



# **50 Facts**

## **About Oil and Gas:**

### **A Summary**

### **Research Brief**

**DECEMBER 2022**

**CEC Research Brief Twenty-Six**  
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**Canadian Energy Centre**

## **A NOTE FROM THE AUTHORS**

The following summary facts and data were drawn from  
26 Fact Sheets and 5 Research Briefs and various research snapshots  
released in 2022 by the Canadian Energy Centre.

For sources and methodology, as well as additional data and information,  
the 31 original reports are available at the research portal on the Canadian  
Energy Centre website at [canadianenergycentre.ca](https://canadianenergycentre.ca).

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# INDEX

## PAGE

### Environment

1

1. Canada's share of global CO2 emissions	1
2. Canadian oil sands industry is getting cleaner	1
3. Canada's conventional oil sector is getting cleaner	2
4. Oil and gas sector and methane emissions	2
5. Canada's oil and gas sector is doing its part to reduce methane emissions	3
6. Canada's natural gas emissions intensity is falling	3
7. Gas flaring across the world	4
8. Reductions in gas flaring in Canada	4
9. Environmental spending by Canada's oil and gas sector	5
10. Provincial spending on environmental protection	5
11. CO2 (fuel combustion) emissions in North America's energy sector	6

### Net zero emissions (NZE) and the impact on Canada's oil and gas sector

7

12. Impact of net zero on production by Canada's oil and gas sector	7
13. Impact of net zero emissions on GDP from Canada's oil and gas sector	8
14. Net zero transition risk for Canada's upstream oil and gas sector	9
15. Net zero transition risk for Canada's oil sands sector	10
16. Assessing Canada's natural gas markets under net zero	11

### Carbon Capture Utilization and Storage (CCUS), Direct Air Capture, and Hydrogen

12

17. Short-term impact of Carbon Capture, Utilization and Storage (CCUS) in Canada	12
18. The long-term impact of Carbon Capture, Utilization and Storage (CCUS) in Canada	12
19. The economic impact of Direct Air Capture (DAC)	13
20. The economic impact of the hydrogen sector	13

	<b>PAGE</b>
<b>Economy</b>	<b>14</b>
21. The Canadian oil and gas sector's contribution to the national economy	14
22. The oil and gas sector's contribution to Atlantic Canada's economy	14
23. Purchases by Atlantic Canada's oil and gas sector from other industries	15
24. Atlantic Canada's interprovincial trade with Alberta	15
25. Oil and gas consumption in Quebec	15
26. The oil and gas sector's contribution to Quebec's economy	15
27. Quebec's interprovincial trade with Alberta	16
28. The oil and gas sector's contribution to British Columbia's economy	16
29. Purchases by the oil and gas sector from other industries in British Columbia	16
30. British Columbia's interprovincial trade with Alberta	16
<b>Small businesses and Canadian oil and gas</b>	<b>17</b>
31. Small businesses in Canada's oil and gas sector	17
32. Small business industry comparison	17
33. Canada-U.S. comparisons of small business in oil and gas extraction	17
34. Number of firms involved in oil and gas extraction in Canada and Europe	18
<b>Jobs in Canada's oil and gas sector</b>	<b>19</b>
35. Employment in Canada's oil and gas sector	19
36. Employment and wages in Atlantic Canada	19
37. Employment and wages in British Columbia	19
<b>Pipelines and exports</b>	<b>20</b>
38. Crude oil and gas exports from Canada	20
39. Crude oil export by pipelines	20
40. Projected impact of increased Canadian oil and gas exports	21
41. Examining the impact of increased pipeline access	21



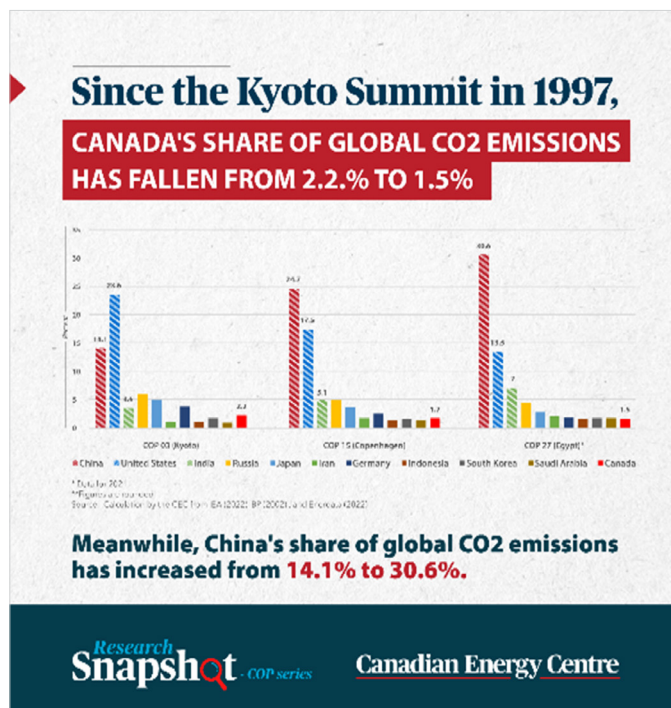
	<b>PAGE</b>
<b>Social and governance</b>	<b>22</b>
42. Women’s employment in Canada’s oil and gas sector	22
43. Diversity in the oil and gas sector	22
44. New Canadians in the oil and gas sector	22
 <b>Liquefied Natural Gas (LNG)</b>	 <b>23</b>
45. Global LNG market	23
46. Top LNG exporting countries	23
47. Industrial demand for natural gas in Asia	24
48. Canadian LNG and Asian markets	24
49. Canadian LNG opportunities	25
50. How Canadian LNG exports can reduce global emissions	25

## ENVIRONMENT

### 1.

#### Canada's share of global CO2 emissions

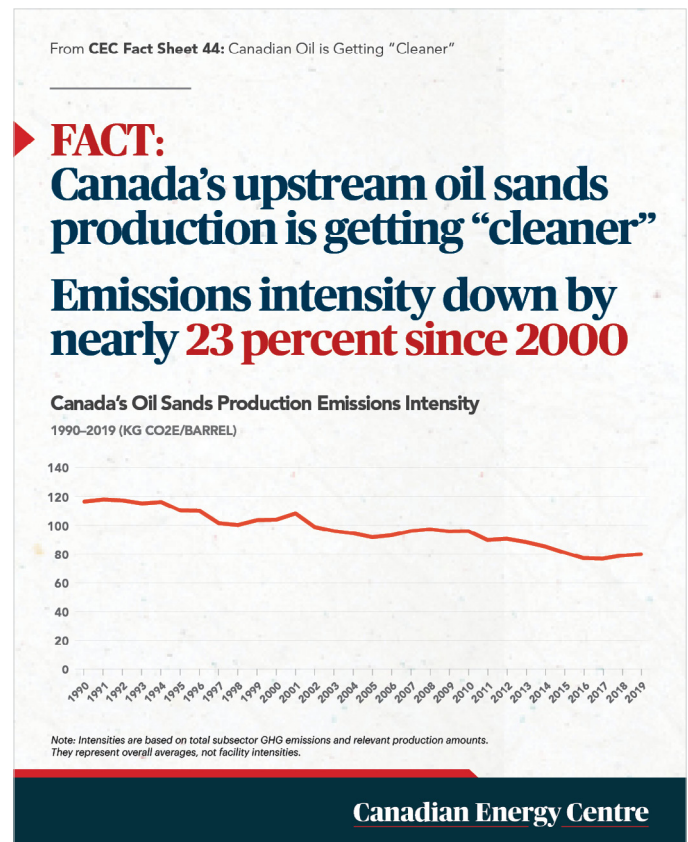
Canada's CO2 emissions are 1.5 percent of total worldwide CO2 emissions. Since the Kyoto Summit in 1997, Canada's share of the world's CO2 emissions has fallen from [2.2 percent to 1.5 percent](#).



### 2.

#### Canadian oil sands are getting cleaner

Emissions intensity is the emission rate of a given pollutant relative to the intensity of a specific activity or industrial production process. Emissions intensity is determined by dividing the number of absolute emissions by some unit of output, such as GDP, energy used, population, or barrel of oil produced. Between 2000 and 2019, the GHG emissions intensity of Canada's oil sands subsector declined [by nearly 23 percent](#).



### 3.

#### Canada's conventional oil sector is getting cleaner

Between 2000 and 2019, GHG emissions intensity in Canada's conventional oil sector [decreased more than 32 percent](#). As GHG emissions intensity in the upstream oil sector continues to decline and while Canada's ESG performance remains highly rated, Canadian oil has the potential to become the barrel of choice on the world stage.

### 4.

#### The oil and gas sector and methane emissions

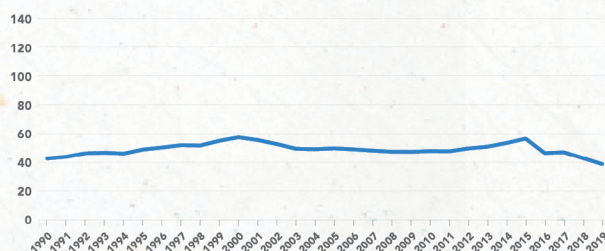
Methane is between 28 and 34 times more potent as a greenhouse gas than carbon dioxide (CO<sub>2</sub>). According to the International Energy Agency (IEA), there was 591.3 million tonnes (Mt) of methane emitted globally in 2020. The most significant human-caused source of methane emissions is agriculture, which accounted for 145.0 Mt that year, or nearly 25 percent of all methane emissions. The oil and gas sector emitted an estimated 77.3 MT of methane in 2020—[about 13 percent](#) of methane emitted globally.

From CEC Fact Sheet 44: Canadian Oil is Getting "Cleaner"

► **FACT: Canada's upstream conventional oil production is getting "cleaner"**

**Emissions intensity down by over 32 percent since 2000**

Canada's Conventional Oil Production Emissions Intensity  
1990–2019 (KG CO<sub>2</sub>E/BARREL)

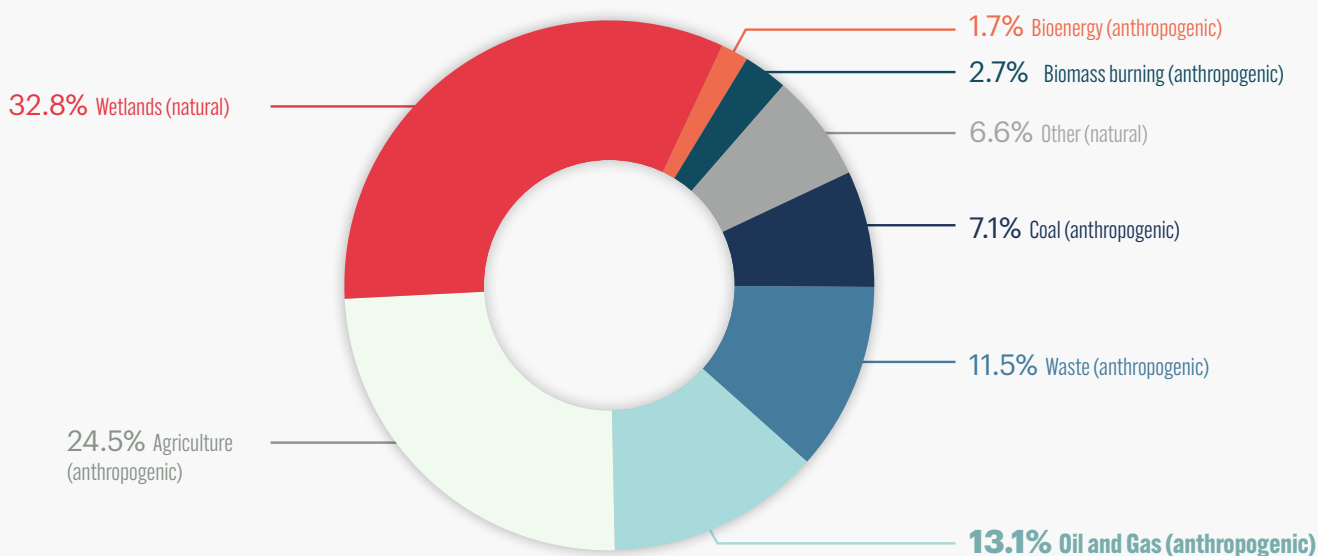


Note: Intensities are based on total subsector GHG emissions and relevant production amounts. They represent overall averages, not facility intensities.

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#### Sources of Methane Emissions

Percent share



Notes: Oil and gas sector emissions are for the year 2020, while non-energy sector emissions are for the year 2017.

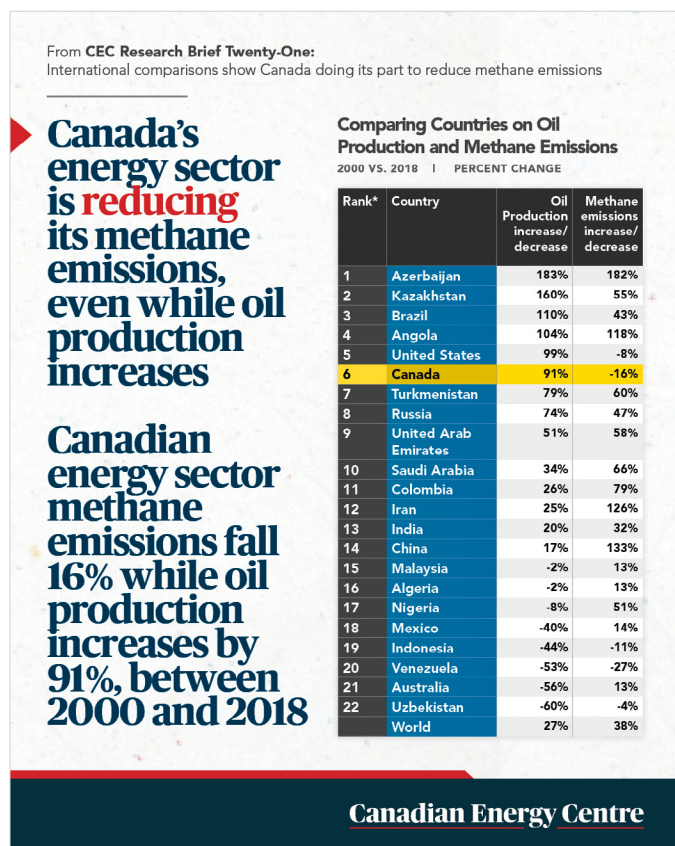
Source: IEA (2021a), and percentage share calculation by authors.



## 5.

**Canada's oil and gas sector is doing its part to reduce methane emissions**

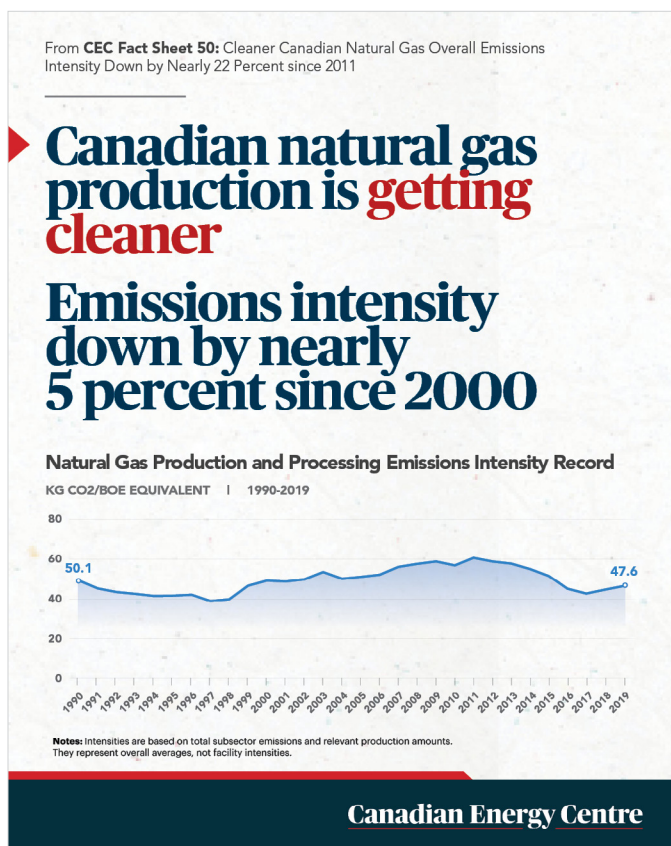
Methane emissions intensity of Canada's oil and gas industry is one of the lowest among major energy producers. Between 2000 and 2018, Canada was one of only five countries in which the oil and gas sector reduced methane emissions. Canada's methane emissions fell [by 16 percent](#), even as the country's oil production increased by 91 percent between 2000 and 2018.



## 6.

**Canada's natural gas emissions intensity is falling**

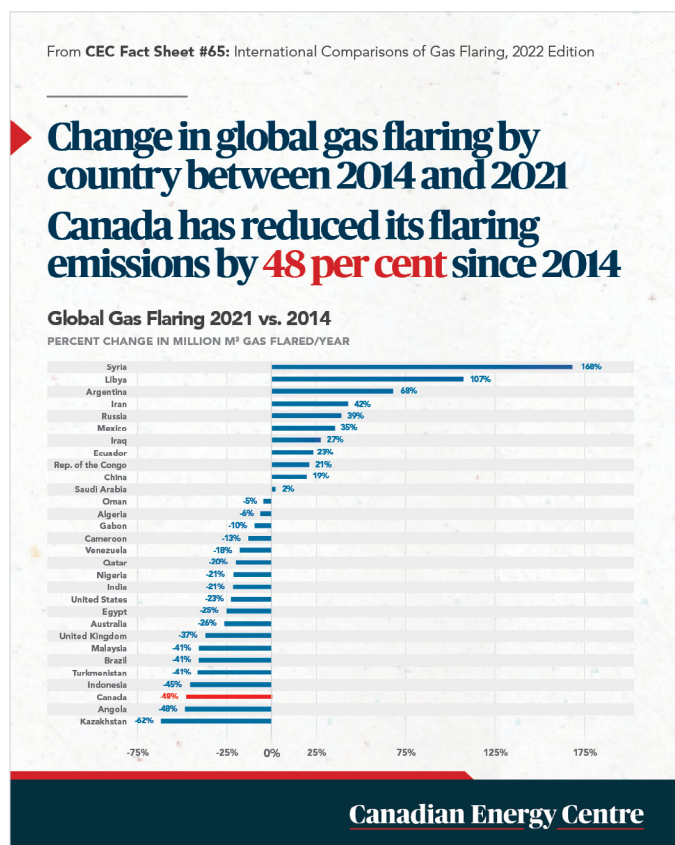
Between 2000 and 2019, the GHG emissions intensity of Canadian natural gas production fell from 50 kilograms of CO<sub>2</sub> per barrel of oil equivalent (boe) in 2000 to just under 48 kilograms of CO<sub>2</sub> per boe in 2019, an overall reduction of nearly 5 percent. Between 2011 and 2019, the GHG emissions intensity of Canadian natural gas production fell from slightly under 61 kilograms of CO<sub>2</sub> per boe to nearly 48 kilograms of CO<sub>2</sub> per boe, a decline of [about 22 percent](#).



## 7.

### Gas flaring across the world

Gas flaring, the burning off of gas generated in the oil and gas production process, is a significant greenhouse gas contributor. In 2021, 19 countries flared more than they did in 2014, [while 11 countries](#) flared less. The five countries that increased flaring the most between 2014 and 2021 were Syria (up by 168 percent) Libya (up 107 percent), Argentina (up 68 percent), Iran (up 42 percent), and Russia (up 39 percent).



## 8.

### Reductions in gas flaring in Canada

There was a [48% reduction](#) in emissions from oil and gas flaring in Canada between 2014 and 2021, even as Canada's production of crude oil increased by 9 percent and natural gas production rose by 16 percent in that period.

### Comparing Countries on Production\* and Flaring

2014 vs. 2021 | percent change

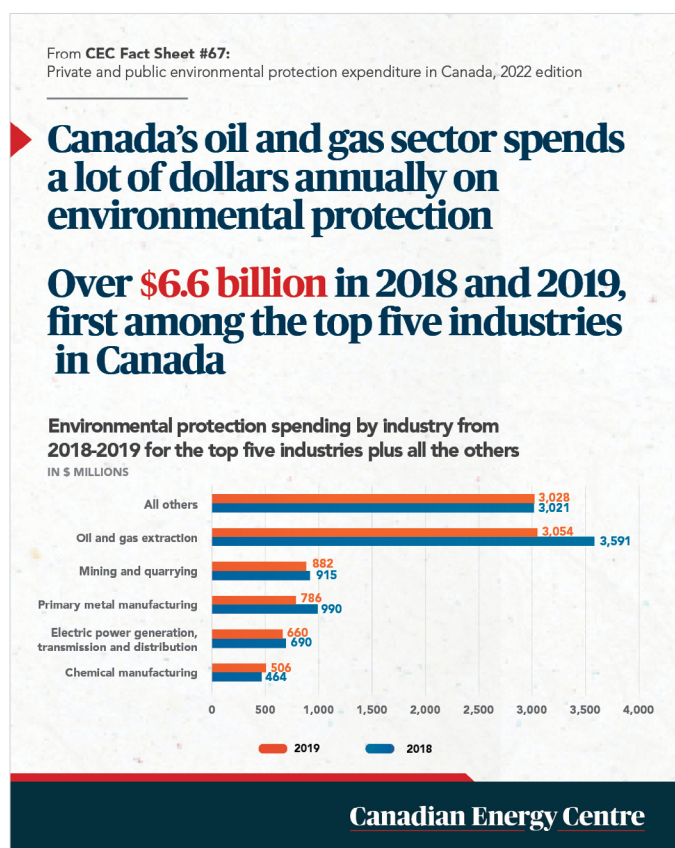
Rank	Country	Production increase (decrease) of crude oil	Production increase (decrease) of natural gas	Increase (decrease) in gas flaring
1	Syria	44%	65%	168%
2	Brazil	30%	5%	-41%
3	Iraq	29%	111%	27%
4	Canada	9%	16%	-48%
5	Kazakhstan	6%	-20%	-62%
6	Congo DR	6%	-100%	21%
7	Malaysia	2%	2%	-41%
8	United Kingdom	1%	-16%	-37%
9	Libya	0%	-10%	107%
10	India	-1%	-2%	-21%
11	Russia	-2%	22%	39%
12	Cameroon	-2%	424%	-13%
13	China	-2%	60%	19%
14	Gabon	-4%	30%	-10%
15	Argentina	-4%	8%	68%
16	Saudi Arabia	-5%	19%	2%
17	Oman	-7%	122%	-5%
18	Australia	-8%	120%	-26%
19	Qatar	-11%	5%	-20%
20	United States	-12%	33%	-23%
21	Ecuador	-14%	58%	23%
22	Algeria	-14%	20%	-6%
23	Indonesia	-15%	-22%	-45%
24	Egypt	-17%	84%	-25%
25	Turkmenistan	-21%	2%	-41%
26	Mexico	-27%	-25%	35%
27	Iran	-29%	35%	42%
28	Nigeria	-30%	6%	-21%
29	Angola	-37%	671%	-48%
30	Venezuela	-72%	-42%	-18%

\*Ranking based on increase (decrease) in crude oil production. Data description depends on source agency with petroleum data in Mt; gas data in Mcm, and flaring data in million m<sup>3</sup> flared/year. Oil production data for Syria, Libya, Cameroon, Ecuador, and Iran are from the year 2020. Gas production data for Syria, Iraq, Oman, Ecuador, Turkmenistan, and Venezuela are for the year 2020.

## 9.

**Environmental spending by Canada's oil and gas sector**

In 2018 and 2019, the oil and gas sector spent **\$6.6 billion** over both years, while all other industries combined spent \$11.9 billion. Between 2006 and 2018, the oil and gas sector alone spent \$28.1 billion or 41 percent in capital and operating expenses on environmental protection, while all other industries combined spent \$39.6 billion or 59 percent.



## 10.

**Provincial spending on environmental protection**

Of the \$128.8 billion that provinces spent on environmental protection between 2008 and 2020, Alberta **spent \$21.4 billion** or 16.6 percent of the total, while its proportion of the (10-province) population was 11.7 percent as of 2020.

**Environmental spending by provincial governments**  
2008-2020

Province	Total 2008-2020 environment spending		Share of 10-province population totals (2020)
	\$ billions	% of total	%
Newfoundland & Labrador	1.3	1.0%	1.4%
Prince Edward Island	0.5	0.4%	0.4%
Nova Scotia	3.8	3.0%	2.6%
New Brunswick	1.9	1.5%	2.1%
Quebec	23.9	18.6%	22.6%
Ontario	51.5	40.0%	38.9%
Manitoba	3.7	2.9%	3.6%
Saskatchewan	4.2	3.3%	3.1%
Alberta	21.4	16.6%	11.7%
British Columbia	16.5	12.8%	13.6%
All provinces	128.8	100.0%	100.0%

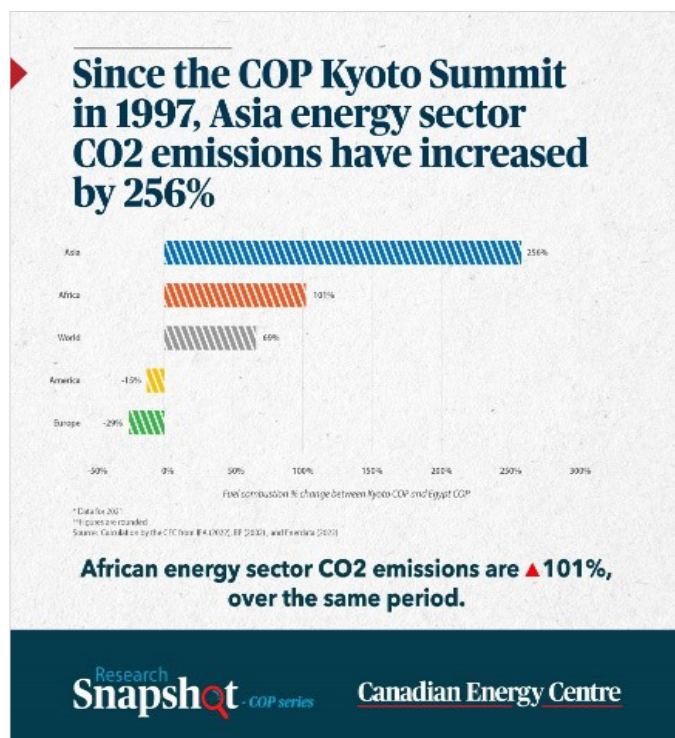
**Source:** Statistics Canada, Tables 10-10-0005-01 and 17-10-0005-01; and authors' calculations.



## 11.

**CO<sub>2</sub> (fuel combustion) emissions in North America's energy sector**

Since the Kyoto protocol in 1997, CO<sub>2</sub> emissions in North America's energy sector have decreased by 15 percent, while massive population growth and reliance on coal have seen emissions from Asia's energy sector emissions skyrocket by 256% over the last 25 years.



# NET ZERO EMISSIONS

## (NZE) AND THE IMPACT ON CANADA'S

## OIL AND GAS SECTOR

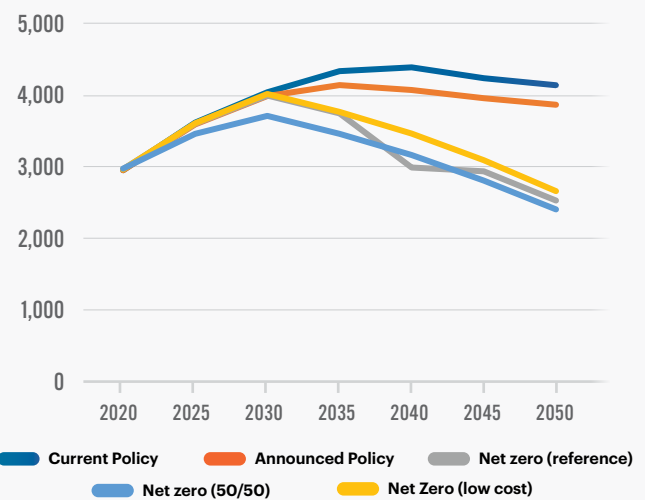
### 12.

#### Impact of net zero on production by Canada's oil and gas sector

Under a net zero scenario, which maintains the federal government's announced emissions policy to 2030 then phases in a cap on oil and gas emissions from 2035 onwards to reach net zero emissions by 2050, Canada's crude oil production is expected to be 508,000 barrels per day lower in 2030 and 2.054 million barrels per day lower in 2050 than under current policy. Oil sands production is anticipated to be 344,000 barrels per day lower in 2030 and 1.705 million barrels per day lower in 2050 under net zero 50/50 than under current policy. Natural gas production will be two billion cubic feet per day (bcf/d) lower in 2030 and six bcf/d lower in 2050 under net zero 50/50 than under current policy.

#### Projected Canadian oil sands production (excludes upgrading) under current policy, announced policy, and net zero

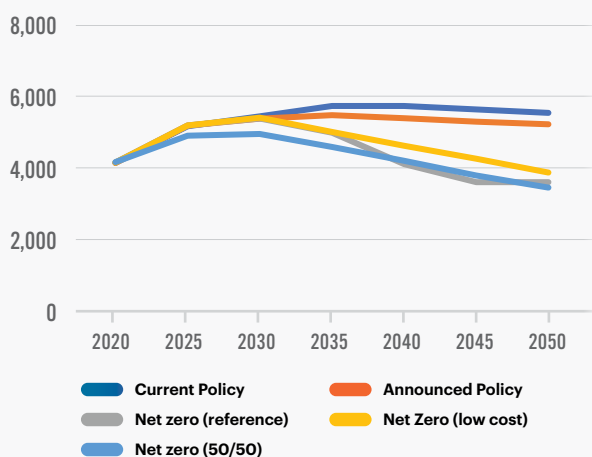
2020-2050 | Thousands of barrels per day



Source: Derived from the Navius Research gTech model.

#### Projected Canadian oil production (excludes upgrading and pentanes plus) under current policy, announced policy, and net zero

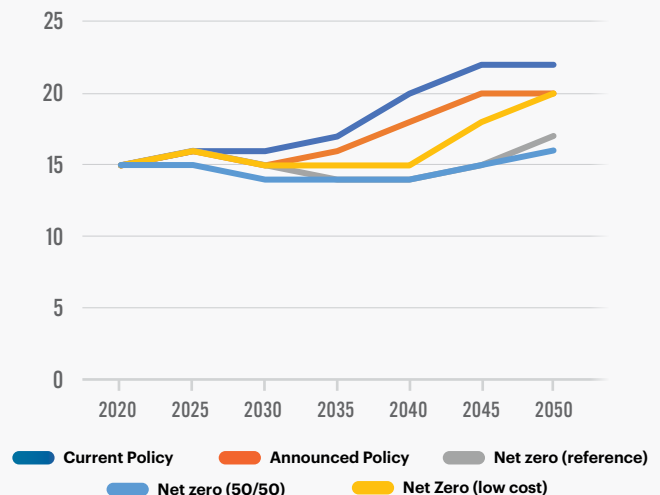
2020-2050 | Thousands of barrels per day



Source: Derived from the Navius Research gTech model.

#### Projected Canadian natural gas production under current policy, announced policy, and net zero

2020-2050 | Billion cubic feet per day

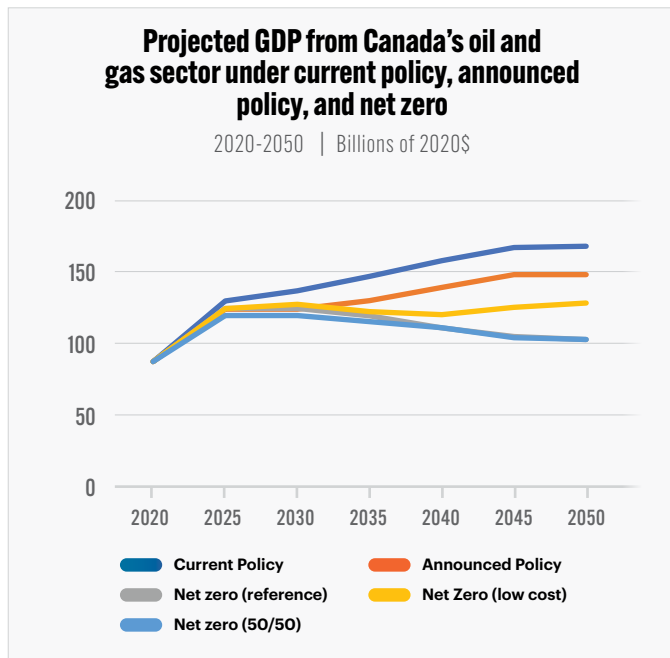


Source: Derived from the Navius Research gTech model.

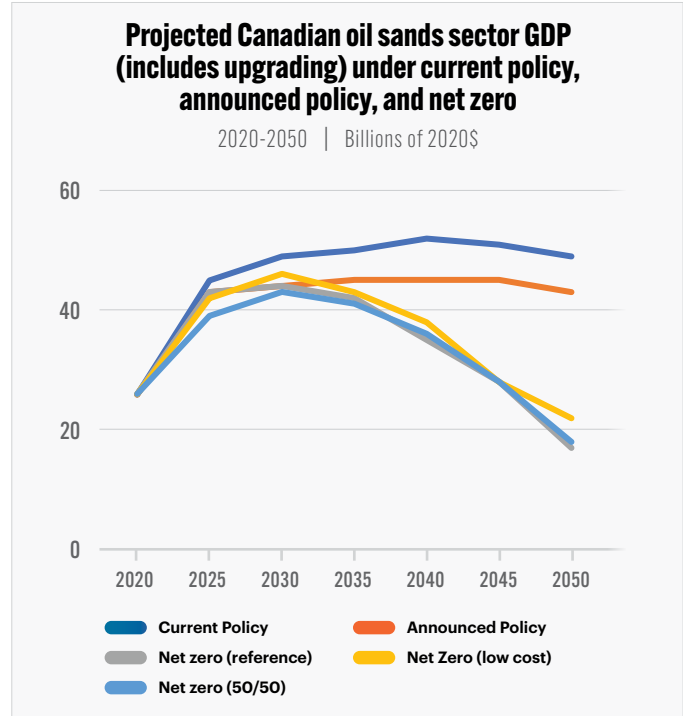
### 13.

#### Impact of net zero emissions on GDP from Canada's oil and gas sector

GDP from Canada's oil and gas sector is expected to [be \\$18 billion](#) or 13.1 percent lower in 2030 under net zero than under current policy, while in 2050, oil and gas GDP will be \$65 billion or 38.7 percent lower under net zero than under current policy. GDP from the oil sands sector is projected to be \$5 billion or 10.2 percent lower in 2030 under net zero than under current policy, while in 2050, GDP from the oil sands sector will be \$32 billion or 65.3 percent lower under net zero than under current policy.



Source: Derived from the Navius Research gTech model.

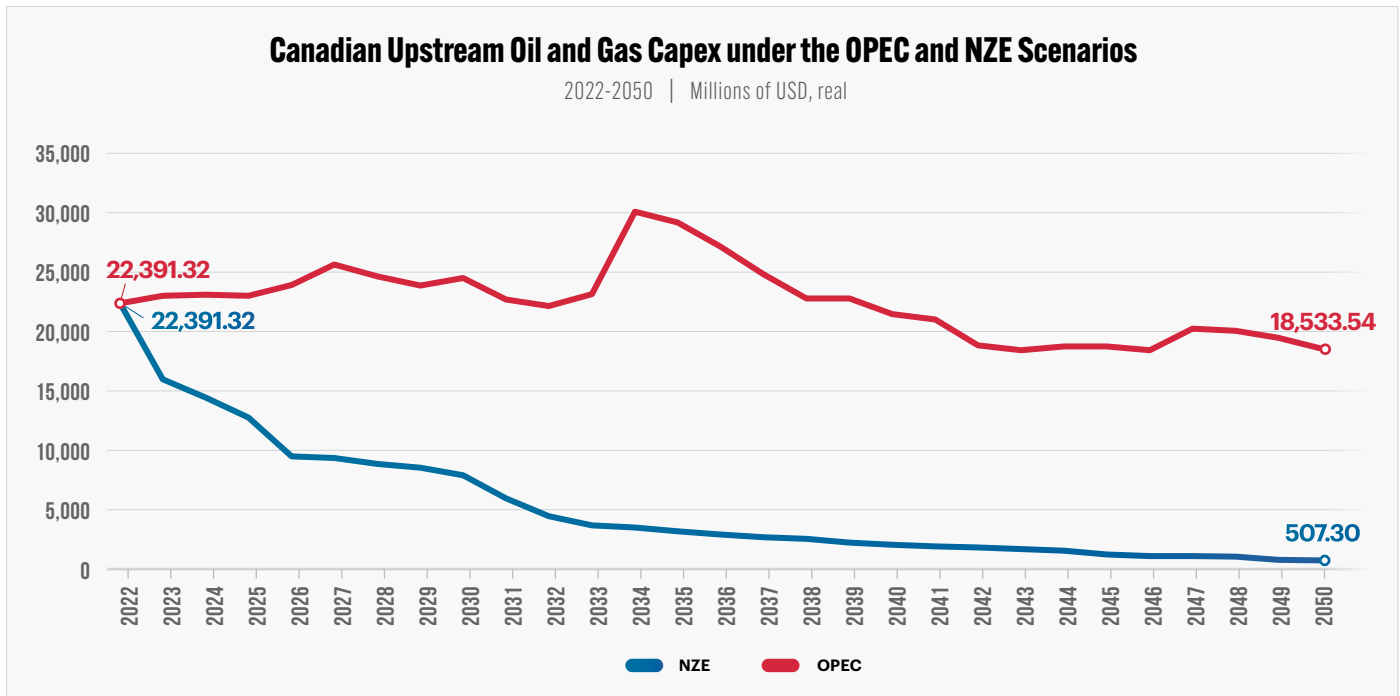


Source: Derived from the Navius Research gTech model.

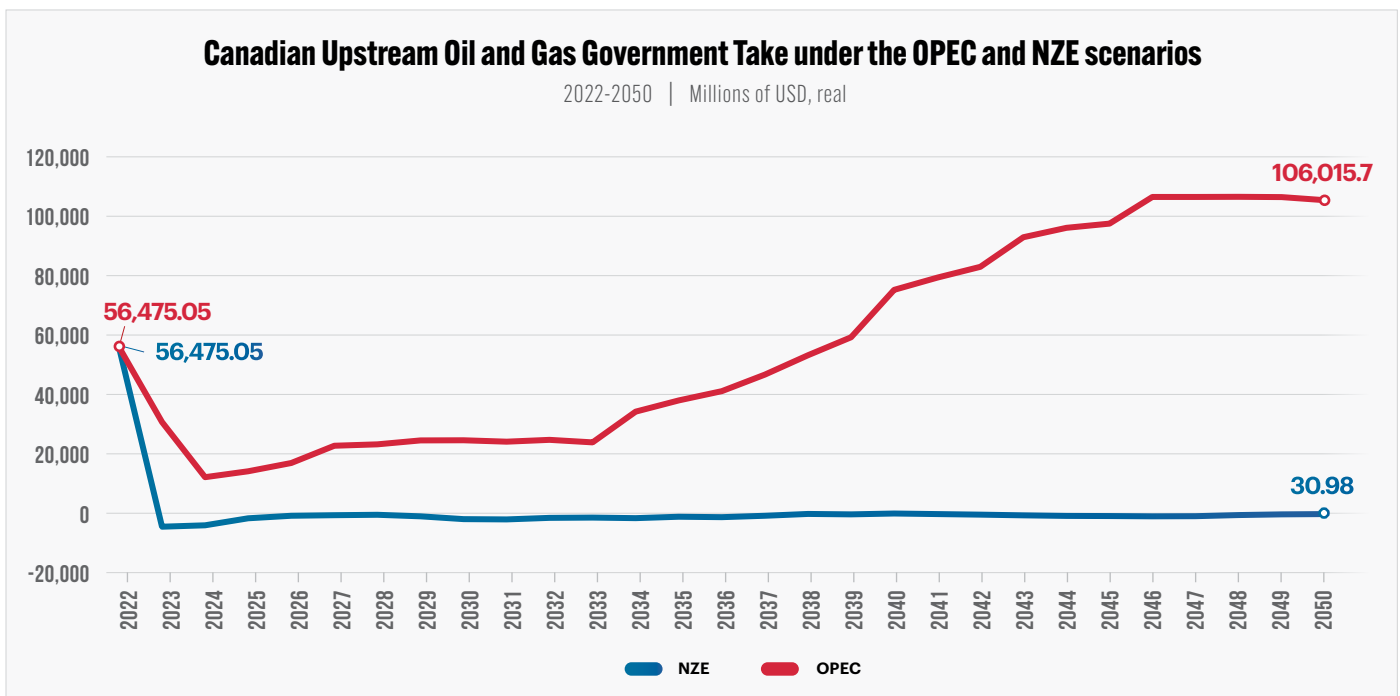
## 14.

**Net zero transition risk for Canada's upstream oil and gas sector**

Cumulatively between 2022 and 2050, [US\\$1.6 trillion](#) of revenue for the government from Canada's upstream oil and gas sector is at risk under a net zero scenario. And, cumulatively between 2022 and 2050, US\$503.4 billion of Canadian upstream oil and gas sector capex is at risk under a net zero scenario.



**Source:** Derived from the Rystad Energy Upstream Energy Transition Risk Dashboard

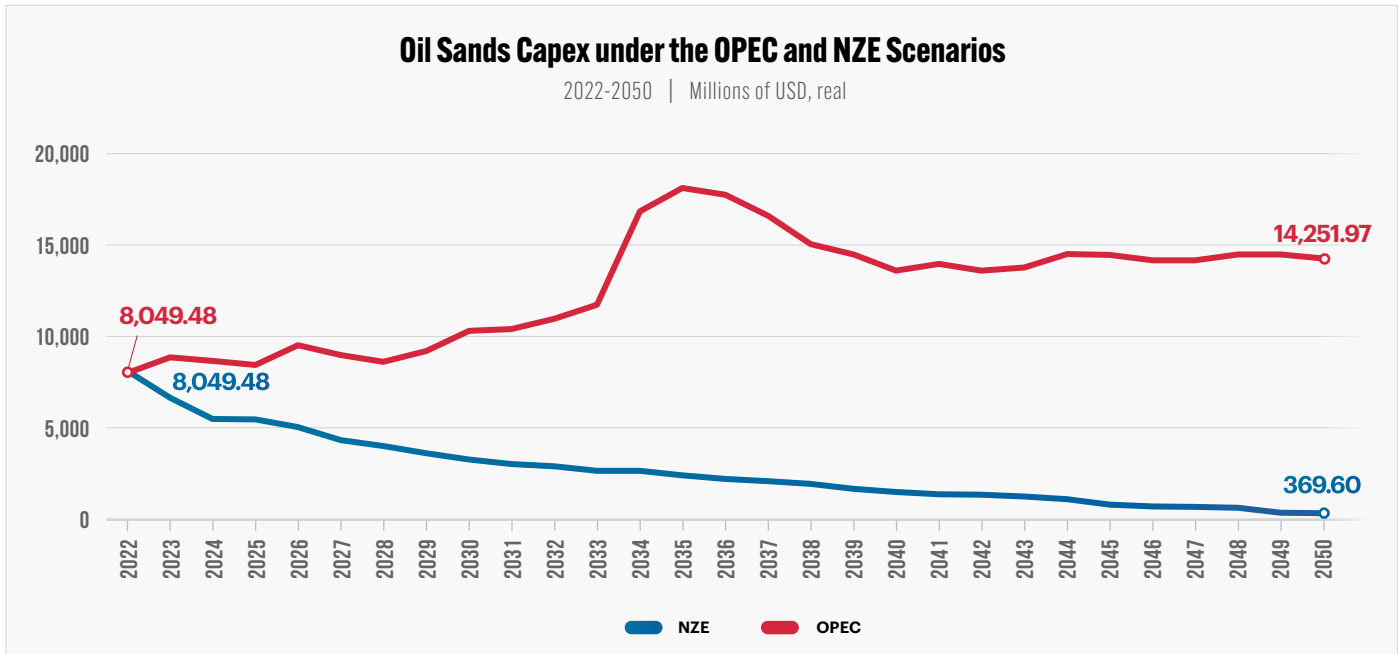


**Source:** Derived from the Rystad Energy Upstream Energy Transition Risk Dashboard

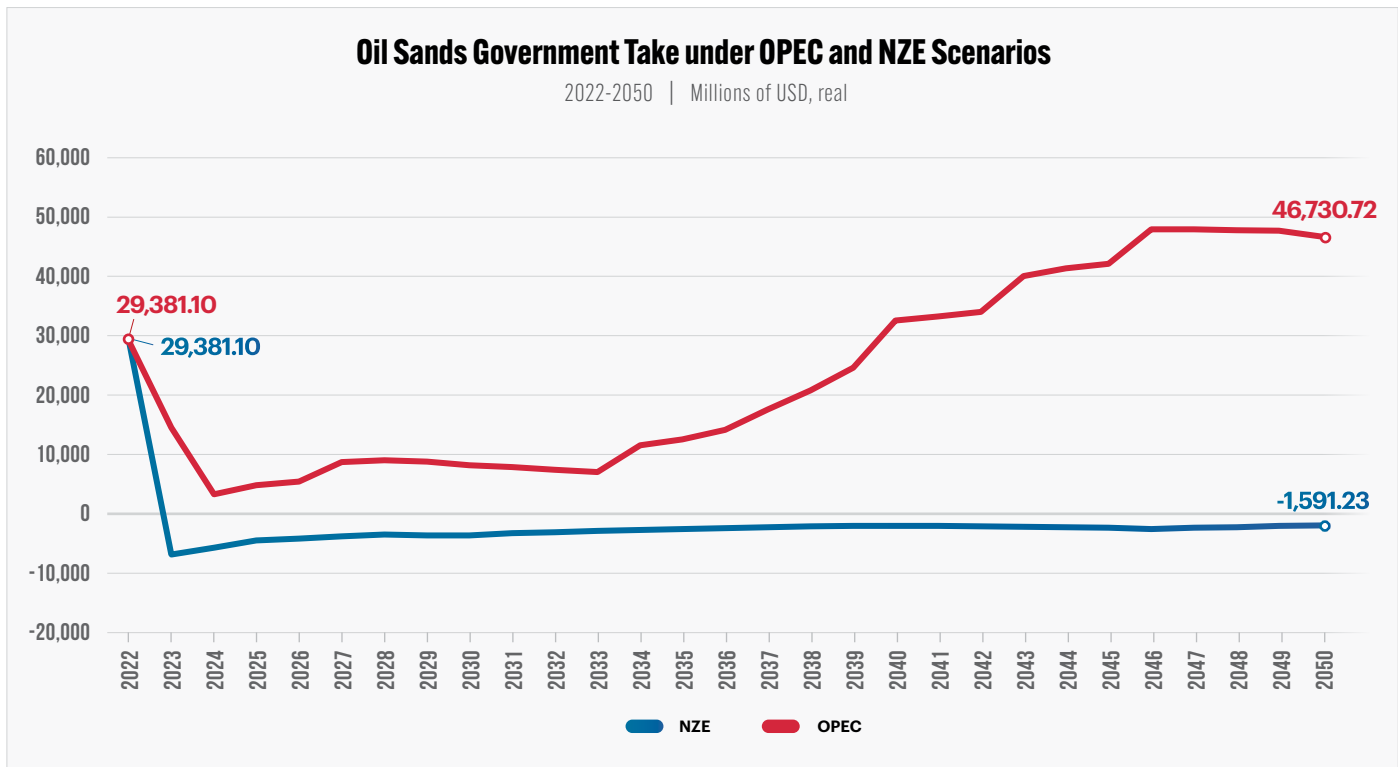
## 15.

## Net zero transition risk for Canada's oil sands sector

Cumulatively, between 2022 and 2050, [\\$728 billion](#) of revenue for the government from Canada's oil sands sector is at risk under a net zero scenario.



Source: Derived from the Rystad Energy Upstream Energy Transition Risk Dashboard

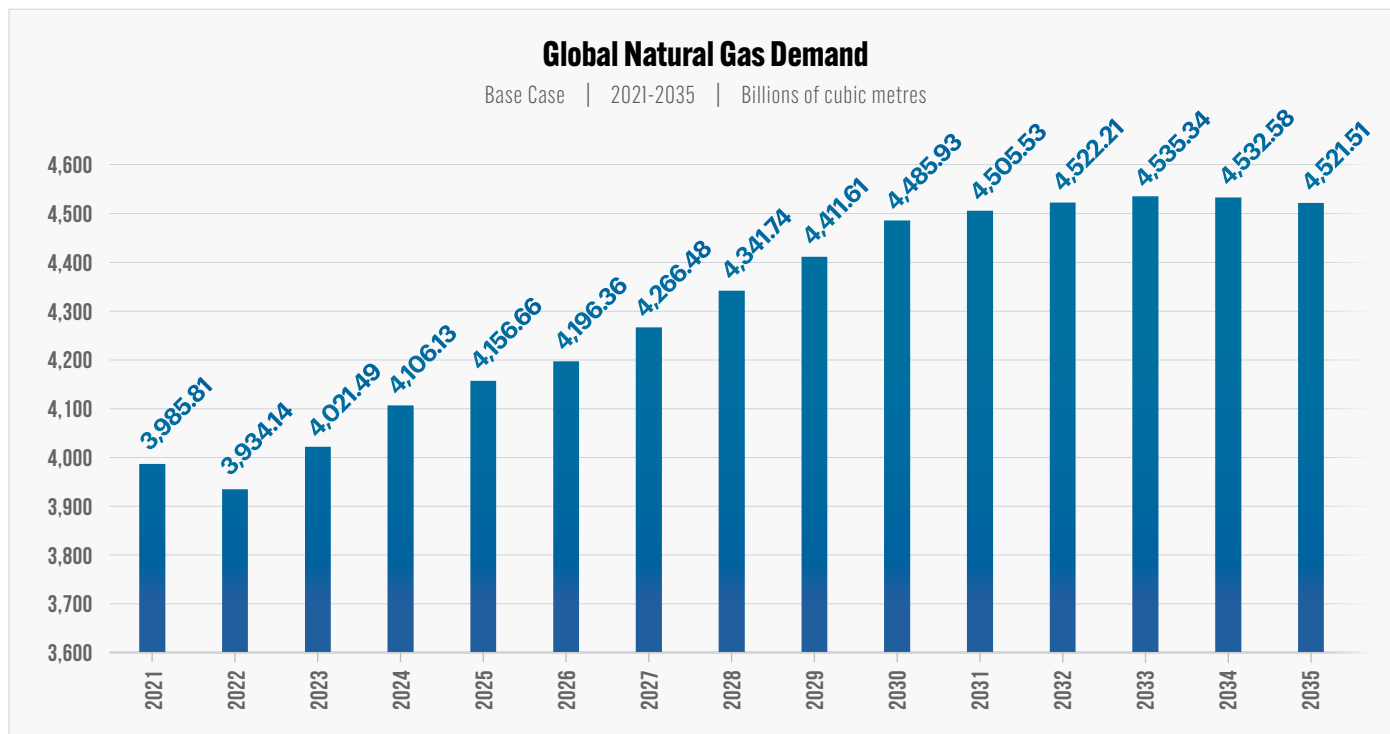


Source: Derived from the Rystad Energy Upstream Energy Transition Risk Dashboard

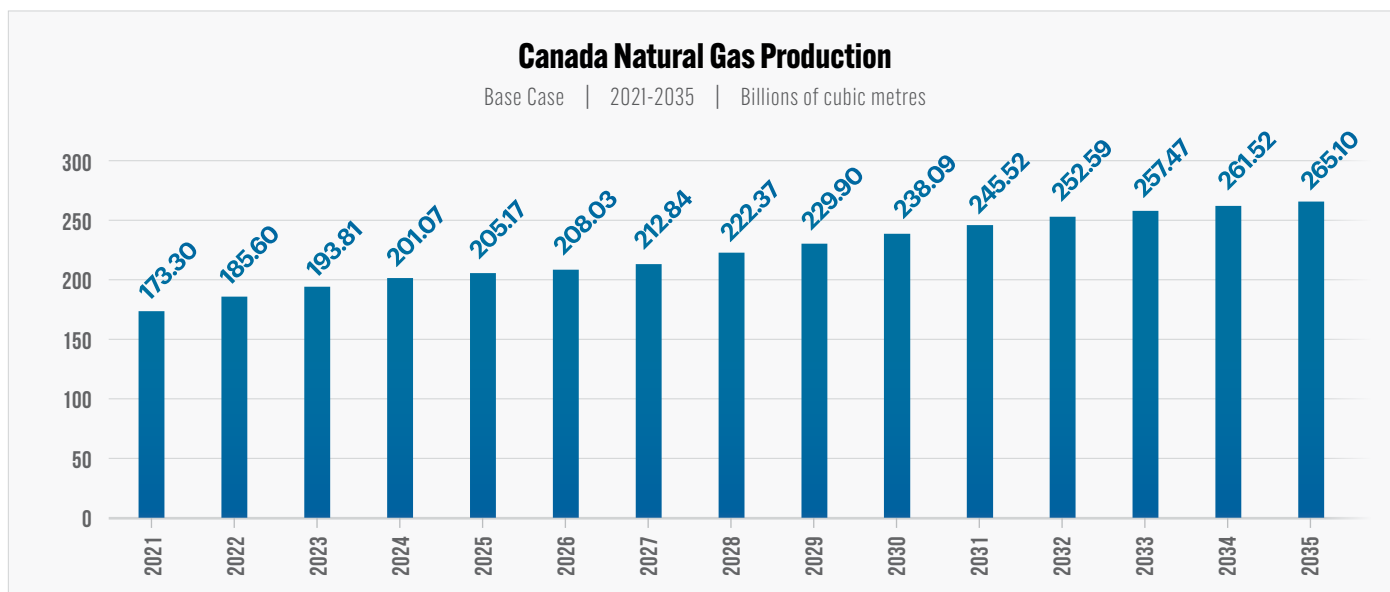
## 16.

## Assessing Canada's natural gas markets under net zero

Under Rystad Energy's supply and demand base case, global natural gas demand will increase by [over 13 percent](#) between 2021 and 2035, growing from 3,985 billion to 4,522 billion cubic metres (bcm) per year. Under the Rystad base case, natural gas production in Canada is forecast to continue to be strong, rising from 173 bcm in 2021 to 265 bcm in 2035, an increase of nearly 48 percent. LNG supply in Canada is expected to begin by 2025 (at 3.31 bcm per year), rising to 38.98 bcm per year by 2034, before falling slightly to 38.96 bcm by 2035, according to Rystad Energy.



Source: Derived from the Rystad Energy GasMarketCube



Source: Derived from the Rystad Energy UCube

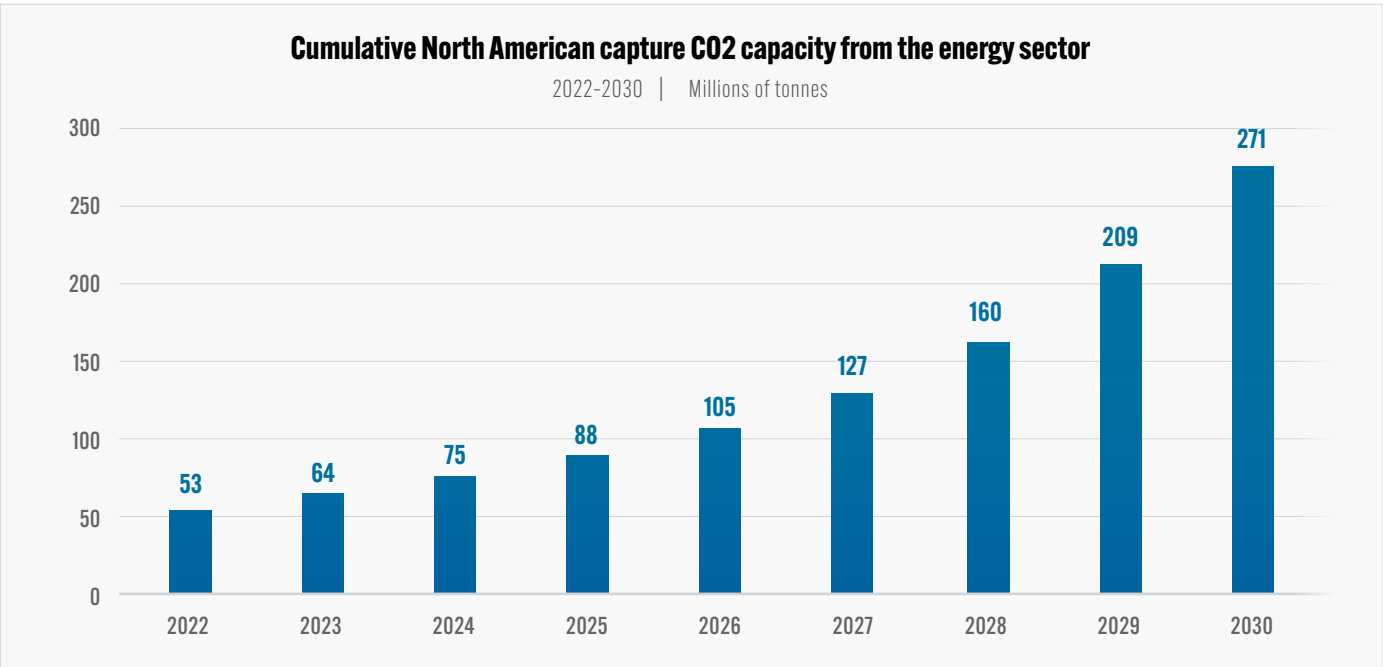


# CARBON CAPTURE, UTILIZATION AND STORAGE (CCUS), DIRECT AIR CAPTURE, AND HYDROGEN

## 17.

### Short-term impact of Carbon Capture, Utilization and Storage (CCUS) in Canada

It is estimated that Canada’s energy sector could increase cumulative CO2 capture capacity to [88 million](#) tonnes per annum (mtpa) in 2025 and 271 mtpa by 2030 if the proper regulatory fiscal and regulatory instruments are in place. Based on a supply chain analysis of CCUS projects likely to proceed by 2025, Canadian in CCUS projects are set to reach over \$6.4 billion (cumulative) in investment between 2022 and 2025, with nearly \$5.8 billion invested in capture, \$496 million in storage, and \$133 million in transport.



Source: Derived from the Rystad Energy CCUS Market Dashboard.

## 18.

### Long term impact of Carbon Capture, Utilization and Storage (CCS) in Canada

GDP from Carbon Capture, Utilization and Storage (CCUS) has the potential to reach between \$7 billion and \$52 billion per year in CA\$2020 by 2050 under net zero scenarios. This wide range is driven by many factors including the cost of CCUS, the cost of alternative technologies, and the drivers of output in industries with significant CCUS adoption, and oil prices. GDP from CCUS comes from the construction of facilities and operations for storing captured carbon.

## 19.

### **The economic impact of Direct Air Capture (DAC)**

According to a study conducted by Navius Research for CEC, GDP from Direct Air Capture could range from \$0 to \$51 billion CA\$2020 per year by 2050. The \$0 value comes from a scenario in which no DAC is available, as well as scenarios with high DAC costs and lower relative costs for alternatives, such as CCUS and hydrogen. When available at lower cost, DAC adoption drives GDP growth from DAC operations, construction of facilities, manufacturing of inputs, and the sale of carbon offsets to other sectors. The value of offsets sold by the sector is a function of the annual CO<sub>2</sub> abatement from DAC facilities and the shadow price of carbon each year, i.e., the marginal cost of abatement.

## 20.

### **The economic impact of the hydrogen sector**

GDP from hydrogen ranges from \$13 billion to \$59 billion in CA\$2020 per year by 2050. Similar to the case of CCS, the range of GDP contributions from hydrogen are driven by the cost of hydrogen technology and alternatives, as well as growth in industries with significant potential for hydrogen adoption, such as oil and gas. GDP from hydrogen comes from building hydrogen infrastructure, producing hydrogen, and the sale of hydrogen for use in a range of sectors, including transport and heavy industry.

## ECONOMY

## 21.

**The Canadian oil and gas sector's contribution to the national economy**

The oil and gas sector makes an outsized contribution to the Canadian economy not only in healthy years, but also in down years, such as in 2018. In 2018, the GDP associated with Canada's oil and gas sector totalled [\\$137.6 billion](#), or 6.6 percent of the entire Canadian economy.

**Impact of the oil and gas sector on Canada's economy**

2018

Direct	Indirect	Total	Total economy	Oil and gas sector's share of the total economy
GDP impact (in \$ billions)				
87.5	50.0	137.6	2,083.4	6.60%
Output (purchases of goods and services) impact (in \$ billions)				
165.1	90.2	255.3	3,931.5	6.50%

**Source:** Derived from Statistics Canada, Custom Tabulation of the Supply and Use Tables, 2018.

## 22.

**The oil and gas sector's contribution to Atlantic Canada's economy**

The oil and gas sector was responsible for adding [\\$8.6 billion](#) in nominal GDP to Atlantic Canada's economy in 2018 and generating \$13.9 billion in outputs, consisting primarily of the value of goods and services produced by the sector in the region's economy.

From CEC Fact Sheet #70: Nearly 22,000 jobs and \$8.6 billion:  
The impact of oil and gas (and Alberta) on Atlantic Canada's economy

► **The oil and gas sector is responsible for a significant share of Atlantic Canada's economy**

**Over \$8.6 billion in GDP in 2018**

**The oil and gas sector's impact on Atlantic Canada's economy**

2018

	Output (in \$ millions)	GDP (in \$ millions)	Number of jobs
Direct impact	10,405.7	6,885.8	7,249
Indirect impact	3,507.8	1,728.4	14,536
<b>Total impact</b>	<b>13,913.5</b>	<b>8,614.2</b>	<b>21,785</b>

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## 23.

**Purchases by Atlantic Canada's oil and gas sector from other industries**

In 2018, the oil and gas sector purchased nearly [\\$4.1 billion](#) worth of goods and services from other sectors in Atlantic Canada, including \$642 million from the professional, scientific, and technical services sector, and over \$2.2 billion in manufacturing.

<b>Purchases in Atlantic Canada by the oil and natural gas sector from other industries</b> 2018	
Sector	Value of purchases (in \$ millions)
Manufacturing	2,218
Professional, scientific and technical services	642
Finance and insurance	92
Administrative and support, waste management and remediation services	173
Real estate and rental and leasing	134
Transportation and warehousing	107
Utilities	98
Management of companies and enterprises	91
Other services (except public administration)	62
Information and cultural industries	52
Accommodation and food services	32
Construction	31
Wholesale and retail trade	26
Educational services	15
<b>Total</b>	<b>4,172</b>

**Source:** Authors' calculation derived from Supply and Use Tables, Statistics Canada catalogue 15-602-x\_2017.

## 24.

**Atlantic Canada's interprovincial trade with Alberta**

Alberta plays a significant role in Atlantic Canada's interprovincial and international trade flows. Atlantic Canada's interprovincial trade with Alberta in 2018 [was \\$1.8 billion](#), behind the region's trade with the United States (\$22.5 billion), Ontario (\$7.8 billion), and Quebec (\$6.7 billion), but ahead of trade with international markets such as China (\$1.7 billion), and the Netherlands (\$1 billion).

## 25.

**Oil and gas consumption in Quebec**

Quebec's total energy consumption in 2018 was [1,770 petajoules](#). Fifty-four percent of the energy Quebec uses comes from refined petroleum products (RRP) and natural gas. At 20 percent of Canada's RRP demand, Quebec is the second-largest market for RRP in Canada after Ontario. In 2018, Quebec used 180,000 barrels of gasoline per day and 85,000 barrels of diesel per day. That year the province also used 591 million cubic feet of natural gas per day.

## 26.

**The oil and gas sector's contribution to Quebec's economy**

The oil and gas sector was responsible for adding [\\$1.8 billion](#) in nominal GDP to Quebec's economy in 2017 and generated \$3.5 billion in outputs, consisting primarily of the value of goods and services produced by the sector.

## 27.

### Quebec's interprovincial trade with Alberta

Albertans spent a substantial amount on Quebec's goods and services in 2018. Alberta's purchases ranged from relatively small amounts in accommodation and food services (\$29 million) to considerably more trade in manufactured goods (\$4.1 billion), finance and insurance (\$1.5 billion), and professional services (including software and research and development) (\$1.2 billion). In 2018 alone, interprovincial exports from Quebec to Alberta were worth over [\\$9.7 billion](#).

## 28.

### The oil and gas sector's contribution to British Columbia's economy

The oil and gas sector was responsible for adding [\\$9 billion](#) in nominal GDP to British Columbia's economy in 2018 and generated \$17.8 billion in outputs that year, consisting primarily of the value of goods and services produced by various sectors in the BC economy.

The oil and gas sector's impact on BC's economy			
2018			
	Output (in \$ billions)	GDP (in \$ billions)	Jobs
Direct impact	10.7	5.1	18,697
Indirect impact	7.1	3.9	36,590
<b>Total impact</b>	<b>17.8</b>	<b>9.0</b>	<b>55,288</b>

**Source:** Derived from Statistics Canada, Supply and Use Tables, Custom Tabulation. Totals may not add exactly due to rounding.

## 29.

### Purchases by the oil and gas sector from other industries in British Columbia

In 2018, the oil and gas sector purchased nearly [\\$6.3 billion](#) worth of goods and services from other sectors in British Columbia including \$652.6 million from the insurance sector, \$861.3 million in professional services, and nearly \$3.2 billion in manufacturing.

## 30.

### British Columbia's interprovincial trade with Alberta

British Columbia's trade with Alberta was worth [\\$16.7 billion](#), or 39 percent of all of BC's interprovincial trade in 2018, surpassing BC's trade with Ontario and Quebec.



## SMALL BUSINESSES AND CANADIAN OIL AND GAS

31.

### Small businesses in Canada's oil and gas sector

In Canada, [96 percent of the companies](#) in the oil and gas sector are small businesses (fewer than 100 employees), while 3.3 percent are medium-sized (100 to 499 employees), and 0.5 percent are large enterprises (500+ employees).

32.

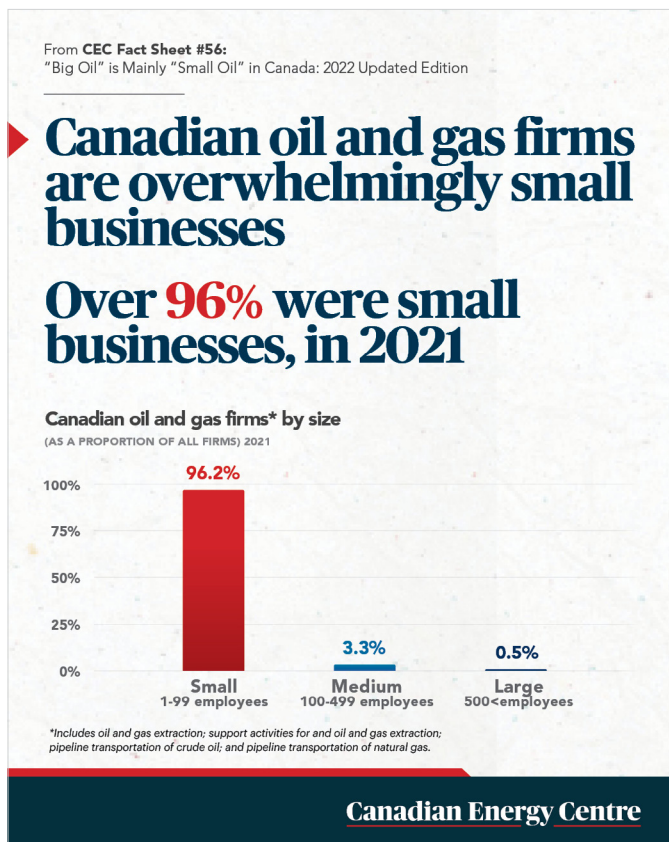
### Small business industry comparison

As of 2021, [96.2 percent](#) of all energy firms have between 1 and 99 employees compared with 93.1 percent in manufacturing, 89.9 percent in utilities, and 99 percent in the construction sector. The all-industry average is 98 percent.

33.

### Canada-U.S. comparisons of small business in oil and gas extraction

For just those firms involved in oil and gas extraction, [96.2 percent of Canada's oil and gas extraction sector](#) is composed of small businesses, compared to 94.2 percent in the United States.





## 34.

### Number of firms involved in oil and gas extraction in Canada and Europe

Canada's oil and gas extraction sector has a higher proportion of small and medium-sized businesses [than either Norway or the EU](#).

- [Canada](#) has 1,135 oil and gas firms with fewer than 200 employees;
- The European Union has 329 firms with fewer than 250 employees; and
- Norway has just 32 oil and gas firms with fewer than 250 employees.

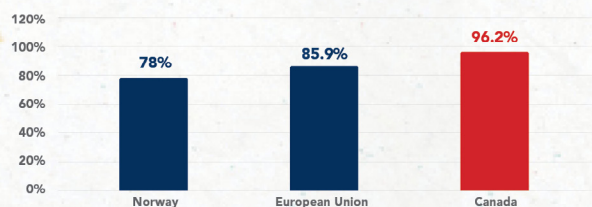
From CEC Fact Sheet #56:

"Big Oil" is Mainly "Small Oil" in Canada: 2022 Updated Edition

### ▶ More Canadian oil and gas firms are small businesses when compared to Norway and the E.U.

**96.2% for Canada, 78% for Norway, and 85.9% for the E.U.**

Oil and gas extraction firms compared:\* Proportions below 200 employees (Canada) and below 250 employees (Norway and EU)  
LATEST AVAILABLE YEAR\*\*



\*Data increments available for firms with 1 to 199 employees in Canada and 1-249 employees in Norway and the European Union. These percentages are based on oil and gas extraction firms only. \*\*2021 for Canada, 2018 for the European Union and Norway.

**Canadian Energy Centre**

## JOBS IN CANADA'S OIL AND GAS SECTOR

### 35.

#### Employment in Canada's oil and gas sector

There were [597,635 jobs](#) associated with Canada's oil and gas sector in 2018 – 198,397 direct and 399,238 indirect – representing about 3.1 percent of all jobs across Canada. That same year, the total compensation paid to oil and gas extraction sector workers alone was over \$13.8 billion.

From CEC Fact Sheet #68:  
The Oil and Gas Sector's Contribution to Canada's National Economy

#### ▶ Canada's oil and gas sector is responsible for a significant share of the jobs in the Canadian economy

**597,635 jobs** in 2018,  
3.1% of total national employment

Number of jobs in Canada associated with the oil and gas sector  
2018

Direct jobs	Indirect jobs	Total jobs	Total employment (all industries)	Share of oil and gas sector jobs to total employment
198,397	399,238	597,635	18,986,400	3.1%

Canadian Energy Centre

### 36.

#### Employment and wages in Atlantic Canada

In 2018, oil and gas supported [nearly 22,000 jobs](#) in Atlantic Canada, directly and indirectly paying over \$1.4 billion in wages and salaries to workers in Atlantic Canada.

### 37.

#### Employment and wages in British Columbia

Oil and gas supported [over 55,000 jobs](#), both direct and indirect, in BC in 2018 and paid over \$2.9 billion in wages and salaries to workers in that province.

From CEC Fact Sheet #69:  
\$9 billion and 55,000 jobs: The impact of oil and gas (and Alberta) on BC's economy

#### ▶ The oil and gas sector is responsible for a significant share of jobs in BC's economy

**Over 55,000 jobs**  
in 2018

The oil and gas sector's impact on BC's economy  
2018

	Output (in \$ billions)	GDP (in \$ billions)	Jobs
Direct impact	10.7	5.1	18,697
Indirect impact	7.1	3.9	36,590
Total impact	17.8	9.0	55,288

Canadian Energy Centre



## PIPELINES AND EXPORTS

38.

### Crude oil and gas exports from Canada

In 2020, COVID-19 had a devastating impact on Canadian crude oil and natural gas exports. However, as the global economy has begun to recover from COVID-19, the demand for oil and gas has increased. Alberta saw record crude oil production in the first half of 2021, [averaging 3.53 million barrels](#) per day. International crude oil exports from Canada have also increased: between July and September 2021, Canada exported \$31.9 billion worth of oil and gas.

39.

### Crude oil export by pipelines

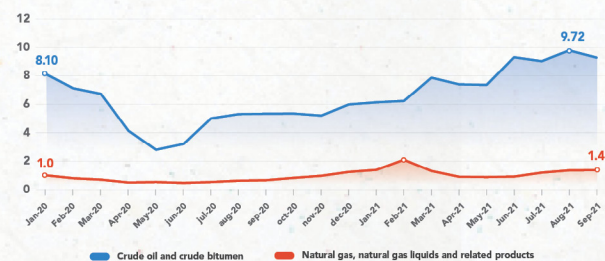
Between 2010 and 2020, exports of crude oil leaving Canada by pipeline grew from over 1.7 million barrels per day (mb/d) to over 3.2 mb/d, an 84 percent increase. In 2020, total crude oil exports from Canada were nearly 3.7 mb/d, with over [2.9 million barrels per day](#), or nearly 88 percent, being moved by pipeline, mainly to the U.S. Enbridge's Canadian Mainline transports 58 percent of all Canadian crude oil exported to the United States.

From **CEC Fact Sheet 48: Projected impact of increased oil and gas exports**

### ► **FACT:** COVID-19 recovery sees boost in Canadian oil and gas exports

**\$31.9 billion** in exports between  
July and September 2021

Canadian Oil and Gas Exports by Month  
JANUARY 2020 TO SEPTEMBER 2021 | IN 2019 \$ BILLIONS



Canadian Energy Centre

From **CEC Fact Sheet 53: The Economic Impact to the Canadian Economy of Crude Oil Pipeline Transportation**

### ► Pipelines are the solution to meeting U.S. and global crude oil needs

Over **2.9 million barrels**  
per day of Canadian crude  
oil shipped to the U.S. by  
pipeline in 2020

Crude oil exports by mode of transportation  
Barrels per day

	2015	2016	2017	2018	2019	2020
Marine	170,994	202,031	205,013	275,120	262,442	259,314
Pipeline	2,762,887	2,810,478	2,983,420	3,098,114	3,214,127	2,911,573
Rail	111,305	87,876	131,837	242,193	281,380	153,143

Canadian Energy Centre

## 40.

### Projected impact of increased Canadian oil and gas exports

Modelling finds that each [\\$100 million increase in crude oil](#) and natural gas exports is estimated to support 289 direct and indirect Canadian jobs and add \$40 million to labour income in 2022. The same modelling found that each \$100 million increase in crude oil and natural gas exports is estimated to add \$86 million to nominal GDP while generating nearly \$153 million in outputs in 2022.



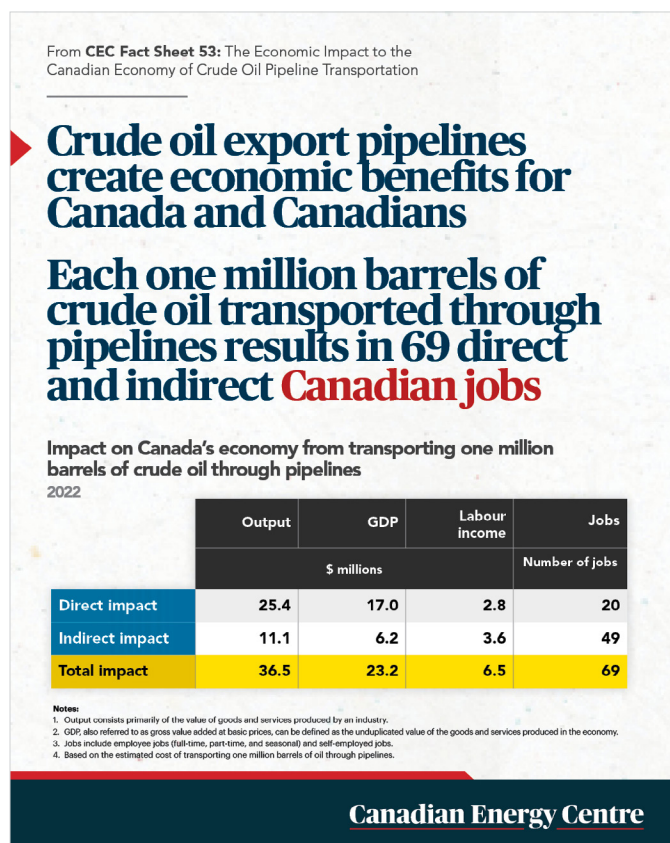
## 41.

### Examining the impact of increased pipeline access

The percentage of heavy oil that the U.S. imports from Canada as a share of all imports of Canadian oil increased from 25.1 percent in 2000 to 55.8 percent in 2019. Additional export pipeline capacity would enable Canadian oil producers to receive up to US\$7 per barrel more for

their product, lifting capital investment by an estimated \$10 billion and affecting real GDP by an estimated 1.5 to 2 percent. Each one million barrels of crude oil transported through pipelines [will add \\$23.2 million](#) to nominal GDP in 2022. Further,

- Each one million barrels of crude oil transported through pipelines will support 69 direct and indirect Canadian jobs in 2022;
- Each one million barrels of crude oil transported through pipelines will generate nearly \$36.5 million in outputs in 2022, consisting primarily of the value of goods and services produced; and
- Each one million barrels of crude oil transported through pipelines will add \$6.5 million to labour income in 2022.





## SOCIAL AND GOVERNANCE

42.

### Women's employment in Canada's oil and gas sector

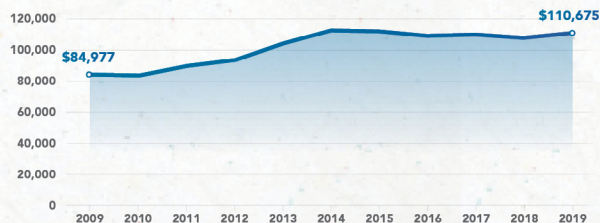
Nearly [31 percent of jobs](#) in Canada's oil and gas sector are held by women, and the average pay for women has increased by over 30 percent since 2009.

From CEC Fact Sheet 55: Examining Key Demographics of Canadian Oil and Gas Workers

► **Nearly 31 percent of jobs in the Canadian oil and gas sector are held by women**

**Average annual wage and salary for a female Canadian oil and gas sector worker was nearly \$111,000 in 2019**

Average annual female wage and salary: Canadian oil and gas sector 2009 to 2019 | \$



Canadian Energy Centre

43.

### Diversity in the oil and gas sector

In 2019, 6.3 percent of workers in Canada's oil and gas sector identified as Indigenous, with their average pay increasing by over 7 percent since 2009. Nearly 24 percent of workers in the sector identify as visible minorities, with their average pay increasing by over 12 percent since 2009.

44.

### New Canadians in the oil and gas sector

Between 2006 and 2021 the number of landed immigrants employed in Canada's oil and gas sector increased by over 86 percent – from 8,800 to 16,400. In 2021, the average weekly wage for landed immigrants in the oil and gas extraction sector was \$2,304, or 78 percent more than the all-industry average weekly wage of \$1,292 for landed immigrants. Between 2010 and 2021, average weekly wages for landed immigrants employed in the oil and gas extraction sector grew from \$1,634 to \$2,304, or nearly 41 percent.

From CEC Fact Sheet # 61:  
New Canadians: Employment and Incomes in the Oil and Gas Extraction Sector

► **High wages for landed immigrants**

**Average weekly wages for landed immigrants employed in Canada's oil and gas extraction sector significantly higher than other industrial sectors**

Average Weekly Wages for Landed Immigrants in Selected Industries

2021 (\$)



Canadian Energy Centre



## LIQUEFIED NATURAL GAS (LNG)

### 45.

#### The global LNG market

Worldwide imports of natural gas via [LNG rose from 97,923 million cubic metres](#) (Mm3) in 1995 to 460,547 Mm3 in 2020, an increase of 370 percent, including a 414 percent increase in imports by Europe over that period, and a 365 percent increase by Asia. In 2010, total LNG exports were worth just over US\$63.6 billion, a figure that increased to almost US\$117.4 billion by 2017 before declining to about US\$75.9 billion due to COVID-19 and then again increasing to US\$157.1 billion in 2021.

### 46.

#### Top LNG exporting countries

Australia, Qatar, and the U.S. are the world's top exporters of LNG. As of 2020, Australia accounted for [22.6 percent of global LNG exports](#), followed by Qatar (22 percent) and the U.S. (12 percent). Several countries saw a significant increase in LNG exports between 1990 and 2020, including Australia with a 3,777 percent rise, Qatar (3,940 percent), the U.S. (4,484 percent), Malaysia (204 percent) and Russia (444 percent).

From **CEC Research Brief 22:**  
The Global Liquefied Natural Gas (LNG) Market: Where Does Canada Fit In?

#### ► LNG demand is on the rise, creating opportunities for Canada as a secure supplier

**Global LNG imports increased by over 508 percent since 1990**

**International LNG imports**  
2000-2020 | MILLIONS OF CUBIC METRES



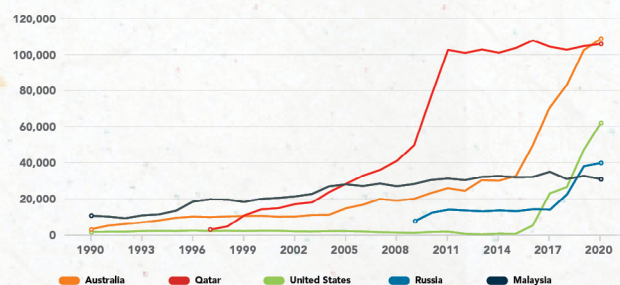
Canadian Energy Centre

From **CEC Research Brief 22:**  
The Global Liquefied Natural Gas (LNG) Market: Where Does Canada Fit In?

#### ► LNG exports **skyrocketing**, opportunities for Canada promising

**Between 1990 and 2020, LNG exports up 3,777 percent in Australia, up 3,940 percent in Qatar, and up 4,483 percent in the United States**

**LNG exports by select country**  
1990-2020 | MILLIONS OF CUBIC METRES



Canadian Energy Centre



## 47.

## Industrial demand for natural gas in Asia

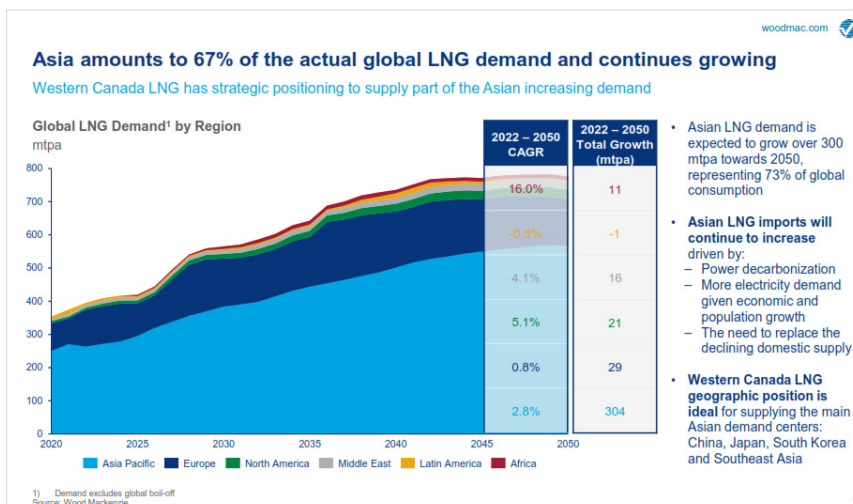
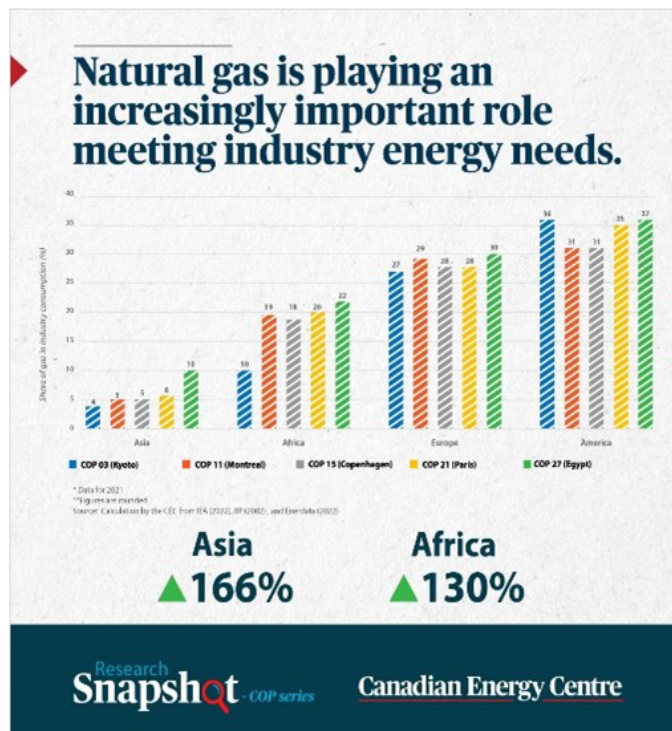
Natural gas is playing an increasingly important role in meeting industry energy demand around the world. Natural gas is integral to developing economies in Asia. Since the Kyoto protocol, demand for natural gas across industries in Asia [has jumped by 166 percent](#).

## 48.

## Canadian LNG and Asian markets

A Wood Mackenzie study, commissioned by the [Canadian Energy Centre](#) demonstrates how natural gas from Canada could help energy-hungry Asian countries meet growing demand while at the same time helping lower net global emissions by supplanting coal.<sup>1</sup> Specifically,

- Asia now accounts for more than two-thirds (67 percent) of global LNG demand, and is expected to grow to 300 million tonnes per annum (mtpa), or about 73 percent of total global demand by 2050 due to rising economic and population growth, and the need to decarbonize the existing power supply.
- By 2050, energy demand from Asian countries is expected to account for [47 percent](#) of the global total, with China making up more than half of that.
- A global LNG demand gap of 150 mtpa is anticipated by 2035. If currently planned west coast projects come online by 2035, Canada could provide up to 59 mtpa to help address the shortfall under a scenario in which this country accelerates its LNG capacity.



<sup>1</sup> The study examined three scenarios – a base case that considers moderate growth by in Canada's LNG industry, one in which Canada greatly accelerates its LNG capacity, and one in which it remains largely stagnant.

## 49.

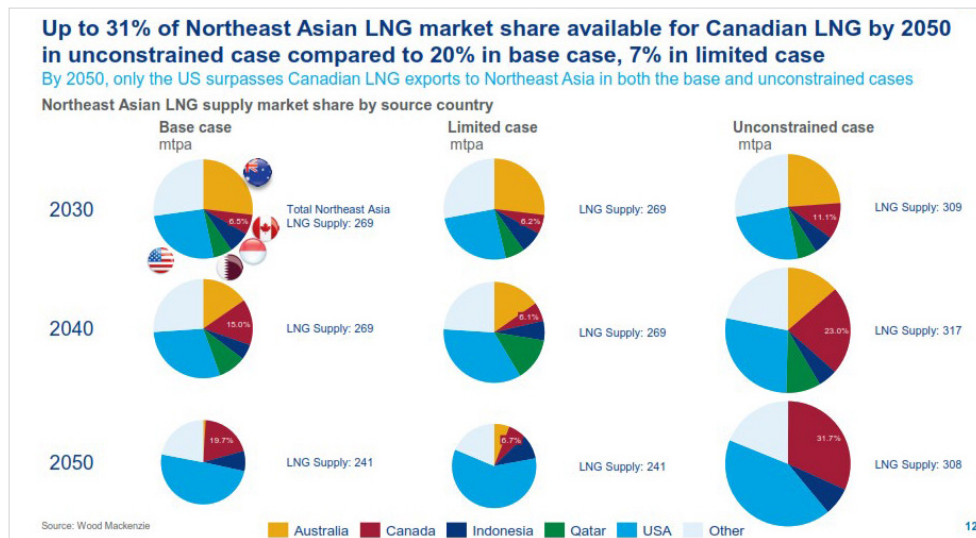
## Canadian LNG opportunities

Canada can be a preferred and reliable supplier of LNG to Northeast Asia. Up to [31 percent](#) of the Northeast Asian LNG market share is available for Canadian LNG by 2050.

## 50.

## How Canadian LNG exports can reduce global emissions

If Canada increases its LNG export capacity to Asia, by 2050 net emissions could decline [by 188 million](#) tonnes of CO<sub>2</sub> equivalent per year – or the annual impact of taking 41 million cars off the road.

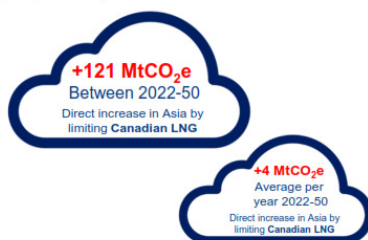


**To assess the impact of Canadian LNG on Northeast Asia, Wood Mackenzie estimated the emissions results for NE Asia under two sensitivities:**

**Sensitivity A (Base Case vs. Limited Case)**

Northeast Asian emissions if **Canada has less LNG liquefaction capacity than expected** (Base Case vs. Limited case)

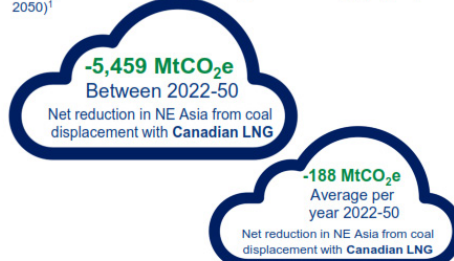
With less Canadian LNG supply, total Northeast Asian emissions would increase **121 MtCO<sub>2</sub>e** from 2022 to 2050, an average of **4 MtCO<sub>2</sub>e** per year (2022-2050)



**Sensitivity B (Base Case vs. Unconstrained Case)**

Northeast Asian emissions if **Canadian LNG helps replace coal for power generation** (Base Case vs. Unconstrained Case)

If Canada increases LNG capacity to help Northeast Asia reduce its reliance on coal-fired power generation, net emissions decline **-5,459 MtCO<sub>2</sub>e** from 2022 to 2050, an average of **-188 MtCO<sub>2</sub>e** per year (2022-2050)<sup>1)</sup>



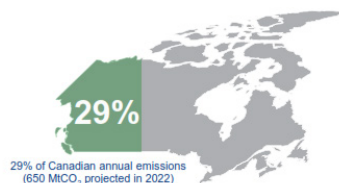
<sup>1)</sup> Total emissions displaced from Sensitivity B (Unconstrained Case) are -8,824 or -304 per year (2022-2050), with 62% being from Canadian LNG (-5,459 or -188 per year for 2022-2050)

Source: Wood Mackenzie

**The reduction of 188 MtCO<sub>2</sub> emissions on average per year from Canadian LNG sent to NE Asia under Sensitivity B represents 29% of Canadian yearly emissions**

Emissions Reduction from Unconstrained Case in Context

**-188 MtCO<sub>2</sub>**  
in average per year, is equivalent to:



**All Canadian Cars Removed from the Road**

41 million cars removed from the road (4.6 tons per car per year. Canada had 36 million vehicles registered in 2019)

or



**188 M Passengers**

188 million passengers flying from London to Vancouver (~1 ton per passenger per round trip)

or



**174 Carbon Capture and Storage Projects**

The Quest Project in Alberta is designed to capture up to 1.08 million tons of CO<sub>2</sub> per year, with an over \$700 million investment

Source: Wood Mackenzie, Government of Canada, Government of Alberta, EPA, Statistics Canada, The Economist

17

## About the Canadian Energy Centre

The Canadian Energy Centre's mandate is to promote Canada as the supplier of choice for the world's growing demand for responsibly produced energy. It is an independent provincial corporation that is primarily supported by the Government of Alberta's industry-funded Technology, Innovation and Emissions Reduction (TIER) fund. [www.canadianenergycentre.ca](http://www.canadianenergycentre.ca).

### CEC Research Briefs

Canadian Energy Centre (CEC) Research Briefs are contextual explanations of data as they relate to Canadian energy. They are statistical analyses released periodically to provide context on energy issues for investors, policymakers, and the public. The source of profiled data depends on the specific issue. This research brief is a compilation of previous Fact Sheets and Research Briefs released by the Centre in 2020. Sources can be accessed in the previously released reports. All percentages in this report are calculated from the original data, which can run to multiple decimal points. They are not calculated using the rounded figures that may appear in charts and in the text, which are more reader friendly. Thus, calculations made from the rounded figures (and not the more precise source data) will differ from the more statistically precise percentages we arrive at using the original data sources.

### About the authors

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