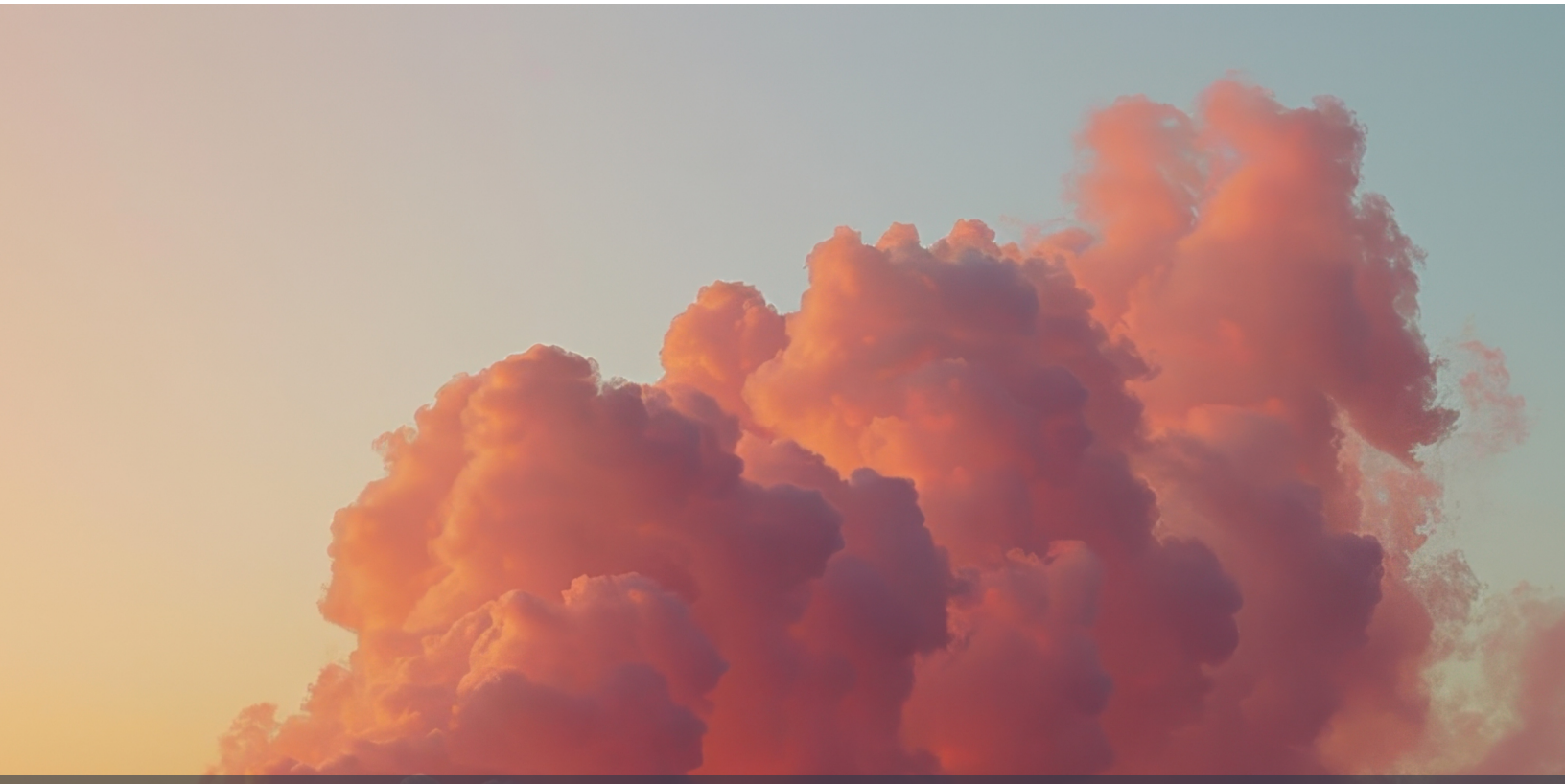
March 12, 2025

Impact Assessment of the Oil and Gas Emissions Cap



OFFICE OF THE PARLIAMENTARY BUDGET OFFICER
BUREAU DU DIRECTEUR PARLEMENTAIRE DU BUDGET

The Parliamentary Budget Officer (PBO) supports Parliament by providing economic and financial analysis for the purposes of raising the quality of parliamentary debate and promoting greater budget transparency and accountability.

This report provides an assessment of the potential economic impact of the Government's proposed regulations to cap greenhouse gas emissions from the oil and gas sector.

Lead analysts:

Nasreddine Ammar, Advisor-Analyst
Tim Scholz, Advisor-Analyst

Contributor:

Marianne Laurin, Analyst

Prepared under the direction of:

Chris Matier, Senior Advisor

Nathalie Desmarais, Marie-Eve Hamel Laberge, Martine Perreault and Rémy Vanherweghem assisted with the preparation of the report for publication.

For further information, please contact the Office of the Parliamentary Budget Officer.

Yves Giroux
Parliamentary Budget Officer

Table of Contents

Highlights 1
Summary 2
Key results 2
Introduction 4
Background 4
Updated GHG emissions data and projections 5
Key limitations of PBO's assessment 6
Methodology and key assumptions 7
Upstream oil and gas emissions 7
Oil and gas emissions cap and compliance flexibility 7
Estimating economic impact 8
Results 9
Baseline scenario 9
Achieving the legal upper bound 10
Sensitivity analysis – baseline GHG emissions 12
Appendix A: Detailed subsector assumptions 14
Conventional oil production 14
Oil sands production 15
Natural gas production and processing 16
Notes 18

Highlights

In the absence of the Government's proposed oil and gas emissions cap regulations, PBO's baseline scenario indicates that upstream oil and gas emissions will exceed the legal upper bound (that is, the maximum allowable emissions) of 160 megatonnes (Mt) by 7.1 Mt annually, on average, over the first compliance period 2030 to 2032.

To achieve the legal upper bound, PBO estimates indicate that upstream oil and gas sector production will need to be reduced by 4.9 per cent over 2030 to 2032 relative to projected levels in the baseline scenario. That said, under the proposed regulations production is projected to be 11.1 per cent higher, on average, over 2030 to 2032 compared to current levels.

PBO estimates that the required reduction in upstream oil and gas sector production levels will lower real gross domestic product (GDP) in Canada by 0.39 per cent in 2032 and reduce nominal GDP by $20.5 billion. PBO estimates that achieving the legal upper bound will reduce economy-wide employment in Canada by 40,300 jobs and full-time equivalents by 54,400 in 2032.

Summary

In response to parliamentary requests, this report provides an assessment of the potential economic impact of the Government's proposed regulations to cap greenhouse gas (GHG) emissions from the oil and gas sector that were published in the Canada Gazette on 9 November 2024.

The proposed regulations would establish a national cap-and-trade system for the upstream oil and gas sector, applying to emissions from: conventional oil production; oil sands production; natural gas production and processing; and liquified natural gas production.

Under the proposed regulations, the cap would be set at 27 per cent below reported emissions levels in 2026 for the first compliance period of 2030 to 2032, with a limit of 20 per cent in compliance flexibility (that is, eligible offset credits and decarbonization units). Taken together, the cap and limited compliance flexibility form an effective legal upper bound that is, the maximum allowable emissions for the upstream oil and gas sector.

Our analysis is based on updated (historical) emissions data and the most recent projections of oil and gas sector emissions and production from Environment and Climate Change Canada and the Canada Energy Regulator.

Key results

- In the absence of the proposed oil and gas emissions cap regulations, our baseline scenario indicates that upstream oil and gas emissions will exceed the legal upper bound of 160 megatonnes (Mt) by 7.1 Mt annually, on average, over the first compliance period 2030-2032.

- To achieve the legal upper bound, we assume proportional reductions in conventional oil production, oil sands production, and natural gas production and processing. We estimate that production in these subsectors will need to be reduced by 4.9 per cent over 2030 to 2032 relative to projected levels in our baseline scenario.

- That said, under the proposed oil and gas emissions cap regulations, total production from these upstream subsectors is projected to be 11.1 per cent higher, on average, over 2030 to 2032 compared to current levels.

- We estimate that the required reduction in upstream oil and gas sector production levels will lower real gross domestic product (GDP) in Canada by 0.39 per cent in 2032 and reduce nominal GDP by $20.5 billion. Further, we estimate that achieving the legal upper bound over the first compliance period will reduce economy-wide employment in Canada by 40,300 jobs and full-time equivalents by 54,400 in 2032.

- Our estimate of the emissions reduction in the upstream oil and gas sector required to achieve the legal upper bound falls within the range of external estimates. Similarly, our estimates of the corresponding reduction in projected oil and gas production levels and economy-wide real GDP impact are within the range of external estimates.

Parliamentary Budget Officer (PBO) does not provide economic, fiscal or climate policy recommendations to parliamentarians. Nor does PBO provide comparative policy or cost-benefit analyses. Consistent with PBO's analyses of carbon pricing and the Clean Fuel Regulations, our assessment of the potential economic impact of the oil and gas emissions cap does not account for the benefits of reducing Canada's GHG emissions. That is not to say that these benefits should be dismissed rather, they could be considered in a cost-benefit analysis of the proposed oil and gas emissions cap regulations, which is beyond the scope of our report and PBO's mandate.

Introduction

Background

In December 2023 Environment and Climate Change Canada (ECCC) published its regulatory framework for an oil and gas emissions cap.[1] The framework confirmed the Government's plan to implement an oil and gas emissions cap through a national cap-and-trade system.[2] The framework also provided key design details and outlined the approach to setting the emissions cap and the maximum allowable emissions (that is, the legal upper bound). To help inform the development of draft regulations, the Government requested feedback on its regulatory framework.

The proposed 2030 emissions cap in the framework was set at a level "slightly below" what upstream[3] oil and gas emissions would be if technically achievable emissions reductions were implemented by 2030 and production was maintained at 2019 levels. The 2030 legal upper bound was calculated similarly but was based on (higher) production levels from the Canada Energy Regulator's 2023 Canada Net-Zero production scenario.[4] Consequently the legal upper bound included 25 Mt as compliance flexibility in addition to the 106 to 112 Mt in allowances to be issued under the oil and gas emissions cap. This compliance flexibility would give covered facilities the option to make contributions to a decarbonization fund or remit domestic offset credits.

In early 2024 the Government of Alberta's Environment and Protected Areas Ministry published third party reports prepared by the Conference Board of Canada[5] and Deloitte[6] that assessed the economic impacts of the oil and gas emissions cap presented in the regulatory framework. Both reports indicated that to reduce emissions to the legal upper bound would require significant cuts (of over 10 per cent) to projected oil and gas production levels in 2030, reducing real GDP in Canada by between 0.6 per cent and 0.9 per cent in 2030.

In November 2024 the Government published the proposed oil and gas emissions cap regulations.[7] The proposed regulations included some key changes from the approach in the regulatory framework, notably the determination of the emissions cap and legal upper bound. Under the proposed regulations the cap would be set at 27 per cent below reported emissions levels in 2026 for the first compliance period of 2030 to 2032 with a limit of 20 per cent in compliance flexibility.[8]

The Government's Regulatory Impact Analysis Statement (RIAS) published with the proposed regulations estimated that modest cuts to projected oil and gas production, of 0.7 per cent over 2030 to 2032, would be required to achieve the (modelled) legal upper bound, reducing real GDP in Canada by 0.04 per cent.[9]

In the Backgrounder to the proposed regulations, ECCC indicated that the third party reports conducted by the Conference Board and Deloitte (along with S&P) "do not reflect an accurate analysis of the current draft regulations".[10]

Updated GHG emissions data and projections

Our analysis of the potential economic impact of the oil and gas emissions cap is based on updated (historical) emissions data and the most recent projections of oil and gas sector emissions and production from ECCC and the Canada Energy Regulator (CER).

Analysis of the economic impact of the oil and gas emissions cap conducted by ECCC, the Conference Board and Deloitte was based on the 2023 National Inventory Report (NIR) which included historical emissions data from 1990 to 2021. The most recent NIR, published in May 2024, includes historical data from 1990 to 2022. Of note, the 2024 NIR included significant revisions (largely due to methodological improvements) to upstream oil and gas emissions. For example, according to the 2024 NIR, upstream oil and gas emissions in 2021 were 187 Mt, which is 26 Mt (16 per cent) above levels reported in the 2023 NIR.[11]

In December 2024, ECCC published Canada's First Biennial Transparency Report under the Paris Agreement (BTR1), which included updated emissions projections consistent with the 2024 National Inventory Report. Although under the proposed regulations the oil and gas emissions cap for the first compliance period will be based on observed 2026 emissions levels, these projections can be used to provide updated estimates of the level of the cap and the effective legal upper bound for the first compliance period.

Scenarios considered in the First Biennial Transparency Report were based on preliminary forecasts of oil and gas sector production levels from the CER. Consequently, these production forecasts provide a more up-to-date outlook for the oil and gas sector.

Key limitations of PBO's assessment

PBO does not provide economic, fiscal or climate policy recommendations to parliamentarians. Nor does PBO provide comparative policy or cost-benefit analyses. PBO produces a baseline economic and fiscal projection to provide parliamentarians with an independent outlook for the Canadian economy and the Government's finances. The projection also serves as the basis for costing proposals under the PBO's legislative mandate.

PBO's assessment of the potential economic impact of the oil and gas emissions cap does not provide estimates of the impacts of alternative policies or measures that would achieve an equivalent reduction in GHG emissions. Providing comparative policy analysis is outside the scope of the PBO's mandate. Further, in supporting parliamentarians, PBO does not initiate analysis to identify policy options or optimal policy decisions.

PBO's baseline scenario without the oil and gas emissions cap should not be seen as an alternative policy option of "doing nothing" such that if the economic impact of the emissions cap is negative then the Government should adopt a do-nothing approach to reduce Canada's GHG emissions. Estimates of the impact of a given policy are often measured, or illustrated, relative to a scenario without the policy in question.[12]

Consistent with PBO's analyses of carbon pricing[13] and the Clean Fuel Regulations, our assessment of the potential economic impact of the oil and gas emissions cap does not account for the benefits of reducing Canada's GHG emissions. In contrast, ECCC's cost-benefit analysis of the oil and gas emissions cap in the November 2024 RIAS uses the social cost of carbon, which "is an estimate of the global damages associated with one tonne of carbon emitted".[14]

In PBO's view, potential economic benefits of reducing Canada's emissions based on the social cost of carbon would largely accrue to residents in other countries.[15] That is not to say that these benefits should be dismissed rather, they could be considered in a cost-benefit analysis of the proposed oil and gas emissions cap regulations, which is beyond the scope of our report and PBO's mandate.[16]

Methodology and key assumptions

Upstream oil and gas emissions

Following the Conference Board of Canada's 2024 analysis of the oil and gas emissions cap, we segment emissions subject to the cap in the upstream oil and gas sector into three subsectors: conventional oil production; oil sands production; and, natural gas production and processing. Within each subsector we distinguish between methane emissions and non-methane emissions (that is, carbon dioxide and nitrous oxide).

Under our baseline scenario, reflecting the Government's Strengthened Methane Emissions, we assume that methane emissions in each subsector will decline from current levels to 75 per cent below their 2012 levels over the first compliance period 2030-32.

To project non-methane emissions over the first compliance period, following the Conference Board of Canada's approach, we apply trend estimates and assumptions of emissions intensity (that is, GHG emissions per unit of production) by subsector to preliminary forecasts of production from the CER used in ECCC's First Biennial Transparency Report (With Measures[17] scenario).[18] We take future emissions for the liquified natural gas (LNG) subsector from ECCC's With Measures scenario as given.[19] Appendix A provides our detailed assumptions for the three main upstream subsectors.

Oil and gas emissions cap and compliance flexibility

To provide an updated estimate of the oil and gas emissions cap for the first compliance period 2030-32, consistent with ECCC's modelling we use the most recent projection of upstream emissions in 2026 from the With Additional Measures scenario in the First Biennial Transparency Report, which amounts to 176 Mt.

Consistent with the proposed regulations the oil and gas emissions cap is set at 27 per cent below this level, resulting in an estimated cap of 128 Mt for the first compliance period.[20] Given the limit of 20 per cent compliance flexibility, this results in an estimated legal upper bound of 160 Mt.

Estimating economic impact

Our baseline scenario indicates that oil and gas emissions will exceed the legal upper bound of 160 Mt (described in more detail in the following section). We assume that firms in the three main upstream subsectors will reduce production (relative to baseline projected levels) to achieve the legal upper bound. Further, we assume that production in each subsector will be reduced proportionally.

To determine the direct and indirect impact on real GDP (at the national level), we apply our estimates of the percentage reduction in production required to achieve the legal upper bound to oil and gas extraction (except oil sands) and oil sands extraction output in an Input-Output model.[21] The combined direct and indirect impact from the Input-Output model is then introduced into our economic projection model to incorporate macroeconomic feedback.[22] We assume that the financial cost of compliance flexibility will effectively result in sectoral redistribution and therefore do not incorporate it in our economic modelling.

Results

Baseline scenario

Given preliminary production forecasts for upstream subsectors from the CER, our projected improvements in non-methane emissions intensities, and our assumption that methane emissions are reduced to 75 per cent below 2012 levels, we project baseline upstream emissions that will be subject to the oil and gas emissions cap and legal upper bound (Table 1).[23] Appendix A provides detailed assumptions and projections for the main upstream subsectors.

Our baseline scenario shows an overall decline in upstream emissions of 19.2 megatonnes of carbon dioxide equivalent (Mt CO_2 eq), or 10 per cent by 2032 relative to current levels. This decline is driven entirely by significantly lower methane emissions (33.3 Mt) as higher non-methane emissions, mainly from oil sands production and natural gas production and processing, offset over 40 per cent of the contribution from methane emissions.

Table 1
Baseline GHG emissions scenario, Mt CO_2 eq

Subsector	Historical			Projected		
	2005	2019	2022	2030	2031	2032
Conventional oil production	48.5	49.4	39.8	24.2	24.5	24.8
Oil sands production	35.8	83.8	86.1	92.4	91.3	90.7
Natural gas production and processing	75.4	62.5	59.9	48.5	48.3	48.3
Liquified natural gas	-	-	-	2.7	2.7	2.7
Total upstream emissions	159.7	195.7	185.8	167.8	166.8	166.6
Legal upper bound	Not applicable			160		
Oil and gas emissions cap	Not applicable			128		

Source:
Environment and Climate Change Canada, Statistics Canada and Office of the Parliamentary Budget Officer.

Note:
Totals may not add due to rounding.

Conditional on our assumption that the strengthened methane regulations will reduce emissions to 75 per cent below 2012 levels over the first compliance period, our estimates indicate that in the absence of the oil and gas cap, upstream oil and gas emissions will exceed the legal upper bound of 160 Mt by 7.1 Mt annually, on average, over 2030 to 2032.

Achieving the legal upper bound

To achieve the legal upper bound over the first compliance period, we assume proportional reductions in production will be made across the three main upstream subsectors.[24] To reduce upstream emissions to the legal upper bound we estimate that (non-LNG) production will need to be reduced by 4.9 per cent over 2030 to 2032 relative to projected levels over the same period in our baseline scenario (Table 2).[25] That said, under the proposed oil and emissions cap regulations, production from these upstream subsectors is projected to be 11.1 per cent higher, on average, from current (2022) levels.

Table 2
Upstream oil and gas production

Subsector	Scenario	Actual	Projected		
		2022	2030	2031	2032
Conventional oil production (Mb/d)	Baseline	1,243	1,253	1,279	1,305
	OGEC	-	1,185	1,219	1,245
Oils sands production (Mb/d)	Baseline	3,316	4,001	4,000	4,029
	OGEC	-	3,785	3,811	3,844
Natural gas production and processing (Tcf)	Baseline	7.71	8.98	9.06	9.18
	OGEC	-	8.50	8.63	8.76
Liquified natural gas (Tcf)	Baseline/OGEC	-	0.89	0.89	0.89

Source:

Environment and Climate Change Canada, Canada Energy Regulator and Office of the Parliamentary Budget Officer.

Note:

Mb/d refers to million of barrels per day and Tcf refers to trillions of cubic feet. OGEC refers to the oil and gas emissions cap. Oil sands production excludes upgraders. Production levels for liquified natural gas in the OGEC scenario are assumed to be unchanged from the baseline scenario.

Based on our assumptions, production levels required to meet the legal upper bound result in conventional oil production over 2030 to 2032 that is slightly below current levels (2.1 per cent on average). In contrast, despite lower production (relative to the projected baseline levels) to achieve the legal upper bound, oil sands and natural gas production and processing over the first compliance period are projected to remain well above current levels (by 15.0 per cent and 11.9 per cent, respectively, on average), which are at or close to historical highs.

To estimate the economic impact of achieving the legal upper bound, we use our macroeconomic model, in conjunction with an Input-Output model, to simulate the required production cut (in percentage terms).

To achieve the legal upper bound, we estimate that the reduction to projected production levels in the upstream oil and gas sector will lower real GDP in Canada by 0.39 per cent in 2032 (Table 3). Lower real GDP and a lower GDP price level combine to reduce nominal GDP by $20.5 billion in 2032. While some of the reduction in real GDP reflects a loss in productivity (that is, real GDP per hour worked), by 2032 most of the loss reflects both lower employment and lower average hours worked. We estimate that achieving the legal upper bound over the first compliance period will reduce economy-wide employment by 40,300 jobs and full-time equivalents by 54,400 in 2032.

Table 3
Economic impact of achieving the legal upper bound

Indicator	2030	2031	2032
Real GDP (per cent)	-0.33	-0.34	-0.39
Nominal GDP ($ billions)	-13.1	-15.8	-20.5
Employment (per cent)	-0.09	-0.15	-0.18
Employment (jobs)	-18,700	-32,800	-40,300
Full-time equivalents	-28,000	-45,200	-54,400

Source:
Office of the Parliamentary Budget Officer.

Note:
Impacts are measured as the difference (in percentage or level terms) between the projected level of the economic indicator over 2030 to 2032 under a scenario with the oil and gas emissions cap and its projected level over the same period under the baseline scenario without the oil and gas emissions cap.

With upstream oil and gas emissions at the legal upper bound of 160 Mt over the first compliance period due to reduced production levels, covered firms will be required to

purchase decarbonization units and offset credits (totalling 32 Mt) to reach the oil and gas emissions cap of 128 Mt. Our analysis, however, does not incorporate potential impacts from the use of compliance flexibility to achieve the 128 Mt emissions cap.

Despite differences in data, methodologies, assumptions and regulatory structures, to provide context we present a comparison of our results to external estimates of the impact of the oil and gas emissions cap (Table 4). Our estimate of the emissions reduction in the upstream oil and gas sector required to achieve the legal upper bound falls within the range of external estimates. Similarly, our estimates of the corresponding reduction in projected oil and gas production levels and economy-wide real GDP impact are within the range of external estimates.

Table 4
Comparison of estimated impacts in 2030

Organization	Oil and gas production (%)	Real GDP (%)	GHG emissions† (Mt)
PBO	-5.4	-0.33	-7.8
Conference Board of Canada	-11.1	-0.9	-16.9
Deloitte	-11.5	-0.6	-20
Environment and Climate Change Canada*	-0.7	-0.04	-4.5 (-6.7**+2.2***)

Source:

Conference Board of Canada, Deloitte, Environment and Climate Change Canada and Office of the Parliamentary Budget Officer.

Note:

† GHG emissions reduction required to reach the legal upper bound. * Average over 2030- 32. ** Impact for the oil and gas sector under the modelled legal upper bound. *** Impact for the rest of the economy.

Sensitivity analysis – baseline GHG emissions

Given uncertainty surrounding baseline GHG emissions over the first compliance period, we consider alternative assumptions pertaining to: emissions intensity; upstream production; and, methane emissions that would result in alternative upstream oil and gas emissions in the absence of the proposed regulations (Table 5).

All else equal, assuming non-methane emissions intensity for natural gas production and processing reaches levels consistent with the sharper downward trend over 2014 to

2022 (instead of over 2005 to 2022), emissions would be 8 Mt lower annually, on average, compared to our baseline scenario—slightly below the legal upper bound.

All else equal, assuming non-methane emissions intensity for conventional oil production increases to levels consistent with the upward trend over 2005 to 2022 (instead of being maintained at 2022 levels), emissions would be higher by 4 Mt annually, on average, compared to our baseline scenario.

All else equal, assuming lower upstream oil and gas production levels in line with ECCC's BTR1 Low Price scenario[26] (instead of the With Measures scenario) would result in significantly lower projected emissions (18 Mt annually on average) compared to our baseline scenario—well below the legal upper bound.

All else equal, assuming methane emissions fall to 65 per cent below 2012 levels over the compliance period (instead of 75 per cent under the strengthened methane regulations), emissions would be 8 Mt higher annually, on average, compared to our baseline scenario.

For additional context, we present the upstream emissions projection from ECCC's With Measures scenario in BTR1. This scenario does not incorporate the oil and gas emissions cap or the strengthened methane emissions regulations and projects emissions that are 5 Mt higher annually, on average, compared to our baseline scenario over 2030 to 2032.

Table 5

Projected upstream oil and gas emissions under alternative assumptions, Mt of CO_2 eq

	2030	2031	2032
PBO baseline scenario	168	167	167
2014-22 trend natural gas intensity*	161	159	158
2005-22 trend conventional oil intensity*	171	171	171
Lower oil and gas production	153	148	145
65% methane emissions below 2012	176	175	174
ECCC BTR1 With Measures scenario	173	172	172

Source:
Conference Board of Canada, Deloitte, Environment and Climate Change Canada and Office of the Parliamentary Budget Officer.

Note:
* Non-methane emissions intensity.

Appendix A: Detailed subsector assumptions

Conventional oil production

The preliminary forecast from the Canada Energy Regulator shows conventional oil production over the first compliance period 2030-32 that is 2.9 per cent higher, on average, relative to current levels (Table A1).

For conventional oil production, we assume that non-methane emissions intensity (measured as kilotonnes of carbon dioxide equivalent per million of barrels produced per day) will remain at its current level over the first compliance period.[27] This assumption falls below the midpoint of the range between what the historical (upward) trend[28] in non-methane emissions intensity over 2005 to 2022 would suggest and ECCC's With Measures scenario.

Based on the CER preliminary forecast of conventional oil production and our assumed non-methane emissions intensity, we project non-methane emissions over the first compliance period to be slightly higher relative to current levels. Assuming that methane emissions over 2030 to 2032 fall to 75 per cent below 2012 levels (under the strengthened methane regulations), total emissions for conventional oil production are projected to average 24.5 Mt annually over the first compliance period, which is 15.3 Mt (38 per cent) below current levels.

Table A1
Conventional oil production and emissions

Indicator	Historical			Projected		
	2005	2019	2022	2030	2031	2032
Production (Mb/d)	1,360	1,304	1,243	1,253	1,279	1,305
Emissions intensity*	7.7	11.5	11.7	11.7	11.7	11.7
Non-methane emissions (Mt)	10.4	15.0	14.6	14.7	15.0	15.3
Methane emissions (Mt)	38.1	34.4	25.2	9.5	9.5	9.5
Total emissions (Mt)	48.5	49.4	39.8	24.2	24.5	24.8

Source:
Environment and Climate Change Canada, Statistics Canada, Canada Energy Regulator and Office of the Parliamentary Budget Officer.

Note:
* Non-methane emissions intensity is measured as kilotonnes of carbon dioxide equivalent per million of barrels per day (Mb/d). Non-methane, methane and total emissions are measured in megatonnes (Mt) of carbon dioxide equivalent. Totals may not add due to rounding.

Oil sands production

The preliminary forecast from the Canada Energy Regulator shows significantly higher oil sands production of 20.9 per cent (excluding upgraders)[29], on average, over the first compliance period 2030-32 relative to current levels (Table A2).

For oil sands production (excluding upgraders), we assume that non-methane emissions intensity will continue to decline, falling to levels consistent with the historical downward trend[30] over 2005 to 2022.[31] This results in assumed non-methane emissions intensity over the first compliance period that is 10 per cent below current levels, on average, but 9 per cent higher than projected under ECCC's With Measures scenario.[32]

Based on the CER preliminary forecast of oil sands production and our assumed non-methane emissions intensity, we project non-methane emissions over the first compliance period to be higher relative to current levels. Assuming that methane emissions over 2030 to 2032 fall to 75 per cent below 2012 levels (under the strengthened methane regulations), total emissions for the oil sands subsector are projected to average 91.5 Mt annually over the first compliance period, which is 5.4 Mt (6 per cent) above current levels.

Table A2
Oil sands production and emissions

Indicator	Historical			Projected		
	2005	2019	2022	2030	2031	2032
Production (Mb/d)	1,065	3,097	3,316	4,001	4,000	4,029
Emissions intensity*	28.6	25.6	24.8	22.5	22.3	22.0
Non-methane emissions (Mt)	30.5	79.2	82.1	90.2	89.0	88.5
Methane emissions (Mt)	5.3	4.6	3.9	2.2	2.2	2.2
Total emissions (Mt)	35.8	83.8	86.1	92.4	91.3	90.7

Source:
Environment and Climate Change Canada, Statistics Canada, Canada Energy Regulator and Office of the Parliamentary Budget Officer.

Note:
* Non-methane emissions intensity is measured as kilotonnes of carbon dioxide equivalent per million of barrels per day (Mb/d). Non-methane, methane and total emissions are measured in megatonnes (Mt) of carbon dioxide equivalent. Oil sands emissions include emissions from upgraders. To avoid double counting, oil sands production excludes barrels produced from upgraders. Totals may not add due to rounding.

Natural gas production and processing

The preliminary forecast from the Canada Energy Regulator shows significantly higher natural gas production and processing of 17.7 per cent, on average, over the first compliance period 2030-32 relative to current levels (Table A3).

For natural gas production and processing, we assume that non-methane emissions intensity over the first compliance period will reach levels consistent with the historical downward trend[33] over 2005 to 2022.[34] This results in assumed non-methane emissions intensity over 2030 to 2032 that is 4 per cent below current levels, on average, but 29 per cent higher than projected under ECCC's With Measures scenario.[35]

Based on the CER preliminary forecast of natural gas production and processing, and our assumed non-methane emissions intensity, we project non-methane emissions over the first compliance period to be higher relative to current levels. Assuming that methane emissions over 2030 to 2032 fall to 75 per cent below 2012 levels (under the strengthened methane regulations), total emissions for the natural gas production and

processing subsector are projected to average 48.4 Mt annually over the first compliance period, which is 11.6 Mt (19 per cent) below current levels.

Table A3

Natural gas production and emissions

Indicator	Historical			Projected		
	2005	2019	2022	2030	2031	2032
Production (Tcf)	7.73	7.08	7.71	8.89	9.06	9.18
Emissions intensity*	5.3	5.0	4.6	4.5	4.4	4.3
Non-methane emissions (Mt)	40.8	35.1	35.3	40.0	39.8	39.8
Methane emissions (Mt)	34.6	27.4	24.6	8.5	8.5	8.5
Total emissions (Mt)	75.4	62.5	59.9	48.5	48.3	48.3

Source:

Environment and Climate Change Canada, Statistics Canada, Canada Energy Regulator and Office of the Parliamentary Budget Officer.

Note:

* Non-methane emissions intensity is measured as megatonnes of carbon dioxide equivalent per trillion of cubic feet (Tcf). Non-methane, methane and total emissions are measured in megatonnes (Mt) of carbon dioxide equivalent. Totals may not add due to rounding.

Notes

[1] Regulatory Framework for an Oil and Gas Sector Greenhouse Gas Emissions Cap. Environment and Climate Change Canada.

[2] In July 2022 ECCC published a discussion paper Options to cap and cut oil and gas sector greenhouse gas emissions to achieve 2030 goals and net-zero by 2050 that sought input on two potential regulatory approaches to cap and cut emissions from the oil and gas sector. The first approach developed a new cap-and-trade system and the second approach modified the existing carbon pricing system.

[3] Upstream oil and gas emissions include GHG emissions from: conventional oil production; oil sands production; natural gas production and processing; and liquified natural gas production. In 2022, upstream emissions accounted for 86 per cent of total emissions from the oil and gas sector.

[4] Canada's Energy Future 2023: Energy Supply and Demand Projections to 2050. Canada Energy Regulator.

[5] Economic impacts of a greenhouse gas emissions cap on the oil and gas sector. Environment and Protected Areas.

[6] Potential economic impact of the proposed federal oil and gas emissions cap. Environment and Protected Areas.

[7] Oil and Gas Sector Greenhouse Gas Emissions Cap Regulations. Canada Gazette.

[8] Further, contributions to a decarbonization fund would be limited to a maximum of 10 per cent (of a covered operator's compliance obligation), while offset credits could be used for the full 20 per cent of compliance flexibility.

[9] The RIAS noted that the legal upper bound is not codified in the proposed regulations and that the combination of the emissions cap and the 20 per cent compliance flexibility together form an "effective legal upper bound on emissions". However, in the regulatory analysis, given the uncertainty surrounding the price of offset credits, only the compliance option of contributing to a decarbonization fund was modelled, resulting in a "modelled" legal upper bound of 127 Mt over 2030 to 2032. Based on forecasted

emissions of 156.6 Mt in 2026, the emissions cap was estimated at 114 Mt (that is, 27 per cent below 2026 levels), resulting in a legal upper bound of 143 Mt.

[10] ECCC also noted in its Backgrounder that a common assumption in the reports was that "the oil and gas sector would take limited to no additional action to reduce emissions without the regulations".

For a contextualization of the Conference Board of Canada's analysis, see the Pembina Institute's April 2024 report, Modelling future impacts of the oil and gas emissions cap.

[11] In absolute terms, the large upward revision to upstream oil and gas emissions in 2021 extended back over several years. For example, upstream oil and gas emissions in 2005 were revised up by 27 Mt from 133 Mt in NIR 2023 to 160 Mt in NIR 2024.

[12] For example, the baseline scenario in ECCC's regulatory analysis (RIAS) does not include the oil and gas emissions cap. The regulatory scenario builds on the baseline scenario based on the assumption that the proposed regulations are implemented.

[13] For example, see PBO's October 2024 report, A Distributional Analysis of the Federal Fuel Charge – Update.

[14] For additional detail on the social cost of carbon, see Social cost of greenhouse gas emissions. Environment and Climate Change Canada.

[15] For further discussion of the benefits of reducing Canada's GHG emissions, see PBO's October 2024 report, A Distributional Analysis of the Federal Fuel Charge – Update.

[16] For a discussion of issues related to the inclusion of benefits to foreign residents of GHG emissions reductions from Canadian policy (regulatory) measures, see Heyes, Morgan and Rivers (2013), The Use of a Social Cost of Carbon in Canadian Cost-Benefit Analysis. Canadian Public Policy.

[17] ECCC's With Measures scenario includes federal, provincial and territorial government policies and measures that were in place as of August 2024. The strengthened methane regulations and the oil and gas emissions cap are included in ECCC's With Additional Measures scenario. The With Additional Measures scenario includes all policies and measures from the With Measures scenario as well as "those additional policies and measures that are under development and for which there is enough information for the policies and measures to be modelled".

[18] In BTR1 ECCC notes that final Current Measures production forecasts from the CER will be released in Canada's Energy Future report in the spring of 2025.

[19] LNG emissions are projected to be a very small fraction (1.6 per cent, or 2.7 Mt annually) of total upstream oil and gas emissions in ECCC's With Measures scenario over the first compliance period. Under ECCC's With Additional Measures scenario (which includes the oil and gas emissions cap and strengthened methane regulations), LNG emissions are projected to be only 0.27 Mt lower annually, on average, over the first compliance period compared to the With Measures scenario, due to lower non-methane emissions. Under ECCC's scenarios, LNG production is projected to commence in 2025.

[20] The estimated cap of 128 Mt is approximately 35 per cent below upstream oil and gas sector emissions in 2019. Recall that the choice of 27 per cent below 2026 emissions levels in the proposed regulations was estimated to align with 35 per cent below the sector's 2019 emissions, consistent with the (35 to 38 per cent) range provided in the regulatory framework.

[21] Our Input-Output model is based on Statistics Canada's 2019 Supply and Use Tables. The model structure and reduced-form equations are taken from Ghanem (2010), The Canadian and Inter-Provincial Input-Output Models: The Mathematical Framework. Statistics Canada.

For a critique of input-output models see, Getting to Know Models: A primer and critique on Input-Output and Computable General Equilibrium Models and their uses for policy and project analysis by Fellows and Winter (2018). The School of Public Policy, University of Calgary.

[22] This approach was used in PBO's March 2020 analysis, Estimate of the Impacts of the February 2020 Rail Disruption.

[23] Similar to ECCC's regulatory analysis, our estimates of the oil and gas emissions cap and legal upper bound include electricity emissions, which (as ECCC notes) would result in slightly higher estimated levels than the expected level of the cap and legal upper bound.

[24] See Note 19.

[25] For simplicity, in our OGEC scenario we assume that the legal upper bound of 160 Mt will apply in each year of the first compliance period of 2030 to 2032. On an annual basis, this results in production cuts across the main upstream subsectors of 5.4 per cent

in 2030, 4.7 per cent in 2031 and 4.6 per cent in 2032 relative to projected levels in our baseline scenario.

[26] Under ECCC's Low Price scenario over 2030 to 2032, conventional oil and oils sands production are 15 per cent and 4 per cent lower, respectively, compared to ECCC's With Measures scenario used in our baseline. Over the same period, natural gas production and processing under the Low Price scenario is 31 per cent lower than the With Measures scenario used in our baseline.

Under ECCC's Low Price scenario, crude oil (West Texas Intermediate) and natural gas (Henry Hub) prices in 2030 are projected to be $43.43 per barrel and $2.60 per MMBtu (million British thermal units), respectively, expressed in constant 2022 U.S. dollars. These prices are, respectively, 49 per cent and 35 per cent below projected levels in ECCC's With Measures scenario ($85.07 per barrel and $4.00 per MMBtu).

[27] Our assumption that non-methane emissions intensity for conventional oil production remains at current levels is a departure from the Conference Board of Canada's analysis, which extrapolated the 2005-19 historical (upward) trend to 2030 levels.

[28] Our trend estimates of emissions intensities for the upstream subsectors over the first compliance period 2030-2032 are based on an extrapolation of the least-squares estimate of the historical trend over 2005 to 2022.

[29] Consistent with ECCC's treatment of the oil sands subsector in BTR1 (see Figure 6 and Table 15) we have included emissions from oil sands upgraders, but have excluded production from upgraders to avoid double counting in our estimates of non-methane emissions intensity.

[30] See Note 28.

[31] Our assumption that non-methane emissions intensity for oil sands production departs somewhat from the Conference Board of Canada's analysis, which extrapolated the 2005-19 historical trend to 2030 levels.

[32] Based on 2019 emissions intensities, ECCC's 2023 regulatory framework estimated that a 20 Mt reduction in non-methane oil sands emissions would be "technically achievable" by 2030. Using an updated 2019 emissions intensity and production forecast, our trend intensity assumption would imply a reduction of 12.2 Mt in non-methane oil sands emissions in 2030 (rising to 14.6 Mt in 2032).

[33] See Note 28.

[34] Our assumption that non-methane emissions intensity for natural gas production and processing departs somewhat from the Conference Board of Canada's analysis, which extrapolated the 2005-19 historical trend to 2030 levels.

[35] Based on 2019 emissions intensities, ECCC's 2023 regulatory framework estimated that a 6 Mt reduction in non-methane natural gas production and processing emissions would be "technically achievable" by 2030. Using an updated 2019 emissions intensity and production forecast, our trend intensity assumption would imply a reduction of 4.6 Mt in non-methane natural gas production and processing emissions in 2030 (rising to 5.7 Mt in 2032).

Together our trend intensity assumptions for oil sands production and natural gas production and processing imply a 16.7 Mt reduction in non-methane emissions in 2030, which is lower than the 26 Mt in technically achievable reductions for these subsectors estimated by ECCC in its 2023 regulatory framework.

This discrepancy could reflect full inclusion in ECCC's estimate of the Pathways Alliance carbon capture storage (CCS) foundational project, which has an announced capacity of 10 Mt to 12 Mt per year (with 2030 as the planned year of commissioning). To date, however, Pathways Alliance has not made a final investment decision (FID). According to the International Energy Agency's CCUS database (as of March 2024), an actual or planned year of FID has not been made for this project. February 2025 commentary from the Pathways Alliance on the proposed oil and gas emissions cap regulations noted that "The Emissions Cap Regulations do not recognize the need for, nor enable, the fiscal supports, policy certainty and regulatory assurances that are necessary to enable decarbonization projects to succeed."

RP-2425-032-S_e
T_RP_3.1.0e