

Reports of the Commissioner of the Environment and Sustainable Development to the Parliament of Canada

Emission Reductions Through Greenhouse Gas Regulations— Environment and Climate Change Canada

Report 5



Independent Auditor's Report | 2023



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- report both positive and negative findings
- conclude against the established audit objectives
- make recommendations for improvement when there are significant differences between criteria and assessed performance

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At a Glance



Overall message

Overall, we found that Environment and Climate Change Canada did not know the extent to which the greenhouse gas regulations we examined contributed to Canada’s overall emission reductions. This was because the department’s approach to measuring emissions did not attribute emission results to specific regulations. As well, we found that the department was too slow to develop the *Clean Fuel Regulations*, jeopardizing the pace of Canada’s emission reductions.

When we looked at the performance of individual regulations, we found mixed results. The regulations we looked at that aimed to reduce emissions from power generation achieved their targets, but some of the regulations that aimed to reduce emissions from vehicles did not. Although greenhouse gas emissions from passenger cars decreased, they increased by more for light trucks and heavy-duty vehicles, such as school and transit buses and freight, delivery, garbage, and dump trucks. However, the regulations have yet to reach their full stringency.

In addition, Environment and Climate Change Canada could not be certain whether regulations to limit methane emissions helped Canada reach its targets. This is worrying because methane has 25 times the warming potential of carbon dioxide over a 100-year period. We found large sources of methane emissions were unaccounted for in inventories and not covered by any existing regulations. This increases the uncertainty about the quantity and significance of the reductions being achieved.

Without comprehensive impact information, the federal government does not know whether it is using the right tools to reduce emissions.

Key findings



- Environment and Climate Change Canada did not measure or report on the contributions of the greenhouse gas regulations we examined toward Canada's 2030 target for emission reduction.
- The department's regulatory impact analysis statements did not sufficiently assess the risk that there might be uncertainty in the measurements of emissions.
- The department missed its initial target dates for developing the *Clean Fuel Regulations* by 2 years, which is out of sync with the urgent nature of the climate crisis.
- The power generation regulations we examined were on track to achieve their emission reduction targets, but the transportation regulations were not.
- It is unclear whether Canada will meet its target for methane emission reductions.

Key facts and figures



- In 2020, Canada's total greenhouse gas emissions were equivalent to 672 megatonnes of carbon dioxide. A megatonne of carbon dioxide equivalent (Mt CO₂ eq) is the amount of a greenhouse gas that has the same warming potential as a million tonnes (a megatonne) of carbon dioxide over a specified period. The oil and gas and the transportation sectors were the largest sources of emissions, at 27% and 24%, respectively.
- Canada's 2030 Emissions Reduction Plan includes funding of more than \$9 billion to help Canada reduce its greenhouse gas emissions by 40% to 45% below 2005 levels by 2030.
- Environment and Climate Change Canada has several key regulations that target emissions from vehicles, coal-fired electricity, and oil and gas extraction. The department estimates that they will result in the following cumulative reductions:

Regulations	Estimated cumulative reductions	Time period
<i>Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations</i>	174 Mt CO ₂ eq	Over the lifetime operation of all 2017 to 2025 model year light-duty vehicles sold in Canada
<i>Heavy-Duty Vehicle and Engine Greenhouse Gas Emission Regulations</i>	73 Mt CO ₂ eq	2020 to 2050 for 2020 to 2029 model year heavy-duty vehicles
<i>Reduction of Carbon Dioxide Emissions From Coal-Fired Generation of Electricity Regulations</i>	94 Mt CO ₂ eq	2019 to 2055
<i>Clean Fuel Regulations</i>	151 to 267 Mt CO ₂ eq	2022 to 2040

- In October 2021, Environment and Climate Change Canada announced a commitment to reduce oil and gas methane emissions by at least 75% below 2012 levels by 2030. Methane has at least 25 times the warming potential of carbon dioxide over a 100-year period.

See **Recommendations and Responses** at the end of this report.

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Introduction

Background

Canada's greenhouse gas emissions

5.1 Greenhouse gases include carbon dioxide, methane, and nitrous oxide. They are produced mainly by human activities that use fossil fuels. Once released into the atmosphere, these gases warm the earth by trapping solar radiation. They are a primary cause of climate change, which has negative impacts on environments, human health, and economies. In Canada, the largest sources of greenhouse gas emissions are the oil and gas and the transportation sectors (Exhibit 5.1).

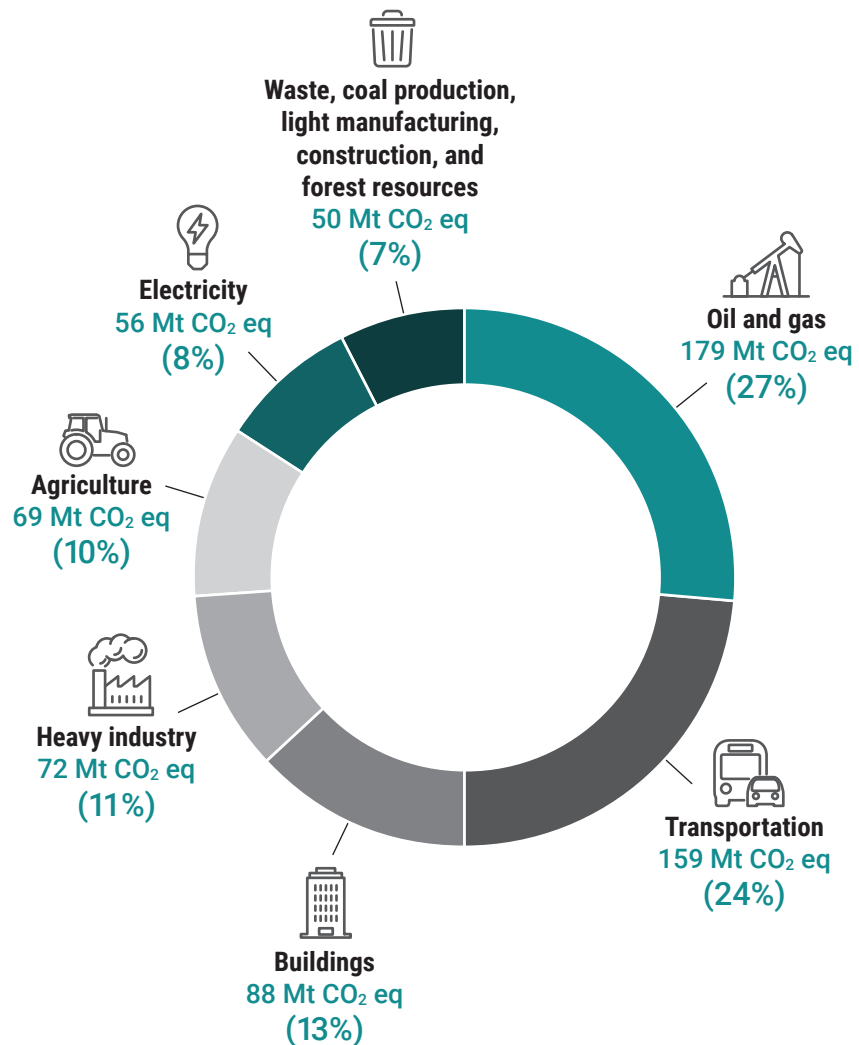
5.2 Canada has been trying to address its greenhouse gas emissions for more than 3 decades. However, in 2020, its total emissions were 13% higher than they were in 1990. Greenhouse gases can endure in the atmosphere for hundreds of years, so the more quickly reductions occur, the greater the overall beneficial impact will be.

5.3 In 2016, the Government of Canada committed to reducing Canada's greenhouse gas emissions by 30% by 2030 compared with 2005 levels. In 2021, it announced a more ambitious target of 40% to 45% below 2005 levels by 2030. That same year, Parliament enacted the *Canadian Net-Zero Emissions Accountability Act*. The act enshrines into law the country's commitment to achieve net-zero greenhouse gas emissions by 2050 and provides a framework of accountability and transparency to deliver on it.

5.4 In 2020, Canada's total greenhouse gas emissions were 672 **megatonnes of carbon dioxide equivalent (Mt CO₂ eq)**.¹ This represented a net decrease of 9.3% (69 Mt CO₂ eq) from 2005. In order to meet the 2030 target of a 40% to 45% reduction, the greatest share of emission reduction will need to occur in the next 7 years.

¹ **Megatonne of carbon dioxide equivalent (Mt CO₂ eq)**—The amount of a greenhouse gas that has the same warming potential as a million tonnes (a megatonne) of carbon dioxide over a specified period.

Exhibit 5.1—Canada’s total greenhouse gas emissions (in megatonnes of carbon dioxide equivalent, Mt CO₂ eq, rounded) by sector (2020)



Source: National Inventory Report 1990–2020: Greenhouse Gas Sources and Sinks in Canada, Environment and Climate Change Canada, 2022

Canada’s greenhouse gas regulations

5.5 The federal government has identified greenhouse gases as toxic substances under the *Canadian Environmental Protection Act, 1999* and has developed regulations to reduce them. We examined 5 key regulations that target emissions from vehicles, coal-fired electricity, and oil and gas extraction (Exhibit 5.2). We also examined the process for developing the *Clean Fuel Regulations*. These regulations are intended to reduce greenhouse gas emissions by reducing the carbon emitted per unit of energy during production of liquid fossil fuels used in Canada.

Exhibit 5.2—We examined 5 key regulations designed to reduce greenhouse gas emissions in Canada

Regulations	Main objectives	Regulatees	Timelines
Transportation sector			
<i>Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations</i>	<p>Establish greenhouse gas emission standards and testing procedures for passenger automobiles and light trucks that align with US requirements.</p> <p>Provide an emission credit system that allows regulated companies to bank and trade emission credits (which are generated by outperforming the applicable emission standards).</p>	<p>Approximately 20 major vehicle manufacturers and 5 low-volume manufacturers. The standards apply to newly built passenger and light truck vehicles produced in 2011 or later.</p>	<p>The regulations came into force on 23 September 2010 and set vehicle emission standards for the 2011 to 2016 model years. An amendment effective 19 March 2015 set more stringent emission standards for the 2017 to 2025 model years.</p>
<i>Heavy-Duty Vehicle and Engine Greenhouse Gas Emission Regulations</i>	<p>Establish greenhouse gas emission standards for new on-road, heavy-duty vehicles and their engines.</p> <p>Provide an emission credit system that allows regulated companies to bank and trade emission credits (which are generated by outperforming the applicable emission standards).</p>	<p>More than 390 vehicle manufacturers and importers. The standards apply to heavy-duty vehicles and engines produced on or after 1 January 2014 and to commercial transportation trailers produced on or after 1 January 2020.</p>	<p>The regulations came into force on 22 February 2013. An amendment effective 16 November 2018 increased the stringency of requirements until 2027.</p>

Regulations	Main objectives	Regulatees	Timelines
Electricity sector			
<i>Reduction of Carbon Dioxide Emissions From Coal-Fired Generation of Electricity Regulations</i>	Establish performance standards for the intensity of carbon dioxide emissions that are generated by producing electricity from coal.	All power plants that use coal as a sole or mixed-use fuel and that are not excluded through equivalency agreements:* <ul style="list-style-type: none"> • 4 plants in Nova Scotia** • 3 plants in Saskatchewan** • 2 plants in New Brunswick • 2 plants in Alberta 	Effective 1 July 2015, the performance standard applied to all newly built coal-fired plants as well as older plants that had exceeded their useful lives (typically 45 to 50 years after the commissioning date) and continue to operate. A 2018 amendment required all units to meet the emission performance standard by 2030, effectively closing down coal-fired plants on an accelerated timeline.
<i>Regulations Limiting Carbon Dioxide Emissions From Natural Gas-Fired Generation of Electricity</i>	Establish performance standards for the intensity of carbon dioxide emissions that are generated by producing electricity from natural gas.	Includes 3 significantly modified natural gas power plants in Alberta.	1 January 2019 for new or significantly modified boiler power plant units with a capacity of 25 megawatts that also meet other technical criteria. 1 January 2021 for new or significantly modified combustion engine units with a capacity of 25 megawatts that also meet other technical criteria.
Oil and gas sector			
<i>Regulations Respecting Reduction in the Release of Methane and Certain Volatile Organic Compounds (Upstream Oil and Gas Sector)</i>	Introduce standards for the upstream oil and gas industry—onshore exploration and production of oil and gas—aimed at reducing emissions of methane and certain volatile organic compounds.	More than 930 operators running about 42,000 upstream oil and gas facilities that extract, process, and/or transport hydrocarbon gas.	The first requirements came into force on 1 January 2020. More requirements will come into force in 2023.

* An equivalency agreement is an agreement under the *Canadian Environmental Protection Act, 1999* between the federal government and a provincial government. The agreement recognizes that the province has laws in force that are equivalent to certain federal regulations made under the act and has laws to investigate offences. As such, those federal regulations will not apply in the province.

** Under an equivalency agreement that came into force on 1 January 2020, the federal regulation does not currently apply.

Source: Adapted from information provided by Environment and Climate Change Canada

Roles and responsibilities

5.6 **Environment and Climate Change Canada.** This department is the federal lead on a range of environmental matters. It administers laws and regulations to prevent or limit damage to the environment and human health and to conserve habitats and biodiversity. It also supports and coordinates the Government of Canada’s environmental and climate change policies, programs, and plans to reduce greenhouse gas emissions. This work includes

- supporting clean growth and developing and implementing regulations to help mitigate climate change
- contributing to international environmental and climate-related actions and initiatives
- engaging with other federal government departments, Indigenous partners, provinces and territories, domestic and international partners, and other interested parties to address environmental and climate change issues

Focus of the audit

5.7 This audit focused on whether selected regulations administered by Environment and Climate Change Canada achieved their greenhouse gas emission reduction targets and contributed as intended to Canada’s long-term climate change mitigation goals.

5.8 The audit team examined actions in support of the United Nations’ Sustainable Development Goals to understand the department’s contributions to Goal 13 (Climate Action).

5.9 This audit is important because the release of greenhouse gases and their increasing concentration in the atmosphere are negatively affecting environments, human health, and economies around the world, yet Canada has repeatedly missed its targets to reduce its greenhouse gas emissions. Even though not all of the selected regulations are fully implemented yet—and recognizing that their stringency is meant to increase over time—it is important to measure the regulations’ performance at an early stage to assess whether they are on track to reduce emissions as intended.

5.10 More details about the audit objective, scope, approach, and criteria are in **About the Audit** at the end of this report.



Take urgent action to combat climate change and its impacts

Source: United Nations

Findings and Recommendations

Environment and Climate Change Canada did not know how much greenhouse gas regulations helped Canada to reduce emissions

Why this finding matters

5.11 This finding matters because without this information, Canada cannot be sure whether it is using the right tools to reduce its greenhouse gas emissions. Assessing the results of policy measures, including regulations, is a key step toward developing effective greenhouse gas reduction strategies, reducing emissions, and ultimately meeting targets.

5.12 It is also important to communicate the effects of policy measures on greenhouse gas emissions, both before they are adopted (to inform policy design) and after they are implemented (to understand whether the intended effects are being achieved and identify whether adjustments need to be made). Furthermore, it is important to assess the performance of policy measures to inform future related measures and increase their likelihood of success.

Context

5.13 Since 2016, the Government of Canada has brought forward more than 100 policy measures to combat climate change. In March 2022, Environment and Climate Change Canada released the 2030 Emissions Reduction Plan—Canada’s Next Steps for Clean Air and a Strong Economy under the *Canadian Net-Zero Emissions Accountability Act*. The plan includes ongoing and new initiatives plus funding of more than \$9 billion in new investments to help Canada reduce its greenhouse gas emissions by 40% to 45% below 2005 levels by 2030. Each sector of the Canadian economy is subject to a suite of mitigation measures. Regulations are among these. The measures may interact and overlap in a layered approach.

5.14 Environment and Climate Change Canada has set the following expectations for the regulations we examined in the transportation and electricity sectors:

- **Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations.** The department anticipates that over the lifetime operation of all 2017 to 2025 model year light-duty vehicles sold, these regulations will result in a cumulative reduction of about 174 Mt CO₂ eq. The reductions will not be fully realized until at least 2035, as the vehicles reach the end of their useful lives.

- **Heavy-Duty Vehicle and Engine Greenhouse Gas Emission Regulations.** The department anticipates that for 2020 to 2029 model year heavy-duty vehicles (including engines and trailers), the regulations will lead to a reduction of approximately 73 Mt CO₂ eq from 2020 to 2050. These emission reductions will not be fully realized until at least 2050, as the vehicles reach the end of their useful lives.
- **Reduction of Carbon Dioxide Emissions From Coal-Fired Generation of Electricity Regulations.** The department expects these amended regulations to reduce greenhouse gas emissions by 94 Mt CO₂ eq from 2019 to 2055.
- **Regulations Limiting Carbon Dioxide Emissions From Natural Gas-Fired Generation of Electricity.** The department did not conduct a modelling analysis for these regulations because the regulations were not designed or expected to lead to incremental greenhouse gas reductions.

5.15 Environment and Climate Change Canada uses modelling approaches to estimate greenhouse gas emission reductions. To do this, it develops annual projections based on historical data and up-to-date assumptions about the key drivers of Canada's emissions. These key drivers include economic growth, population and household formation, technological changes, policy decisions, and energy prices, such as for oil, refined petroleum products, natural gas, and electricity. Varying any of these assumptions can have a significant impact on the outlook for reductions.

Significant difficulties tying emission reductions to specific regulations

Findings

5.16 We found that Environment and Climate Change Canada did not measure or report on the contributions of each selected greenhouse gas regulation (Exhibit 5.2) toward Canada's 2030 emission reduction target. Department officials told us that interactions among some of the policy measures make it challenging to attribute reductions to specific regulations.

5.17 We also found that Canada's annual national inventory reports—which are prepared by the department and are one of the main tools for reporting greenhouse gas emissions—did not attribute emissions to specific regulations. These reports are developed following guidelines established by the United Nations' Intergovernmental Panel on Climate Change. The guidelines require countries to estimate emissions at the sectoral level, not according to individual measures, such as regulations. The most recent report, National Inventory Report 1990–2020: Greenhouse Gas Sources and Sinks in Canada, contained 2020 data and was published in April 2022.

5.18 Data from the 2022 National Inventory Report shows that overall, emissions from passenger automobiles decreased by 21% from 2005 to 2019, while emissions from light trucks increased by 41% and from heavy-duty vehicles by approximately 34% in the same period. As stated in paragraph 5.14, Environment and Climate Change Canada had expected the vehicle-related regulations that we examined to reduce total greenhouse gas emissions.

5.19 According to the 2022 National Inventory Report, apart from 2020, when greenhouse gases dropped in part because of the **coronavirus disease (COVID-19)**² pandemic, emissions in Canada have been on an overall upward trajectory, despite the introduction of increasingly stringent emission standards. The overall increase in emissions from road vehicles has largely been due to growth in the number of people driving and choosing larger vehicles, such as sport-utility vehicles, pickup trucks, and minivans. Despite a reduction in the kilometres driven per vehicle, the number of vehicles in Canada has increased by 42% since 2005—especially light- and heavy-duty trucks—leading to more kilometres driven overall. Environment and Climate Change Canada expects greenhouse gas emissions from road vehicles to drop as regulations continue to be phased in and new, more energy-efficient vehicles replace less efficient vehicles.

5.20 Finally, we found that because of the significant difficulties involved in attributing emission reductions to individual regulations, Environment and Climate Change Canada could not estimate whether any regulation had its intended effect. We note that this weakness could affect the department's ability to make timely decisions about whether to continue current regulations or implement additional measures. In the 2022 Reports of the Commissioner of the Environment and Sustainable Development, Report 3—Hydrogen's Potential to Reduce Greenhouse Gas Emissions, we found a similar problem with the department's modelling of the impact of hydrogen initiatives. We noted several negative impacts stemming from the inability to understand pathways to emission reduction.

Gaps in the models used to estimate impacts

Findings

5.21 We found that Environment and Climate Change Canada captured key values and assumptions in its modelling approach to estimate the long-term impacts of the *Reduction of Carbon Dioxide Emissions From Coal-Fired Generation of Electricity Regulations*. The department also documented these thoroughly and clearly in its 2018 Regulatory Impact Analysis Statement for the amended

² **Coronavirus disease (COVID-19)**—The disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).

regulations. Regulatory impact analysis statements, published when regulations are developed or amended, describe the issues or problems that a regulation will address and why the regulation is needed.

5.22 However, we found that the information that Environment and Climate Change Canada published in the regulatory impact analysis statements for the transportation regulations was less comprehensive. The department's discussion of its modelling for light- and heavy-duty vehicles did not explain the reference scenarios or the extent to which the analysis considered policy interactions. A more complete description of the methods used would be needed to allow others to understand the approach and confirm the results. In the 2022 Reports of the Commissioner of the Environment and Sustainable Development, Report 3—Hydrogen's Potential to Reduce Greenhouse Gas Emissions, we raised similar concerns about transparency in modelling. We encourage the department to continue improving the transparency of its scenarios by implementing the recommendations in that audit.

5.23 We also found gaps in the department's approach to estimating the long-term impacts of the amended *Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations* and the *Heavy-Duty Vehicle and Engine Greenhouse Gas Emission Regulations*. As a result, the regulations' impacts may have been incorrectly estimated. We found the following:

- The department did not model the full range of flexibility within the regulations. Both manufacturers' and purchasers' behaviours can influence sales volume, mix, and technology changes—but while the department did some modelling of manufacturers' behaviours, it did little for consumers'. For example, it did not model the impact of price changes.
- The department's modelling of both regulations did not count credit opportunities under the amended regulations, such as adding vehicles that use advanced technology (like electric buses and short-haul trucks).

5.24 Finally, the department did not include sufficient **sensitivity analyses**³ in its modelling approaches for the 3 regulations:

- For the light-duty vehicle regulations, the sensitivity analysis covered only a limited set of variables.
- For the heavy-duty vehicle regulations, no sensitivity analysis was conducted at all.
- For the coal-fired regulations, the sensitivity analysis was not extensive and did not report estimated greenhouse gas emission reductions.

³ **Sensitivity analysis**—An assessment of how various sources of uncertainty in a mathematical model contribute to variation in the model's result.

Recommendation

5.25 Environment and Climate Change Canada should improve the sensitivity analyses in its modelling by including additional variables. This will enable the department to more accurately assess the risk that future regulations may not meet their greenhouse gas emission reduction goals and to be better prepared to respond.

The department's response. *Agreed.*

See **Recommendations and Responses** at the end of this report for detailed responses.

Developing awareness of the regulations' impacts on diverse groups of people

Findings

5.26 We found that even though no **gender-based analysis plus**⁴ was required when the regulations we examined were first developed, Environment and Climate Change Canada established the Task Force on Just Transition for Canadian Coal Power Workers and Communities. The task force was tasked to provide advice and recommendations to the Minister of the Environment and Climate Change on implementing a just transition for workers and communities directly affected by the accelerated phase out of coal-fired electricity in Canada. Part of Canada's 2015 international commitment to reducing greenhouse gas emissions is to support a just transition to a low-carbon economy—that is, a transition that helps affected workers and communities, including by offering financial assistance, retraining, and employment opportunities. We reported on the extent to which the recommendations of the task force were implemented by the Government of Canada in the 2022 Reports of the Commissioner of the Environment and Sustainable Development, Report 1—Just Transition to a Low-Carbon Economy.

5.27 Most of the regulations we examined were subject to the 2012 Cabinet Directive on Regulatory Management, which did not include the requirement to conduct a gender-based analysis plus. The *Clean Fuel Regulations*, published in July 2022, were subject to the latest Cabinet Directive on Regulation (2018), which requires departments to analyze the social and economic impacts of regulatory proposals on diverse groups of Canadians. Federal departments must assess whether

⁴ **Gender-based analysis plus**—An analytical process that provides a rigorous method for the assessment of systemic inequalities and a means to assess how diverse groups of women, men, and gender-diverse people may experience policies, programs, and initiatives. The “plus” acknowledges that gender-based analysis goes beyond biological (sex) and socio-cultural (gender) differences and considers many other identity factors, such as race, ethnicity, religion, age, and mental or physical ability.

Source: Adapted from Women and Gender Equality Canada

there are any gender-based analysis plus considerations for their proposed regulations, and if so, describe these in a regulatory impact analysis statement.

5.28 We found that Environment and Climate Change Canada conducted a gender-based analysis plus of household and employment impacts associated with the *Clean Fuel Regulations* and included the results in the Regulatory Impact Analysis Statement for the regulations. The analysis found that the regulations would increase energy prices and that that this would disproportionately affect lower- and middle-income households, as well as those already experiencing energy poverty.

5.29 The gender-based analysis plus also found that there could be an unevenly distributed negative impact on employment. It found that middle-aged men working in the oil and gas sector would be negatively affected because the regulations would decrease demand for fossil fuel products. Older workers in Canada, especially those aged 55 to 64, may face barriers like ageism, lack of education and training, health issues, and lack of workplace accommodations when searching for new jobs.

5.30 The department acknowledged that its analysis may not have captured all groups because of unavailable data, scarce research, or the under-representation of certain communities in available studies, such as the lesbian, gay, bisexual, transgender, queer, and 2-spirit community.

5.31 We found that the department took steps to look for information that could inform its development of regulations. These steps included establishing partnerships with the academic community and other federal departments and using expert advisory tables to gather information and data.

5.32 In addition, in summer 2022, the department sponsored public opinion research on climate adaptation and sought information on gender identity, Indigenous status, marital status, visible minority status, and more.

The department's development of the *Clean Fuel Regulations* took too long

Why this finding matters

5.33 This finding matters because greenhouse gas emissions are driving climate change and its impacts around the world, and Canada has repeatedly missed its targets. There is an urgent need to accelerate efforts to reduce greenhouse gas emissions and their impacts, which include the increasing frequency of wildfires, droughts, and severe storms. Greenhouse gases remain in the atmosphere for hundreds of years, so achieving real reductions quickly will help to curtail negative effects on the environment.

Context

5.34 As part of the November 2016 Pan-Canadian Framework on Clean Growth and Climate Change, the Government of Canada announced a plan to develop clean fuel regulations that would reduce Canada’s greenhouse gas emissions by increasing the use of lower-carbon fuels, energy sources, and technologies.

5.35 The resulting proposed *Clean Fuel Regulations* were adjusted during their development to account for climate policy, which has seen a range of new measures and investments announced in budgets and climate plans. These have included the 2020 strengthened climate plan, A Healthy Environment and a Healthy Economy, and the 2030 Emissions Reduction Plan—Canada’s Next Steps for Clean Air and a Strong Economy, published in 2022. When the proposed regulations were introduced, they were intended to cover liquid, gas, and solid fuels. Over time, the Government of Canada narrowed the scope. Gaseous and solid fuels would not face regulatory obligations.

5.36 The final *Clean Fuel Regulations* are a key element in the federal government’s emission reduction plans, second only to carbon pricing in terms of the estimated impact on emission reductions. Environment and Climate Change Canada has estimated that the cumulative greenhouse gas emission reductions attributable to the regulations will range from 151 to 267 Mt CO₂ eq from 2022 to 2040. According to the department, the regulations are among the most complex it has ever developed. The department held multiple consultation sessions with stakeholders and the provinces and territories from 2017 to 2020.

Slow development of the *Clean Fuel Regulations*

Findings

5.37 We found that Environment and Climate Change Canada did not meet its initial target dates for developing the *Clean Fuel Regulations*: It took more than 5 years rather than the originally planned 2 and a half years. The Minister of Environment and Climate Change has publicly stated that the federal government took too long to develop the regulations and that the expected time frame to develop environmental regulations is now about 2 years.

5.38 The department set the following target dates for publishing the regulations:

- 27 October 2018 for the proposed regulations
- 26 June 2019 for the final regulations

However, it missed both initial targets. It ultimately published the proposed regulations on 19 December 2020 and the final regulations on 6 July 2022.

5.39 The regulations were also originally intended to reduce annual greenhouse gas emissions by 30 Mt CO₂ eq from 2030 onwards. Environment and Climate Change Canada’s estimate of the reduction that will be achieved by the regulations as implemented is 26.6 Mt CO₂ eq because of reductions in the scope of the regulations to cover only most liquid fuels.

5.40 The department told us that the 2019 and 2021 federal elections and the COVID-19 pandemic played roles in the delays. During both election periods, Environment and Climate Change Canada could not engage with stakeholders on regulatory proposals. The 2021 federal election slowed the publication of the final regulations by about 6 months. The exceptional circumstances of the COVID-19 pandemic amplified these delays.

5.41 Compounding the situation, the *Clean Fuel Regulations* competed with other high-priority regulations during their development. Environment and Climate Change Canada’s documentation noted that workloads for the Department of Justice Canada were particularly high during the development of the regulations and may have limited the availability of the Department of Justice Canada’s legal drafting experts.

5.42 According to Environment and Climate Change Canada documentation, the Department of Justice Canada indicated that it might not be in a position to meet Environment and Climate Change Canada’s timelines because of the significant drafting effort expected for the regulations. However, the Department of Justice Canada later noted that departments set priorities and that drafting resources are always available for top-priority projects.

Some transportation regulations did not achieve their targets

Why this finding matters

5.43 This finding matters because the transportation sector is the second-largest source of greenhouse gas emissions in Canada. Reducing emissions from vehicles is an essential element of Canada’s strategy to reduce both air pollutants and greenhouse gas emissions and is a key aspect of mitigating climate change.

Some missed targets

Findings

5.44 We found that Environment and Climate Change Canada established performance targets, indicators, and expected outcomes for the transportation sector regulations we examined and that these enabled it to gauge their likely success.

5.45 We found that the *Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations* did not achieve their targets. However, the *Heavy-Duty Vehicle and Engine Greenhouse Gas Emission Regulations* did.

5.46 Performance with respect to the regulations for cars and light trucks is indicated by reductions in the greenhouse gases emitted by vehicles from the 2017 and later model years versus the 2011 model year baseline. Performance needs to improve by about 3% per year to reach 42% by 2025 from 21% in 2017.

5.47 The performance target for the 2019 model year was a 26.7% improvement relative to the 2011 baseline. But the net improvement fell short, at 23% for passenger automobiles and light trucks. According to Environment and Climate Change Canada’s 2021–22 Departmental Results Report, the 2017 and 2018 model years also fell short of the improvement targets (Exhibit 5.3).

Exhibit 5.3—Performance targets for 2017, 2018, and 2019 cars and light trucks were not achieved

Model year	Performance targets for the <i>Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations</i>	Performance results
2017	21.1%	17%
2018	23.9%	21%
2019	26.7%	23%

Source: Adapted from information provided by Environment and Climate Change Canada

5.48 Department officials told us that in their view, the current performance indicator does not accurately reflect the actual performance of the *Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations*. This is because the regulations permit manufacturers to offset performance gaps, such as those identified in Exhibit 5.3, by using credits that are generated if they outperform the applicable standards in earlier model years. Manufacturers have generated such credits. At the time of the audit, the department was reviewing the indicator to determine its applicability and considering the credit system when assessing regulatory performance.

5.49 Environment and Climate Change Canada evaluates performance with respect to the *Heavy-Duty Vehicle and Engine Greenhouse Gas Emission Regulations*, which were amended in 2018, by comparing reductions in the greenhouse gases emitted by vehicles from the 2021 and later model years with the 2018 model year baseline. This indicator represents the average percentage of improvement in greenhouse gas emissions in 4 regulated vehicle categories (Exhibit 5.4).

Exhibit 5.4—Emission reduction targets for heavy-duty vehicles grow more ambitious over time

Model year	Combination tractors	Heavy-duty pickup trucks and vans	Vocational vehicles	Trailers
2021	13%	2%	8%	4%
2024	17%	10%	14%	6%
2027	23%	16%	17%	8%

Source: Adapted from information provided by Environment and Climate Change Canada

5.50 Prior to the amendment, the performance indicator was the percentage improvement in greenhouse gas emission reductions for manufacturers' 2018 to 2020 model years relative to the 2010 model year. For combination tractors, heavy-duty pickup trucks and vans, and vocational vehicles, the targets were 11%, 13%, and 5%, respectively. Environment and Climate Change Canada published data for the 2018, 2019, and 2020 model years showing that these targets were mostly met (Exhibit 5.5). Results for 2021 and later model years will be available in the 2022–23 reporting cycle.

Exhibit 5.5—Performance targets for 2018, 2019, and 2020 heavy-duty vehicles were achieved

Model year	Combination tractors	Heavy-duty pickup trucks and vans	Vocational vehicles
Targets			
	11%	13%	5%
Achievements			
2018	19%	12%	9%
2019	20%	13%	9%
2020	19%	15%	9%

Source: Adapted from information provided by Environment and Climate Change Canada

The regulations' aim to phase out coal-fired electricity was on track

Why this finding matters

5.51 This finding matters because coal is an outsized contributor to global climate change and a major source of toxic pollution. Phasing it out protects human health by reducing our exposure to harmful air

pollutants. In addition, industry compliance with regulations is key to reducing greenhouse gas emissions from both coal- and natural gas-fired power generation.

Context

5.52 The *Reduction of Carbon Dioxide Emissions From Coal-Fired Generation of Electricity Regulations* aim to phase out conventional coal-fired electricity in Canada by no later than 2030. The regulations limit coal-fired power plants to producing 420 tonnes of carbon dioxide per gigawatt hour of electricity.

5.53 For coal-fired electricity-generating plants commissioned on or after 1 July 2015, the limit applies immediately upon the start of operation. For those commissioned before that, the limit applies when the plant reaches the end of its useful life but continues to operate. Useful life is defined in the regulations as follows:

- A power plant commissioned after 1974 will reach the end of its useful life 50 years after its commissioning date or at the end of 2029, whichever is first.
- A plant commissioned before 1975 will reach the end of its useful life 50 years after its commissioning date or at the end of 2019, whichever is first.

5.54 Plants that are subject to the limit must submit annual reports that include their emission intensity, carbon dioxide emissions, and quantity of electricity generated. If applicable, they must also submit documents showing that they captured, transported, and stored carbon dioxide emissions in line with the regulations.

5.55 Environment and Climate Change Canada has established a performance indicator for these regulations. The indicator is the percentage of regulated plants that are in compliance with the regulated requirements. The target is 100%.

5.56 The *Regulations Limiting Carbon Dioxide Emissions From Natural Gas-Fired Generation of Electricity* aim to ensure that new and converted natural gas-fired electricity plants are subject to achievable emission limits based on efficient technology. The performance indicator for these regulations is the percentage of regulated plants whose reports show compliance with the testing and emission requirements. This target is also 100%.

Performance targets achieved to date

Findings

5.57 We found that Environment and Climate Change Canada established performance targets, indicators, and expected outcomes for the electricity sector regulations we examined and that the regulations had achieved their targets to date.

5.58 The department's 2021–22 Departmental Results Report stated that the *Reduction of Carbon Dioxide Emissions From Coal-Fired Generation of Electricity Regulations* achieved their 100% compliance target. This finding was based on the annual report submitted by 1 plant in Alberta.

5.59 We also found that Environment and Climate Change Canada had received reports from provinces with equivalency agreements showing that these plants met the provincial standards. Plants in provinces with equivalency agreements are not required to comply with federal regulations: They follow provincial regulations that have been determined to be equivalent. As of 30 September 2022, 7 plants in Canada were subject to equivalency agreements.

5.60 Under the provisions of the *Regulations Limiting Carbon Dioxide Emissions From Natural Gas-Fired Generation of Electricity*, no plants were required to submit reports for 2020 or 2021.

Environment and Climate Change Canada lacked information needed to confirm the effectiveness of methane regulations

Why this finding matters

5.61 This finding matters because methane is a potent greenhouse gas with at least 25 times the warming potential of carbon dioxide over a 100-year period. Reducing methane emissions as quickly as possible is critical to limiting the rise of global temperatures in the near term. An accurate understanding of how much methane is being emitted and where is critical to ensuring that methane regulations are correctly targeted.

Context

5.62 The federal and provincial governments share the legal responsibilities involved in protecting the environment. Section 10 of the *Canadian Environmental Protection Act, 1999* authorizes the **Governor in Council**,⁵ on the recommendation of the federal Minister of the Environment, to exempt the application of certain regulations under the act in a province or territory if the minister agreed with the province or territory that there are equivalent provincial or territorial laws in force. An equivalency agreement has a maximum term of 5 years from the date on which it comes into force.

5.63 Most of the oil and gas sector's methane emissions are from Alberta, Saskatchewan, and northeastern British Columbia. In 2020, equivalency agreements were finalized between the Government of

⁵ **Governor in Council**—The Governor General, who acts on the advice of Cabinet and, as the formal executive body, gives legal effect to those decisions of Cabinet that are to have the force of law.

Canada and these 3 provinces to enable tailored regional approaches to methane mitigation in the provinces' respective oil and gas sectors while ensuring equivalent environmental outcomes. The equivalency agreements last for 5 years and include requirements to share certain types of information between jurisdictions annually.

5.64 In 2016, the Government of Canada committed to a 40% to 45% reduction in methane emissions by 2025 compared with 2012 levels in the oil and gas sector. The existing federal regulations were designed to achieve this target.

5.65 In October 2021, Environment and Climate Change Canada announced a commitment to reduce oil and gas methane emissions by at least 75% below 2012 levels by 2030. The Government of Canada proposed to amend the existing federal regulations for methane emissions from the oil and gas sector to achieve this goal. The draft amendments are expected to be published in 2023.

Incomplete collection of data to monitor methane regulations' results

Findings

5.66 We found that Environment and Climate Change Canada lacked some information to monitor whether all the provincial regulations would achieve the same environmental outcomes as the federal methane regulations over a 5-year period.

5.67 To compare outcomes between provincial and federal regulations when it negotiated the equivalency agreements in 2020, Environment and Climate Change Canada estimated the methane reductions from the federal regulations and each provincial regulation over a 5-year period using a 2018 reference case. The analysis demonstrated that each provincial regulation would be equivalent to the federal regulations over a 5-year period.

5.68 Environment and Climate Change Canada committed to performing an annual progress review, and in 2021, the department updated its equivalency modelling using the 2020 reference case. That modelling estimated that compared with the federal regulations, Alberta's regulations would achieve about 7% fewer reductions. For British Columbia and Saskatchewan, the updated modelling showed that these provinces' regulations would reduce emissions slightly more than the federal regulations would.

5.69 The department did not repeat in 2022 the 2021 analysis that it had performed during its review of federal methane regulations, and it did not conclude on the extent to which the provinces were on track to meet their targets.

5.70 We also found that all 3 provinces provided Environment and Climate Change Canada with the information required by the equivalency agreements. However, the department concluded that further details would be needed from Alberta to fully assess the results of the 2020 regulatory implementation.

5.71 We found that Environment and Climate Change Canada did not follow up to obtain additional information. Its rationale was that 1 year was insufficient to evaluate how such issues would affect the equivalency agreement over its duration of 5 years.

5.72 Furthermore, the department did not request a list of compliance verification activities or enforcement measures from Saskatchewan, even though the equivalency agreement gave it this right.

Recommendation

5.73 To accurately assess the effectiveness of the provinces' methane regulations, Environment and Climate Change Canada should collect all relevant information from provinces, including compliance data.

The department's response. *Agreed.*

See **Recommendations and Responses** at the end of this report for detailed responses.

Uncertainty in meeting the 2025 target for methane reductions

Findings

5.74 We found that when it reviewed the federal methane regulations in 2021, Environment and Climate Change Canada concluded that overall, Canada was on track to meet its 2025 target for reducing emissions from the oil and gas sector. However, in our view, the department cannot be certain about this conclusion.

5.75 Modelling by Environment and Climate Change Canada showed that federal and provincial methane regulations would reduce emissions by 39% by 2025 from 2012 levels, slightly short of the 40% to 45% target. This analysis did not quantify the impacts of other programs and initiatives. In our view, there are several reasons to doubt the accuracy of this estimate:

- As discussed in paragraph 5.69, the department did not conclude on the extent to which the provinces were on track to achieve the federal methane emission reductions target.

- Poor compliance rates during the first few years of the regulations indicate that Canada is at risk of failing to meet its methane reduction target.
- Several Canadian scientific studies suggest that total emissions are underreported in the national inventory and that the distribution of emissions is likely inaccurate.

5.76 The studies noted concerns about the level of methane emissions from oil and gas operations. The department uses a **bottom-up approach**⁶ to estimate methane emissions from the oil and gas industry. However, Canada's latest methane strategy acknowledges that recent studies of the **top-down approach**⁷ have demonstrated that bottom-up inventories underestimate methane emissions from the oil and gas industry by anywhere from 25% to as much as 90%. Changes to the upcoming 2023 Canadian inventory are expected in the department's next update. The department has stated that major improvements to incorporate new measurement-based data would not occur until at least 2024, and it was unclear whether these would be fully implemented across all provinces. These changes have the potential to affect both federal and provincial emission estimates.

5.77 We also found that, although the department studied how to improve the accuracy of emission data, it did not incorporate the results into its model. Furthermore, there are sources of emissions—such as unlit flares, which directly vent gas to the atmosphere—that are unaccounted for in inventories and not covered by regulations.

Recommendation

5.78 Environment and Climate Change Canada should complete the methodology update in the National Inventory Report by including all sources of methane emissions in its model. It should also allow the use of the most recent measurement-based data to improve the accuracy of its estimates of methane emissions from the oil and gas sector.

The department's response. *Agreed.*

See **Recommendations and Responses** at the end of this report for detailed responses.

6 **Bottom-up approach**—A method to estimate greenhouse gas emissions that collects and processes data at the local level to build an overall inventory for emissions. Its weakness is that these collection and accounting methods can differ across sectors, emitters, and time periods.

7 **Top-down approach**—A method to estimate greenhouse gas emissions that aggregates, analyzes, and calculates greenhouse gas data at the national and/or provincial levels to arrive at a national inventory. Its weakness is that aggregated data may not reflect local conditions or specific factors accurately.

Conclusion

5.79 We concluded that selected greenhouse gas regulations administered by Environment and Climate Change Canada achieved some, but not all, of their reduction targets and had not yet contributed as intended to Canada's long-term goals for climate change mitigation. As well, Environment and Climate Change Canada could not be certain whether its methane regulations were helping Canada to reach its targets.

5.80 Environment and Climate Change Canada took more than 5 years to develop the *Clean Fuel Regulations*, twice as long as initially planned. Taking action as quickly as possible is necessary to mitigate the negative impacts that greenhouse gases are having on the earth.

About the Audit

This independent assurance report was prepared by the Office of the Auditor General of Canada on Canada's implementation of greenhouse gas regulations. Our responsibility was to provide objective information, advice, and assurance to assist Parliament in its scrutiny of the government's management of resources and programs and to conclude on whether Environment and Climate Change Canada complied in all significant respects with the applicable criteria.

All work in this audit was performed to a reasonable level of assurance in accordance with the Canadian Standard on Assurance Engagements (CSAE) 3001—Direct Engagements, set out by the Chartered Professional Accountants of Canada (CPA Canada) in the CPA Canada Handbook—Assurance.

The Office of the Auditor General of Canada applies the Canadian Standard on Quality Management 1—Quality Management for Firms That Perform Audits or Reviews of Financial Statements, or Other Assurance or Related Services Engagements. This standard requires our office to design, implement, and operate a system of quality management, including policies or procedures regarding compliance with ethical requirements, professional standards, and applicable legal and regulatory requirements.

In conducting the audit work, we complied with the independence and other ethical requirements of the relevant rules of professional conduct applicable to the practice of public accounting in Canada, which are founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality, and professional behaviour.

In accordance with our regular audit process, we obtained the following from entity management:

- confirmation of management's responsibility for the subject under audit
- acknowledgement of the suitability of the criteria used in the audit
- confirmation that all known information that has been requested, or that could affect the findings or audit conclusion, has been provided
- confirmation that the audit report is factually accurate

Audit objective

The objective of this audit was to examine whether selected regulations administered by Environment and Climate Change Canada achieved their greenhouse gas emission reduction targets and contributed as intended to long-term mitigation goals.

Scope and approach

The audit covered the implementation of greenhouse gas regulations by Environment and Climate Change Canada. The audit methodology included document reviews, data analysis, and interviews with department officials.

Criteria

We used the following criteria to conclude against our audit objective:

Criteria	Sources
<p>Environment and Climate Change Canada monitors and transparently reports to the public on the outcomes of the selected regulations intended to help prevent pollution and achieve Canada’s greenhouse gas emission reduction goals.</p>	<ul style="list-style-type: none"> • <i>Canadian Environmental Protection Act, 1999</i> • <i>Federal Sustainable Development Act</i> • Cabinet Directive on Regulation, Treasury Board • Policy on Regulatory Development, Treasury Board • Policy on Results, Treasury Board • A Guide to Understanding the <i>Canadian Environmental Protection Act, 1999</i>, Government of Canada, 2004 • Mitigation Goal Standard, Greenhouse Gas Protocol, 2014 • 2030 Emissions Reduction Plan—Canada’s Next Steps for Clean Air and a Strong Economy, Environment and Climate Change Canada, 2022 • Canada’s Federal Implementation Plan for the 2030 Agenda, Employment and Social Development Canada, 2021 • 2017 Fall Reports of the Commissioner of the Environment and Sustainable Development, Report 1—Progress on Reducing Greenhouse Gases—Environment and Climate Change Canada
<p>Environment and Climate Change Canada ensures that the equivalency agreements it has entered into under the <i>Canadian Environmental Protection Act, 1999</i> for methane regulations rely on provincial regulations that are as effective as the federal ones and deliver the same or better environmental outcomes.</p>	<ul style="list-style-type: none"> • <i>Canadian Environmental Protection Act, 1999</i> • <i>Regulations Respecting Reduction in the Release of Methane and Certain Volatile Organic Compounds (Upstream Oil and Gas Sector)</i> • Canada–British Columbia equivalency agreement respecting the release of methane from the oil and gas sector, 2020 • Canada–Alberta equivalency agreement respecting the release of methane from the oil and gas sector, 2020 • Canada–Saskatchewan equivalency agreement respecting the release of methane from the oil and gas sector, 2020

Criteria	Sources
Environment and Climate Change Canada’s regulatory development process is efficient.	<ul style="list-style-type: none"> • <i>Department of the Environment Act</i> • Cabinet Directive on Regulation, Treasury Board • Policy on Regulatory Development, Treasury Board • Quality Management System Process for the Development and Publication of Regulations in ECCC, Environment and Climate Change Canada • 2030 Emissions Reduction Plan—Canada’s Next Steps for Clean Air and a Strong Economy, Environment and Climate Change Canada, 2022 • A Healthy Environment and A Healthy Economy, Environment and Climate Change Canada, 2020 • Pan-Canadian Framework on Clean Growth and Climate Change, Environment and Climate Change Canada, 2016

Period covered by the audit

The audit covered the period from 1 January 2020 to 30 September 2022. This is the period to which the audit conclusion applies. However, to gain a more complete understanding of the subject matter of the audit, we also examined certain matters that preceded the start date of this period.

Date of the report

We obtained sufficient and appropriate audit evidence on which to base our conclusion on 14 February 2023, in Ottawa, Canada.

Audit team

This audit was completed by a multidisciplinary team from across the Office of the Auditor General of Canada led by Nicholas Swales, Principal. The principal has overall responsibility for audit quality, including conducting the audit in accordance with professional standards, applicable legal and regulatory requirements, and the office’s policies and system of quality management.

Recommendations and Responses

In the following table, the paragraph number preceding the recommendation indicates the location of the recommendation in the report.

Recommendation	Response
<p>5.25 Environment and Climate Change Canada should improve the sensitivity analyses in its modelling by including additional variables. This will enable the department to more accurately assess the risk that future regulations may not meet their greenhouse gas emission reduction goals and to be better prepared to respond.</p>	<p>The department’s response. Agreed. The Cabinet Directive on Regulation requires regulatory proposals to be evaluated in terms of their overall costs and benefits to Canadian society. This is broader than the audit’s focus on the narrow evaluation metric (greenhouse gas reductions).</p> <p>In accordance with the directive, Environment and Climate Change Canada organizes its sensitivity analyses relative to the degree of uncertainty regarding a conclusion of the net benefit or net cost for a given regulatory analysis. Although the current practice aligns with the recommendation, Environment and Climate Change Canada will continue to improve its assessment and communication of the uncertainty of its greenhouse gas emission estimates in all regulatory impact analysis statements where greenhouse gas emission reductions are the policy objective of the regulations.</p>
<p>5.73 To accurately assess the effectiveness of the provinces’ methane regulations, Environment and Climate Change Canada should collect all relevant information from provinces, including compliance data.</p>	<p>The department’s response. Agreed. Environment and Climate Change Canada will continue to engage with the provinces of British Columbia, Alberta and Saskatchewan regarding the implementation of methane regulations in those provinces, including implications of compliance activity as it relates to methane emissions.</p>
<p>5.78 Environment and Climate Change Canada should complete the methodology update in the National Inventory Report by including all sources of methane emissions in its model. It should also allow the use of the most recent measurement-based data to improve the accuracy of its estimates of methane emissions from the oil and gas sector.</p>	<p>The department’s response. Agreed. As highlighted in the 2022 National Inventory Report, Environment and Climate Change Canada is actively working to utilize airplane-based measurement data to improve the accuracy of emission estimates. An updated quantification methodology will be developed for incorporation into the National Inventory Report.</p>

