Environment and Climate Change Canada
Environnement et Changement climatique Canada

Options to Cap and Cut Oil and Gas Sector Greenhouse Gas Emissions to Achieve 2030 Goals and Net-Zero by 2050

Discussion Document

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Canada

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Glossary

For the purposes of this discussion paper:

Net-zero by 2050 is Canada's stated goal of having the Canadian economy achieve either no emissions of greenhouse gases (GHGs) by 2050, or that all emissions are completely compensated for by removing carbon from the atmosphere (negative emissions) through other actions, for example, planting trees or carbon capture and storage technology deployment. In realizing this goal, it is expected that some economic sectors, facilities, institutions, and other sources of GHG emissions that are difficult to eliminate entirely would continue to emit some GHGs, but at levels much lower than current rates and thus could be balanced by negative emissions elsewhere in the economy.

Absolute emissions refers to the total measured quantity of greenhouse gases emitted.

Emissions intensity is a measure of the greenhouse gas emissions released per unit, for example per GPD, per barrel of oil, or per capita. Emissions intensities are used to compare the environmental impact of different fuels or activities.

Direct emissions, referred to as "Scope 1" emissions, originate directly from sources that are owned or controlled by an organization.

Indirect emissions, are emissions generated indirectly from the consumption of purchased energy such as natural gas, diesel, or coal-fired electricity generation (referred to as Scope 2 emissions), or other indirect emissions (referred to as Scope 3 emissions) associated with an organization's operations (i.e. emissions from supply chains) or products. Scope 3 emissions can occur in other sectors or other jurisdictions (e.g., the use of exported crude oil or of gasoline in internal combustion engine vehicles).

Flaring emissions are controlled emissions of gases from industrial activities as a result of the combustion of a gas or liquid stream produced at a facility, the purpose of which is not to produce useful heat.

Venting emissions are controlled emissions that occur due to the design of a facility, to procedures used in the manufacture or processing of a substance or product or to pressure exceeding the capacity of the equipment at the facility.

Fugitive emissions are unintentional releases of GHGs from the production, processing, transmission, storage and delivery of fossil fuels. Released hydrocarbon gases that are disposed of by combustion (e.g., flaring of natural gases at oil and gas production and processing facilities) and post-production emissions, including those from abandoned coalmines and abandoned oil and gas wells, are also considered fugitive emissions.

Carbon capture and storage (CCS) and carbon capture, utilization and storage (CCUS) are similar processes that use a suite of technologies to capture carbon dioxide (CO_2) from facilities that would otherwise be directly released to the atmosphere. Using CCS technologies, the captured CO2 is compressed and transported to be permanently stored in long-term geological formations underground (e.g. saline aquifers, oil reservoirs). CCUS is a form of CCS that utilizes the captured carbon to create products, such as concrete and low-carbon synthetic fuels, or for injection into oil reservoirs for Enhanced Oil Recovery, where the injected gas helps facilitate the flow of oil to a well for further extraction after primary and secondary production. CCS and CCUS are also critical enabling technologies for carbon dioxide removal solutions such as direct air capture.

Carbon leakage can occur when carbon costs cause companies or investors to move production to jurisdictions with lower or no carbon costs. The result is that emissions are not reduced; they are just emitted in a different location.

Cap-and-trade is a market-based system where the regulator issues a quantity of emissions allowances that is less than the quantity of emissions expected in the absence of the policy, creating emissions scarcity under a cap. Since each regulated entity must remit one allowance for each tonne of emissions, and the total number of allowances is less than the business-as-usual emissions in the system, the scarcity drives demand in an allowance market designed by the regulator and thus prioritizes low cost abatement first. In Canada, cap-and-trade systems are currently in place in Quebec and Nova Scotia.

The federal benchmark refers to the minimum national stringency criteria used by the Government of Canada to assess provincial and territorial carbon pricing systems to ensure that they are fair, consistent and effective.

Stringency refers to the strength of a policy signal. Greater stringency in carbon pricing policy means stronger incentives to reduce GHG emissions.

Output-based standards are the emissions-intensity performance standards for specific activities covered under an output-based pricing system (OBPS), expressed as a set level of GHG emissions per unit of output for a given product or activity. In the federal Output-Based Pricing System, these standards are, for the most part, set as a percentage of the production-weighted average emissions intensity of all large emitter facilities producing similar products across Canada.

Offset credits or 'offsets' are GHG emission reductions or removal enhancements generated from project-based activities that compensate for emissions made elsewhere. Offset credits can be generated in both regulatory and voluntary programs. In regulatory programs, offsets allow regulated emitters to use emission reductions from projects undertaken by project developers on a voluntary basis to fulfil their emissions reduction obligations.

1. Purpose

The Government of Canada is taking action to reduce greenhouse gas (GHG) emissions from the oil and gas sector at a pace and scale necessary to achieve Canada's 2030 and 2050 climate targets in a way that allows the sector to compete in a global economy that is transitioning to net-zero. Addressing emissions from the oil and gas sector—the largest source of GHG emissions in Canada—is critical to the achievement of Canada's climate goals and international commitments, and vital to the sustainability and competitiveness of Canada's energy industry.

This discussion document invites input on the design and implementation of an approach to cap and cut emissions from the sector. The document seeks input on two potential regulatory approaches:

1. The development of a new cap-and-trade system under the *Canadian Environmental Protection Act, 1999* (CEPA)*;* and
2. The modification of existing carbon pollution pricing systems under the *Greenhouse Gas Pollution Pricing Act* (GGPPA).

The details of how best to design and implement a cap will require close collaboration with industry, provinces and territories, Indigenous partners, and civil society. The government welcomes feedback on these options. Key questions are included in the document (Section 10) to guide discussion and engagement. Perspectives and comments on other related issues and considerations are also welcome.

2. Introduction and Context

The Intergovernmental Panel on Climate Change (IPCC) warns that GHG emissions reductions must be both deep and fast to avoid the most severe impacts from climate change.[1] Impacts from climate change are wide ranging and costly, affecting infrastructure, health and safety, economic activity and biodiversity, and are likely to have increasingly significant geopolitical impacts. Signatories to the Paris Agreement, including Canada, have collectively pledged to reduce GHG emissions to limit the global average temperature increase to below 2.0 degrees Celsius, and to pursue efforts to limit it to 1.5 degrees to reduce the severity of climate impacts.

The *Canadian Net-Zero Emissions Accountability Act* establishes a legally binding process that requires the Government of Canada to develop credible emissions reduction plans to achieve incremental five-year emissions reduction targets. In March 2022, the Government of Canada published the first iteration. The 2030 Emissions Reduction Plan (2030 ERP) outlines the measures Canada is taking to reach its Nationally Determined Contribution under the Paris Agreement, a 40-45% economy-wide reduction in GHG emissions below 2005 levels by 2030. The 2030 ERP, which builds on the *Pan-Canadian Framework on Clean Growth and Climate Change* (2015) and *A Healthy Environment and a Healthy Economy* (2020), lays the foundation to set Canada on a path to net-zero emissions by 2050.

A key element of the Government's plan is to cap and cut GHG emissions from the oil and gas sector at a pace and scale necessary to contribute to Canada's 2030 climate goals and to achieve net-zero emissions by 2050.

[1] Working Group I Contribution to the Sixth Assessment Report of the International Panel on Climate Change (2021). "Climate Change 2021: The Physical Science Basis: Summary for Policy Makers." The Intergovernmental Panel on Climate Change.

This Government of Canada commitment was first announced in November 2021 at the United Nations Climate Change Conference in Glasgow.

In addition to the environmental imperative to reduce GHG emissions, the 2030 ERP highlights that reducing oil and gas sector emissions will help position Canada to benefit economically as part of the global transition to net-zero. The International Energy Agency's (IEA) net-zero 2050 scenario forecasts that global oil demand will decline from 100 million barrels per day in 2020 to 24 million barrels by 2050. An increase of low carbon energy sources will be needed to fuel zero-emissions vehicles, power and heat homes, and drive industrial processes.

Furthermore, any oil and gas produced and consumed beyond 2050 will need to result in net-zero emissions. To remain competitive in this global market, it is important that Canada's energy sector reduce its emissions from production by deploying clean technologies while also exploring opportunities to transition to produce non-emitting products and services such as hydrogen or petrochemicals.

The global economy faces the dual challenge of maintaining energy security and fighting climate change – with increased recognition of the need to address both or face socio-economic instability. Canadians, like people around the world, are paying more for gas due to a global supply shortage caused by the Russian invasion of Ukraine and the coronavirus pandemic. Allies are subsequently looking to producers of oil and gas, such as Canada, to help mitigate these impacts and ensure that people in Canada and around the world can afford to drive to work or heat their homes. At the same time, for countries importing oil and gas, higher prices have increased the incentive to diversify their energy supply in order to reduce reliance on fossil fuels. In addition, resulting high oil and gas prices are driving a period of record profitability for the sector, providing scope for greater investment in decarbonization and diversification to renewable and low carbon sources of energy.

The *2030 Emissions Reduction Plan* includes $9.1 billion in new investments and a suite of new measures that will cut emissions, while:

- Creating good sustainable jobs
- Creating a strong, resilient economy for everyone
- Making life more affordable for the middle class
- Cleaning the air Canadians breath
- Fighting inequality
- Creating more opportunities to enjoy nature
- Advancing climate resilience through nature based solutions.

Budget 2022 includes further measures to supplement the 2030 ERP and tackle climate change, including to support emissions reductions in the oil and gas sector:

- The creation of the Canada Growth Fund to help attract tens of billions of dollars in private capital towards building a net-zero economy by 2050.
- A proposed refundable investment tax credit for businesses that incur eligible carbon capture and storage expenses, starting in 2022.

With their expertise and history as major investors in clean technology, Canadian oil and gas companies have an opportunity to lead the way in advancing clean energy and clean technologies for domestic and international markets. Moreover, Canadian energy workers – contractors, roughnecks, construction crews, project managers, financial managers, and engineers – have essential and transferable skills that can help build our low-emissions energy future and leverage new opportunities in clean technology and low carbon industries, such as carbon capture and storage, geothermal energy, and clean fuels such as hydrogen. Bold and ambitious choices today can benefit Canadian workers with new, good-paying jobs for generations to come.

Capping and cutting oil and gas sector emissions, with milestones set at a pace that aligns with achieving Canada's 2030 and net-zero by 2050 climate change objectives, will send a clear, long-term policy signal to

invest in clean technology, low-emissions energy assets, and supporting infrastructure while avoiding investments in oil and gas production that do not incorporate best-in-class technologies and infrastructure.

3. Oil and Gas Sector Background

Oil and gas is Canada's highest emitting sector, accounting for approximately 27% of the country's total greenhouse emissions in 2020.[2] The sector also plays an important role in the Canadian economy, in the lives of Canadians, and to the energy security of our trading partners. As the world's fourth largest oil producer and fifth largest gas producer in 2020,[3] Canada's oil and gas sector is an important energy source for Canadians and the world. It provides fuels to move people and goods, sources of heat and electricity for residential, commercial, and industrial purposes, and feedstock for the production of critical material and value-added products required for modern life, including petrochemicals, fertilizers, solvents, personal protective equipment, construction materials such as asphalt, and pharmaceuticals.

The oil and gas sector can be grouped into three segments: upstream (including conventional onshore and offshore oil production, oil sands production, and natural gas production and processing); midstream (e.g. oil, natural gas and CO_2 transmission pipelines); and downstream (e.g. petroleum refining and natural gas distribution). Supporting these activities is a service sector, which consists of businesses that provide the specialized equipment and skills needed for drilling, testing, producing, maintaining and reclaiming crude oil and natural gas wells. Each petroleum subsector has unique costs and economic drivers.

Upstream oil and gas production is concentrated in Alberta, Saskatchewan, British Columbia and Newfoundland and Labrador. There are also producing oil and gas wells in Ontario, Manitoba, the Northwest Territories, and New Brunswick. Midstream infrastructure and downstream petroleum refineries, distribution terminals or bulk storage facilities are located in every province and territory. Within the upstream, midstream, and downstream segments are a myriad of operators, ranging from small exploration and production firms, to large integrated oil and gas companies.

The Canadian and U.S. oil and gas sectors are highly interconnected, providing flexibility, market competition, and continental energy security. Most of Canada's oil and gas exports are transported to the U.S. via pipeline, rail, and less often by truck or tanker shipments. Of Canada's $86 billion in oil and gas exports in 2020, 95% went to the U.S. In the same year, U.S. imports accounted for 25% of Canadian crude oil consumption, and 20% of Canadian natural gas consumption.[4]

The oil and gas sector is a major contributor to Canada's economy. In 2020, the oil and gas sector generated $118B in GDP and accounted for 16% of Canada's exports (valued at $86B).[5] The sector is also a major employer across the country. In 2020, Canada's oil and gas sector employed 178,500 direct and 415,000 indirect workers.[6] In addition to the concentration of jobs in oil and gas producing provinces, there are

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[2] Environment and Climate Change Canada, National Inventory Report, 2022, https://publications.gc.ca/site/eng/9.502402/publication.html

[3] Natural Resources Canada, Energy Fact Book 2021-2022, https://www.nrcan.gc.ca/sites/nrcan/files/energy/energy_fact/2021-2022/PDF/2021_Energy-factbook_december23_EN_accessible.pdf

[4] Ibid.

[5] Ibid.

[6] Ibid.

thousands of jobs in manufacturing, environmental, and financial services tied to the oil and gas industry, especially in Ontario and Québec.

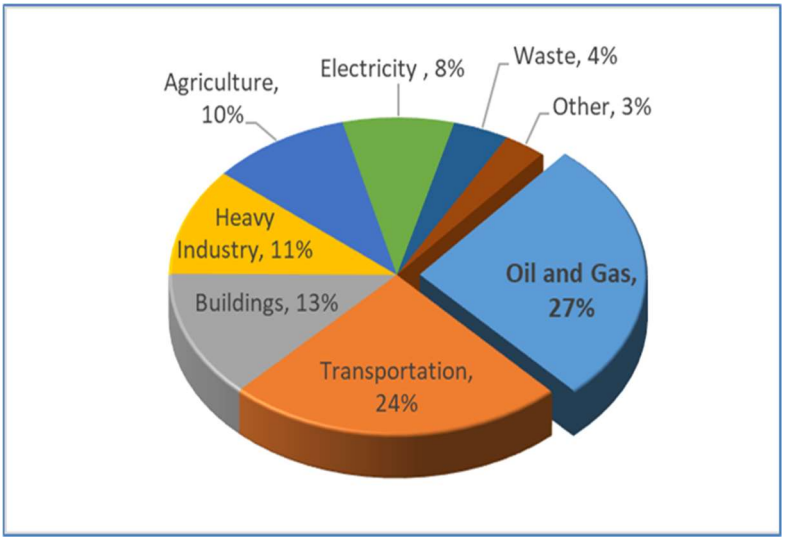
The sector is also an important employer of Indigenous peoples, providing an estimated 10,400 jobs in 2020.[7] Since 2014, Indigenous employment in Canada's oil and gas sector has increased by more than 20%.[8] In addition, oil and gas companies spent more than $2.6B on procurement from Indigenous businesses in 2019—up from $1.5B (43%) in 2017—and more than 250 Indigenous-owned service and other businesses were active in Canada's oil and gas sector.[9] In 2018-2019, $55 million in oil and gas-related revenues were collected on behalf of First Nations in Alberta, Saskatchewan and British Columbia by Indian Oil and Gas Canada[10] (a special operating agency within Indigenous Services Canada).

Although the oil and gas sector is currently seeing record cash flows, the sector now employs fewer people than in 2013 – the last time the price of oil was over $90 per barrel – as the sector has prioritized improving efficiency. In addition, the sector has gone from representing 30% of private sector capital spending in Canada to 11%. Making further private sector investments in emission reductions will require a long term policy signal along with a supportive and predictable investment landscape.

Sector Emissions Profile

The oil and gas sector is Canada's largest source of GHG emissions, accounting for approximately 179 Mt, or 27%, of total national GHG emissions in 2020 (Figure 1).

Figure 1 – GHG Emissions by Canadian Economic Sector in 2020



Source: ECCC, National Inventory Report, 2022

[7] Ibid.
[8] Ibid.
[9] Canadian Association of Petroleum Producers, "Indigenous Engagement and ESG Report", 2021, https://www.capp.ca/wp-content/uploads/2021/11/Indigenous-Engagement-and-ESG-Report-397763.pdf
[10] Indian Oil and Gas Canada, "Annual Report 2018-2019", https://www.pgic-iogc.gc.ca/eng/1579632009260/1579632089904

Absolute GHG emissions from Canada's oil and gas sector grew by 5%[11] from 2005-2020 (Table 1)[12], while oil and gas production increased by 26% (Table 2). This compares with decreases in absolute GHG emissions of 52% from the electricity sector and 18% from heavy industry from 2005-2020.[13] In the same 2005-2020 timeframe, electricity generation in Canada increased by 5%,[14] and output from heavy industry fell by 9%.[15]

The GHG emissions intensity of Canadian oil production declined from 2005-2020, as the sector reduced the amount of energy needed to produce each barrel of oil through energy efficiency, fuel switching and deployment of additional clean technologies. Despite these improvements, the GHG emission intensity of Canadian oil production is among the highest in the world[16], driven by combustion intensive oil sands production processes. Canada's oil sands production nearly tripled from 2005-2020 (Table 2), outweighing emissions intensity improvements, and leading to an increase in absolute emissions.

Absolute GHG emissions from oil sands operations more than doubled from 35 Mt in 2005, to 81 Mt in 2020 (Table 1). By comparison, total GHG emissions declined for other oil and gas sub-sectors from 2005-2020, including natural gas production and processing, conventional oil production, oil and natural gas transmission, and petroleum refining. The GHG emissions intensity of oil production can also differ significantly depending on how and where it is produced. For example, in 2020, Canada's off-shore oil production had an average emissions intensity approximately 25% of the average for Canadian oil sands production.[17] Canada's oil and gas methane regulations, and plans to strengthen them, are expected to drive down the Canadian natural gas sector's emissions intensity.

While upstream oil and gas extraction is the largest contributor to Canada's GHG emissions from the oil and gas sector (84%), some petroleum refineries are among Canada's largest GHG emitting facilities. The downstream oil and gas subsector emitted 18 Mt of carbon dioxide equivalent (CO_2 eq) emissions in 2020—accounting for 10% of total GHG emissions from the oil and gas sector. Transmission pipelines accounted for 10 Mt CO_2eq, or 6% of total emissions from the sector (Table 1).

[11] Note that from 2019 to 2020, estimated GHG emissions from Canada's oil and gas sector dropped by 16 Mt. This drop coincides with several contributing factors, including: Federal and equivalent provincial regulations (AB, BC, and SK) to reduce methane emissions from oil and gas operations; 2) overall contraction of the industry, which experienced a 9% reduction in conventional oil production, a 1% reduction in natural gas production, and an 11% reduction in the number of operating oil and gas wells; and a drastic decrease in the price of oil at the onset of the COVID-19 pandemic (ECCC NIR 2022).
[12] ECCC, National Inventory Report, 2022.
[13] Ibid.
[14] Statistics Canada, Table 25-10-0020-01, "Electric power, annual generation by class of producer".
[15] Statistics Canada, Table 36-10-0434-06, "Gross domestic product (GDP) at basic prices, by industry, annual average, industry detail".
[16] Masnadi et al., "Global Carbon Intensity of Crude Oil Production", 2018, Science, Vol. 361, Issue 6405 (pp. 851-853).
[17] ECCC, Greenhouse Gas Reporting Program, 2021; and Canada-Newfoundland and Labrador Offshore Petroleum Board, "Statistical Information", 2021.

Table 1 – Canadian GHG Emissions by Oil and Gas Sub-Sector (1990-2020)

Subsector	1990	2005	2015	2016	2017	2018	2019	2020
				Mt CO_2 eq				
Upstream Oil and Gas Production	**71**	**136**	**174**	**163**	**167**	**175**	**172**	**150**
Natural Gas Production and Processing	31	66	61	57	54	56	55	44
Conventional Oil Production	24	35	40	37	37	37	35	25
Conventional Light Oil	15	19	25	24	24	25	24	17
Conventional Heavy Oil	9.1	14	13	11	10	9.5	8.7	6.5
Frontier Oil (Off-shore and North)	0.26	1.7	1.5	1.7	1.8	1.9	1.9	1.8
Oil Sands Production	15	35	73	70	77	82	83	81
Mining and Extraction	2.2	5.6	11	11	13	15	15	15
In-situ	4.5	12	38	38	42	44	43	41
Upgrading	8.4	17	24	21	22	24	25	25
Oil, Natural Gas & CO_2 Transmission	**12**	**12**	**10**	**9.9**	**9.8**	**11**	**11**	**10**
Downstream Oil and Gas	**20**	**23**	**21**	**21**	**19**	**19**	**20**	**18**
Petroleum Refining	18	22	20	20	18	18	19	17
Natural Gas Distribution	1.6	1.3	1.2	1.2	1.2	1.1	1.2	1.1
TOTAL	**103**	**171**	**205**	**194**	**196**	**205**	**203**	**179**

Source: ECCC, National Inventory Report (NIR), 2022, Part 1.
Note: In the economic sector data tables within the NIR report, transmission pipelines are grouped with "upstream", however, they are broken out in the table above to distinguish between oil and gas extraction, and pipeline transmission and downstream activities.

Table 2 – Canadian Oil and Gas Production (1990-2020)

Sub Sector	1990	2005	2015	2016	2017	2018	2019	2020
				Millions of Barrels equivalent (***Annual***)				
Upstream Oil and Gas Production	1,264	2,068	2,476	2,506	2,642	2,734	2,710	2,597
Natural Gas Production and Processing	684	1,155	1,033	1,068	1,110	1,141	1,097	1,070
Conventional Oil Production	447	508	483	468	461	484	494	449
Conventional Light Oil	341	227	290	264	259	277	272	232
Conventional Heavy Oil	94	163	127	124	121	122	123	111
Frontier Oil Production (Off-shore and North)	12	118	66	80	81	85	98	106
Oil Sands Production*	133	406	960	970	1,071	1,108	1,120	1,078
Mining and Extraction	104	254	472	465	518	598	630	604
In-situ	55	178	555	564	632	638	627	605
Upgrading	78	230	392	375	413	424	444	434
Oil, Natural Gas & CO_2 Transmission	NA	NA	NA	NA	NA	NA	NA	NA
Downstream Oil and Gas	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Refining	630	757	696	708	736	714	763	691
Natural Gas Distribution	NA	NA	NA	NA	NA	NA	NA	NA

Source: Statistics Canada, Report on Energy Supply and Demand in Canada, 2021; Alberta Energy Regulator's Statistical Reports, 2021; and Saskatchewan's Mineral Statistics Yearbook, 2021 (including oil and gas).
*Note: Total oil sands production is not a summation of production in the oil sands production subsectors, as some crude bitumen produced at mining and in-situ operations is upgraded into synthetic crude oil.

The GHGs emitted from Canada's oil and gas sector include carbon dioxide, methane, and nitrous oxide. Carbon dioxide accounts for the majority of GHG emissions from the sector, accounting for approximately 80% of total sector-wide (CO2 eq) emissions in 2020, while methane accounts for approximately 20%. Nitrous oxide accounts for less than 1% of total GHG emissions from the sector.

The oil and gas sector is the largest source of methane emissions in Canada. Methane is a potent GHG, and also a smog precursor, estimated to contribute to more than half a million premature deaths globally each year related to respiratory illness caused by ground-level ozone.[18] In 2020, the bulk of methane emissions from Canada's oil and gas sector resulted from conventional oil production (43%) and natural gas production and processing (37%). Other oil and gas sub-sectors were smaller sources of methane emissions, including oil sands production (9%), transmission pipelines (7%), natural gas distribution (3%) and petroleum refining (0.22%).

Methane emissions from the oil and gas sector are often categorized according to how they are released, including fugitive emissions (from accidental leaks) and intentional routine equipment venting and flaring. These sources, when compared to more well-known carbon dioxide emission sources (from the combustion of fossil fuels), can make measuring, monitoring, and reporting the methane portion of the oil and gas sector's total emissions more challenging.

Given the unique issues and challenges associated with methane mitigation and measurement, Canada has published a discussion document entitled Reducing Methane Emissions from Canada's Oil and Gas Sector that is complementary to this paper. That paper outlines key considerations related to the Government of Canada's commitment to update its current methane regulations to ensure at least a 75% reduction in methane missions from the oil and gas sector by 2030 relative to 2012 levels. The Government of Canada has also committed to establishing a global centre of excellence on methane detection and elimination.

4. Key Decarbonization Opportunities

As noted above, technological advances have steadily reduced the emission intensity of Canadian oil and gas production over the past few decades. Emissions per barrel in the oil sands have fallen 33% since 1990.[19] Some Canadian oil and gas producers operate extraction and processing facilities that are among the lowest emitting of their type in the world, such as the Hibernia platform offshore of Newfoundland and Labrador. Further driving down emissions in Canada's energy sector will become increasingly important to making our energy products more attractive as the world transitions to net-zero.

Reaching Canada's 2030 climate targets and achieving net-zero will require significant additional reductions, and there is no single or simple solution for transitioning Canada's oil and gas sector towards net-zero by 2050. Given the unique features of each subsector, multiple pathways will be required. Solutions will also vary regionally, depending on access to infrastructure, carbon storage, energy grid mixes, and availability of clean electricity and other fuels.

Numerous process improvements and clean technologies are either commercially available or will be ready to implement this decade. These include relatively low-cost solutions to improve energy efficiency, the deployment of gas conservation and utilization infrastructure to mitigate methane emissions, and

[18]ECCC, "About Methane Emissions", 2019.
[19] ECCC, National Inventory Report, 2022, Part 1, Figure 2–27.

opportunities to switch from natural gas to clean electricity and low carbon fuels as power sources for the extraction, refining and transportation of oil and gas. Carbon capture and storage technologies (e.g., expanded use of amine-based capture technologies, similar to those used at Shell's Quest CCS facility for high concentration CO_2 streams) will also play a significant role in reducing oil and gas emissions.

A low-cost opportunity for reducing GHG emissions in the sector is reducing fugitive methane emissions—both from accidental leaks and intentional venting and flaring. The Oil and Gas Climate Initiative, which includes many of the world's largest oil companies, has committed to strive to reach near zero methane emissions from oil and gas assets by 2030, implement all reasonable measures to reduce methane emissions from their operations, and to support sound government regulatory approaches to tackle methane emissions from oil and gas. Recent improvements in satellite and ground-based measurement technologies means that smaller and intermittent methane emission sources can be detected and mitigated.

Key Decarbonization Options for the Oil and Gas Sector

Electrification includes the deployment of co-generation, renewables, small nuclear reactors, or electrification of transport equipment, operational processes and low-temperature heat processes to reduce GHG emissions from the combustion of fossil fuels throughout the oil and gas sector.

Steam displacement refers to the use of solvents, such as diluent, propane, and natural gas that chemically dilute bitumen to reduce viscosity and allow it to flow at lower temperatures, reducing the need to generate and use steam by in-situ oil sands production, a major source of GHG emissions

Fuel switching opportunities include replacing petroleum coke boilers with natural gas equipment and the expanded use of low-carbon or renewable fuels for heat and energy, including clean hydrogen.

Energy efficiency and other process improvements include upgrades to equipment, use of advanced leak detection and repair technologies, digitization and automation of processes, among other solutions.

Methane Abatement options include continuous leak detection and repair, electrification of equipment such as compressors and pneumatic devices fueled by natural gas and limiting fugitive releases from tanks and wells.

Carbon Capture, Utilization and Storage (CCUS) has potential to mitigate a significant share of GHG emissions from the oil and gas sector by 2050.

About 88% of oil sands emissions come from burning fossil fuels to extract bitumen during mining or in-situ operations and to upgrade that bitumen into synthetic crude. Oil sands producers have been investigating ways to reduce the steam-oil ratio which would reduce the amount of natural gas required for bitumen extraction. The use of solvents to assist the steam extraction process can become cost-effective at higher crude prices. Advances in post-combustion capture could also help capture CO_2 emissions from combustion equipment. For example, companies such as Svante and Fluor have been developing next generation absorbent and adsorbent technologies, and Shell Canada's Cansolv technology has been deployed successfully to recover CO_2 from the Boundary Dam coal-fired generating station in Saskatchewan.

Some GHG emissions will be more difficult to abate than others. Moreover, some solutions require additional technological development or cost decreases. Some emission reduction solutions also require the deployment of enabling infrastructure, which can be costly and will require time to plan, permit and construct.

Achieving significant additional emissions reductions will require further innovation and a massive scaling-up of emerging technology and infrastructure solutions. It will be essential to increase investments in these areas immediately even though some of these activities will have minimal impact on emissions in the short-term due

to their long lead times for development and deployment. For example, the widespread use of CCUS will require access to CO_2 pipelines, while the electrification of various energy-intensive processes will require access to high voltage transmission connected to clean electricity generation. Some emerging solutions, such as clean hydrogen blending to replace natural gas, the use of solvents for steam displacement, and methane capture and use, could be implemented in the coming years, while others such as small nuclear reactors could take more than a decade to implement.

The oil and gas sector is one of the leading investors in clean technology and innovation in Canada, making an estimated 58% of all energy research and development investments (averaging about $1B/year) over the decade to 2019. Oil and gas companies such as Shell Canada, Whitecap Resources, Wolf Midstream, Enhance Energy, and Northwest Redwater Partnership are leaders in carbon capture, utilization and storage (CCUS).

Other companies have announced investments and plans to decarbonize their operations in the coming decades. For example, Pembina Pipeline announced a $195 million project to fuel operations with wind power in 2021. Suncor Energy and ATCO are in the early stages of developing a clean hydrogen project that could reduce emissions at Suncor's Edmonton oil refinery by 60 per cent and provide broader benefits for Alberta. Tidewater Midstream and Imperial Oil are advancing renewable diesel projects. These are just some recent examples of innovative projects for emissions reductions in the oil and gas sector.

Many Canadian oil and gas companies have already set net-zero-emissions targets and have developed decarbonization plans. This includes the Pathways Alliance, comprised of Canadian Natural Resources, Cenovus, Conoco Phillips Canada, Imperial Oil, MEG Energy and Suncor Energy — which collectively account for 95% of Canada's oil sands production. To achieve net-zero by 2050, this Initiative proposes a $75 billion investment to deploy a combination of clean electrification, operational efficiencies, emerging technologies such as low-emission hydrogen and carbon capture, small modular nuclear), and offsets to eliminate 68 Mt from oil sands operations.

Central to these planned activities is the point-source capture of CO_2 from oil sands facilities, which would travel by pipeline from Fort McMurray to be sequestered permanently underground. The Pathways Initiative envisions a phased GHG reduction over three 10-year segments to 2050, starting with 22 Mt of absolute emission reductions by 2030.

Canada's oil and gas sector is poised to leverage its expertise to gain a competitive advantage in a range of emerging industries. Clean fuels such as hydrogen are expected to help Canada achieve its net-zero target while creating jobs and economic opportunity in Canada. Given the essential role hydrogen plays as a feedstock in refining, increasing the use of clean hydrogen presents an opportunity to drive down emissions from the sector.[20] Growth in production of value-added non-combustion products such as asphalt, petrochemicals, zero-carbon fuels or carbon fibres also presents major opportunities in a world transitioning to net-zero.

[20] The Government of Canada is exploring ways in which a carbon intensity standard could be applied to standardize the measurement of and ideally reduce the emissions intensity of hydrogen over time. More uniform standards for clean hydrogen would enable emissions to be assessed and verified more easily, particularly across borders.

5. Existing Measures and Alignment with Partner Actions

Various Government of Canada measures, combined with measures in other jurisdictions, will help reduce oil and gas production emissions. The Emissions Reduction Plan presents modelling of the most economically efficient pathway to meeting Canada's 2030 target. Drawing on that modelling, the 2030 ERP identifies a projected contribution from the oil and gas sector of reducing emissions by 31% from 2005 levels to reach 110 Mt in 2030 (equivalent to a 42% reduction from 2019 levels).

Carbon Pricing. Since 2019, a price on carbon pollution has been in place across Canada through a mix of federal, provincial and territorial pricing systems. The federal government sets minimum national standards that all systems must meet to ensure they are fair and consistent ("the federal benchmark"). Putting a price on carbon pollution creates a financial incentive throughout the economy to reduce emissions and invest in clean innovation. Oil and gas activities across Canada are subject to carbon pricing under the federal OBPS or equivalent provincial systems.

Methane Regulations. Current federal regulations require the oil and gas sector to reduce methane emissions by 40-45% below 2012 levels by 2025. In 2021, Canada joined the Global Methane Pledge, which aims to reduce global methane emissions by 30% below 2020 levels by 2030. As part of this Pledge, Canada committed to develop regulations to reduce methane emissions from the oil and gas sector by at least 75% below 2012 levels by 2030.

Clean Fuel Regulations. These regulations will reduce the carbon intensity of liquid fossil fuels in Canada, including by reducing emissions from oil and gas production.

Emissions Reduction Fund. The $675M Emissions Reduction Fund– Onshore Program is helping Canadian onshore oil and gas companies invest in green solutions to continue their progress toward reducing methane emissions in the context of the COVID-19 pandemic. The $42M Offshore Deployment Program will further position the offshore oil and gas sector as a leader in Canada's transition to a low carbon future. The $33 million Offshore RD&D Program is supporting research, development, and demonstration projects that advance solutions to decarbonize the offshore oil and gas industry.

Clean Growth Program. A $155 million investment in clean technology research, development, and demonstration projects in three Canadian sectors: energy (including oil and gas), mining, and forestry.

Energy Innovation Program Canadian Emissions Reduction Innovation Network. The objective of this program is to accelerate the development, validation and deployment of technologies that reduce oil and gas sector emissions. CERIN is jointly funded by Natural Resources Canada and Alberta Innovates. CERIN includes significant funding for research, development, and demonstrations to advance the commercial viability of CCUS technologies.

CCUS Investment Tax Credit. The Government is developing an investment tax credit for capital invested in CCUS projects to encourage the development and deployment of CCUS technologies. Budget 2022 proposes a refundable investment tax credit for businesses that incur eligible CCUS expenses, starting in 2022. The investment tax credit would apply to CCUS projects to the extent that they permanently store captured CO_2 through an eligible use. Eligible CO_2 uses include dedicated geological storage, and storage of CO_2 in concrete, but does not include enhanced oil recovery. From 2022 through 2030, the investment tax credit rates would be set at:

- 60% for investment in equipment to capture CO_2 in direct air capture projects;
- 50% for investment in equipment to capture CO_2 in all other CCUS projects; and
- 37.5% for investment in equipment for CO_2 transportation, storage and use.

To encourage the industry to move quickly, these rates will be halved starting in 2031.[21]

The government has also committed to engage with provinces to discuss ways in which they will further strengthen financial incentives to accelerate the adoption of CCUS technologies.

Best in Class Guidance. In April 2022, the Minister of Environment and Climate Change stated that the Government will develop guidance to require proponents of new oil and gas projects subject to a federal review to demonstrate that they will have "best-in-class" low-emissions performance. The guidance will be informed by consultations with industry, provinces, territories, Indigenous Peoples, and other relevant stakeholders.

The guidance will explain how proponents of new oil and gas projects subject to a federal impact assessment should use the analysis required by the Strategic Assessment of Climate Change to demonstrate that the project will be "best-in-class."

Commitment to phase out inefficient fossil fuel subsidies. The Government of Canada has accelerated its G20 commitment to phase out and rationalize inefficient fossil fuel subsidies, and plans to complete this work by 2023.

Working with Partners

In addition to federal measures, a number of provinces and territories have set net-zero targets and all have implemented measures that will directly or indirectly reduce emissions from the oil and gas sector. Many of these initiatives are described in Annex I of the 2030 ERP.

Indigenous participation in planning and policy development is also important given the impacts of oil and gas development. Indigenous communities, workers, and businesses are also key partners on oil and gas projects and decarbonization initiatives, through ownership and benefit sharing agreements. Canada's clean energy transition and the design and implementation of the oil and gas emissions cap will benefit from Indigenous perspectives.

Starting in 2022, the House of Commons Standing Committee on Natural Resources undertook a study on the Greenhouse Gas Emissions Cap for the Oil and Gas Sector. The Committee heard from a broad range of experts, stakeholders, and Indigenous Leaders. The Government has worked collaboratively with the Committee and its ongoing work has informed the content of this discussion paper.

In June 2022, the Government of Canada launched the Regional Energy and Resource Tables to work collaboratively with provinces and territories to develop place-based, resource-based economic strategies. By collectively identifying and advancing top growth opportunities for the region, both public dollars and private capital can be strategically directed to have maximum potential for economic growth, climate outcomes and sustainable job creation. These strategies will also provide direction to workers, labour organizations, businesses, and governments with respect to the job opportunities created by a net-zero transition.

[21] The government will also undertake a review of investment tax credit rates before 2030 to ensure that the proposed reduction in the level of tax support from 2031 to 2040 aligns with the government's environmental objectives.

Recognizing that private sector investment will play an indispensable role in the transition to a low-carbon global economy, the Federal Government established the Sustainable Finance Action Council comprising twenty-five of Canada's leading financial institutions, insurance companies, and pension funds. In May 2022, the Sustainable Finance Action Council's Terms of Reference was updated to include a focus on strategies for aligning private sector capital with the transition to a net-zero economy. Harnessing expertise from industry, civil society and other partners will also help to inform getting the approach right.

The development of the emissions cap is also being supported by advice from Canada's independent Net-Zero Advisory Body (NZAB), which has recommended principles[22] to guide the path forward. One example of NZAB advice includes setting targets to drive new and more ambitious actions. This means setting ambitious goals despite some uncertainty regarding the pathway to achieving them.

Canada is prioritizing leadership and engagement at the international level, including continued collaboration with key international partners such as the U.S. to advance decarbonization efforts, align action on climate change, and create a level playing field. Canada is also promoting the expanded coverage of carbon pricing globally and exploring carbon border adjustments and other such measures.

The Government of Canada recognizes and commends the efforts of oil and gas companies to reduce emissions and establish 2030 and 2050 commitments. These efforts include the Oil Sands Pathways to Net-Zero Initiative, comprised of Canadian Natural Resources, Cenovus, Conoco Phillips Canada, Imperial Oil, MEG Energy and Suncor, which collectively account for 95% of Canada's oil sands production – and which have committed to achieve net-zero emissions from their oil sands operations by 2050, and Shell Global, which has committed to a 50% direct emissions reduction by 2030, and net zero direct and indirect emissions by 2050.

Oil and gas companies such as Shell Canada, Whitecap Resources, Wolf Midstream, Enhance Energy and Northwest Redwater Partnership are leaders in carbon capture, utilization and storage (CCUS). Some of Canada's conventional oil and gas producers operate production facilities that are some of the lowest emitting of their type in the world, such as the Hibernia platform offshore of Newfoundland and Labrador. Other companies, including ATCO and Federated Co-operatives have announced plans and investments to achieve net-zero emissions in their operations in the coming decades.

The oil and gas sector is one of the leading investors in clean technology and innovation in Canada, fueling over 58% of all energy research and development investments (averaging about $1B/year in the decade up to 2019).

6. Policy Design Considerations

Although it is likely that the suite of existing measures will reduce the oil and gas sector's GHG emissions, a regulatory tool designed to cap oil and gas sector emissions will ensure the sector lowers absolute emissions at a pace and scale necessary to achieve our 2030 and net-zero by 2050 goals and support the transition of the sector to net-zero. Input on the following overarching design parameters will help inform the development of the cap.

Scope of Policy Coverage – GHGs

Covering all GHGs (including carbon dioxide and methane) under the cap would provide a greater opportunity for the sector to leverage easier-to-abate emissions in the near term that go beyond methane-specific measures, and allow more time to invest in more costly or complex abatement solutions. The cap would apply

[22] Annex 3: Net-Zero Advisory Body Advice, 2030 Emissions Reduction Plan. (p. 196-200)

to all direct emissions from regulated activities. It would not apply to "Scope 3" emissions, which result from activities not owned or controlled by regulated facilities.

Scope of Policy Coverage – Activities

Given that upstream production accounts for the largest proportion of the sector's emissions, the cap should include broad coverage of upstream facilities. This would increase the opportunities for emissions reductions and maximize emissions trading opportunities in the context of a market-based approach. Broad coverage would enable flexibility to account for differing mitigation opportunities among sub-sectors and regions in meeting reduction targets, for example, accounting for differing emission characteristics, costs, and timelines for the enabling infrastructure needed for decarbonizing oil and gas production.

In addition to upstream activities, the government is seeking input on whether the cap should apply to natural gas transmission pipelines and petroleum refineries. As noted in Section 3 above, upstream oil and gas extraction accounted for 84% of total GHG emissions from Canada's oil and gas sector in 2020, followed by petroleum refineries and other downstream operations at 10%, and transmission pipelines at 6%. Decisions on whether to include these facilities under the oil and gas emission cap will have an impact on the complexity of the regulatory design and also the geographic scope of coverage (see Table 2). Other considerations include that some of Canada's petroleum refineries are integrated with chemical manufacturing operations, or focus on production of asphalt or lubricants, rather than gasoline or other fuel products.

Table 3 – Breakdown of Oil & Gas Sector GHG Emissions by Province and Territory (2020)

Province/Territory	GHG Emissions (Mt CO_2 eq)				Provincial/ Territorial Share of National Oil and Gas Sector Emissions
	Upstream Extraction	Transmission Pipelines	Downstream Operations	Total	
Alberta	122.7	5.2	4.9	132.8	74.3%
Saskatchewan	14.4	1.6	1.4	17.3	9.7%
British Columbia	10.7	1.5	0.6	12.8	7.2%
Ontario	0.1	1.3	5.7	7.2	4.0%
New Brunswick	0.04	0.03	3.3	3.4	1.9%
Québec	0	0.1	2.2	2.3	1.3%
Newfoundland and Labrador	1.8	0.0	0.3	2.1	1.2%
Manitoba	0.7	0.2	0.0	0.9	0.50%
N.W.T.	0.05	0.0	0.0	0.06	0.03%
Nova Scotia	0.0	0.01	0.0	0.02	0.01%
P.E.I.	0	0.0	0	0.0	0.0%
Yukon	0.0	0	0	0.0	0.0%
Nunavut	0	0	0	0	0
All Provinces & Territories	150	10	18	179	100%

Source: ECCC, National Inventory Report, 2022, Part 3.

Note: The sector data tables in the NIR report group transmission pipelines with upstream oil and gas. They are broken out in Table 3 above to distinguish between oil and gas extraction, pipeline transmission and downstream activities. Totals may not add up due to rounding. "0.0" represents emissions that are rounded to 0, while "0" represents no emissions.

Emissions Trajectory

The emission reduction trajectory set by the cap should ensure emissions do not increase from current levels, should account for the "expected contribution" of the sector identified in Canada's 2030 *Emissions Reduction*

Plan, and should ensure that the sector achieves net zero emissions by 2050 in alignment with Canada's commitment under the *Canadian Net-Zero Emissions Accountability Act*.

The cap will need to take into consideration the technological readiness of key mitigation solutions and the timelines for their deployment. This will be essential to addressing carbon leakage and competitiveness risks effectively, and avoiding incentives for capital investments aimed at short-term reductions but that risk becoming stranded as deeper cuts are made in alignment with a net-zero future.

The cap will also need to consider how best to encourage continued investment to abate emissions. The policy design will also need to consider potential impacts of the regulated cap on producers' incentive to invest in emissions reduction technology versus curtailing production in order to meet emission limits.

Finally, the design of the cap and its trajectory will also need to take into consideration energy security and affordability.

Compliance Options

As indicated in Canada's 2030 ERP, consideration will be given to whether time-limited compliance flexibilities, for example using robust domestic or international offsets, will be an option in limited circumstances. The intent of allowing some flexibility in complying with the emissions cap trajectory would be to ensure that the sector is responsible for reducing emissions while allowing time for investment and deployment of key deep decarbonization solutions. The nature and availability of any flexibilities will influence the costs and timelines to achieve the emission reduction trajectory set by the cap, and will therefore be an important consideration in determining the trajectory.

Implementation Timing

As outlined in the 2030 ERP, methane regulations and carbon pricing are expected to result in significant emission reductions (38% relative to 2019 emissions) in the sector between now and 2030. The regulatory options for the oil and gas emissions cap outlined in this paper will drive additional reductions before and after 2030.

The form and timeline of the cap will be communicated by early 2023.

Policy Coherence and Coordination Across Jurisdictions

A number of federal and provincial regulatory and supporting measures to reduce oil and gas sector emissions are in place or under development. These include methane regulations, the updates to the federal OBPS and provincial carbon pricing systems, the *Clean Fuel Regulations*, as well as the proposed Clean Electricity Standard, among others (Section 5 includes a comprehensive list). The emissions cap will need to function together with this broader suite of measures.

Coordination across jurisdictions will also be key to ensure coherence with policies in different provinces. For instance, B.C., Alberta and Saskatchewan have implemented their own measures to address oil and gas methane emissions. For technologies like CCUS or emerging energy sources like hydrogen, provinces also play a pivotal role in establishing regulatory frameworks.

In addition, the determination of the cap trajectory will need to consider sequencing with other key policies and investments, including clean electricity generation and transmission, and clean hydrogen and CCUS development.

7. Regulatory Options

The Government of Canada proposes to implement the oil and gas emissions cap through a regulatory, market-based approach, and is seeking input on two options:

Option 1: A new cap-and-trade system under the *Canadian Environmental Protection Act, 1999* (CEPA).

Option 2: Modification of the current carbon pricing approach under the *Greenhouse Gas Pollution Pricing Act* (GGPPA).

This section outlines examples of how each option could be implemented. The information is intended to outline concrete design elements to facilitate discussion and solicit input.

Connection of the Oil and Gas Emissions Cap to the Current Carbon Pollution Pricing Benchmark Process

In August 2021, the Government of Canada published updated minimum national stringency standards (the 'federal benchmark') that all carbon pricing systems must meet for the 2023-2030 period. Neither of the oil and gas emissions cap options proposed in this paper will impact the current benchmark requirements or the current ongoing assessment process of provincial and territorial carbon pricing systems for 2023 to 2030. The federal government remains committed to ensuring that updates to federal and provincial carbon pricing systems continue in accordance with *The Federal benchmark for carbon pollution pricing systems in Canada: 2023-2030.*

Any changes to carbon pricing systems resulting from the two oil and gas cap options outlined below would be addressed as part of the interim review of the carbon pricing benchmark which the Government of Canada committed to undertake in collaboration with provinces, territories and Indigenous organizations.

Connection to the Forthcoming Strengthened Oil and Gas Methane Regulations

ECCC is developing regulations to achieve its 75% reduction target for methane emissions from the oil and gas sector—building on the existing regulatory approach—and released a discussion paper for public comment in March 2022. The reduction of methane emissions under this strengthened regulatory approach will contribute to the total oil and gas sector emissions reductions under the cap.

Connection to the Forthcoming "Best in Class Guidance" for New Oil and Gas Projects

The Best-in-Class Guidance under development will be a distinct obligation from the emissions cap. Regardless of their design, all new oil and gas projects, including those approved under the *Impact Assessment Act*, will be subject to the cap once it is in place.

Criteria Applicable to Both Cap Options

Scope: The oil and gas emissions cap would apply to direct emissions from upstream oil and gas production. It would not apply to natural gas distribution, oil pipelines or end-uses (i.e. fuels used in vehicles or home heating).

There are important differences between the upstream and downstream oil and gas sectors, including the markets they serve, and coverage under other regulatory measures such as the CFR.

The government is seeking feedback on whether to include petroleum refineries and natural gas transmission pipelines under the emissions cap.

Coverage: The oil and gas emissions cap would cover all greenhouse gases reported in Canada's National Inventory Report resulting from upstream oil and gas production, including carbon dioxide and methane.

Time-limited Compliance flexibilities: Consideration will be given to whether the cap will allow the use of time-limited flexibilities under specific circumstances. These could include robust domestic or international offsets to achieve a portion of the required reductions.
A prerequisite for the use of international offsets will be Canada's establishment of an overarching framework and international agreement(s) governing the use of internationally transferred mitigation outcomes (ITMOs).

Emissions Baseline: An emissions baseline will provide a reference for setting the cap trajectory. The baseline emissions level for covered sources will account for current capacity, but will not include planned expansions. For example, some oil and gas facilities have plans and permits to expand production in future years, which may have an impact on future emissions. The calculation of the emissions baseline would not be adjusted to account for these expansions.

Emissions Cap Trajectory: Both cap options would implement the same emissions cap trajectory. Specific cap levels will be determined based on further analysis that considers the many factors identified in this discussion paper.

In addition to the trajectory, another important consideration on which input is welcome is whether the cap should be set in the form of annual or multi-year emission levels.

OPTION 1: REGULATED CAP AND TRADE SYSTEM

Option 1 would involve the development and implementation of a new cap-and-trade system. This would apply in addition to existing federal and provincial regulations that apply to the sector, including carbon pollution pricing, the *Clean Fuel Regulations*, and methane regulations. The system would be national in scope and would be expected to be implemented through regulations under CEPA.

The cap-and-trade system would establish a total quota of GHG emissions allowable for specified periods, with that quantity declining over time. Emission permits ("allowances") would be issued for each tonne of emissions allowed under the cap for the period. Emitters covered by the cap would be required to remit one allowance for each tonne of emissions, expressed in tonnes of CO_2 eq.

Emissions allowances would be unique to the cap-and-trade system, meaning they could not be recognized by, traded or exchanged with other regulatory instruments or carbon pricing systems. Likewise, surplus credits, performance credits or other permits or allowances from other regulations or carbon pricing systems would not be eligible for use within the cap-and-trade system. As indicated above, under specific circumstances the use of compliance flexibility may be enabled under the cap-and-trade system. If enabled, eligible facilities subject to the cap would be able to remit eligible offset credits in place of allowances for a time limited period, up to a predefined limit.

Allocation of Emission Allowances

Emission allowances would be fully or partially distributed through auctioning, with the option to vary the proportion of allowances auctioned over time. The government is seeking feedback on the approach to

allocation under the cap-and-trade option, notably whether there is preference for one, or a combination of allocation approaches.

Auctioning

Auctioning allowances has a number of benefits. It is transparent and creates a level playing field for market participants. It allows new facilities to participate in a straightforward manner, without the government having to predict their emissions or reallocate allowances. It also ensures facilities only bid on the allowances they need based on current and future emissions rather than receiving allowances based on historical levels.

Auctioning also generates proceeds, which would be reinvested to support sector decarbonization and reduce carbon leakage risks. For example, proceeds could be used to support important decarbonization projects such as operation of CCUS.

Auctions would require establishing an auction schedule, auction platform, and rules with regard to participation and bidding. For example, in order to mitigate risks associated with the differing market power of auction participants, some cap-and-trade systems limit the size of individual bids (e.g., to a maximum percent of the total allowances available) and on the number of allowances a facility can hold in relation to its emissions.

The auction design would be expected to be similar to those implemented in the European Union, Nova Scotia, Quebec and California:

- the government accepts bids (that include price and quantity) from auction participants;
- all qualified bids are ordered from highest to lowest price and are processed, starting with the highest priced bid, until the associated quantity of allowances available for auction is reached; and
- the price of the last bid processed (where the allowance supply is exhausted) sets the clearing price for the auction, which determines the price per allowance that all participants pay.

Free allocation of allowances

The free allocation of some allowances is generally used in cap-and-trade systems as a strategy to mitigate carbon leakage risks for emissions-intensive and trade-exposed sectors. It achieves this by reducing the average carbon costs while maintaining the prohibition on emissions in excess of the regulated cap.

Free allocation would be based on an output-based approach, leveraging existing output-based standards developed under the federal *Output-Based Pricing System Regulations*. Refinements may be made to take into account carbon leakage risk, localized competitiveness risks, such as for smaller firms and regional contexts, and longer-term energy transition considerations such as the role of natural gas as a feedstock for hydrogen production. In alignment with common practice, standards would be tightened over time to reflect the declining cap. In addition, the distribution of allowances may need to be pro-rated to avoid exceeding the cap.

The advantage of an output-based approach compared to allocating allowances based on historical emission levels is that it avoids creating an incentive to curtail production, as the level of free allocation would fall with declines in production. In addition, an output-based approach would not require special treatment or reserve approaches for new facilities, as new entrants would have the same access to free allocation based on production as existing facilities, thereby eliminating barriers to entry that can arise under approaches tied to historical emissions levels. However, since all allowances will need to be pro-rated to avoid exceeding the cap, this approach does mean that existing facilities will see their free allocations decline if the number of new entrants or total production level covered by the system increases substantially.

Time-Limited Compliance Flexibility

Carbon offsets could provide a lower-cost compliance option for facilities regulated under a cap-and-trade system . Under the cap-and-trade system, some facilities that meet specific criteria could use a limited quantity of recognized, compliance-based offset credits, up to a predefined limit for a specific period of time. In order to ensure emissions abatement occurs within the sector, any allowable proportion of compliance obligation that could be met by offset credits would be limited, for a short period, specific to certain circumstances and would decline over time.

Other limited flexibility options could also be considered, for example through rules around the acquisition, holding, and remittance of emissions allowances. Examples to explore could include:

- Banking: allow facilities to hold a predefined quantity of emissions credits for a predefined period of time.
- Multi-year compliance periods: give facilities flexibility regarding when compliance obligations must be remitted.

These options, which are a common design feature in other cap and trade systems, are primarily intended to provide flexibility on the timing of emission reductions within the sector. As a result, they reduce the certainty of the sector's emissions level in any specific year, but could be developed within limits to ensure the regulated emissions cap and overall long-term trajectory is maintained. In order to ensure predictability and effective market functioning, the use of these options would require further consideration and analysis, particularly in conjunction with any approaches to free allocation of allowances or offset credit use.

Emission Prices and Market Stability

The price for allowances would be determined through supply and demand within the emissions trading market. However, the system would include mechanisms to mitigate volatility in the market price of emission allowances.

While many cap-and-trade systems establish auction reserve prices to ensure that a minimum marginal price signal is maintained across the market, Canada's minimum national carbon price, applied through federal, provincial or territorial pricing systems, will continue to provide a minimum floor price signal to regulated facilities to incent reductions. The cap and trade system, as a result, may not require an auction price floor mechanism for this specific purpose. However, the market could face low-price risks if a large bank of unused emissions allowances and/or offset credits is available on the market at a given time. To address this issue, a predetermined adjustment to the number of allowances available in subsequent auctions and allocated for free could be considered in addition to potential limits on banking.

The risk of sudden or unpredicted high market prices could be addressed though one or several mechanisms that could be included in the cap. A common design feature in most cap and trade systems, including the Western Climate Initiative and the European Union Emissions Trading System (EU ETS), is an emission allowance reserve from which emission allowances can be released to new entrants or to moderate sudden market pressures and mitigate rapid or unexpected price increases. An allowance reserve is generally comprised of emission allowances withheld from auctions and free allocations in previous years, or allowances that remained unsold at previous auctions. A reserve does not create or introduce additional allowances beyond the regulated cap level.

Design Considerations for a Cap-and-Trade System

Environmental Outcomes: A cap-and-trade system provides a high level of certainty of achieving the emissions cap trajectory. However, compliance flexibility choices may influence the emissions level in specific years, and offsets and ITMOs would result in the cap being achieved, in part, through emissions reductions originating outside the sector or country.

Cost Effectiveness*:* A national cap-and-trade system would be an efficient (lower cost) way to achieve a desired level of emissions for the oil and gas sector. However, as coverage increases, so would policy complexity, as opportunities, costs and timelines for reductions vary across the many oil and gas sub-sectors.

Policy Coherence*:* A cap-and-trade system would complement other regulatory instruments and carbon pricing in that reductions made by an oil and gas facility under those programs would contribute to a reduction of a facility's compliance obligation under the emissions cap, and vice-versa. Interactions may impact the supply and demand of credits in federal and provincial carbon pricing systems once the cap-and-trade is implemented, which could require changes to those systems to ensure the marginal price continues to hold, in alignment with federal benchmark requirements. Depending on the approach to allowance allocation and the level of the cap, facilities subject to existing regulations and carbon pricing may face additional compliance costs under the cap-and-trade system. The scope of the cap-and-trade system may also have implications for oil and gas offset projects that currently exist in some provincial systems.

Administrative Burden: A cap-and-trade system would be implemented through new regulations and would create new monitoring, reporting and verification requirements for oil and gas facilities, in addition to existing pricing and regulatory requirements and Canada's Greenhouse Gas Reporting Program.

Key Steps for Option 1

The precise timing of the Government of Canada's next steps in the implementation of design of the oil and gas emissions cap will depend on the option selected. A key step to implement Option 1 would be a regulatory process including publication of draft and final regulations.

OPTION 2: MODIFY EXISTING GHG EMISSIONS PRICING SYSTEMS

This approach would build on the existing federal approach to carbon pricing by setting out the emissions cap trajectory in policy and modifying federal carbon pollution pricing benchmark criteria to incent further reductions from the oil and gas sector, aligned with the emissions cap trajectory. This would be implemented under Canada's approach to pricing carbon pollution, the GGPPA and the federal benchmark. It would include changes to the federal OBPS and relevant provincial carbon pricing systems for industrial emissions. These would be considered as part of the interim review of carbon pricing.

Recap – Canada's Current Approach to Economy-Wide Carbon Pricing

The Government's current approach to pricing carbon pollution gives provinces and territories the flexibility to implement a carbon pricing system that makes sense for their circumstances, provided that the system meets minimum national stringency criteria, as defined in the federal benchmark, to ensure systems across Canada are comparable and effective. Where a province or territory does not implement a system that meets the benchmark, the federal government implements the federal carbon pricing backstop system. Jurisdictions can also request the backstop system.

The benchmark includes a minimum national price per tonne of CO_2 eq emissions for direct pricing systems that rises by $15 per year to $170 per tonne in 2030. The federal benchmark requires provinces and territories to implement either:

- An explicit price-based system (i.e., (i) a carbon levy on fossil fuels, or (ii) a hybrid system comprised of a carbon levy on fossil fuels and an output-based pricing system for industry); or,
- A cap-and-trade system (e.g. as currently exists in Quebec)

Under the benchmark, jurisdictions that implement cap and trade systems must put in place caps that correspond, at a minimum, to the projected emissions levels that would result from the application of the minimum national carbon price. Jurisdictions that implement explicit price-based systems must have a minimum carbon pollution price that matches the minimum national carbon price. In addition, output-based pricing systems for industry must be designed to maintain a marginal price signal equivalent to the minimum national carbon price across all covered emissions.

The GGPPA establishes the framework for the federal carbon pollution pricing backstop system. The GGPPA also provides the authority for the establishment of Canada's Greenhouse Gas Offset Credit System.

The federal carbon pollution pricing system consists of two parts:

- a regulatory charge on fossil fuels (fuel charge); and
- a regulatory trading system for industry, known as the OBPS.

The OBPS is designed to put a price on the carbon pollution of large industrial facilities, while mitigating the risks of carbon leakage and adverse competitiveness impacts due to carbon pollution pricing under the federal fuel charge or in certain cases, a provincial fuel charge or levy. Covered facilities are required to provide compensation for GHG emissions that exceed an emissions limit and are issued surplus credits if their emissions are lower than the applicable emissions limit. Facilities can sell surplus credits or bank them for use in future years, for up to five years since their date of issuance.

Currently, the federal OBPS is in place in Manitoba, Prince Edward Island, Yukon, Nunavut, and partially in Saskatchewan.

The federal government is currently assessing provincial and territorial carbon pricing plans for 2023-2030 and will announce where the federal backstop will apply later this year.

Changes to the Benchmark Criteria

Under the benchmark, stringency is primarily set through carbon prices. In order to use this approach to achieve the desired emissions reductions from the oil and gas sector, the benchmark would be amended to set out separate criteria specific to that sector. This would include an applicable oil and gas carbon price, set at the level needed to incent the sector to reduce emissions to the emissions cap trajectory level. This oil and gas specific carbon price would be evaluated at five year intervals. The benchmark would also require provincial and territorial systems to cover a specific set of oil and gas GHG sources and emissions.

If the economy-wide carbon pricing systems in place are forecast to achieve the oil and gas emissions cap trajectory, further measures for the sector would not be necessary and the general benchmark criteria would continue to apply. However, if further reductions from the sector are needed to achieve the cap trajectory, the oil and gas-specific carbon price would apply, as set out in the benchmark. In this case, in order to ensure reductions occur within the sector, the trading of credits/allowances with other sectors of the economy would not be allowed. If permitted, Exception could be made for a time limited period in a manner consistent with

any allowable use of offset credits. If a portion of compliance obligation is allowed to be met by offset credits or surplus credits, it would be for a limited amount, specific to certain circumstances, and this flexibility would decline over time (same approach as for the cap and trade option).

Federal reporting requirements would also be put in place to enable the government and the public to monitor progress towards the caps.

Finally, since the oil and gas industry is concentrated in certain jurisdictions in Canada, where the oil and gas sector in a province or territory makes up less than a certain amount (e.g. 0.5% of the total emissions from the national sector), the jurisdiction would be exempt from the oil and gas section of the benchmark.

Implementation of an oil and gas specific carbon price as the mechanism to meet the cap

Canada has committed to achieve net-zero emissions by 2050 and economy wide carbon pricing will play a key role in achieving this objective. Economy-wide carbon-pricing systems are designed to incent emissions reductions while allowing for maximum flexibility at the lowest overall cost. The flexibility afforded by these systems will result in different segments of the economy reducing emissions along different pathways, depending on the availability and cost of emissions reduction opportunities. The oil and gas emissions cap will set out a specific trajectory for the oil and gas sector to achieve net zero emissions by 2050.

As would be the case for a cap-and-trade system, this trajectory would take into account the technological readiness of the sector, the need to incent the deployment of low emissions technology while avoiding stranded assets and the importance of global energy security within the context of an energy transition that maximizes net global GHG reductions. In any given five-year period, the trajectory for the oil and gas sector under the cap may align with the trajectory that will be incentivized by the economy-wide carbon pricing system or there may be a need for additional reductions to achieve the cap level.

If the sector is not on track to meet the emission cap level for the next five-year period due to the incentives created by the economy-wide carbon pricing systems alone, the imposition of an oil and gas-specific price would require modifications to each of the pricing systems (provincial and federal) that apply to oil and gas activities across Canada. The modifications necessary will depend on the system the jurisdiction has in place:

- Carbon levies – Jurisdictions with carbon levy systems would need to set a separate price applicable to oil and gas facilities, as well as a price applicable to methane emissions.
- Cap and trade systems – Jurisdictions with cap and trade systems would need to set an oil and gas specific cap at the level necessary to achieve the emissions reductions that would be achieved by the sector-specific price.
- Hybrid systems – Jurisdictions with hybrid systems in place would either need to set a higher sector-specific price in both the carbon levy (including methane emissions) and OBPS, or set a higher oil and gas-specific price in the OBPS and make participation in the OBPS mandatory for most oil and gas facilities.

A higher oil and gas price will serve to incent investments in higher cost emissions intensity improvements that will reduce emissions further than the economy-wide price.

This focus on the price is proposed instead of a system which requires increasing the stringency of output-based standards for the oil and gas sector. Increasing the stringency of standards while maintaining the price at the economy-wide level would increase the average costs to the sector without any material impact on the incentive to invest in emissions reduction technology. This would be more likely to result in emissions

reductions from decreased production and carbon leakage rather than improvements in emissions intensity from existing facilities.

Restrictions on trading

In order to ensure that the desired emission reductions from the oil and gas sector occur, it would be necessary to not permit, the trading of surplus credits under output-based pricing systems, or allowances under cap and trade systems, between oil and gas and other sectors. Without such restrictions, in carbon pricing systems with trading between sectors, the high price for the oil gas sector could be met by oil and gas facilities buying credits generated by other sectors pursuing reductions beyond what would have been incented by the economy-wide price. For similar reasons, depending on the availability of offset credits, it may also be necessary to establish oil and gas specific rules limiting the use of offsets to specific circumstances for a time limited period.

Effects on benchmarking for economy-wide carbon pricing systems

A key criterion in the carbon pricing benchmark is that output-based pricing systems must be designed to maintain a marginal price signal equivalent to the minimum national carbon pollution price across all covered emissions. The assessment of this criterion is based on federal modelling, which considers the expected impact of other GHG emissions mitigation measures. To meet this criterion, assessment results must show that the projected sum of all regulated facilities' compliance obligations is greater than the projected sum of tradeable units available to the market after industries have responded to the price signal in a given compliance period, i.e., that the marginal price is holding.

In periods when the oil and gas carbon price is set higher than the economy-wide carbon price, emissions performance standards for other sectors may also need to be adjusted so that the marginal price signal will be maintained in the rest of the economy, taking into account the restrictions on trading between the oil and gas sector and other industrial sectors. As outlined below, any such changes would occur as part of the planned interim assessment of carbon pricing.

Reporting

To improve price forecasting for the oil and gas sector, a federal reporting requirement would be put in place for all large oil and gas facilities (e.g. > 50kt) to forecast their emissions for five subsequent years. This forecasting of emissions will help form the basis for determining the oil and gas sector-specific price. The first report would be for the 2026-2030 period.

Facilities would be required to provide best available information regarding the next five operating years, including any scheduled expansions and turn-over, as well as planned facility improvements that will result in the reduction in emission intensities.

This requirement would be similar to the Alberta TIER regulation, which requires facilities emitting over 1Mt per year to provide annual forecasting reports.

Timing

Under the current benchmark, the Government has committed that where the federal backstop applies in 2023 it will remain in place until at least the end of 2026. The Government has also committed to engaging provinces, territories and Indigenous organizations in an interim review of the benchmark by 2026 to confirm that benchmark criteria are sufficient to continue ensuring that pricing stringency will remain aligned across all carbon pricing systems in Canada. Work on the review will begin in 2023 to allow it to be completed early enough to inform the interim assessment of carbon pricing systems. Changes to the benchmark to incorporate criteria to incent emission reductions aligned with the oil and gas cap would be made as part of that interim

review. This would likely require some acceleration of the timelines to complete the review process. After this, all carbon pricing systems, including economy-wide pricing and the price applicable to the oil and gas sector, would be evaluated at five-year intervals to ensure that pricing continues to ensure achievement of the prescribed cap levels.

Changes to the Federal OBPS

The same changes that would be required of provincial and territorial systems would also be required of the federal carbon pricing system. Implementing an oil and gas specific price under the federal backstop would require amending the GGPPA to enable the Governor in Council to set a price in the Schedule to the Act that would be applicable specifically to oil and gas facilities under the federal OBPS. In addition, changes to the federal OBPS could include:

- Making participation in the federal OBPS mandatory for most oil and gas facilities in jurisdictions in which the federal OBPS applies; and
- Removing the exemption for methane emissions from fugitive and venting from oil and gas facilities.

Considerations for Option 2

Environmental Outcomes: This option would rely on a price-based approach to achieve the emissions cap trajectory. Although it would enable adjustments to existing pricing systems to achieve desired emission reductions, the actual caps would not be prescribed in the regulation and would not be enforceable. As a result, this option would provide lower certainty of achieving the emissions cap level in each five-year period in comparison to Option 1.

Policy Coherence: This approach would make use of existing regulatory instruments to achieve the oil and gas cap, although significant changes to that framework would be required.

Cost Effectiveness*:* Carbon pricing is widely recognized as the most cost effective way to reduce emissions. This option would continue to make use of pricing to encourage the lowest cost reductions within the sector. However, in the case where an oil and gas specific carbon price that is higher than the economy-wide price is necessary, restrictions on trading could have adverse implications for output-based pricing systems in oil and gas producing provinces by reducing the scope of the overall OBPS market. To reduce these impacts, oil and gas producing provinces could consider linking their emissions trading markets with one another or with other provinces.

Administrative Burden*:* This option would place less administrative burden on the oil and gas industry than Option 1 as emissions would not be subject to two separate regulations. However, due to the backstop approach, the system would be very complex to administer, as it would require making potentially significant changes to the benchmark, the federal OBPS and individual provincial/territorial systems every five years.

Key Steps for Option 2

The precise timing of the Government's next steps in the development of the oil and gas cap will depend on the final design. Key steps to implement Option 2 include engagement on changes to the federal carbon pricing benchmark; a legislative process for amendments to the GGPPA to add an oil and gas sector-specific carbon price; updates to the benchmark; federal, provincial and territorial updates to pricing systems; and benchmarking assessments and subsequent decisions.

8. Guiding Principles

The government is proposing the following principles to guide the development of the emissions cap. The development of these principles was informed by advice from Canada's NZAB, recommendations from the House of Commons Standing Committee on Natural Resources, and input received to date from provinces and territories, Indigenous groups, industry and non-governmental organizations.

1. **Accountable**: The approach will hold the oil and gas sector accountable for its emissions.
2. **Ambitious**: The obligations under the cap will align with Canada's climate ambition and commitments, with the aim to move swiftly and deliver significant emissions reductions in the near-term.
3. **Effective and achievable**: The approach will be designed to achieve the desired environmental outcomes, while minimizing impacts to workers and communities and avoiding unnecessary administrative burden.
4. **Enable investment in Canada**: The approach will manage competitiveness challenges and minimize carbon leakage risks; it will also maximize opportunities for ongoing investment in decarbonizing the sector to achieve net zero by 2050.
5. **Certainty**: The approach will provide long-term clarity for industry and Canadians and help achieve the sector's contribution to 2030 targets**.**

9. Next Steps

The Government of Canada is seeking views on the guiding principles, policy design considerations, and regulatory options presented in this paper.

Formal written submissions in response to this document are invited. In addition, a series of online engagement sessions will be organized to allow interested parties to share their perspectives.

Your input and ideas are important. To ensure that your input can be considered as the cap is developed, please submit written comments by email by **September 30, 2022**, to **PlanPetrolieretGazier-OilandGasPlan@ec.gc.ca**

10. Discussion Questions

General

1. How do you envision the future of the oil and gas sector in the Canadian economy or your community?
2. What do you see as the role of your organization or community in contributing to reducing oil and gas sector emissions in Canada?
3. What are the benefits or drawbacks of the options outlined in the discussion document?
4. Of the two approaches outlined, is there an approach your organization or community would prefer?
5. Do you have suggestions on how to improve the options outlined?
6. What potential short or long-term socio-economic impacts do you foresee or anticipate for particular regions or population groups resulting from an oil and gas emissions cap in general, and more specifically, the two proposed regulatory options?

Scope of coverage

7. Should consideration be given to facility emission thresholds to set different approaches and requirements for small versus large emitters?
8. Should the cap include petroleum refineries and natural gas transmission pipelines?
9. Are there other considerations relevant to determining the scope of the cap?

Emissions Cap Trajectory

10. What are the relevant considerations for determining a GHG emissions trajectory, particularly over the first 10 to 15 years?
11. How should the trajectory of the oil and gas emissions cap be designed to support Canada's 2030 targets and achieve net-zero by 2050? Should the cap set annual or multi-year emission levels?
12. Should the trajectory be fixed out to 2050, or should the approach include steps to ratchet up the trajectory at one or more fixed intervals?

Competitiveness and carbon leakage

13. What design features should be considered to maintain Canadian competitiveness and minimize the risk of carbon leakage?
14. What compliance flexibilities should be allowed, and what conditions should determine eligibility?
15. Should the use of compliance flexibilities decline over time? If so, to what extent?
16. Under a potential cap-and-trade option, should distribution of allowances be done through auction, free allocation, or a combination of the two?

Policy coherence and coordination across jurisdictions

17. Would there be merit in excluding or taking an approach that results in lower compliance costs for emissions generated from the production and processing of fuels used to support the development of clean fuels (e.g., natural gas required for low carbon hydrogen production)?
18. How should the Government of Canada ensure that the cap incents investments in diversification and other preparations for a clean energy transition?
19. How would each potential cap approach interact with other climate measures?
20. What opportunities exist for coordination among federal and provincial and territorial measures?

Implementation

21. How should a cap on GHG emissions be implemented to maximize emission reductions while avoiding potential challenges related to layering of multiple policies and regulations?
22. What other factors related to implementation should be considered in developing an approach to cap and cut GHG emissions from the oil and gas sector?