.2	80.4	11
Indonesia	761.0	246.9	3
Mexico	724.0	120.8	6
Canada	718.0	34.8	21
Iran	715.0	76.4	9
Ontario	**171.0**	**13.4**	**13**
Sweden	53.7	9.5	6
Canada			
Alberta	260.0	3.8	68
Ontario	**171.0**	**13.4**	**13**
Quebec	82.0	8.1	10
Saskatchewan	72.0	1.1	66
British Columbia	63.0	4.5	14
Manitoba	21.0	1.3	17
Nova Scotia	19.0	0.9	20
New Brunswick	17.0	0.8	22
Newfoundland and Labrador	9.8	0.5	19
Prince Edward Island	2.1	0.1	14

Note: The most recent compilation of global emissions is only available as of 2012.

Inventory Report for historical emissions. The most recent data, in the 2014 National Inventory Report, indicates Ontario's per-person emissions are the fifth-lowest of the provinces and territories.

2.2 Responses to Climate Change

Overall, there are two types of strategies to address climate change: *mitigation* focuses on lessening the extent of global warming by reducing greenhouse-gas emissions, and *adaptation* focuses on reducing the potential harm caused by the effects of climate change.

In its Fifth Assessment (2014) Report, the Intergovernmental Panel on Climate Change highlighted the importance of both strategies. **Appendix 2** provides more general information about climate-change mitigation and adaptation.

Figure 2: Breakdown of Ontario's 2014 Greenhouse Gas Emissions by Sector

Source of data: Environment and Climate Change Canada

Sector	Carbon Dioxide Equivalent (Mt)	% of Total Ontario Emissions	Most Common Sources of Emissions
Transportation	58.7	34	Combustion-engine (gas burning) cars, trucks, farm equipment, commercial vehicles, freight trains, boats, recreational vehicles
Industry	50.9	30	Industrial processes (cement, lime, iron and steel), manufacturing
Buildings	34.8	20	Heating for residential and commercial buildings using natural gas, including houses and apartments; cooking with natural gas
Agriculture	10.0	6	Animal manure, artificial fertilizers
Waste	9.4	6	Decomposition of organic material; waste-water handling, including sewage; and waste incineration
Electricity	6.2	4	Natural gas power plants
Total	**170.0**	**100**	

Note: Not all electricity generated in the province produces greenhouse gases. According to the Independent Electricity System Operator, in 2014, 62% of Ontario's electricity was generated from nuclear, 24% from hydro, 10% from natural gas, 4% from wind, with coal, biofuels, and solar together generating less than 1%. Since the closure of Ontario's last coal plant in 2014, most greenhouse gases from electricity come from the burning of natural gas.

2.2.1 Mitigation in Ontario

In 2007, the Ministry of Environment and Climate Change (Ministry) released a climate-change mitigation plan called the GO Green Action Plan (Plan). The Plan contained the following targets for reducing Ontario's annual emissions, using the 182 Mt produced in 1990 as a baseline (in 2015, a midterm target for 2030 was added):

- 2014—6% below 1990 levels, currently estimated to be 171 Mt;
- 2020—15% below 1990 levels, currently estimated to be 154.7 Mt;
- 2030—37% below 1990 levels, currently estimated to be 114.7 Mt; and
- 2050—80% below 1990 levels, currently estimated to be 36.4 Mt.

The Plan indicated that 44% of the 2014 target would be achieved by phasing out coal power and increasing the use of renewable energy. The rest would come from results of funding for research and innovation (17%), grants and loans to assist municipalities in reducing emissions (8%), and other initiatives such as transit projects and building retrofits (refer to **Figure 3** for an outline of initiatives and expected reductions). These forecast reductions were based on such assumptions as completion dates for transit projects and adoption rates for new technologies such as high-efficiency furnaces.

In November 2015, the Ministry introduced a Climate Change Strategy, which provided a high-level overview of the government's climate-change plans. The government then passed the *Climate Change Mitigation and Low-carbon Economy Act, 2016* (Act) the following year. The Act outlines Ontario's greenhouse-gas targets, requires the government to develop climate-change action plans, lays the legal framework for a cap-and-trade system, and outlines how cap-and-trade revenues are to be spent.

One regulation under the Act outlines the rules of cap and trade, while another spells out the greenhouse-gas reporting requirements for emitters. The Ministry has indicated that more regulations will eventually be enacted.

In June 2016, the Ministry released a new five-year mitigation plan, called the Climate Change Action Plan 2016-2020 (Action Plan), which identified cap and trade as a "cornerstone" of the province's mitigation efforts. **Figure 4** explains examples of other options, such as regulations, that the gov-

Figure 3: Ontario's 2007 Climate Change Action Plan
Source of data: Ministry of the Environment and Climate Change

The following chart lists the initiatives of the 2007 Climate Change Action Plan and the amount by which each initiative was expected to have reduced greenhouse gas emissions after seven years (by 2014).

	Expected Emissions Reduction by 2014	
Initiative	**Mt**	**%**
Green power (a $150-million investment to replace coal with renewable power)	26.8	44
Research and innovation (a $650-million investment in the Next Generation of Jobs Fund and a $527-million investment in the Ontario Research Fund)	10.4	17
Federal plan for industrial reductions	6.7	11
Municipal Eco Challenge (a $220-million investment in a grant and loan program to help municipalities reduce greenhouse gas emissions) and other actions	4.9	8
Other policies (e.g., Greenbelt protection)	4.3	7
Freight and diesel initiatives	3.0	5
Passenger vehicles and transit (includes MoveOntario 2020—now called The Big Move—a $17.5-billion investment in 52 transit projects)	3.0	5
Home-related initiatives (e.g., home energy audits)	1.8	3
Total	**61.0***	**100**

* The Ministry has not measured the success of these individual initiatives in achieving the expected emissions reductions.

ernment may also use to encourage people to reduce emissions. The Action Plan includes a number of actions to be funded through revenues from cap and trade. These items are outlined in **Figure 5**.

2.2.2 Ontario's Cap-and-Trade System

The Ontario government first committed to join a cap-and-trade system with other North American jurisdictions in 2008 by signing a memorandum of understanding with Quebec.

Quebec and California each implemented such systems in 2013, and linked them in 2014, but Ontario did not join them then; instead, Ontario re-announced in April 2015 its plans to implement cap and trade by 2017, and to link with Quebec and California.

As with Quebec and California, Ontario's cap-and-trade program will be administered in part by WCI, Inc., a non-profit organization based in the United States. The Ministry has obtained approval to pay WCI, Inc. almost $9.9 million between 2016/17 and 2020/21 to provide administrative services for Ontario's system, including the tracking and monitoring of cap-and-trade allowances traded by individual businesses, and the facilitation of allowance auctions. **Appendix 3** provides more information about WCI, Inc.

For a chronology of Ontario's climate-change activities, see **Appendix 4**.

Under the Linked System, Ontario's Cap Does Not Actually Control the Amount of Greenhouse Gases That Can Be Emitted in the Province

Ontario's cap-and-trade system is expected to cover about 80% of the province's annual greenhouse-gas emissions, including those from the transportation, industry, buildings and electricity sectors, all referred to as "covered" sectors. The rules for Ontario's cap-and-trade program are set out in **Appendix 5**. **Figure 6** explains which participants receive free allowances under Ontario's cap-and-trade system.

Figure 4: Policy Options for Reducing Greenhouse-Gas Emissions

Prepared by the Office of the Auditor General of Ontario

Policy Option	How it Works	Benefits	Challenges
Cap and Trade[1]	**Applies to:** businesses that are required to participate. **Description:** participating businesses have to obtain allowances (1 allowance per tonne of emissions) equal to their total greenhouse gas emissions. Allowances can be provided for free by government or bought at auction or directly from other businesses. **The price of allowances** is determined by the demand and supply of allowances in a carbon market. Governments can set floor or ceiling prices for auctions. **To be effective:** Supply of allowances per year (Cap) decreases over time such that total emissions decrease. **Example in practice:** California, Quebec and Europe	Government can reduce supply of allowances to meet overall emissions targets. Flexible for participating businesses since they have multiple options, including reducing emissions, buying allowances, buying offset allowances, and banking allowances. Creates a market that can provide an economic opportunity for businesses to trade. Is not called a tax and is politically easier for the government. In theory, participating businesses will make most efficient reductions first.	Complex and difficult to understand. Linking systems means individual jurisdiction loses control over the supply of allowances. Much more government administration and oversight is needed. May not reduce emissions if supply of allowances exceeds demand.
Carbon Tax[1]	**Applies to:** businesses and/or consumers **Description:** The government adds a direct tax to the emission of greenhouse gases, usually applied to the consumption of fossil fuels, such as gasoline. The government may choose to charge these taxes to individuals and/or businesses. The government controls the price. **To be effective:** Cost has to be high enough to discourage use of fossil fuels. **Examples in practice:** British Columbia and Sweden	Government controls the cost to emit. Simpler and easier for businesses and consumers to understand. Minimal additional administration required (as tax administration services already exist). Emitters are treated equally (the same carbon price is applied no matter the type of activity). In theory, emission reductions will occur where most efficient first.	Inflexible for businesses (compared to flexibility of cap and trade). Less economic incentive to reduce emissions compared to cap and trade since a low-emitting company can sell its reduced emissions in form of an allowance. May not reduce emissions if tax is not high enough.

Policy Option	How it Works	Benefits	Challenges
Regulations[2]	**Applies to:** businesses and/or consumers (based on regulation). **Description:** Regulatory policies involve government setting laws or regulations that limit emissions. Regulation may require reducing emissions to a certain level, switching fuels or installing a particular technology. **To be effective:** Regulations have to force overall emission reductions and laws must be complied with. **Examples in practice:** Canada has a minimum fuel efficiency law for new vehicles sold in Canada.	Able to control emissions at an individual emitter level. Changes are made that may not have been made otherwise such as building code improvements that increase costs of buildings.	Can impose a high cost to make a change. May not encourage further innovation to improve emissions beyond the legal minimums. Higher mandated fuel efficiency can encourage more overall use and reduce the emissions benefits from the higher efficiency. Government may not choose most effective or efficient technology or sector to reduce emissions in.
Voluntary Programs	**Applies to:** businesses and/or consumers **Description:** government programs intended to encourage emission reductions, where participation is optional. **To be effective:** Programs would need to encourage reductions above what would have already been done. **Examples in practice:** Subsidies provided to consumers purchasing an electric vehicle, a program for replacing inefficient furnaces, or providing transit services to discourage car use.	Business and consumers have the choice to participate. For new emission-reducing technologies that are not well-known, can help to increase public awareness and adoption.	Behaviour may not change as a result. May not encompass enough emitters to significantly reduce overall emissions. May subsidize those who would have used the technology anyway.

1. Cap and trade and carbon tax are both forms of carbon pricing that charges for emitting greenhouse gases and is used to influence businesses and consumers to reduce their emissions. It is expected that emitters will take measures to reduce emissions if the cost to do so is less than the cost to emit (either allowances or tax). Governments can use the revenue generated in different ways such as reinvesting in programs to further reduce emissions, reduce government debt, fund other social or economic programs or redistribute the revenue through equal tax breaks and credits (commonly referred to as revenue neutral).
2. Regulatory policies involve setting rules that limit emissions.

Figure 5: Projects Designed to Reduce Emissions to be Funded from Proceeds of Cap and Trade

Source of data: Ministry of the Environment and Climate Change

Key Initiatives in Action Plan[1]	Cost (Low End)[2] ($ million)	Cost (High End)[2] ($ million)	Forecasted Emissions Reductions in 2020 (Mt)
Reduce electricity bills	1,000.0	1,320.0	3.00
Creation of the Green Bank, a new government agency, to provide programs and services to help industry and business increase use of low-carbon technologies	875.0	1,100.0	2.50
Infrastructure Subsidy for fuel distributors to increase availability of renewable fuels	115.0	175.0	2.00
Introduce a renewable content requirement for natural gas	60.0	100.0	1.00
Green Commercial Vehicle Program and low-carbon fueling stations	215.0	290.0	0.40
Ontario government buildings retrofits and updated government emission targets	165.0	175.0	0.20
Subsidy for home upgrades and low-carbon technologies (New Homes Rebate)	681.0	824.0	0.18
Assist Agri-Food Sector in adopting low carbon technologies	50.0	115.0	0.15
Improve energy efficiencies in schools and hospitals	400.0	800.0	0.11
Support for municipalities: grants for emission reduction projects, supporting community energy planning, and energy mapping	270.0	325.0	0.10
Energy efficiency retrofits for social housing and grants for apartment building retrofits	680.0	900.0	0.10
Increase the use of electric vehicles and replace less efficient vehicles	246.8	277.0	0.05
Implement Ministry's Waste-Free Ontario strategy	20.0	30.0	0.04
Improve cycling infrastructure and encourage cycling and walking	150.0	225.0	0 (enables post 2020 reductions)
Regional Express Rail (Electrification of GO Rail project)	355.0	675.0	0 (enables post 2020 reductions)
Retrofit heritage buildings	40.0	80.0	0 (enables post 2020 reductions)
Support Ontario's clean tech sector	140.0	235.0	0 (enables post 2020 reductions)
Home energy audits	200.0	250.0	Not provided
Train workforce for development of low-carbon buildings (e.g., building materials science, materials design)	45.0	70.0	Not provided
Collaborate with Indigenous communities	85.0	96.0	Not provided
Set tax and regulatory to encourage innovations	–	1.0	Not provided
Create the Global Centre for Ultra Low-Carbon Mobility, based out of a post-secondary institution, to advise government on low-carbon transportation and to direct funding for research	100.0	140.0	Not provided
Develop a Land Use Carbon Inventory (understand how to measure how land and forests remove and store carbon)	2.0	3.0	Not provided
Implement Agricultural Soil Health and Conservation Strategy	30.0	30.0	Not provided
Plant 50 million trees across the province by 2025	0.5	1.5	Not provided
Reduce road congestion: grants for municipal transportation management plans	10.0	20.0	Not provided

Key Initiatives in Action Plan[1]	Cost (Low End)[2] ($ million)	Cost (High End)[2] ($ million)	Forecasted Emissions Reductions in 2020 (Mt)
Other initiatives using cap and trade proceeds			
Electric vehicle charging stations in government locations	0.5	2.0	Not provided
Car dealership program to provide training to increase electric vehicle sales	10.0	20.0	Not provided
Electric school bus pilot project in five communities	10.0	10.0	Not provided
Climate change partnerships with community organizations and private sector to reduce emissions	7.0	7.0	Not provided
OPS Carbon Challenge: competition for public service employees to develop greenhouse gas reduction project	0.3	1.0	Not provided
Ontario Public Service Climate Change Information Centre: online database for public service greenhouse gas tools	1.0	2.0	Not provided
Climate change training for Ontario Public Service employees	0.3	1.0	Not provided
Finalize a Wetlands Conservation Strategy for Ontario	0.5	1.0	Not provided
Total	**5,964.8**	**8,301.5**	**9.83[3]**

1. Initiatives that will not require the use of proceeds from cap and trade have not been included here.
2. A range of costs have been provided from the Ministry for each initiative to reflect the uncertainty of how much each will cost. Spending on each initiative may be adjusted downwards or upwards relative to cap-and-trade revenues collected.
3. The Ministry's environmental consultant estimates that spending cap-and-trade revenues on these types of initiatives will result in emission reductions of only 3.8 Mt in 2020.

A regulation of the Act outlines Ontario's cap—the total number of allowances the Ontario government will make available to emitters each year—from 2017 to 2020. The cap in 2017 is set at 142.3 million allowances (for 142.3 Mt of emissions), equivalent to the forecast emissions of the covered sectors in that year. The total number of allowances Ontario makes available to emitters is to decrease by about 4% each year to encourage emitters to reduce their emissions.

However, because Ontario is planning to link its cap-and-trade system with Quebec and California, Ontario emitters will actually have access to purchase significantly more allowances than the Ontario government releases. In fact, all three jurisdictions' individual caps will be combined to create an overall cap, as outlined in **Figure 7**.

Consequently, a jurisdiction can exceed its own cap as long as the total emissions in the linked system do not exceed the overall cap. For example, Ontario's 2018 cap is 136 million allowances (for 136 Mt of emissions); however, actual Ontario emissions can exceed 136 Mt as long as emitters here purchase enough allowances from either Quebec or California to cover their emissions.

Price of Allowances and Government Revenue

Governments generate revenue from the sale of allowances at auction, where price is expected to be influenced by demand by emitters and supply of allowances. To provide some stability, the three jurisdictions set a minimum price at each auction. In 2016, the minimum was close to $17 per allowance, and it is scheduled to increase by 5% plus inflation each year until 2020.

However, at times, the price may drop below this level outside of auctions; for example, emitters may trade allowances directly with one another at prices lower than the minimum set by the three jurisdictions.

The Ministry has estimated Ontario's cap-and-trade system will generate about $8 billion in government revenue from 2017 to 2020. It has indicated that it expects most of this to come from auctions of Ontario's allowances, primarily to fuel distributors.

Figure 6: Mandatory and Voluntary Participants in Ontario's Cap-and-Trade System

Prepared by the Office of the Auditor General of Ontario

Participants	Emission Threshold	Free Allowances
Industry	**Mandatory:**[1] >25,000 tonnes of emissions per year **Voluntary:**[3] 10,000-25,000 tonnes per year	**2017:** Free allowances for 100% of combustion and process emissions[2] **2018:** Free allowances for 95% of combustion and 100% of process emissions[2] **2019:** Free allowances for 91% of combustion and 100% of process emissions[2] **2020:** Free allowances for 87% of combustion and 100% of process emissions[2]
Institutions	**Mandatory:**[1] >25,000 tonnes of emissions per year **Voluntary:**[3] 10,000-25,000 tonnes per year	Free allowances for 100% of all emissions until 2020
Energy-from-Waste Facilities	**Mandatory:**[1] >25,000 tonnes of emissions per year **Voluntary:**[3] 10,000-25,000 tonnes per year	Free allowances for 100% of all emissions until 2020
Fuel Distributors	**Mandatory:**[1] >200 litres of fuel per year	No free allowances
Electricity from Other Jurisdictions[4]	**Mandatory:**[1] All	No free allowances
Non-participants: Smaller businesses and Ontario households will not participate directly in cap and trade. However, gas and electricity distributors that participate will pass on the full carbon price to households and businesses, for example, in the form of a higher price for gas in the hope that small businesses and households in Ontario will alter behaviour resulting in a reduction in emissions.		

1. Mandatory participants are required to obtain allowances equal to emissions.
2. For more information on combustion and process emissions, refer to **Appendix 1**.
3. Voluntary participants can choose to obtain allowances equal to emissions. If they opt out, they will not receive free allowances and will pay the higher price passed on by fuel distributors.
4. Electricity sold to Ontario is charged for fossil fuels burned to create the electricity. In 2015, Ontario imported 5.8 TWh and exported 22.6 TWh of electricity.

Figure 7: Caps for the Three Linked Jurisdictions

Sources of data: California Air Resource Board; Quebec's Ministry of Sustainable Development, Environment and the Fight Against Climate Change; and Ontario's Ministry of the Environment and Climate Change

	California		Quebec		Ontario		Overall	
	Cap[1] (A)	% Decrease[2]	Cap[1] (B)	% Decrease[2]	Cap[1] (C)	% Decrease[2]	Cap[1] (A+B+C)	% Decrease[2]
2017	370.04	–	61.08	–	142.33	–	573.81	–
2018	358.30	3.2	58.96	3.5	136.44	4.1	553.70	3.4
2019	346.30	3.3	56.85	3.6	130.56	4.3	533.71	3.6
2020	334.20	3.5	54.74	3.7	124.67	4.5	513.61	3.8

1. Cap is the total allowances made available, with one allowance per tonne of CO_2 (or CO_2 equivalent) emitted.
2. % decrease is the percentage by which the cap is lower than the year before.

2.2.3 Adaptation in Ontario

In 2011, the Ministry released *Climate Ready: Ontario's Adaptation Strategy and Action Plan, 2011–2014* (Plan), produced in response to the 2009 report of Ontario's Expert Panel on Climate Change Adaptation. The Plan concluded that:

- the greatest risk from climate change to Southern Ontario is from flooding caused by increases in storm frequency and severity; and
- the greatest risk from climate change to Northern Ontario is a high degree of warming that will reduce the availability of ice roads to remote communities, and melting of the permafrost, which will affect water and sewage lines, and damage local ecosystems.

Figure 8 outlines the action items in the Plan.

2.2.4 Ministry Organization and Key Activities

The Ministry spent about $13 million on climate-change activities in the 2015/16 fiscal year. The Climate Change and Environmental Policy Division is the key division for climate change within the Ministry, and it has 144 full-time staff.

Three branches within this Division, collectively referred to as the Climate Change Directorate, were designated in 2014 to co-ordinate mitigation activities. They are:

- the Air Policy Instruments and Program Design Branch, responsible for the design of Ontario's cap-and-trade program as well as greenhouse-gas modelling;

Figure 8: Status of Action Items Contained in *Climate Ready: Climate Change Adaptation Strategy and Action Plan, 2011–2014*

Source of data: Compiled by the Office of the Auditor General of Ontario

Ontario's 2011 Climate Change Adaptation Strategy and Action Plan contained a number of action items spread across the government. The table below shows the title of each action item as contained in the Plan along with the current status (as of August 2016).

Item	Action Item	Primary Ministry Responsible	Status as of August 2016
1	Require consideration of climate change in existing and new policies and programs	Environment and Climate Change	Some parts completed
2	Establish a Climate Change Directorate	Environment and Climate Change	Completed
3	Promote Water Conservation	Environment and Climate Change	Some parts completed
4	Review the Ontario Low Water Response Program	Natural Resources and Forestry	Little progress made
5	Consider Climate Change Impacts in the Building Code	Municipal Affairs and Housing	Some parts completed
6	Undertake Infrastructure Vulnerability Assessments	Economic Development, Employment and Infrastructure	Some parts completed
7	Build Climate Change Adaptation into Ontario's 10-Year Infrastructure Plan	Economic Development, Employment and Infrastructure	Little progress made
8	Integrate Climate Change Impacts into the Environmental Assessment Process	Environment and Climate Change	Little progress made
9	Integrate Adaptive Solutions into Drinking Water Management	Environment and Climate Change	Little progress made
10	Develop Guidance for Stormwater Management	Environment and Climate Change	Little progress made
11	Strengthen the Winter Road Network	Northern Development and Mines	Little progress made
12	Protect Animal Health	Agriculture, Food and Rural Affairs	Some parts completed

Item	Action Item	Primary Ministry Responsible	Status as of August 2016
13	Protect Plant Health	Agriculture, Food and Rural Affairs	Some parts completed
14	Encourage Business Risk-Management Approaches	Agriculture, Food and Rural Affairs	Some parts completed
15	Pilot Adaptation Strategies in the Tourism Sector	Tourism, Culture and Sport	Little progress made
16	Conserve biodiversity and support resilient ecosystems	Natural Resources and Forestry	Little progress made
17	Undertake forest adaptation assessment	Natural Resources and Forestry	Some parts completed
18	Build adaptation into the Great Lakes Agreements	Environment and Climate Change	Completed
19	Examine Climate Change impacts on Fisheries	Natural Resources and Forestry	Completed
20	Develop the Lake Simcoe Adaptation Strategy	Environment and Climate Change	Little progress made
21	Increase Awareness of Land Use Planning Tools	Municipal Affairs and Housing	Little progress made
22	Integrate Adaptation Policies into the Provincial Policy Statement (which is a change to a policy alone)	Municipal Affairs and Housing	Completed
23	Consider Climate Change in the Growth Plan for Northern Ontario	Northern Development and Mines	Completed
24	Raise Awareness about Health Hazards of Climate Change	Health and Long-Term Care	Completed
25	Raise Public Awareness of Lyme Disease	Health and Long-Term Care	Some parts completed
26	Update Intensity-Duration-Frequency Curves	Transportation	Completed
27	Update the Environmental Farm Plan Program	Agriculture, Food and Rural Affairs	Completed
28	Provide Community Outreach and Training	Natural Resources and Forestry	Little progress made
29	Develop the Far North Land Use Strategy	Natural Resources and Forestry	Little progress made
30	Incorporate Climate Change into Curriculum	Education	Some parts completed
31	Enhance Climate-Related Monitoring	Natural Resources and Forestry	Little progress made
32	Undertake Climate Impact Indicators Study	Environment and Climate Change	No parts completed
33	Undertake Research Partnerships for Climate Modelling (the Plan has specific partnerships to be undertaken)	Environment and Climate Change	Completed
34	Establish an Ontario Public Service Climate Modelling Collaborative	Environment and Climate Change	Little progress made
35	Establish and Lead Ontario's Regional Adaptation Collaborative	Environment and Climate Change	Completed
36	Work with Canadian Council of Ministers of the Environment and Canadian Council of Forest Ministers	Environment and Climate Change	Completed
37	Participate in the Territorial Approach to Climate Change	Environment and Climate Change	Some parts completed

- the Air Policy and Climate Change Branch, responsible for the development of the Climate Change Strategy and Action Plans; and
- the Partnerships Branch, responsible for partnerships between the Ministry and external organizations related to climate change.

Other branches in the Division are responsible for climate-change adaptation efforts, supporting intergovernmental agreements on climate change, and managing non-hazardous-waste-related greenhouse-gas emissions.

Under the *Environmental Assessment Act* (Act), the Ministry's Operations Division is responsible for overseeing environmental assessments for government projects subject to the Act, many of which can have a direct impact on greenhouse-gas emissions. **Appendix 6** provides more information on how environmental assessments relate to climate change.

Under the *Environmental Protection Act*, the Ministry is also responsible for ensuring that emitters have environmental approvals in order to release emissions into the air from public- or private-sector projects, and that these do not exceed allowable limits; however, greenhouse-gas emissions are not specifically considered under the environmental approvals process. **Appendix 6** provides more information on environmental approvals.

Although various other ministries and government agencies engage in climate-change-related projects, the Ministry does not systematically track these activities, and so could not provide an estimate of total government spending on climate change.

Most programs that we identified in the course of our audit that reduce greenhouse gases were not created primarily for this reason. For example, the original goal of closing coal-fired electricity-generating plants was to improve air quality, and the primary goal of major transit projects is to reduce traffic congestion. In most cases, greenhouse-gas-emissions reduction was a secondary goal. Our audit indicated very few government programs are established with a primary goal of reducing greenhouse gases. Other than cap and trade, the only two such programs we identified were:

- Landfill Gas Collection: Regulations under the *Environmental Protection Act* require all large landfills over 1.5 million cubic metres to have processes to capture landfill gas created by the decomposition of organics. In 2014, such systems collected nearly 3 Mt of carbon dioxide equivalents in methane gas.
- Electric Vehicle Incentive Program: This voluntary program subsidizes the cost of an eligible electric vehicle as well as the installation of equipment needed to properly charge the vehicles at homes. As of October 2016, vehicles subsidized represented 0.018 Mt of annual greenhouse-gas reductions.

3.0 Audit Objective and Scope

Our audit objective was to assess whether:

- the Ministry of the Environment and Climate Change (Ministry) has effective systems and processes in place to ensure efforts to mitigate greenhouse gases are sufficient, comprehensive, and co-ordinated, 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.

Senior management at the Ministry agreed to our audit objective and criteria.

Our audit work was conducted primarily at the Ministry's offices in Toronto from December 2015 to June 2016. We focused on implementation of past and current mitigation and adaptation climate-change plans and on evaluating challenges in implementing them, and also the upcoming cap-and-trade system set to start in 2017 that is part of the province's 2016 Climate Change Action Plan.

We reviewed documentation at the Ministry from 2006 to 2016 relating to climate change, and contracted a national survey company to ask natural gas ratepayers their views about including the cost of cap and trade on their gas bills.

As climate change is a broad topic involving many ministries within government, we interviewed representatives from the ministries of Economic Development and Growth; Education; Energy; Finance; Housing; Municipal Affairs; Indigenous Relations and Reconciliation; Infrastructure; Natural Resources and Forestry; Northern Development and Mines; Research and Innovation; Tourism, Culture and Sport; and Transportation. We also researched climate-change mitigation and adaptation strategies, including international, federal and other provinces' practices.

In addition, we met with other provincial bodies, including the Independent Electricity System Operator, Infrastructure Ontario, the Ontario Energy Board, Treasury Board Secretariat, Waste Diversion Ontario, and former members of the Climate Change Secretariat, dismantled in 2011.

We also spoke to such organizations as the Association of Municipalities of Ontario, the California State Air Resource Board (a state agency generally equivalent to Ontario's Ministry of the Environment and Climate Change), the City of Toronto, Environment and Climate Change Canada, the Institute for Catastrophic Loss Reduction, the Insurance Bureau of Canada, the Ontario Chamber of Commerce, CFIB (Canadian Federation of Independent Businesses), the C.D. Howe Institute, and the Ontario Waste Management Association.

We also engaged two experts in the field of climate change to guide us in conducting this audit.

We also reviewed reports of the Environmental Commissioner of Ontario, and relied upon these where applicable. While the Office of the Auditor General of Ontario has a mandate to assess whether public money has been spent with due regard for economy and efficiency, and whether appropriate procedures were in place to measure and report on program effectiveness, the Environmental Commissioner is responsible for reviewing and reporting on the government's compliance with the *Environmental Bill of Rights*. Such reporting includes reviewing whether ministries consult the public regarding environmentally significant project proposals, which is required under the *Environmental Bill of Rights*, and whether government decision-making considers the environment. Also, the Commissioner has been responsible for reporting on the government's progress on reducing greenhouse gases since 2009.

The province has announced its intentions to link with Quebec's and California's cap-and-trade systems in 2018, but, at the time of our audit, had not finalized formal linking agreements. The Ministry had also not finalized the design of Ontario's cap-and-trade system beyond 2020 and told us that its estimates and projections related to the impact of cap and trade beyond 2020 were very preliminary.

This audit is part of a collaborative audit with the Office of the Auditor General of Canada and most provincial legislative audit offices across Canada that has as its central goal to determine the extent to which federal, provincial and territorial governments in Canada are meeting commitments to reduce greenhouse-gas emissions and adapt to climate change. The collaborative report is expected to be tabled in 2017.

Subsequent to the end of our field work, in October 2016, the federal government announced its intention to implement a minimum national carbon price, starting in 2018. All provinces and territories will be required to implement some type of carbon pricing system. The federal proposal was preliminary at the time of the completion of our audit, and further details were still needed to fully assess the impact of this new federal policy on Ontario's projected emissions reductions.

4.0 Detailed Audit Observations

Mitigation

The Ministry of the Environment and Climate Change (Ministry) is the lead on the government's efforts to reduce greenhouse gases, which are referred to as mitigation activities. According to the Ministry, a cornerstone of these activities is the cap-and-trade program, which is to commence in 2017. **Sections 4.1** to **4.6** address the Ministry's mitigation activities.

4.1 Recent Global Initiatives May Force Ministry to Refine Targets

Figure 9 compares Ontario's targets for reducing greenhouse-gas emissions to those of other Canadian provinces. It shows that British Columbia's 2020 target and Quebec's 2020 and 2030 targets require proportionately larger reductions than Ontario.

According to the Ministry, Ontario's targets were established in 2007 to be consistent with the principles of the Kyoto Protocol, an international agreement linked to the United Nations Framework Convention on Climate Change, which came into force in 2005.

Under Kyoto, Canada, Europe and 36 other industrialized countries committed to reduce greenhouse-gas emissions by at least 5% below 1990 levels between 2008 and 2012 (the first commitment period), and by at least 18% below 1990 levels between 2013 and 2020 (the second commitment period). Canada withdrew from Kyoto in 2011.

In October 2016, 192 countries, including Canada, signed the Paris Agreement, also within the United Nations Framework Convention on Climate Change, which commits them to "holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change."

Consistent with the goals of the Paris Agreement, the Canadian government has indicated it will review its national target, provide targeted funding, and ensure that provinces and territories have

Figure 9: Percentage Difference Between Target Emissions for Each Year and 1990 Emissions

Prepared by Office of the Auditor General of Ontario

	2014	2020	2030	2050
Quebec	−6	−20	−37.5	−80 to −90
British Columbia	+6[1]	−19	n/a	−76
Ontario	**−6**	**−15**	**−37**	**−80**
New Brunswick	n/a	−10	−35 to −45	−65 to −79
Newfoundland and Labrador	n/a	−10	−35 to −45	−74 to −85
Nova Scotia	−4	−10	−35 to −45	−80
PEI[2]	n/a	−10	−35 to −45	−74 to −84
Manitoba	−6	−6	n/a	n/a
Canada	+1	+1	−15	n/a
Saskatchewan	n/a	+22[1]	n/a	n/a
Alberta[3]	–	+49[1]	n/a	–

Note: n/a in the figure means no target has been set for the year indicated.

1. Due to the comparison of targets against the 1990 baseline, some of the provincial and federal targets are shown here as a positive number, representing an increase in targeted emissions compared to 1990 levels.
2. PEI uses an "Atlantic Canada" target.
3. Alberta's target is based on reducing emissions below its current 2020 forecast.

the flexibility to design their own carbon pricing. Meeting such a new national target will depend on emissions reductions by the provinces and territories, although the provinces and territories are not legally required to establish targets in line with the federal ones. In fact, Ontario's *Climate Change Mitigation and Low-carbon Economy Act, 2016* (Act) indicates that reduction targets may be increased to be consistent with the United Nations Framework Convention on Climate Change.

RECOMMENDATION 1

To ensure Ontario's targets are aligned with those of the federal government, the Ministry of the Environment and Climate Change should:

- co-ordinate with the federal government regarding impacts of the federal targets on key policies and programs in Ontario; and
- ensure any process for revising targets considers the impacts on and interests of Ontarians.

MINISTRY RESPONSE

The Ministry agrees with the Auditor General's recommendation. Ontario recognizes the federal government has a crucial role to play fighting climate change.

Ontario will continue to work with Canada and the other provinces/territories on the pan-Canadian framework and will continue to advocate for federal support to Ontario in addressing climate change.

Ontario's legislated target exceeds Canada's current international climate change commitment. We will continue to monitor national and international developments to ensure we remain a leader in the fight against climate change.

4.2 Coal Plants Closing and Recession Main Contributors to Achievement of Ontario's 2014 Reduction Target

As noted in **Figure 2**, Environment and Climate Change Canada determined that Ontario emitted 170 Mt of greenhouse gases in 2014 (the latest year for which figures are available). Based on this data, Ontario met its 2014 target of reducing emissions by 6% below 1990 levels.

According to Ontario's Climate Change Update 2014 (Update), total emissions in Ontario declined by 34 Mt between 2007 and 2014, with the greatest reductions in the electricity and industrial sectors.

Much of the 34-Mt decrease was attributable to the government acting on its 2003 commitment to close all of Ontario's coal-fired electricity-generating plants. The government decommissioned the plants between 2005 and 2014, resulting in a significant decrease in greenhouse-gas emissions.

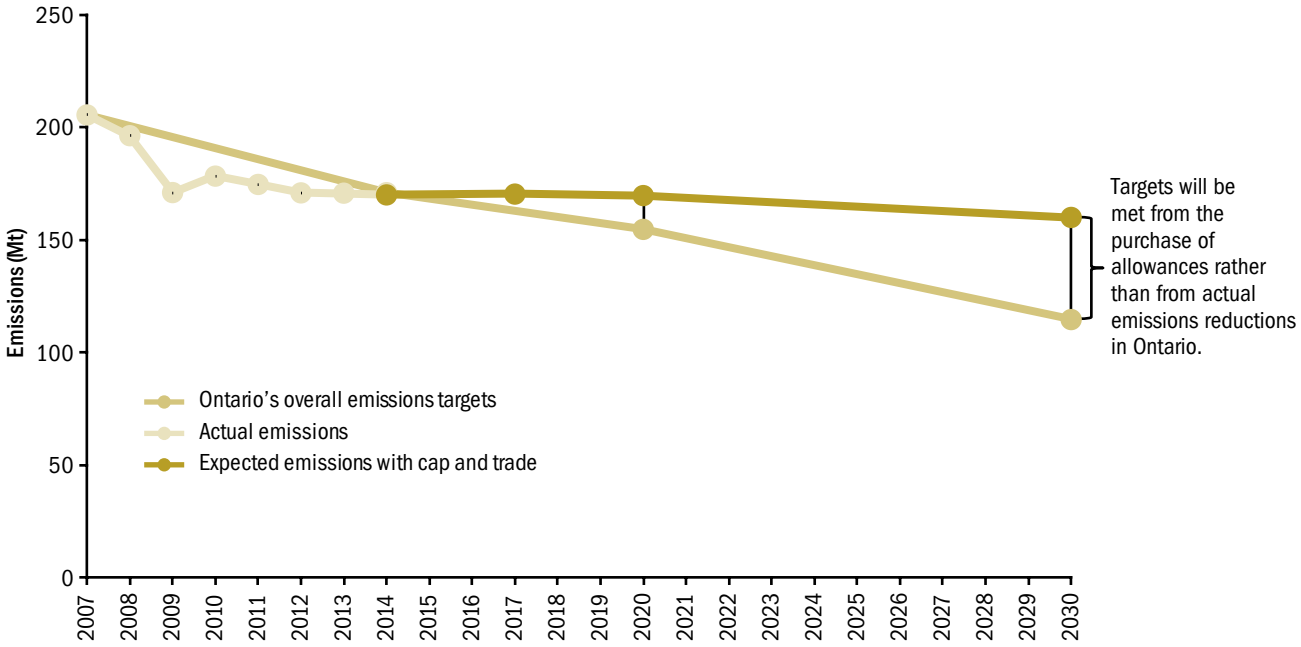
In addition, the 2008 financial crisis that sparked a recession in Ontario also indirectly helped the province meet its target; the Update attributes 10 Mt of the 34-Mt decrease to plants reducing production or closing altogether between 2007 and 2012. See **Figure 10** for actual and projected greenhouse-gas emissions by year.

As of the 2007/08 fiscal year, the Ministry committed to report annually on emissions levels and its plans regarding future efforts to cut emissions. However, it was under no legal obligation to do so, and in fact issued no such reports in 2011 and 2013.

Although the Ministry's 2007 Mitigation Plan outlined specific initiatives to reduce emissions, as seen in **Figure 3**, its annual reporting does not link changes in emissions to individual initiatives, making it difficult to evaluate the outcome of those initiatives. The Environmental Commissioner has already commented in its 2013 report on the Ministry's delays in producing annual reports and the lack of detailed explanations in the reports on actions taken by the Ministry to reduce greenhouse gases. (For more information on the Environmental Commissioner, see **Appendix 7**.)

Figure 10: Ontario's Emission Targets Compared to Expected Emissions

Source of data: Ministry of the Environment and Climate Change's environmental consultant



RECOMMENDATION 2

To keep Ontarians updated on the status of its efforts to reduce greenhouse gases, the Ministry of the Environment and Climate Change should:

- report at least annually to the public on its overall progress toward meeting its emissions targets; and
- explain the outcomes of its specific initiatives to reduce emissions.

MINISTRY RESPONSE

The Ministry recognizes the importance of keeping Ontarians informed of the status of the government's efforts to reduce greenhouse-gas emissions. The Ministry has already established the requirement for annual reporting under the *Climate Change and Low Carbon Economy Act, 2016*.

The Minister of the Environment and Climate Change is also required by the Act to review and provide an evaluation to Treasury Board of any initiative proposed to be funded through the Greenhouse Gas Reduction Fund, and report annually on evaluations and the status of the funded initiatives set out in the Climate Change Action Plan. This status will include the emissions reductions achieved from the initiatives.

4.3 Ontario Cap and Trade Will Not Significantly Lower Actual Emissions up to 2020

Under its plans to link its cap-and-trade system with Quebec and California, Ontario is expected to achieve only a relatively small reduction in actual emissions within Ontario from implementation through to 2020. However, the Ministry intends to count in its own emissions totals some of the reductions achieved in the two other jurisdictions.

The Ministry did limited analysis of alternative approaches prior to selecting a cap-and-trade system linked to Quebec and California in 2008 as a means of reducing emissions in Ontario.

In May 2016, the Ministry received and made public an economic analysis of alternatives from its environmental consultant, entitled *Impact Modelling and Analysis of Ontario Cap and Trade Program*. This analysis supported the choice of its linked cap-and-trade system. However, the analysis was produced about eight years after Ontario signed a memorandum of understanding for a linked cap-and-trade system, and just a day before it gave Royal Assent to supporting legislation (the *Climate Change Mitigation and Low-carbon Economy Act, 2016*).

The analysis compared four possible approaches, one of which was the linked cap-and-trade model that Ontario chose. The others were an Ontario-only cap-and-trade system, and two carbon-tax models in which businesses and consumers are directly taxed based on the quantity of emissions they produce. **Figure 11** shows the projected economic impact of each of the four options, along with the forecast emissions reductions.

In order for Ontario to meet its 2020 target of 155 Mt, the Ministry needs to find ways to reduce emissions, because its current projections indicate the province will be 18.7 Mt over target. The current plan is to rely on cap and trade, and other measures funded from cap-and-trade revenues, to close this 18.7 Mt gap.

However, as seen in **Figure 11**, the analysis commissioned by the Ministry forecast that of the required 18.7 Mt, only about 3.8 Mt in actual reductions is expected to be achieved in Ontario—the remaining 15 Mt is expected to be achieved in Quebec and California.

The analysis commissioned by the Ministry indicates that, up until 2020, Ontario businesses will, for the most part, buy allowances from California and/or Quebec instead of making changes such as installing new equipment. The Ministry intends to include these purchased allowances in the tally to help it meet the Ontario target. The Ministry has not determined details of the cap-and-trade program after 2020.

The analysis indicates that the price of an allowance in 2020 would have varied extensively depending on which cap-and-trade system was chosen:

Figure 11: Relative Impact of Carbon Pricing Options on Emissions Reductions in 2020 According to Study Commissioned by the Ministry

Source of data: May 2016 Report commissioned by the Ministry of the Environment and Climate Change

Options	Emissions Reduction Projected to be Needed in 2020 to Meet Ontario's Target (Mt) A	Allowances Purchased from California and/or Quebec (Mt) B*	Emissions Reduction due to Businesses Leaving Ontario (Mt) C	Actual Emissions Reductions (Mt) A–B–C	Economic Impact as % of GDP	Allowance Price per Tonne to be Paid by Emitters ($)
Considered in Study						
Model chosen: Linked Cap and Trade, funding received spent on reduction initiatives	18.70	14.90	0.28	**3.52**	(0.03)	18
Unlinked Cap and Trade, funding received spent on reduction initiatives	18.70	–	1.75	**16.95**	(0.39)	157
Carbon Tax, funding received spent on reduction initiatives	18.70	–	5.84	**12.86**	(0.40)	69
Carbon Tax, funding received returned as tax cuts	18.70	–	6.04	**12.66**	(0.21)	72

* May also include offsets.

- Under the current linked system, an allowance is projected to cost $18 per tonne of emissions.
- In an unlinked Ontario-only system, the price was projected to be $157 per tonne, or almost nine times more.

The two systems have such a significant price variance because the number of allowances available for sale from an only Ontario system would be much smaller than the linked system, where a larger number of allowances would be available from the two other jurisdictions.

The analysis also noted that in an Ontario-only, unlinked cap-and-trade system, actual reductions in greenhouse gases in the province in 2020 would close the projected gap in emissions mentioned above—that is, they would be almost 18.7 Mt versus 3.8 Mt, or almost five times higher than in a linked system.

However, the analysis further pointed out that more businesses might leave the province in an Ontario-only system because the cost of doing business would be considerably more as a result of the higher-priced allowances ($157 per tonne versus $18 per tonne).

The higher price of allowances would make it more expensive for businesses to produce emissions. Businesses can choose to either obtain allowances equal to their emissions; invest in the technologies needed to reduce their actual emissions; reduce production to lower their emissions; or leave the province.

Businesses leaving Ontario, combined with the higher cost to all consumers of fossil fuels such as gasoline and natural gas, would have a more significant negative impact on the province's GDP (the gross domestic product, a measure of all goods and services produced in the province) under the unlinked system.

The Ministry justified its choice of the linked cap-and-trade system by saying this option had the least onerous impact, claiming that the linked model offers the benefits of greater actual emissions reductions while avoiding high economic costs.

4.3.1 Ontario Businesses to Pay $466 Million for Quebec and California Allowances in Linked Cap and Trade

The Ministry's analysis also indicates that under the linked cap-and-trade system, many Ontario businesses are initially more likely to buy allowances—almost 15 Mt worth in 2020—rather than pay for the more expensive equipment needed to actually reduce emissions.

Based on estimates of the number of allowances required from outside Ontario, and the forecast prices, Ontario businesses will pay approximately $466 million for Quebec and California allowances by the end of 2020, money that will leave the Ontario economy. Based on early forecasts in 2015 used to inform program design, the Ministry estimated this could rise to $2.2 billion in 2030. However, if initiatives outlined in the Government's Climate Change Action Plan are successful at reducing emissions over the long term, this number may be lower.

In addition, the allowances sold by the government of Ontario are forecast to raise about $8 billion over the four years.

The Ministry estimates households are expected to face an average increase in direct yearly costs (of fossil fuels) of $156 ($13 per month) in 2017. Preliminary estimates by the Ministry of Finance have estimated the direct costs to the average Ontario household in 2019 will be $210, plus an additional $75 in indirect costs (e.g., goods and services). The Ministry has not determined the specific impact of cap and trade on rural and Northern households.

4.3.2 Ontario's Emissions Reporting Will Not Follow Federal Rules

As noted above, the main benefit of the plan to link with Quebec and California is the Ministry's assertion that it will meet the 2020 target. However, the Ministry has not publicly said that it intends to achieve Ontario's target by counting reductions achieved in its partner jurisdictions.

Furthermore, since the final determination of whether Ontario has met a given target is based primarily on the National Inventory Report (NIR) prepared by the federal government (see **Section 2.1.1**), Ontario will likely be assessed as not meeting its target, since the NIR does not currently recognize reductions made outside Ontario, such as those from Quebec and California. In addition, while the 2015 Paris Agreement allows one country to claim another's emissions reductions, this is permitted only if both federal governments have formally agreed to such an exchange. Canada at present has no such agreement with the United States. Consequently, if Ontario claims reductions made in California, currently these would not be eligible for inclusion in the NIR reporting.

Finally, the provincial government has not clearly communicated to the public in its 2015 Climate Change Strategy or its 2016 Climate Change Action Plan its intention to use other jurisdictions' emissions reductions to meet Ontario targets.

RECOMMENDATION 3

To ensure Ontarians receive a complete picture of the province's emissions reductions, the Ministry of the Environment and Climate Change should report publicly on:

- the short- and long-term financial impacts of cap and trade on Ontarians; and
- both the projected and actual reductions for its 2020 and other targets, in accordance with the reporting requirements of the Canadian National Inventory Report.

MINISTRY RESPONSE

The Ministry agrees with the Auditor General that public reporting on progress toward greenhouse-gas emissions reductions is a critical element related to accountability and transparency of climate change initiatives. A key element of the *Climate Change Mitigation and Low-carbon Economy Act, 2016* is the requirement for an annual report on implementation of the Climate Change Action Plan and the use of cap-and-trade proceeds to support emissions reductions. As part of this reporting, we will also include the short-and long-term financial impacts of cap and trade on Ontarians.

Cap and trade is an internationally recognized system for reducing greenhouse-gas emissions. The recently ratified Paris Agreement includes provisions for internationally transferred mitigation outcomes, which is a recognition that national jurisdictions may voluntarily participate in emissions trading and that national reporting frameworks need to account for such trading.

The Ministry will ensure it continues to report historical emissions in accordance with the Canadian National Inventory Report (NIR) and with the United Nations Framework Convention on Climate Change's guidelines and practices for this purpose. The Ministry intends to also separately report on progress on mitigation commitments, apart from the NIR, and recognize allowances from other jurisdictions as the NIR currently only recognizes domestic reductions. Ontario will be working closely with its partners in Québec and California on how progress under a linked cap-and-trade program will be communicated.

Ontario also continues to work closely with the federal government on a national approach to pricing carbon emissions through the development of a pan-Canadian framework that aligns with the Paris Agreement on global climate change action.

4.3.3 Ontario Linking with Quebec and California May Not Significantly Reduce Global Emissions in 2020

The Ministry's economic analysis of cap and trade indicates that linking with Quebec and California is a reasonable climate-change strategy because it will ultimately yield lower global emissions. The

Ministry told us it assumes businesses in Quebec and California will further reduce their emissions in order to sell allowances to Ontario companies.

However, this assumption is questionable based on current allowance trading information. This information indicates that well over the 14.9 Mt of allowances that will be needed by Ontario companies are already available—over a year in advance of Ontario entering the linked cap-and-trade system. According to trade data from the California Air Resource Board (a California government board responsible for cap and trade), Quebec and California had more allowances available for sale at auction as of August 2016 than were sold. Only 32% of allowances available in the most recent quarterly auction in August 2016 were sold, and over 60 Mt of allowances went unsold.

In addition, during several months in 2016, the price of allowances traded between emitters themselves had fallen below the minimum auction price set by the governments.

There are two primary reasons why an oversupply of allowances may occur: either a jurisdiction releases more allowances than are needed to cover actual emissions, or other government policies force emissions reductions, resulting in emitters not needing as many allowances.

The experience of the European Union Emissions Trading System (EU ETS) has also shown that when there is an oversupply of allowances, the price falls and the incentive for businesses to reduce emissions also decreases. The EU ETS includes 28 European Union states plus Iceland, Lichtenstein and Norway, and covers around 45% of the EU's emissions.

Between 2008 and 2012, participating governments provided close to 90% of allowances for free, and auctioned the remaining 10%. This was against the background of the 2008 economic crisis, which reduced the demand for allowances.

A collaborative audit by the European Organization of Supreme Audit Institutions in 2012 found that a surplus of inexpensive allowances provided little incentive to businesses to make actual long-term emissions reductions. Reports by the European Parliament and European Commission (the executive branch of the European Union) indicate the surplus had reached 955 million allowances (or the right to emit 955 Mt of emissions), and the price of allowances had fallen from €30 per tonne in 2008 to €3 per tonne in 2013. Part of the reason for the steep decline in the price was the EU ETS did not establish a minimum allowance price for auctions, such as has been established in Ontario.

The ongoing emission-reduction strategies of California especially indicate its reductions may have occurred regardless of whether Ontario was part of the linked cap-and-trade system. For example, California has a number of initiatives to reduce emissions in addition to cap and trade, including standards for low-carbon fuel, vehicle emissions, and renewable electricity. In fact, California's 2014 climate change plan forecasts that 70% of reductions required to achieve its 2020 goal will be achieved through initiatives other than cap and trade.

RECOMMENDATION 4

To ensure that it adopts the best possible greenhouse-gas-reducing system, the Ministry of the Environment and Climate Change should better study the emissions impact of Ontario joining a linked cap-and-trade system to confirm that Ontario's participation is contributing to additional global emissions reductions.

MINISTRY RESPONSE

The best possible greenhouse-gas-reducing program is one that achieves the greatest level of emissions reductions at the lowest cost. A linked cap-and-trade program allows Ontario to achieve its emissions reduction commitments of 18.7 Mt at a substantially lower cost than an unlinked or carbon tax program.

Ontario has conducted evaluations of the benefits of the linked cap-and-trade program on actual emissions reductions in Ontario and potential linking partnerships, and will continue

to study the impacts of the program in emission reductions. We are moving forward with plans to join Quebec and California by linking the cap-and-trade programs in 2018. Pursuing other appropriate linkages will continue to be actively investigated and assessed.

Modelling of alternative programs, such as unlinked cap and trade or carbon tax, showed that the costs of an unlinked Ontario program to households and businesses would be far greater than a linked program, which achieves similar environmental benefits. It also suggests broader linkages with other jurisdictions could further improve outcomes.

4.3.4 Allowances May Be in Short Supply by 2030

While market forecasts suggest that emissions in 2020 for Ontario, Quebec and California are expected to be easily covered by the number of allowances available in 2020, this situation is expected to change in 2030. All three jurisdictions have set targets for much greater emissions reductions in 2030 and are planning to release fewer allowances to ensure their targets are achieved. Consequently, allowance shortages are expected.

4.3.5 Unresolved Issues Remain with Ontario's Cap-and-Trade System

Emissions Reductions May Be Used in Multiple Jurisdictions' Emissions Reporting

WCI, Inc. has an allowance tracking system that is to ensure that each allowance is claimed only once by emitters. However, Ontario, Quebec and California have not formally agreed on how to account for and present the reductions resulting from cap and trade in their own jurisdictional emissions reporting. As a result, there is a risk that two jurisdictions will take credit for one instance of reduction: the jurisdiction that actually made the reduction, and the jurisdiction that bought the allowance.

For example, if a company in California has an allowance available for sale because it reduced its emissions and so does not need it, California may take credit for the reduction in its reporting. When an Ontario company buys the allowance from the California company, Ontario may, under current plans, also take credit, counting the allowance toward its target.

Our review of California's emissions reporting and the current agreement between Quebec and California also indicates that these two jurisdictions have not resolved how to account for allowances sold by one jurisdiction to the other in jurisdictional emissions reporting.

As of June 2016, no mechanism had been put in place to prevent the double reporting of emissions reductions from the buying and selling of allowances among the three jurisdictions.

Method of Measuring the Impacts of Offsets Not Yet Established

Ontario's cap-and-trade system allows for up to 8% of emissions from large emitters to be covered by "offset allowances." Offset allowances are emissions-reducing projects, such as planting trees and collecting landfill gases (refer to **Appendix 5** for more details on offsets in Ontario's cap-and-trade program).

However, in practice, the emissions-reducing impacts of such projects may be difficult to measure and verify. For example, it may be hard to confirm the extent to which a new-growth forest absorbs greenhouse gases.

The Office of the Auditor General of British Columbia raised concerns about the lack of information to adequately assess offsets in a 2013 report entitled *An Audit of Carbon Neutral Government*. The report noted that the regulation setting out offset rules was unclear and that the British Columbia government did not provide proper oversight of the third parties responsible for validating the offsets. The report recommended the British Columbia Ministry develop guidelines to clarify the regulation. At the time of

our audit, the Ontario Ministry was in the process of developing protocols for measuring the impacts of projects resulting in offset allowances.

Ontario May Exceed Cap Due to Impact of Free Allowances for Actions Taken Prior to Cap and Trade

Under Ontario's cap-and-trade system, the Ministry plans to issue free allowances to companies for up to a total of 2 Mt worth of allowances for emissions reductions achieved between 2012 and 2016, prior to the start of cap and trade. Businesses receiving these free allowances will be able to use them in 2017 or carry them forward to any subsequent year.

In 2020, Ontario is planning to release just enough allowances to enable Ontario to meet the 2020 target (the cap). However, the Ministry has not factored these additional free allowances into its cap. The risk is that companies will now have allowances permitting them to collectively emit up to 2 Mt more than the cap.

At the time of our audit, the Ministry had not yet issued any of these allowances and was still considering how to implement this policy.

Cap and Trade Will Likely Contribute to an Increase in Electricity Prices for Industry

The Ontario Chamber of Commerce informed us that, based on its 2015 survey of 1,000 businesses, the high cost of electricity poses one of the largest competitive risks to businesses in Ontario. Under cap and trade, the price of electricity is expected to rise further.

The government is planning to use cap-and-trade revenues to offset higher electricity prices (discussed in **Section 4.4**). Using limited information on the cap-and-trade program that is currently available past 2020, the Ministry has forecast that, even with a planned $5.68 billion allotted for this offset, large industrial electricity customers will still see a 7% increase on their 2030 electricity bills directly attributable to cap and trade. This increase is over and above the planned increases in the 2013 Long-Term Energy Plan (discussed in **Section 4.4**).

RECOMMENDATION 5

To ensure the new cap-and-trade system operates consistently and fairly to achieve maximum greenhouse-gas emissions reductions in Ontario, the Ministry of the Environment and Climate Change (Ministry) should resolve outstanding matters before implementing the system. Specifically, the Ministry should:

- develop protocols for accurately measuring and verifying the impacts of projects eligible for offset allowances;
- consider the impact of the free allowances it plans to offer Ontario businesses for emissions reductions achieved before the implementation of cap and trade; and
- ensure that the same reductions are not reported by multiple jurisdictions.

MINISTRY RESPONSE

The Ministry appreciates the Auditor General's concern with the consistency and fairness of the operation of the cap-and-trade program. The Ministry is taking the following action to finalize cap-and-trade program design to ensure that the cap-and-trade program achieves maximum greenhouse-gas emissions reductions at the lowest cost, and in a fair and consistent manner when implemented in 2017:

Offsets:
Ontario will be consulting the public on a regulatory proposal for offset credits in fall 2016, which would approve the creation of offset credits based on protocols that will be adapted to meet the standards agreed to by Quebec, California and Ontario. Thirteen protocols will be adapted by early 2018. The public will have the opportunity to review and provide comments on the draft protocols.

Early Reduction Credits:
Ontario is planning to implement rules for early reduction credits in 2017. As set out in the

regulatory proposal in February 2016, Ontario would issue a limited number of early reduction credits (up to 2 Mt). These credits are to help capped emitters that took early action to mitigate greenhouse gases. Eligible projects will need to meet rigorous criteria in order to receive the credits.

Double Reporting:
With regard to greenhouse-gas reduction targets, Ontario is committed to working with California and Quebec to meet reduction targets to ensure there is no double counting in reporting of progress.

4.4 Ministry Forecasts Less Greenhouse-Gas Emissions Reduction than Its Own Action Plan Publicly Communicates

The government has said it plans to use the estimated $8 billion in revenue that cap and trade will generate by 2020 for projects to reduce greenhouse-gas emissions and to administer the cap-and-trade program. These projects, outlined in the Ministry's Climate Change Action Plan (Action Plan) of June 2016, are listed in **Figure 5**.

However, it is unlikely that these projects will actually achieve the forecast 9.8-Mt emissions reduction in 2020, which the Ministry has indicated it expects in its Action Plan, since many of the projects' estimated reductions were not supported by a thorough analysis.

The Ministry led the development of the Action Plan, working with 15 other ministries to:

- identify initiatives to help Ontario achieve its 2020 greenhouse-gas reduction target; and
- lay the foundation for future reductions.

Ministries were also asked to submit proposed projects to the Ministry outlining each project's potential for emissions reductions, implementation costs and timelines.

As seen in **Figure 5**, the Ministry expects the projects to be funded under the Action Plan to result in emissions reductions of nearly 10 Mt. However, as discussed in **Section 4.3**, the 2016 analysis titled *Impact Modelling and Analysis of Ontario Cap and Trade Program*, commissioned by the Ministry, forecasts that reductions in Ontario would only reach 3.8 Mt. The analysis included the impact on emissions of both cap and trade and the Ministry's spending of cap-and-trade revenues on initiatives similar to those considered in the Action Plan. The following are examples of projects whose estimated emissions reductions needed to be better supported:

- *Electricity price reductions will have marginal impact:* The Ministry plans to spend up to $1.32 billion between 2017 and 2020 to offset the financial impact of cap and trade on residential and commercial electricity bills, and thereby decrease emissions by 3 Mt. The Independent Electricity System Operator was able to provide us with support to show the impact of this subsidy on the average household electricity bill—which is projected to increase 23% (or $34.07 per month) from 2015 to 2020 even after applying this reduction. However, neither the Ministry of the Environment and Climate Change nor the Ministry of Energy was able to demonstrate how the $1.32 billion subsidy would result in the estimated 3 Mt reduction in emissions; the two ministries informed us they had not decided on how the subsidy would be used to achieve these reductions. In theory, lowering electricity prices should motivate a greater use of electricity over natural gas and diesel—and therefore reduce greenhouse gases. However, the impact of the $1.32 billion on electricity prices is expected to be marginal; without the subsidy, and factoring in the cost of cap and trade, residential bills are projected to rise by 25% and industrial bills by 14% by 2020; with the $1.32 billion applied, residential rates will still increase by 23% and industrial rates by 13%. Finally, such increased electricity costs may make natural gas, which is responsible

for significantly more greenhouse-gas emissions than cleaner energy sources like solar, hydro, nuclear and wind, an even more economical option.

- *No plan for achieving renewable natural gas goal:* $100 million will go toward a project to help natural gas distributors increase their use of "renewable" natural gas (methane made from the decomposition of organic material, also known as "biogas"). The Action Plan indicates this initiative will reduce emissions by 1 Mt by increasing the renewable portion of all natural gas used in the province from 0% to 2% by 2020. Our review of a 2013 report from the Biogas Association of Canada indicated that the current biogas-generation capacity is insufficient to meet this proposed demand. In fact, in order to increase the renewable portion of all natural gas distributed in Ontario to 2%, 500 times more renewable natural gas is required than what Ontario currently produces. The Action Plan does not indicate how this shortfall will be met—it just assumed a level of production of renewable natural gas from a 2011 project proposal from gas distributors that the Ontario Energy Board did not approve due to insufficient information provided by the utilities proposing the project.
- *Zero-emission home rebate initiative not supported:* Funding of $200 million will be provided to the Zero Emission Certification and Incentive Program, an initiative to provide a one-time $20,000 rebate for each house built or retrofitted to a zero-emissions standard. This is expected to achieve an annual 0.01-Mt reduction. It is assumed that 2,500 such homes will be sold each year between 2017 and 2020—as compared to about 70,000 homes built in Ontario in 2015. The initiative does not consider how much more than $20,000 homeowners will need to spend to get their home to zero emissions, and whether they will be willing to spend it. Without this information, there is no basis for projecting the sale of 2,500 such homes a year for four years.

Other concerns with the extent to which the Action Plan items would likely contribute to reductions in greenhouse gases are as follows:

- **Projects initiated before the Action Plan are now being presented as new climate-change initiatives:** The Ministry allocated $952 million for two projects (with projected emissions reductions of over 0.05 Mt in 2020) that were initiated before the Action Plan, as follows:
  - *Electric vehicles ($277 million to achieve 0.05 Mt reduction in 2020):* In 2009, the government committed to the goal of having "one in 20 passenger vehicles on the province's roads being electric by the year 2020." The government is currently falling far short of achieving this goal; as of 2016, there were only about 9,000 electric vehicles registered in Ontario compared to the 500,000 vehicles sold annually. Nevertheless, the Ministry has factored the increased use of electric cars into the impact on emissions in 2020.
  - *Regional Express Rail ($675 million to achieve reductions after 2020):* The Regional Express Rail is a component of the province's regional transportation plan for the Greater Toronto and Hamilton area. The Ministry had already factored the project into its 2014 annual public report on emissions.

Without cap-and-trade revenues, the government would have needed to either downsize the projects from the original commitments or find alternative revenue sources to fund the $952 million in project costs—since the government had committed to these projects before the introduction of the Action Plan. Including these projects in the Action Plan does not result in any additional emissions reductions.

- **Action Plan takes credit for reductions that may have occurred without subsidies:** Many initiatives in the Action Plan are geared to changing Ontarians' behaviour so that they use fewer resources that generate greenhouse gases. The initiatives offer subsidies to effect this change—but some recipients would have changed their behaviour anyway. These Action Plan initiatives do not account for the portion of the subsidy that was unnecessary to change behaviours, and therefore overstate reductions attributable to the Action Plan. For example:
  - *Energy efficiency retrofits ($900 million to achieve 0.10 Mt in 2020):* This initiative provides funding for apartment-building owners and social-housing projects to replace boilers, install adaptive thermostats and retrofit lighting. But some of these improvements would have been made even without the Action Plan because the age of the buildings would have required them.
  - *Electric vehicles ($277 million to achieve 0.05 Mt in 2020):* This funding to subsidize eligible electric vehicles and their related infrastructure was made without consideration given to the people who would have bought such vehicles even without a subsidy. For example, the initiative provides a $3,000 subsidy for an electric vehicle that retails between $75,000 and $150,000. The emissions calculation assumes that vehicles in this high cost category would have been purchased only as a result of the relatively small subsidy.

The goals of these types of initiatives are to encourage the adoption of lower-emitting technology. Some independent research organizations, in particular the C.D. Howe Institute and the Ecofiscal Commission, have published reports that conclude that using revenue generated from programs like Ontario's cap and trade to fund greenhouse-gas-reducing programs may be unnecessary, especially for sectors covered by the cap. For example, the C.D. Howe Institute suggests that merely implementing carbon pricing (e.g., cap and trade) will encourage the adoption of such technologies without additional inducements. The Institute also suggests such funding would be better spent on targeted subsidies for riskier technology research and development—that is, projects that would not be funded by the private sector.

- **Emissions reductions overstated in the Action Plan because combined effect of initiatives not considered:** The expected emissions impact as measured overall by the Ministry has been determined by measuring the impact of each project in isolation. However, some initiatives will shrink the emissions impact of others, and failing to take this into account can result in overstating total emissions reductions. For example, the building retrofit program will reduce the amount of natural gas that buildings consume, thus reducing the impact of any increased use of biogas. California government environment officials told us that the State uses software that factors in this overlapping effect when estimating the impact of emissions on various initiatives.

4.4.1 Legislation Provides Little Guidance on Eligibility of Action Plan Initiatives

As noted, many of the initiatives in the Climate Change Action Plan do not provide a sound basis for achieving the nearly 10 Mt of emissions reductions forecast by the Ministry. One reason for this is that the *Climate Change Mitigation and Low-carbon Economy Act, 2016* (Act) does not provide clear criteria for which types of projects can be funded.

The Act allows the Ministry to use cap-and-trade revenue to fund a wide range of initiatives, with the only requirement being that the initiative is reasonably likely to support the reduction of greenhouse gas.

4.4.2 Consideration of Alternative Approaches Could Identify More Cost-Effective Ways of Reducing Electricity Prices

As noted, the Climate Change Action Plan proposes to spend up to $1.32 billion of cap-and-trade revenue to reduce the price of electricity. While the Independent Electricity System Operator found that this spending would indeed help offset electricity price increases, our analysis indicated that the Action Plan's approach was not the most cost-effective.

We identified alternative approaches that could yield better outcomes. One was providing free cap-and-trade allowances to electricity generators to keep electricity costs lower, and subsidizing residential electricity bills using cap-and-trade revenue. (For more on the businesses receiving free allowances, see **Figure 6**.) The Independent Electricity System Operator performed preliminary calculations that indicated this would yield the same reductions to the cost of electricity bills but would take $500 million less out of cap-and-trade revenues than the approach in the Action Plan. However, this alternative approach was never considered by the Ministry.

RECOMMENDATION 6

The Ministry of the Environment and Climate Change should ensure that projected emissions reductions expected from the 2016 Climate Change Action Plan initiatives that it intends to fund from cap-and-trade revenues:

- are supported by sound assumptions; and that
- it selects initiatives that achieve the highest value-for-money.

MINISTRY RESPONSE

The Ministry agrees with the Auditor General's recommendation on the need for the evaluation of initiatives funded from cap-and-trade proceeds, and ensuring the best value for money of the government's climate change efforts. That is why it has put in place a rigorous evaluation framework for program proposals including refining emissions reduction forecasts prior to their approval for funding. The Minister of the Environment and Climate Change is required to review and provide an evaluation to Treasury Board of any initiative proposed to be funded through the Greenhouse Gas Reduction Fund, and report annually on evaluations and funded initiatives.

The Ministry is also committed to transparency in its decision-making and will report annually on emissions reduction progress as well as on initiatives funded from cap-and-trade proceeds.

4.5 Impact on Emissions Often Not Routinely Considered in Provincial Ministries' and Agencies' Decision-Making

Provincial government programs and activities have the potential to cause or reduce emissions. However, provincial ministries and agencies responsible for those programs and activities do not consistently consider this.

The Ministry can do more to co-ordinate emissions reductions in the programs for which it is directly responsible, such as waste diversion. It can also do more to encourage other ministries to prioritize emissions reduction. We discuss this in further detail below.

4.5.1 Ministry Has Not Improved Diversion of Non-Hazardous Waste to Reduce Emissions

The Ministry has not met its 2004 goal of diverting 60% of all non-hazardous waste; it estimates that less than 30% of non-hazardous waste in Ontario is currently being diverted. Non-hazardous waste diversion reduces greenhouse-gas emissions.

According to Environment and Climate Change Canada, about 8.5 Mt of Ontario's emissions in 2014 resulted from the decomposition of organic waste in landfills. If organic non-hazardous waste is diverted from landfills and instead composted, emissions are avoided.

Recycling also reduces greenhouse-gas emissions, albeit less directly, by reducing the need to extract the natural resources needed to manufacture new products.

The Ministry is responsible for setting standards for the management of non-hazardous waste through legislation and regulations, and enforcing compliance. Our 2010 audit noted that while there was a significant improvement in diversion for households, the industrial, commercial and institutional sector had not improved its overall diversion rates. In our 2012 follow-up, we noted that a number of our recommendations remain outstanding, and that the Ministry had not:

- developed a province-wide organics waste diversion program, which meant that in 2015, only 38% of organic waste in Ontario was being diverted; and
- improved waste diversion in the industrial, commercial and institutional sector, which is responsible for managing its own waste. The Ministry has noted that current regulations have been largely ineffective in improving waste diversion in this sector because, for example, they apply only to large businesses and do not apply to organic waste. Further, there is little economic incentive for businesses to increase waste diversion. For example, according to a recent Ministry study, in 2014 the average cost per tonne of sending organic waste to landfill was about $130, compared to about $200 for diversion in the Industrial, Commercial and Institutional sector.

In 2015, the Ministry introduced a long-term goal of zero waste and zero greenhouse-gas emissions from the waste sector. In June 2016, the government passed the *Resource Recovery and Circular Economy Act, 2016* and the *Waste Diversion Transition Act, 2016*. At the time of our audit, the Ministry could not estimate the expected waste diversion that would result from this legislation because its regulations had yet to be drafted, and the Ministry had not approved a timeline on when it planned to achieve its long-term zero waste goal.

4.5.2 Ministry Has Not Clarified How Environmental Assessments Should Incorporate Climate-Change Considerations

Under the *Environmental Assessment Act* (Act), the Ministry has the authority to set the criteria that must be considered when an environmental assessment is conducted on a proposed project or plan.

The scope of the Act is very broad, and applies to plans ranging from a new transportation corridor that includes both transit and highways for the entire province, to a single new landfill site.

Environmental assessments require an evaluation of alternatives in advance of a project or plan being implemented. The criteria to be considered when evaluating alternatives include such factors as noise, odour and impact on water quality. Before 2014, the Ministry did not require environmental assessments to consider how a particular project or plan would impact climate change. In 2014, the Ministry updated the requirements for all environmental assessments as follows: "Consideration should also be given to how the project and its alternatives may interrelate with components of the environment, including with potentially changing climatic conditions over time." The Ministry has yet to provide any additional guidance on how this requirement should be implemented, for example, by clarifying that environmental assessments should consider alternatives that have varying impacts on greenhouse-gas emissions, with one alternative being focused on minimization. Municipal staff who conduct environmental assessments on proposed projects such as roads and hydro facilities told us that the current requirements are vague and would be better supported by detailed guidance.

4.5.3 Emissions Impact Is Not Consistently Being Considered Prior to Launching Significant Projects

Ministries are not required to consider the impact of their projects or initiatives on greenhouse gases. The following are examples of provincial ministries undertaking projects or major initiatives without factoring in their impact on emissions:

- The Ministry of Transportation has recently introduced a pilot project to allow vehicles with only one passenger to use its high occupancy vehicle (HOV) lanes in exchange for paying a toll. This will likely decrease drivers' incentive to car pool, which is one of the strategies to reduce overall vehicle emissions. Our review indicated that the Ministry of Transportation has not analyzed the impact of this initiative on expected emissions.
- The Ministry of Energy can significantly influence emission levels in the electricity sector, because it decides the sources of power it will acquire. Some sources, such as hydroelectricity, produce no greenhouse gases; others, such as natural gas, produce more significant amounts. The government's 2013 Long-Term Energy Plan did not consider emissions in the province's future energy-supply mix. Currently, Ontario's electricity mix results in fewer greenhouse gases than provinces such as Alberta and Saskatchewan that use coal, but more greenhouse gases than Manitoba and Quebec that use more hydroelectricity.
- The mandate of the Ministry of Northern Development and Mines is to encourage economic development in the North. While there are clear benefits to this, the mandate may conflict with the goal of reducing emissions, because mining usually involves destruction of forests, which can absorb greenhouse gases; use of heavy equipment and machinery that can only be powered by burning fossil fuels; and on-site ore purification processes that produce greenhouse gases. At present, Ministry decisions related to mining projects do not consider the impact on emissions.
- The Ministry of Economic Development, Employment and Growth announced in April 2015 that it would provide $230 million in loans and grants to mostly northern and rural communities to connect them to the natural gas pipeline system. This initiative was intended to reduce energy bills and encourage industry to locate in remote areas. In some cases, the move could reduce greenhouse gases—6% of households in the region currently use heating oil, for example, and a switch to natural gas would mean fewer emissions. However, the 11% of households currently using electricity would, if they switched to natural gas, raise the level of emissions. As a result, this initiative may lead to long-term increases in greenhouse gases by increasing reliance on fossil fuels. By fall 2016, this Ministry had not determined the overall impact of this initiative on emissions.
- The Ministry of Finance provided $215 million in mostly diesel-fuel-tax exemptions in 2015 for home heating and the non-highway use of construction, forestry, mining and agricultural equipment. There are no current plans to introduce legislative changes to discontinue these exemptions. The Environmental Commissioner noted in a 2016 report that subsidies of fossil fuels are a barrier to reducing their use, and it conflicts with the goal of reducing greenhouse-gas emissions.

Government decision-making has historically considered only the direct financial costs of projects (for example, the cost of materials and labour to build a bridge) and not the emissions produced.

However, with the growing awareness of climate change, some decision-makers are taking into account the "social cost of carbon"—an estimate of the economic damage of rising carbon-dioxide emissions. (**Appendix 8** provides a detailed discussion on considering the costs of carbon.)

Including social costing of carbon in project costs can increase the cost of projects that are expected to increase emissions (highway expansions, for example), but it can also decrease the cost of projects expected to reduce emissions (ethanol fuel programs, for example). Examples where the social cost of carbon has been applied to project evaluations include the following:

- The Ministry's Greener Diesel Regulation, intended to increase the use of biofuels in diesel, was evaluated to have a benefit of $31.56 per tonne to reflect the social cost of carbon. The Ministry derived this amount by averaging economic and environmental estimates of the average cost of a tonne of emissions.
- The Hurontario Light-Rail Transit Project, where Metrolinx considered estimates of resulting emissions in its business case by building into its decision-making model a cost of $40 per tonne of emissions, based on an average of social-costs analyses, including one by Environment Canada.

At the time of our audit, the Ministry had not developed any guidance on how ministries and agencies should consistently incorporate the concept of a social cost of carbon into their decision-making.

In 2007, the government recognized the need for an overriding authority to support its climate-change goals, given that ministries often do not consider the impact their projects or initiatives have on greenhouse-gas emissions.

The government established a Climate Change Secretariat that operated out of Cabinet Office from 2008 to 2011, when it was dismantled. The Secretariat was responsible for co-ordinating 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. Instead, it had the authority only to suggest possible actions, which ministries could either act upon or ignore.

We spoke with former members of the Secretariat, who indicated that initially their work had included regular meetings with the Premier to assess the progress of government climate-change initiatives and suggest actions that could be taken to reduce greenhouse gases—in effect, acting as an adviser to the Premier. However, the economic downturn caused a shift in priorities, and the Secretariat ceased to operate in this capacity and was eventually dismantled.

The former staff also indicated that in order to be effective, an independent climate-change entity would need to be established, and would need to have more cross-ministry influence, and this entity should report directly to Cabinet rather than just to the Minister. Such direct reporting was considered necessary to ensure climate-change goals were also given priority along with the goals of ministries.

Currently, the government has a Minister's Table on Climate Change intended to engage ministers on climate-change related issues. The Table consists of ministers from ten ministries: Environment and Climate Change, Transportation, Economic Development and Growth, Northern Development and Mines, Government and Consumer Services, Agriculture and Rural Affairs, Energy, Municipal Affairs, Treasury Board Secretariat, and Finance.

RECOMMENDATION 7

To help guide decisions of ministries and agencies on projects and initiatives, the Ministry of the Environment and Climate Change should develop guidance on the social cost of greenhouse-gas emissions that the ministries and agencies can consistently factor into their decision-making.

MINISTRY RESPONSE

The Ministry recognizes the importance of considering the social cost of carbon in government and agency decision-making. The social cost of carbon is used in a number of jurisdictions as an estimate of the value of avoided climate change

resulting from regulations and policies that reduce greenhouse-gas emissions. Both the Canadian and U.S. federal governments apply the social cost of carbon in their regulatory impact analyses. The Ministry is supportive of this recommendation and is working to encourage greater consideration of climate change impacts in the Government of Ontario's decision-making on a consistent basis.

The Ministry will consider the development of a guidance document on the social cost of carbon for ministries and agencies to use in their decision-making.

RECOMMENDATION 8

To support climate-change mitigation and adaptation efforts government-wide, the Ministry of the Environment and Climate Change should:

- evaluate whether the Minister's Table on Climate Change is sufficient to ensure climate-change mitigation and adaptation goals are also given priority in ministries' and agencies' projects and initiatives and take any necessary corrective action; and
- revise the guidance on how environmental assessments are conducted to ensure it includes a range of alternatives that have varying impacts on greenhouse-gas emissions.

MINISTRY RESPONSE

The Ministry appreciates the Auditor General's comments on how we can better support government-wide climate change efforts.

The Ministry has been charged with leading the fight against climate change on behalf of the Government of Ontario, and our Minister is chair of Cabinet's Minister's Table on Climate Change. We work with partner ministries, stakeholders, Indigenous partners and the public to oversee the implementation of the Climate Change Action Plan, to ensure reductions in greenhouse gas pollution and to support Ontario's transition to a low-carbon economy. In addition, the Ministry will evaluate whether the Minister's Table on Climate Change is sufficient to ensure climate-change goals are also given priority.

Action on climate change cuts across a number of ministries. Where other ministries have a role, they have been mandated to deliver results under the Action Plan.

To further broader adoption of climate-change-supportive actions in decision-making, the Ministry's draft guidance for considering climate change in Environmental Assessment was posted on the Environmental Registry on September 12, 2016. The draft guidance requests proponents review their project for the potential to reduce greenhouse-gas emissions (climate change mitigation) before reviewing the same project for its resilience (climate change adaptation). The Ministry expects to finalize this guidance document shortly.

4.6 Communication to Public about Cap and Trade Has Been Confusing

In an area as complex as cap and trade, there are inherent challenges in communicating clear and accurate messages to the public. These challenges grow even more complex when factoring in uncertainty about how initiatives impact greenhouse-gas emissions, and the social cost of carbon.

That said, we noted instances where ministries' messages about cap and trade may have been incomplete and confusing. **Figure 12** presents some of these public communications and additional facts.

Further, communications to natural gas ratepayers starting in 2017 will not be clear and transparent regarding the impact that cap and trade will have on natural gas bills.

Starting in 2017, such bills will increase by $60 a year. However, the Ontario Energy Board ruled, on July 28, 2016, that it would not require natural gas bills to explicitly state that this additional cost is attributable to cap and trade.

Figure 12: Confusing Messages about the Cap-and-Trade System

Source of data: Various

Cap-and-Trade System as Presented to the Public	Additional Facts
Under cap and trade, Ontario will achieve sufficient emission reductions to enable it to meet its 2020 target.	Most reductions will be achieved by buying allowances from California and Quebec. Actual projected emissions reductions achieved in Ontario will be only 3.80 Mt of the total 18.7 Mt needed. An analysis commissioned by the Ministry notes it is estimated that, in 2020, $268 million will be spent by Ontario companies purchasing allowances from California and Quebec. Preliminary estimates by the Ministry used to inform program design forecast this to rise to over $2.2 billion in 2030.
Price paid by emitters for an allowance will be determined by the market.	The market price of an allowance sold at auction cannot fall below the floor determined jointly by the three jurisdictions involved in the linked cap-and-trade system. The floor price is based on the previous year's floor price plus 5% and inflation.
Ontario emissions cannot go above the Province's emissions cap.	Ontario may exceed its cap because of free allowances provided for actions taken before the introduction of cap and trade. Also, linking with Quebec and California will mean Ontario's emissions can exceed Ontario's own cap as long as the total emissions in the linked system do not exceed the overall cap.
Industry funds the bulk of cap-and-trade costs and households benefit.	Households and small/medium businesses will initially pay the majority from charges embedded in fuel costs.
Cost of cap and trade to an average household is $13/month in 2017.	There will also be indirect costs. Preliminary estimates by the Ministry of Finance note that the direct costs to the average Ontario household will be $210 in 2019, with an additional $75 in indirect cost for goods and services. The Ministry has not determined the impact on more vulnerable northern and rural households.
The Climate Change Action Plan indicates cap-and-trade revenues spent on emissions reduction projects can achieve 9.8 Mt of greenhouse gas reductions by 2020.	Ministry's environmental consultant estimated cap and trade and spending of cap-and-trade revenues would result in reductions of 3.8 Mt.
The Climate Change Action Plan is a new initiative.	The Climate Change Action Plan has allocated $952 million to existing projects, such as the electrification of GO Transit in the 2014 Budget.

The Board said that it was not necessary to separately disclose the impact of cap and trade for regular household ratepayers because, in its view, the impact of one component of the bill is irrelevant. Instead, the Board said, total cost is the only factor that impacts the amount of natural gas used. However, the Board has decided to require natural gas utilities to disclose the added cost to large industrial users.

The Board obtained feedback from 80 stakeholder groups that included Vulnerable Energy Consumers Coalition, utilities such as Enbridge and Union Gas, and the Association of Power Producers of Ontario. Seventy-five of these stakeholder groups indicated that they supported separate disclosure on the natural gas bill. The Board did not seek comments from the general public. We contracted a national survey company to conduct a broad survey of Ontario natural gas ratepayers, and it found that 89% of respondents thought it important to disclose the impact of cap and trade on natural gas bills. Furthermore, in our view, disclosing this information on the natural gas bill could help educate ratepayers on the impact that using natural gas has on greenhouse gases, which could encourage them to switch to an energy source, such as electricity, that produces less greenhouse gas.

RECOMMENDATION 9

To ensure that Ontarians have a clear understanding of the impact on them of cap and trade, the Ministry of the Environment and Climate Change should:

- ensure that its communications to the public are open and transparent; and
- explain clearly how it plans to meet its targets for reducing greenhouse-gas emissions, including all costs to Ontarians associated with implementing the system.

MINISTRY RESPONSE

The Ministry recognizes the importance of Ontarians having a clear understanding of the impact of climate change and how cap and trade can drive emissions reductions by changing behaviour in how we use fossil fuels in our homes, transportation systems and businesses. The Ministry has undertaken many forms for communication with the public, and has endeavoured to be open and transparent in its communications.

In 2015, Ontario engaged Ontarians in a province-wide dialogue on climate change. We held dialogues in 15 communities across the province with over 1,200 individuals and nearly 300 businesses, had more than 31,000 responses through an online consultation tool, and received over 500 comments on a discussion paper. Those consultations helped shape our Climate Change Strategy and Climate Change Action Plan.

Since finalizing the rules for cap and trade in May 2016, we have continued to engage the public, stakeholders and industry on the development of this program. As suggested by the Auditor General, we will explore additional ways of clarifying our messaging to the public and clearly reporting on the costs to Ontarians of the cap-and-trade program.

RECOMMENDATION 10

In order to ensure transparency and inform natural gas ratepayers about the greenhouse-gas impacts of their energy choices, the government should ensure that natural gas bills disclose the portion of charges in the bill attributable to the cap-and-trade program.

ONTARIO ENERGY BOARD RESPONSE

The following is what the Ontario Energy Board plans to include in customer gas bills:

> [Your utility] is taking steps to address climate change. As part of Ontario's Cap and Trade program, there will be costs related to carbon emissions that your utility emits in order to deliver gas to you as well as the cost of carbon emissions resulting from the natural gas consumed by you. The charges to recover these costs are included in the delivery line. Further information on this may be found at (website).

The Ontario Energy Board will hold a hearing to review the natural gas distributors' cap-and-trade compliance plans for prudence and reasonableness of the costs consequences of these plans. As part of that adjudicative process, the Ontario Energy Board will issue a broad public notice of hearing, and the hearing will be held in an open and transparent manner. That notice will include an estimate of the monthly bill impact on customers of the cap-and-trade program. Interested parties can participate in the Board's hearing and information on the cost of the cap-and-trade program will be publicly available.

AUDITOR GENERAL'S RESPONSE

The Office of the Auditor General feels that more transparency is still required by disclosing the portion of charges in natural gas bills attributable to the cap-and-trade program and

informing natural gas ratepayers about the greenhouse-gas impacts of their energy choices.

Adaptation

The Ministry of the Environment and Climate Change (Ministry) does not have the authority to ensure the government implements the necessary measures to reduce the harm caused by climate change—that is, their adaptation activities. However, the Ministry is the lead in developing the government's Adaptation Plan. **Section 4.7** addresses provincial adaptation activities.

4.7 Many Actions Recommended by Expert Panel in 2009 Still Outstanding

In 2007, the Ministry assembled an Expert Panel on Climate Change Adaptation (Expert Panel) to consider the potential risks posed by climate change to Ontario's infrastructure, water, agriculture, forests and ecosystems, and to Ontarians' quality of life in general.

The Expert Panel issued a final report in 2009 to "help the Ontario government, municipalities and Ontarians prepare and plan for the impact of climate change in areas such as public health, environment, infrastructure and the economy."

The report was used to develop Climate Ready, the Ministry's Climate Change Adaptation Strategy and Action Plan (Adaptation Plan), which included 37 actions to be completed across the government between 2011 and 2014. However, many of the action items were not completed as of August 2016. (**Figure 8** provides the current status of each action item.)

The Adaptation Plan set out most of the Expert Panel's recommended initiatives to address the more significant risks of climate change. The Ministry listed actions to be undertaken by other ministries. However, the Ministry does not have the authority to require other ministries to complete the actions or to report back.

As detailed in the following sections, our discussions with these ministries indicated that little or no progress had been made.

4.7.1 Northern Ontario More Vulnerable but Adaptation Actions Not Implemented

The Ministry and the Expert Panel forecast that Northern Ontario will be most affected by climate change due to a higher degree of warming, and compounded by the fact that the North's infrastructure and economy depend on colder weather. The Ministry of Northern Development and Mines was accordingly assigned the following action items:

- **Northern Community Winter Roads:** Under the Adaptation Plan, the Ministry of Northern Development and Mines was tasked with strengthening the winter ice-road network for rural northern communities. Winter ice roads are important to sustain the economies and health of remote communities by ensuring reliable supplies of food and other essential goods. However, the Ministry of Northern Development and Mines has not determined what parts of the winter ice road network are most likely to be vulnerable to warming. The Ministry also does not track the frequency of air transport of supplies and food to Northern Ontario and so could not estimate the extent to which the deterioration of ice roads might have affected the availability of supplies to northern communities. However, it reported that winter roads were available one or two months less than usual in the winter of 2015/16, resulting in delayed shipments of food, fuel and other supplies.
- **Northern Community Decision-Making and Monitoring:** In 2011, the Ministry of Northern Development and Mines initiated a Growth Plan for Northern Ontario to be fully implemented within 25 years. Among other things, the plan was to:
  - incorporate considerations of climate-change adaptation into its planning and

decision-making, including monitoring the impact of climate change on Northern Ontario; and

- implement measures to protect and preserve air quality from possible forest fires, water quality and quantity from reduced water levels, and natural heritage from the destructive storms anticipated due to climate change.

The Plan does not provide timelines to measures progress towards planned actions, such as those related to climate-change adaptation.

4.7.2 Adaptation Also Required in Southern Ontario

Although Northern Ontario is expected to experience the most significant effects of climate change, southern Ontario will also likely experience more severe weather.

The impact will also be magnified by the larger population in the south, leading to the potential for more overall property damage and widespread impact on quality of life. Threats identified in the Adaptation Plan, but not adequately addressed include:

- **Building Codes:** The Ministry of Municipal Affairs and Housing was tasked with developing changes to the provincial Building Code that would make buildings more resilient to the effects of climate change, but it has no data on the extent to which the current Building Code (applicable as of 2014) has incorporated considerations related to climate change.
- **Tourism:** The Ministry of Tourism, Culture and Sport was to run pilot programs on adaptation strategies for Ontario's tourism industry by 2014 in an effort to gradually shift tourism from winter-weather outdoor activities to more warm-weather ones, but none were ever run.

4.7.3 Preserving Biodiversity and Supporting Ecosystems in a Changing Climate

Climate change is expected to have a significant impact on the biodiversity of the various ecosystems in Ontario. The Ontario Biodiversity Council notes that biodiversity is important because the survival of all species is interconnected.

Under the Adaptation Plan, the Ministry of Natural Resources and Forestry (MNR) was tasked with preserving biodiversity and improving the resiliency of ecosystems to climate change. In response, the MNR in 2011 developed Ontario's Biodiversity Strategy, which committed it to complete many of the required actions by 2015, and the rest by 2020.

However, the Ontario Biodiversity Council reported in 2015 that little progress had been made on most of the actions to improve ecosystems' resilience to climate change.

4.7.4 Inadequate Assessment of Impact on Public Buildings and Energy Infrastructure

Buildings

The Province directly owns or controls almost 5,000 buildings and related facilities, such as courthouses, detention centres, Ontario Provincial Police facilities, data centres and government offices. In addition, the Province is also responsible for hospitals, schools and college campuses. In total, these assets are collectively worth more than $50 billion. Given the value and importance of these assets, it would be wise for the government to identify and plan for risks arising from climate change.

The Ministry's 2011 Adaptation Plan committed to conduct reviews of all types of government buildings throughout the province. In order to perform this kind of assessment, the Ministry would have needed to obtain profiles of different building types, and the number of buildings of each type in different parts of the province. However, the Ministry did not obtain this information.

Instead, in 2012, the Ministry conducted a climate-change vulnerability assessment of only three buildings. While each of the assessments reviewed a different type of building (specifically, a courthouse, police detachment and administrative building), all were located in southern Ontario. The Ministry does not have any plans to conduct further vulnerability assessments.

Energy Infrastructure

The Adaptation Plan has not assigned specific actions to address the effects of climate change on the province's energy infrastructure. The Ontario Energy Board (OEB) relies on each local distributor of electricity and natural gas to identify infrastructure upgrades needed to guard against future climate-change risks, such as extreme storms. However, neither the OEB nor the Ministry of Energy have any information on whether appropriate actions are being taken to ensure distributors can withstand the effects of climate change.

RECOMMENDATION 11

To better prepare Ontario for the effects of climate change, the Ministry of the Environment and Climate Change (Ministry) should:

- review its Climate Change Adaptation Strategy and Action Plan to determine whether it should be revised, and revise it as required;
- ensure all Climate Change Adaptation Strategy and Action Plan actions have completion timelines; and
- ensure it completes the action items for which it is directly responsible.

MINISTRY RESPONSE

As part of its mandate letter commitments (September 2016) and the commitments in the Climate Change Action Plan, the Ministry has been directed to "work with partner ministers, stakeholders and Indigenous partners, and develop a (new) Climate Change Adaptation Plan for Ontario that sets out priorities and actions Ontario will take to adapt to the effects of Climate Change". This builds on the efforts made on some of the recommendations in Ontario's first adaptation plan announced in 2011.

To support the development of the new Climate Change Adaptation Plan, since spring 2016, the Ministry has been engaging with partner ministries and key stakeholders to:

- discuss successes of Climate Ready, including an assessment of progress on actions, and identification of areas that can be further strengthened;
- build on previous commitments and identify new actions for the new Plan with a focus on current priorities (i.e., infrastructure, food security, remote communities); and
- ensure actions in the new Plan are supported by specific implementation and reporting timelines.

In addition, the Ministry is also exploring options to enhance governance and accountability mechanisms to co-ordinate adaptation action across government.

RECOMMENDATION 12

The Secretary of Cabinet, in conjunction with relevant ministries through the Ontario Deputy Ministers' Council, should help to ensure that actions in the Climate Change Adaptation Strategy and Action Plan that are not the direct responsibility of the Ministry of the Environment and Climate Change are completed on time by their respective ministries.

MINISTRY RESPONSE

The Secretary of Cabinet agrees with this recommendation and will work with relevant ministries to help ensure climate-change adaptation-plan actions are completed.

4.7.5 Ministry Has Not Developed Useful Information on Future Climate Events

Governments, businesses, and individuals require information on weather events arising from climate change to make informed decisions on matters ranging from the design of buildings to planning for crops.

The required information includes precipitation amounts, timing and frequency of freeze-and-thaw cycles, forecast temperatures, and storm intensities. Because of the complexity and range of assumptions that go into forecasts of weather patterns, it is important to generate multiple forecasts, or "models," to cover different scenarios.

The Expert Panel on Climate Change Adaptation noted that accurate weather forecasts are difficult to develop, and that any one forecast will not be sufficient to support proper planning. It indicated that the best approach is to use multiple forecasts—for example, forecasting the intensity of storms if global temperatures rise by 1.5°C, and by 2°C.

Consequently, the Expert Panel report presented a combined forecast using 24 different scenarios for weather, precipitation and temperature across Ontario. It showed, for example, the effect on annual average precipitation in 2050 if greenhouse-gas emissions are lowered, and if emissions are higher.

The Panel recommended the Ministry acquire, analyze and share climate-trend data and scenarios for extreme weather to help communities throughout Ontario take informed adaptation actions.

While the Ministry has developed some future weather information using various weather models, it has not created the type of combined forecast suggested by the Expert Panel. A combined weather model allows organizations such as municipalities and other non-expert users to appropriately plan for changes to precipitation, temperature ranges and duration of intense heat.

Use of Modelling to Evaluate Impact of Climate Change on Province's Highways

The Ministry of Transportation used one of the Ministry of the Environment and Climate Change's weather models to assess the impact of projected precipitation on highways and bridges, and concluded they are resilient to the anticipated precipitation.

However, the Ministry of Transportation also noted that this one model was not sufficient to support its planning activities, and it funded a University of Toronto study to research and update its existing method for estimating flood frequency and peak flow using historical data, in order to assess the suitability of bridges and culverts.

The study reported that the method used did not incorporate any consideration of future climate change because the possible impacts were too uncertain, and that further study was necessary to properly incorporate the effects of climate change.

4.7.6 Municipalities Need More Support to Adapt to Climate Change

The more than 400 municipalities in Ontario have varying degrees of expertise on assessing weather patterns caused by climate change, and on formulating appropriate actions. The Ministry has not provided sufficient tools such as weather modelling, or adequate guidance, to help municipalities address their respective risks.

The Association of Municipalities of Ontario said in 2011 that developing effective climate-change initiatives requires a high degree of technical expertise and significant staff resources to translate climate data into usable information for municipal decision-making, such as official land-use planning, capital asset management and transportation planning. The Association told us in 2016 that it remains concerned that municipalities lack sufficient expertise and resources but that certain commitments in the Climate Change Action Plan may help to address municipal needs.

In recognition of the need for municipalities to understand and respond to risks posed by climate change, the Insurance Board of Canada started a pilot program in 2009 in three Canadian municipalities for a municipal risk-assessment tool that would be usable by all Ontario municipalities to identify key areas for adaptation efforts related to storm-water flooding. However, Ontario municipalities continue to lack user-friendly forecasting tools for most other weather-related events, including overland flooding, freeze-and-thaw cycles, and extreme heat.

RECOMMENDATION 13

As recommended by the Expert Panel on Climate Change Adaptation, the Ministry of the Environment and Climate Change should:

- obtain information on multiple weather forecasting scenarios using different weather, precipitation and temperature assumptions across Ontario; and
- share this information with all relevant stakeholders for planning adaptation preparations.

MINISTRY RESPONSE

The Ministry agrees with the Auditor General's recommendation. As committed to in the Climate Change Action Plan, the new Climate Change Adaptation Plan for Ontario will provide details of a new Climate Modelling Collaborative (a modelling group that involves other ministries and stakeholders). This Modelling Collaborative will help decision-makers understand potential climate impacts so they can make effective, climate-resilient decisions.

The Climate Modelling Collaborative will build on the province's previous investments in climate modelling information, which has included:

- refining/developing more robust Ontario-specific high resolution regional ensemble climate projections based on multiple climate models and scenarios, with an aim to develop a consolidated set of projections for Ontario;
- sharing Ontario-specific regional climate projections via a climate data portal with user-friendly access and visualization to the public and municipalities, free of charge; and,
- holding additional training sessions to improve practitioners' understanding and use of this climate information to support the development of climate adaptation strategies across the province.

4.7.7 Ministry Not Tracking Effects of Climate Change

One of the key goals of the Adaptation Plan was to "achieve a better understanding of future climate change impacts across the province." The Adaptation Plan required the Ministry to conduct a Climate Impact Indicators Study (Study) to track and assess the success of government policy and programs in the Adaptation Plan, for example, on the following areas:

- *Broad environmental*—water quality and quantity, fish and wildlife populations, and forest health.
- *Economic-specific sectors*—golf course open/closing days, yields on agricultural products, ski-lift-pass sales, etc.
- *Social and health*—heat alert days, reported respiratory distress (which can be brought on by extreme heat), and municipal water-use restrictions.

The Adaptation Plan indicated the Study was to be used in conjunction with ongoing climate-monitoring data such as precipitation, wind speeds, and humidity, to analyze trends and assess government policy and programs. At the time of our audit, the Ministry had not conducted this Study.

RECOMMENDATION 14

In accordance with its Climate Change Adaptation Plan, the Ministry of the Environment and Climate Change should:

- conduct a Climate Impact Indicators Study to track and assess the success of government policy and programs in the Adaptation Plan; and
- share the results of the study with other appropriate ministries and municipalities to support decisions made or determine what further actions need to be taken.

MINISTRY RESPONSE

The Ministry agrees with the Auditor General's recommendation. As part of the development of the new Climate Change Adaptation Plan for the province, the Ministry will assess the success of government policy and programs in the Adaptation Plan, including consideration for:

- monitoring programs underway across government to increase our understanding of the impacts of climate change;
- initiatives across government that support understanding of the results of such monitoring programs and the status and trends over time on both the natural and built environment; and
- reporting publicly on the progress of the Adaptation Plan.

4.7.8 More Public Information Needed on Climate-Change Impact and Adaptation Plan

The Ministry has not taken any significant measures to educate the public on specific risks associated with climate change, and what Ontarians need to do to adapt to those risks. Such information could prompt Ontarians to assess their own vulnerabilities and take action by, for example, installing backwater valves to protect against flooding, or new cooling systems to deal with increasingly severe heat.

The Expert Panel recommended that the Ministry take the lead in developing a readily available and understandable projection on the future weather-related changes that Ontarians can expect. The Ministry has modelled climate data but has not interpreted it to make it available in an understandable form.

Also, since introducing its Adaptation Plan in 2011, the Ministry has publicly reported on the status of the plan only once, in 2012. As indicated earlier, many of the actions in the Adaptation Plan remain outstanding. Following the completion of our audit field work, the Ministry indicated that it planned to have a new plan by the end of 2017.

RECOMMENDATION 15

To help Ontarians assess their own vulnerabilities to climate change, and to take action to address them, the Ministry of the Environment and Climate Change should provide the public with regular information on specific risks of and possible responses to the effects of climate change in Ontario.

MINISTRY RESPONSE

The Ministry agrees with the Auditor General's recommendation. As part of the establishment of the Climate Modelling Collaborative, the Ministry has committed to provide:

- a one-window repository for information about current impacts and projections for the future that the public can use to assess their own vulnerabilities; and
- access to expertise to understand how climate change may affect different activities or lines of business, and help plan for and manage risks in areas such as farming, infrastructure and public health.

RECOMMENDATION 16

To promote transparency and accountability, the Ministry of the Environment and Climate Change should revise as needed and regularly report publicly on the implementation status of its Climate Change Adaptation Strategy and Action Plan.

MINISTRY RESPONSE

The Ministry recognizes the importance of promoting transparency and accountability in the implementation status of the Climate Change Adaptation Plan. The Ministry will endeavour to publicly report on a regular basis and revise the plan as directed by Cabinet.

Appendix 1: Climate Change and Greenhouse Gas Overview

The Intergovernmental Panel on Climate Change (Panel) is an international body established in 1988, sponsored by the United Nations Environment Program and the World Meteorological Organization. The Panel's purpose is to provide the world with regular assessments of scientific knowledge on climate change, including its causes, potential impacts and future risks.

According to the Panel's 2014 Fifth Assessment Report, the average global temperature increased by approximately 0.85°C between 1880 and 2012. Observed impacts of this warming include rising atmospheric temperatures, shrinking glaciers, decreased ice and snow levels, and rising sea levels. This warming has also resulted in changing weather patterns around the world and more frequent extreme weather events (such as extended heat waves, flooding, longer wildfire seasons and extended droughts). The Panel has stated that increased concentrations of greenhouse gases in the atmosphere will lead to increased global warming, with an increased risk of irreversible impacts on people and the environment.

The Panel's Report stated that a 1°C–2°C increase in the average global temperatures from pre-industrial levels (that is, from the temperatures occurring around 1880) is expected to:

- increase the risk of extreme weather events;
- decrease crop yields and water availability in some regions of the world; and
- possibly put certain ecosystems, such as coral reefs, at risk of abrupt and irreversible change.

The Panel's Report further stated that an average global temperature increase of 4°C or more is expected to result in substantial species extinction, global and regional food insecurity, severe constraints on common human activities, and limited room for humans to find ways to adapt to the change in climate. (For more information on climate change adaptation, refer to **Appendix 2**.)

While some greenhouse gases are produced naturally, such as from forest fires and volcanoes, the Panel has concluded that current global warming can largely be attributed to human activities. Specifically, the burning of fossil fuels is a primary contributor to the increase in greenhouse gas emissions over the last 135 years or so (that is, since the pre-industrial era). The Report details that this increase has been spurred by economic and population growth, and has resulted in greenhouse gas concentrations that are higher than anything experienced in the last 800,000 years.

Common sources of human-made greenhouse gases include electricity generation, industrial activities, buildings being heated and transportation. These are known as "combustion" emissions. Other emissions, known as "process" emissions, are created as a by-product of industrial processes. For example, carbon dioxide (a greenhouse gas) is produced when limestone is converted to a lime compound in the process to make cement. Greenhouse gases are also produced from the decomposition of organic waste in landfills and from agricultural activities, such as fertilizing soil using artificial fertilizers.

Greenhouse gases include carbon dioxide, methane, nitrous oxide, ozone, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride. To measure and study greenhouse gases, scientists usually convert the other gases to their "carbon dioxide equivalent"—that is, the amount of carbon dioxide that would create the same amount of warming. Greenhouse gases are generally measured in tonnes (t) and megatonnes (Mt).

Global warming results from the total accumulation of greenhouse gases in the atmosphere; emissions made decades ago still contribute to climate change today and will continue to do so into the future. According to the Panel's Report, even if new greenhouse gas emissions stopped today, many aspects of climate change and their related impacts would continue for decades.

Under international guidelines provided by the United Nations Framework Convention on Climate Change, national governments that are Annex 1 parties to the Convention, such as Canada and the United States, are required to report their greenhouse-gas emissions on an annual basis following specific science-based methodologies.

Using complex mathematical models, Environment and Climate Change Canada, a department of the federal government, annually estimates the greenhouse gas emissions of each province, including Ontario, and the country as a whole. These estimates are included in Environment and Climate Change Canada's National Inventory Report. This Report does not include certain emissions that are more difficult to measure (such as emissions from land use and forestry) or allocate to a jurisdiction (such as emissions from international air travel).

Appendix 2: Mitigation and Adaptation Efforts

Climate Change Mitigation

Typically, climate change mitigation focuses on:

- limiting or reducing the amount of greenhouse gas emissions caused by the burning of fossil fuels (for example, by conserving energy or using renewable fuels); and
- capturing carbon (for example, by preserving or creating "carbon sinks," which are natural environments such as forests or bogs that can absorb more carbon than they release).

Some governments use carbon pricing, such as a carbon tax, and regulatory requirements to reduce emissions. Governments may also use voluntary programs, such as providing cash rebates for the purchase of electric cars to encourage emissions reductions (see **Figure 3** for more information on these methods).

The goal of international agreements on climate change has been to limit the increase in average global temperatures to less than 2°C higher than pre-industrial levels (that is, the global temperatures of around 1880). In December 2015, 195 countries, Canada included, negotiated the Paris Agreement, with the aim of "holding the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels."

Prior to the Conference at which the Agreement was negotiated, 146 countries, representing almost 87% of global greenhouse gas emissions, submitted their intended national climate action plans to the United Nations. The United Nations Environment Programme calculated that even if all 146 countries met their current targets, global warming would still be expected to increase by 3°C–4°C.

Climate Change Adaptation

The impacts of global warming can vary in different regions around the world. For example, regions further from the Equator are expected to experience a much faster increase in average temperatures than regions closer to the Equator. Consequently, climate change adaptation efforts generally vary from region to region.

Adaptation actions include such efforts as upgrading infrastructure to withstand increases in precipitation, for example, by installing valves in homes to prevent storm water from flooding basements, adjusting urban planning to prohibit building on flood plains and strengthening culverts under highways. Other adaptation measures include monitoring for new harmful or invasive species, such as ticks, brought about by climate change; and assisting businesses like ski resorts to adjust to changes in seasonal temperatures.

Appendix 3: The Western Climate Initiative and the Western Climate Initiative, Inc.

The Western Climate Initiative

The Western Climate Initiative (WCI) was launched in February 2007 by five American States (California, Washington, Oregon, Arizona, New Mexico and California). Its purpose was to develop ways to reduce greenhouse gas emissions in their respective states. The members committed to setting a regional greenhouse gas target and implementing a market mechanism, such as cap and trade, to achieve it. WCI is a "non-binding, voluntary coalition," meaning that the commitments the members make are not enforceable, and there are no sanctions if members do not comply.

In 2007 and 2008, two more states (Montana and Utah) and four provinces (British Columbia, Manitoba, Ontario and Quebec) joined WCI.

In 2008, WCI released the "Design Recommendations" for the WCI Regional Cap and Trade Program. In 2010, WCI released the "Design for the WCI Regional Program." These two documents show what a regional cap-and-trade program looks like and are the basis for Quebec and California's linked cap-and-trade program.

By 2011, six of the seven U.S. member states had left WCI because they were no longer planning to implement cap and trade. This left California, British Columbia, Manitoba, Ontario and Quebec as the remaining members. Of them, only Quebec and California have implemented a cap-and-trade system to date, with Ontario planning implementation in 2017.

The Western Climate Initiative, Inc.

In November 2011, California, Quebec, Ontario and British Columbia created the Western Climate Initiative, Inc. (WCI, Inc.). WCI, Inc. is a non-profit corporation dedicated to provide administrative and technical services in support of greenhouse gas reductions.

WCI, Inc. is governed by a board of directors made up of two members from each participating jurisdiction. The board receives direction from the participating jurisdictions and is responsible for overseeing the corporation.

WCI, Inc. has been administering California and Quebec's systems since 2013, and will administer Ontario's cap-and-trade program. Ontario's Ministry of the Environment and Climate Change plans to pay WCI, Inc. almost $9.9 million for its services between the 2016/17 and 2020/21 fiscal years. According to the Ministry's 2016 agreement with WCI, Inc., these services will include:

- developing and administering a system for monitoring allowances and emissions, to which the Ministry will have access;
- monitoring allowance auctions, and allowance and offset trading;
- supporting WCI, Inc. board activities;
- developing and administering an auction platform;
- co-ordinating financial administration services for auctions; and
- providing customer services and support.

Appendix 4: Chronology of Ontario's Climate Change Activities

Date	Event
May 2007	Ontario's Premier signs the "Memorandum of Understanding between the Province of Ontario and the State of California for collaboration on climate change and energy efficiency." The Memorandum states the parties will "explore the potential for linkages between market-based mechanisms" to reduce greenhouse gas emissions, such as working with the Western Climate Initiative (a voluntary coalition of U.S. states and Canadian provinces working on a linked cap-and-trade system for its members).
August 2007	Ministry of the Environment (Ministry) introduces "Go Green: Ontario's Action Plan," and sets greenhouse gas reduction targets for 2014, 2020 and 2050.
December 2007	Ministry forms an Expert Panel on Climate Change Adaptation to consider the potential risks climate change poses to Ontario's infrastructure, water, agriculture, forests, ecosystems and the quality of life for Ontarians.
May 2008	Ontario establishes the Climate Change Secretariat, based out of Cabinet Office and reporting directly to the Premier.
June 2008	Ontario and Quebec sign a Memorandum of Understanding to develop a linked cap-and-trade system to be implemented as early as 2010.
July 2008	Ontario joins the Western Climate Initiative.
Fall 2008	The Ontario economy begins experiencing the impact of a global economic downturn.
November 2008	The Climate Change Secretariat's reporting structure changes: it now reports directly to the Minister of the Environment rather than the Premier.
December 2008	Ontario releases its first discussion paper on cap and trade, "A Greenhouse Gas Cap-and-Trade System for Ontario." The paper states Ontario "is pursuing through partnerships such as the Western Climate Initiative the integration into a broad North American Cap-and-Trade system for greenhouse gases—one that will guarantee reductions in greenhouse gas emissions" from electricity generators and industrial sectors.
May 2009	As part of the *Green Energy and Green Economy Act, 2009*, Ontario amends the *Environmental Bill of Rights, 1993* to require the Environmental Commissioner to monitor and report on the government's progress in reducing greenhouse gases.
June 2009	Ontario releases its second cap-and-trade discussion paper, "Moving Forward: A Greenhouse Gas Cap-and-Trade System for Ontario." The purpose of the paper was "advancing work on the design of a greenhouse gas emissions trading system for Ontario to help meet the province's climate change reduction goals."
November 2009	Ontario's Expert Panel on Climate Change Adaptation issues a report "to help the Ontario government, municipalities and Ontarians prepare and plan for the impact of climate change in areas such as public health, environment, infrastructure and the economy."
December 2009	Ontario passes the *Environmental Protection Amendment Act (Greenhouse Gas Emissions Trading)*. This enables the creation of an Ontario cap-and-trade system and the linking of Ontario's system with other systems in North America.
April 2011	Ministry releases Climate Ready, the Ministry's Climate Change Adaptation Plan. The Plan includes 37 actions to be completed between 2011 and 2014.
May 2011	The Climate Change Secretariat is wound down.
October 2011	Ontario establishes the non-profit organization Western Climate Initiative, Inc. (WCI, Inc.) with Quebec, California and British Columbia. According to its website, WCI, Inc. was "formed to provide administrative and technical services to support the implementation of state and provincial greenhouse gas emissions trading programs."
January 2013	Ontario releases its third discussion paper on cap and trade, "Greenhouse Gas Emissions Reductions in Ontario." The paper's purpose is to continue the discussion on "what could be the key elements of a greenhouse gas emissions reduction program that achieves reductions while supporting the province's economic goals."
January 2013	Quebec's and California's individual, unlinked cap-and-trade systems begin operations.

Date	Event
January 2014	Quebec's and California's cap-and-trade systems link up.
February 2015	Ontario releases "Ontario's Climate Change Discussion Paper 2015." The paper requests public feedback on different types of carbon pricing (i.e., on cap and trade versus carbon tax). It asks public opinion on what type of carbon pricing will meet Ontario's goals of ensuring emissions reductions, encouraging innovation, improving productivity and supporting the transition to a low-carbon economy.
April 2015	Ontario announces that it will implement a cap-and-trade system in 2017.
August 2015	Ontario appoints board members to WCI, Inc.
September 2015	Ontario and Quebec sign a second Memorandum of Understanding to link their carbon markets (see June 2008 for the first Memorandum of Understanding).
November 2015	The Ministry releases the Climate Change Strategy. The Strategy notes that meeting Ontario's future emissions reduction goals "requires a fresh approach to climate change—one that accounts for the shifting global context, recognizes the opportunities in a low-carbon, high-productivity economy, and enlists the support of all Ontarians to find new solutions." The Strategy does not make it clear that Ontario intends to use California's and Quebec's emissions reductions to meet its targets.
February 2016	The Ontario Government introduces its proposed *Climate Change Mitigation and Low-carbon Economy Act* in the Legislature.
May 2016	The Ministry receives its consultant's study comparing its chosen linked cap-and-trade program to two other carbon-pricing models (carbon tax and unlinked cap and trade).
May 2016	The *Climate Change Mitigation and Low-carbon Economy Act* becomes law.
June 2016	The Ministry releases the Climate Change Action Plan.

Appendix 5: The Mechanics of Ontario's Cap-and-Trade System

Participants

Under the rules of cap and trade, the required participants in Ontario's cap-and-trade system are:

1. industry and institutions that produce over 25,000 tonnes of greenhouse gases per year;
2. fuel suppliers that sell more than 200 litres of fossil fuels (for example, gasoline or diesel) per year; and
3. electricity suppliers importing electricity from outside of Ontario that produces greenhouse gases.

These required participants are expected to cover about 80% of the province's annual greenhouse-gas emissions in the "covered" sectors of transportation, industry, real estate and electricity.

In addition, facilities emitting between 10,000 tonnes and 25,000 tonnes of greenhouse gases per year may choose to opt in.

All cap-and-trade participants (required and those opting in voluntarily) must report their emissions every year and buy allowances equal to their total emissions.

It is assumed that fuel suppliers and electricity importers (the required participants of categories 2 and 3) will pass on 100% of their costs of having to buy allowances to households and businesses in the form of higher prices for gasoline and electricity. These are referred to as the direct costs of cap and trade. The indirect costs of cap and trade are the increased cost of goods and services that result from increased fuel and electricity costs.

Smaller businesses and Ontario households will not participate directly in cap and trade (that is, they will not purchase or sell allowances). However, they will still be affected by cap and trade through its direct and indirect costs. The government of Ontario has estimated that the direct costs to the average Ontario household will be $156 in 2017. Preliminary estimates by the Ministry of Finance have estimated the direct costs to the average Ontario household in 2019 will be $210, plus an additional $75 in indirect costs (i.e., costs other than fuel).

Allowances

An allowance is a permit to emit one tonne of greenhouse gas. There are four types of allowances under cap and trade, detailed in the following subsections.

1. Allowances Created by Ontario

Each year, the government of Ontario will create allowances equal to its cap (see the next section, titled **Ontario's Domestic Cap**). The government will set aside 5% of allowances each year as a strategic reserve (see the section **Carbon Price** for more information on strategic reserves). The government will decide how to divide up the other 95% of allowances: each will either be sold at auction or be given to emitters for free.

As shown in **Figure 5** of the report, larger industrial emitters (category 1 required participants) will receive free allowances for all of their emissions in 2017. The number of free allowances will gradually be reduced over the next three years (to 2020). This is intended to encourage these emitters to reduce their emissions. Otherwise, these emitters would have to purchase allowances.

Fuel distributors and electricity importers (required participants in categories 2 and 3) will not receive any free allowances. This will force them to purchase allowances equalling their emissions, with the cost passed down to consumers.

2. Early Reduction Allowances (Credits)

Ontario has announced that the Ministry of the Environment and Climate Change (Ministry) will issue up to an additional 2 million free "early

reduction" allowances (permitting 2 megatonnes (Mt) of emissions). These allowances will be issued to companies that reduced their emissions in the four years before cap and trade is implemented in January 2017. These allowances are over and above the province's cap. Businesses receiving these free allowances will be able to use them whenever they wish.

3. Offset Allowances (Credits)

A large emitter in a covered sector (that is, transportation, industry, real estate or electricity) can get credit if it undertakes a project that reduces greenhouse gases in a non-covered sector (that is, agriculture or waste) such as planting trees or capturing landfill gases. The credit is in the form of "offset allowances" for the amount of the reduction in greenhouse gases it achieved. The emitter can apply these allowances to offset up to 8% of its emissions in a covered sector.

At the time of our audit, the Ministry was developing offset protocols, or rules outlining how to measure and approve the reductions in the non-covered sectors. None had been finalized when we completed our audit.

4. Allowances Created by Quebec or California

Because Ontario's cap-and-trade system plans to link with the systems of Quebec and California, in 2018, Ontario's required participants will be able to buy and sell allowances from Quebec and California.

Ontario's Domestic Cap

Ontario's domestic cap refers to the total number of allowances that the Ministry will make available for auction each year. A regulation of the *Climate Change Mitigation and Low-Carbon Economy Act, 2016* specifies Ontario's caps for the years 2017–20.

In the first year (2017), Ontario will make available as many allowances as the Ministry forecasts the emitters in the covered sectors will need for all of their emissions. The forecasted emissions from the non-covered sectors of agriculture and waste (including landfills) are not included in the cap calculation. Also not included are greenhouse gas emissions that are difficult to measure (such as from domestic flights and gas leaks).

The Ministry will reduce the allowances (or lower the cap) such that the number of allowances available in 2020 (the cap) allows Ontario to just meet its 2020 target.

Linking with Quebec and California, and the Overall Cap

Under a linked cap-and-trade system, each linked jurisdiction is responsible for setting its domestic cap, issuing allowances, approving offset protocols, and developing other cap-and-trade–related policies for its jurisdiction. However, for cap-and-trade systems to be linked, jurisdictions must agree to recognize the transfer of allowances and offsets between participants and allow for joint auctions.

Because Ontario is planning to link its cap-and-trade system with the systems of Quebec and California, all three jurisdictions' individual caps will be combined to create a single *overall* cap.

Figure 6 in the report shows what this larger cap is expected to be. Under a linked system, a jurisdiction can exceed its domestic cap in allowances and emissions as long as the total allowances and emissions in the linked system do not exceed the overall cap. For example, Ontario's 2018 domestic cap is 136 Mt of emissions; Ontario's emissions can exceed that cap above that as long as Ontario's emitters purchase allowances from Quebec or California to cover the excess emissions.

The Carbon Market

Auctions (Primary Market)

Auctions will occur quarterly and will be facilitated by the Western Climate Initiative, Inc. (WCI, Inc.) (the non-profit organization Ontario established jointly with Quebec, California and British Columbia to support cap-and-trade programs).

Ontario has announced it will hold its own auctions in 2017. After linking with Quebec and California in 2018, the three jurisdictions will hold joint auctions. To take part in an auction, participants must be registered through WCI, Inc.'s compliance tracking system (for more on compliance tracking, see the section **Market Oversight**). Allowances will usually be sold in "lots" of 1,000. At the auctions, the final selling price is to be determined by the lowest bid for the last available lot.

WCI, Inc. has contracted with Deutsche Bank to provide financial services in support of the auction (such as confirming the bidder's financial eligibility, administering the bidder's financial guarantees and making payments after the auction).

Regulation requires that the Minister of the Environment and Climate Change release a summary of the auction results to the public within 45 days of the auction.

The Ontario government's revenue from cap and trade will come primarily from the auctioning off of Ontario allowances. The Ministry has estimated this will total about $8 billion in the first four years (2017–20), with most of it coming from fuel distributors (which have to buy allowances since they do not get any free ones). This estimated $8 billion in revenue assumes that all of Ontario's allowances will be bought.

The Ministry estimates that Ontario participants will buy 25.8 million allowances from California and Quebec in the first four years (2017–20). This will allow them to emit 25.8 Mt of greenhouse gases, for which it will pay California and Quebec a total of $466 million.

Trading (Secondary Market)

Beyond buying allowances at auctions, Ontario participants can also buy allowances from California and Quebec (the linked jurisdictions). This activity is referred to as the secondary market. The sellers will be California and Quebec emitters that got allowances for free, and California and Quebec emitters with allowances they do not need because they achieved actual emission reductions.

Price of Allowances

Theoretically, the price of allowances in a linked system with auctions and trading is set by the market. That is, supply (the total number of allowances released by Ontario, Quebec and California) and demand (the caps indicating how many allowances are needed) should determine the price.

However, the three jurisdictions decided to override market forces when it comes to the minimum price of an allowance to be sold at auction. In 2016, they set that minimum price at close to $17. This prescribed minimum price is scheduled to increase by 5%, plus inflation, each year until 2020.

This prescribed minimum price applies only to allowances sold at auction. The price of an allowance can drop below the auction minimum in trading directly between emitters.

California economists have forecast the market-driven allowance prices for just the linked California–Quebec cap-and-trade program as follows (prices have been adjusted to nominal $CAD, assuming annual inflation of around 2%):

- 2017: $18;
- 2018: $19; and
- 2020: $20.

Ontario used these prices to forecast both its revenue and greenhouse-gas reductions. That is, it did not do any projecting or modelling to see whether and how much its joining California and Quebec's linked system would affect allowance prices.

Each of the three jurisdictions has also set aside 5% of their cap as "strategic reserve" allowances.

These strategic reserve allowances can be released into the market if the allowance price gets too high.

Market Oversight

Each jurisdiction requires emitters of over 10,000 tonnes of carbon dioxide (or its equivalent) to:

- annually report their greenhouse gas emissions to their respective governments; and
- have a third party verify the emissions reported.

In 2020, after a four-year compliance period, all participants are required to ensure their total emissions equal their total allowances purchased. As mentioned in the **Allowances** section, up to 8% of an emitter's allowances can be offset credits.

All allowances and emissions reporting will be tracked by WCI, Inc. This includes reviewing all allowances, from when they were issued by a government, to being transferred to participants, and finally to being claimed for the year and surrendered back to the issuing government. As per the agreement, the Ministry has the right to audit WCI, Inc.

At the time of our audit, penalties for having fewer allowances than emissions had not yet been finalized.

Appendix 6: Environmental Assessments and Approvals

Environmental Assessments

The Ministry of the Environment and Climate Change (Ministry) is responsible for environmental assessments and approvals. These can have a direct impact on greenhouse gas emissions.

Under the *Environmental Assessment Act*, project owners must ensure that environmental assessments are completed for all government plans and projects. The assessments are intended to evaluate:

- the plan/project's environmental effects;
- alternatives to the plan/project; and
- any negative impact on the environment.

By approving environmental assessment policies, the Ministry has significant authority to influence many government planning processes.

For more information on environmental assessments, see our environmental assessments audit report later in this chapter (**Chapter 3**, **Section 3.06**).

Environmental Approvals

Under the *Environmental Protection Act*, the Ministry is also responsible for:

- ensuring that projected emissions into air from all projects (both private-sector and public-sector) do not exceed allowable standards set by the Ministry in regulation (by requiring that emitters obtain environmental approvals); and
- inspecting emitters to determine they are complying with the conditions of their environmental approvals.

Currently, inspections do not measure greenhouse gases. Instead, they focus on emissions that pollute the air, such as fine particulate matter (small polluting particles or droplets found in, for example, aerosols and fumes), nitrogen oxides and smog-causing compounds.

For more information on environmental approvals, see our environmental approvals audit report later in this chapter (**Chapter 3**, **Section 3.05**).

Appendix 7: The Environmental Commissioner of Ontario

The Environmental Commissioner of Ontario (Commissioner) is an independent officer of Ontario's Legislative Assembly. The office of the Commissioner was created under the *Environmental Bill of Rights* (EBR) in 1993. The Commissioner's job is to review and report on the government's compliance with the EBR.

In Ontario's 2007 Climate Change Action Plan (see **Figure 9**), the government committed to having the Commissioner provide an independent review of Ontario's progress in reducing greenhouse gas emissions.

In 2009, the government amended the EBR to require the Commissioner to report annually to the Legislative Assembly on "the progress of activities in Ontario to reduce emissions of greenhouse gases." This includes "a review of any annual report on greenhouse gas reductions or climate change published by the Government of Ontario." Under the EBR, the government is legally required to provide the Commissioner with such reports.

Since 2008, the Commissioner has reported annually to the Legislative Assembly on the progress of activities in Ontario in reducing greenhouse gas emissions.

Appendix 8: Considering the Costs of Carbon

Governments worldwide have recognized that carbon emissions, by entering the atmosphere, affect the entire planet. These effects, as discussed in **Section 2.1.3**, include a rise in sea levels, more droughts and heat waves, more intense and frequent hurricanes and storms, and increased precipitation in some regions and increased droughts or desertification in others. Given the impact of climate change, governments have acknowledged the need to find ways to put a value on carbon emissions. Three such ways include:

- Focusing on the global impact of carbon emissions, as measured by the **social cost of carbon**;
- Focusing on the cost to individuals or businesses to reduce emission to meet a certain target, measured by the **cost to reduce carbon emissions**;
- Establishing a **carbon price (pay to emit)** which is required by government for the emission of carbon (e.g., carbon tax or cap-and-trade system).

Social Cost of Carbon Emissions

All greenhouse gas emissions contribute to global warming. Recognizing the global impact of climate change, a "social cost" has been attributed to burning carbon. Such a cost is determined through a comprehensive assessment of the economic costs associated with the global damages of climate change, both now and in the future. According to the U.S. Environmental Protection Agency, these damages include a variety of impacts, such as agricultural productivity losses, impacts on human health, property damages from flooding and other extreme weather events, and changes in energy costs. The social cost of carbon represents the value to society of avoiding this damage, expressed in dollars per tonne of carbon dioxide reductions. Environment and Climate Change Canada calculated the social cost of carbon to be $43 per tonne of CO_2 avoided in 2017 and $46 per tonne of CO_2 avoided in 2020. Increasingly, policymakers are recognizing the need to include the social cost of carbon in their decision-making processes to ensure they factor in the full cost of emitting.

Cost to Reduce Carbon Emissions

The cost of reducing emissions, often referred to as the marginal abatement cost, represents how much an individual or business must spend in order to reduce one tonne of CO_2. The abatement may be achieved from switching to lower carbon fuels, changing manufacturing processes, or capturing the emissions before they are released into the atmosphere. Often abatement projects will need to be planned well in advance because they can involve the purchase of costly equipment and the implementation of new processes. This cost can be helpful for policy-makers to understand and to use in their calculations regarding how to meet their emission reduction targets. For example, a study commissioned by the Ministry of Ontario's emission-intensive industries indicated that a smaller reduction in emissions (0–10%) is often achieved through investments in energy efficiency, which may be less expensive. However, for some industrial facilities, achieving higher levels of reductions (20–30%) can be very costly as they may require changes to production processes or the implementation of new technology, as is the case with the steel industry. The study found that the average cost to reduce emissions by 10% range from $9 to $71 per tonne, whereas the average cost to reduce emissions by 20% to 30% range from $153 to $197. This cost can be used in determining at what level a carbon price may be effective. For example, if it costs a business $15 to buy the equipment to reduce one tonne of greenhouse gases, the carbon price applied by government would have to be equal to or greater than that in order to encourage that business to invest in the technology.

Carbon Price (Pay to Emit)

The third cost to consider is the price imposed on carbon emissions by a government, referred to as the carbon price. This can either be set directly by the government through a carbon tax or by a constructed market through the implementation of a cap-and-trade system. Until 2017, the price to emit carbon in Ontario was $0. It is estimated by the Ministry that the price of carbon between 2017, (when Ontario joins the linked cap-and-trade system with California and Quebec), and 2020 will range from $18 to $20 per tonne. For more information on the features of carbon tax and cap-and-trade systems, see **Figure 3**.