

SUMMARY

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Canada's Energy Sector

Status, evolution, revenue, employment, production forecasts, emissions and implications for emissions reduction

ALTHOUGH THE ENERGY SECTOR HAS BEEN A SIGNIFICANT contributor to Canada's economy, its contributions in terms of employment and revenue from royalties and taxes are declining, even though production is at an all-time high. Production of oil and gas creates one-quarter of Canada's greenhouse gas emissions at a time when Canada has committed to a 40 per cent reduction from 2005 levels by 2030 and "net-zero" emissions by 2050 (through Bill C-12, although in 2016 Canada agreed to an 80 per cent reduction target by 2050).^{1,2,3} Despite these trends, governments and industry tout increasing oil and gas production and exports as critically important for Canada's economic future.

- ¹ John Paul Tasker and Aaron Wherry, "Trudeau Pledges to Slash Greenhouse Gas Emissions by at Least 40% by 2030," CBC News, April 22, 2021, <https://www.cbc.ca/news/politics/trudeau-climate-emissions-40-per-cent-1.5997613>.
- ² "Net-zero" refers to reducing emissions to zero through domestic emissions reductions, purchased carbon offsets, and sequestration through carbon capture and storage (CCS) and direct air capture (DAC) of emissions. CCS and DAC are technologies that have been demonstrated but not proven to be viable at the scale required.
- ³ Bill C-12 has not yet become law. As of April 16, 2021, it had received second reading in the House of Commons. See <https://openparliament.ca/bills/43-2/C-12/> (accessed April 26, 2021) and on April 27 Minister Catherine McKenna announced there would be five more hours of second reading, then the discussion would be closed to further questions.

The energy sector's contribution to Canada's GDP, currently at 9 per cent, has declined over the past two decades, and government revenues from royalties and taxes have dropped precipitously. Despite record production levels, royalty revenue is down 45 per cent since 2000, and tax revenues from the oil and gas sector, which totalled over 14 per cent of all industry taxes as recently as 2009, declined to less than 4 per cent in 2018. Direct employment, which peaked at over 226,000 workers in 2014, was down by 53,000 in 2019 although production was at an all-time high due to efficiencies adopted by the industry. In Alberta, which produces a large proportion of Canada's oil and gas, total non-renewable resource revenue was down 61 per cent from 2000 levels in 2019, and 72 per cent on a revenue per barrel of oil equivalent basis.

At the same time, emissions from oil and gas production have continued to climb due to record production levels, which is largely driven by expansion of exports. Even with substantial reductions in emissions per barrel from the oil sands, along with reductions in fugitive methane emissions from natural gas, growth in oil and gas production will result in Canada failing to meet its emissions-reduction targets unless production is reduced.

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The Canada Energy Regulator's (CER) forecasts for oil and gas production through 2050 show concerning trends.⁴ In its Evolving Energy System Scenario (evolving scenario), which assumes governments will continue to introduce new policies over time to address climate change and emissions reduction, the oil and gas sector alone will cause Canada to exceed its Paris Agreement emissions target of an 80 per cent reduction from 2005 levels by 2050, let alone the "net-zero" target by 2050 adopted in Bill C-12. Even if emissions from all other sectors of the economy were reduced to zero, emissions from oil and gas production would cause the country to miss an 80 per cent by 2050 reduction target by 32 per cent (assuming emissions per barrel in the oil sands could be reduced by 30 per cent). In the CER's Reference Energy System Scenario (reference scenario), which assumes no new policies are adopted to reduce emissions, oil and gas production on its own would result in Canada missing this target by 94 per cent.

Current emissions from oil and gas production account for 26 per cent of Canada's total. As of 2019, the most recent year for which data are available, Canada had only reduced its emissions by 1.2 per cent from 2005 levels. This modest reduction is primarily due to the phase-out of coal-fired power in Ontario and Alberta, which has largely been replaced by natural gas in Alberta and nuclear power from refurbished reactors in Ontario. This was the "low-hanging fruit" for our emissions reductions—the next tranche of emissions reductions to meet the 40 per cent required by 2030 will be much more difficult.

Recent growth in Canada's emissions is the highest of any G7 country. Of the two G7 countries that have increased emissions since the Paris Agreement was signed in 2016, Canada, at 3.3 per cent, was the worst, followed by the US at 0.6 per cent.⁵ The other five G7 countries decreased emissions from between 4.4 per cent (Italy) and 10.8 per cent (Germany).

Jobs are often cited by industry proponents as a reason to support expansion of oil and gas production. Yet despite record production levels, jobs in the oil and gas sector are down

4 Canada Energy Regulator, *Canada's Energy Future 2020: Energy Supply and Demand Projections to 2050*, <https://www.cer-rec.gc.ca/en/data-analysis/canada-energy-future/2020/index.html>.

5 United Nations, *National Inventory Submissions 2021*, <https://unfccc.int/ghg-inventories-annex-i-parties/2021>.

from their peak in 2014 by 23 per cent (Figure S1). Thanks to technological advances, the sector has become more efficient and is able to increase production using fewer workers, meaning employment levels are unlikely to reach previous highs even as production grows. This jobs scenario is particularly true in the oil sands, where much of the production growth is expected. Oil sands production per employee is 70 per cent higher than it was in 2011 (production per employee has increased by 37 per cent in conventional oil and gas and by 50 per cent in the sector overall since 2011). In Canada's overall employment picture, the oil and gas sector accounted for only 1 per cent of direct employment in 2019 (5.5 per cent in Alberta). So, while production is projected to increase, efficiency and automation in the sector mean previous levels of employment are unlikely to return.

Governments receive revenues from oil and gas production through royalties and taxes, as well as lease sales. As noted above, while production has continued to increase, revenues received by governments have fallen dramatically. Royalty revenues have decreased by 45 per cent since 2000 and by 62 per cent on a per barrel basis (Figures S2 and S3). Non-renewable resource revenue in Alberta, where oil and gas production is highest, has fallen even more sharply—by 61 per cent since 2000 and by 72 per cent on a per barrel basis as of 2019. Revenue paid to governments from oil and gas through taxes has also fallen from a high of more than 14 per cent as a share of total industry taxes as recently as 2009 to less than 4 per cent in 2018 (Figure S4).

The CER projects electricity for end-use energy demand will increase from the 2019 level of 16.3 per cent to 26.5 per cent by 2050, primarily through growth in wind and solar generation. However, it also projects a continued heavy reliance on fossil fuels. In 2019, 77 per cent of Canada's end-use energy came from fossil fuels, and the CER projections show that level dropping to just 64 per cent by 2050. The smaller share of energy use that belongs to electricity is a significant challenge for reducing Canada's emissions, and strengthening policies such as building retrofits and more efficient transportation infrastructure that reduce energy consumption must be a major part of the solution.

Although domestic consumption of fossil fuels is projected by CER to decrease over time, production is projected to continue climbing due to a dramatic rise in oil and gas exports. From 2019 levels, the CER evolving scenario projects net exports of oil and gas to grow by 42 per cent and 186 per cent, respectively, by 2050. It is clear that the only way Canada can meet its climate change commitments is by decreasing production of oil and gas from these projected levels.

Canada's existing plans to build pipelines and other export infrastructure to facilitate production growth must change to meet its emissions-reduction targets:

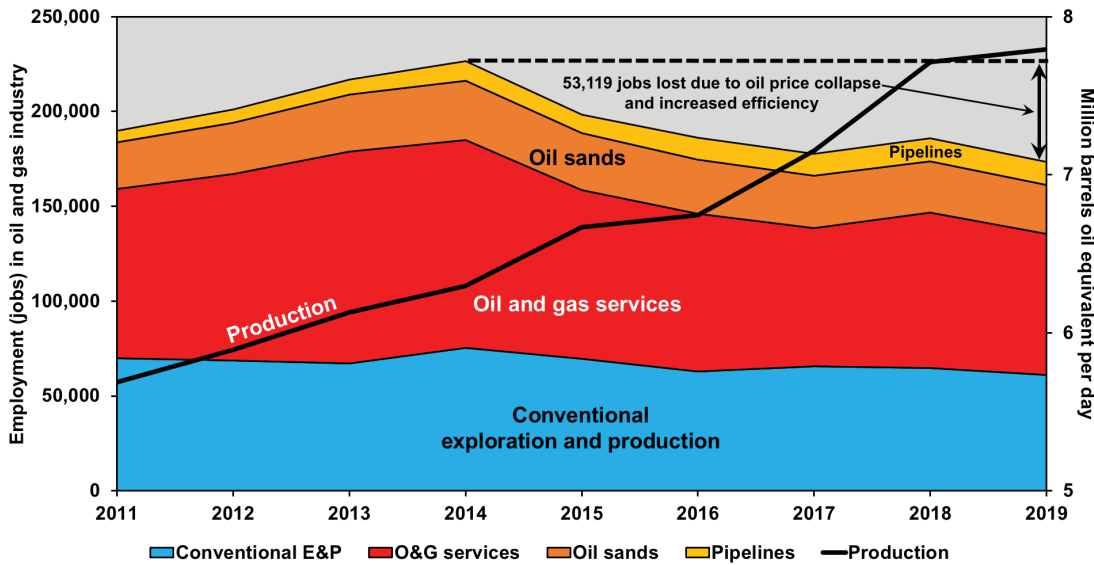
- Using the CER estimates of existing pipeline export capacity and its evolving scenario production, neither the Trans Mountain pipeline expansion (TMX) nor the recently cancelled Keystone XL pipeline are needed. Cancelling the taxpayer-funded TMX project will save \$12.6 billion⁶ (less funds spent to date) that could be spent on aggressive emissions-reduction measures.

Jobs are often cited by industry proponents as a reason to support expansion of oil and gas production. Yet despite record production levels, jobs in the oil and gas sector are down.

⁶ Canadian dollars unless otherwise indicated.

Figure S1: Employment in the oil and gas industry in Canada by sector component from 2011 to 2019, based on PetroLMI data (LHS)

Also shown is oil and gas production over the period (RHS).

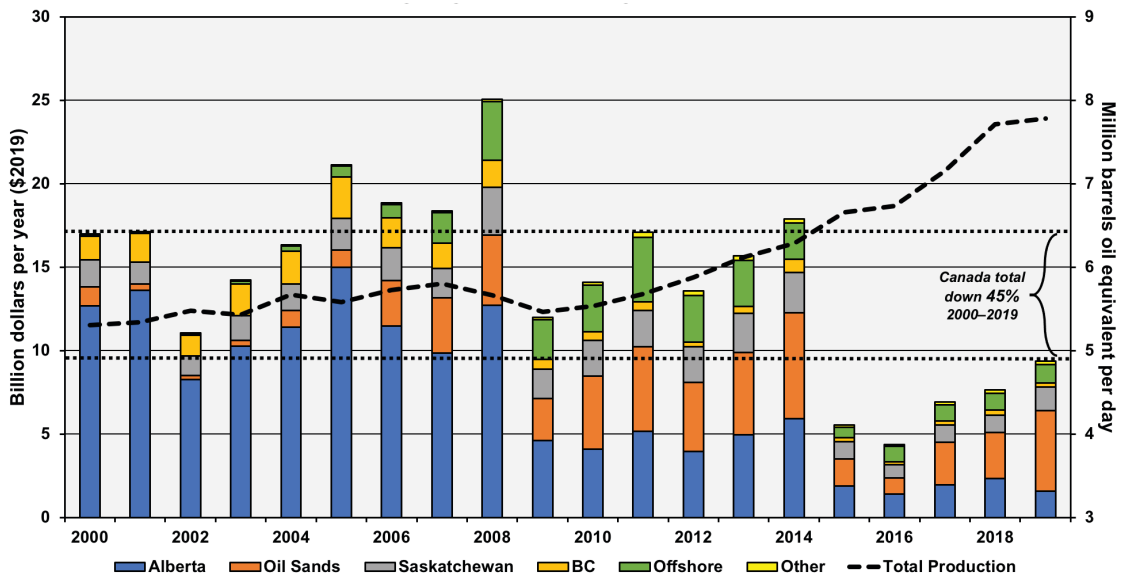


Notes: 2019 is a forecast and 2018 is an estimate.
LHS = left-hand side; RHS = right-hand side.

Source: Employment data from Petroleum Labour Market Information, *2019 Oil and Gas Labour Market Update* (Calgary: PetroLMI, 2019) and earlier labour market updates, https://careersinoilandgas.com/wp-content/uploads/2019/06/2019_Labour_Market_Update_Public_Spreadsheet_FINAL.xlsx (accessed June 10, 2020). Production data from Canadian Association of Petroleum Producers, *Statistical Handbook*, <https://www.capp.ca/resources/statistics/> (accessed October 21, 2020).

Figure S2: Royalty revenue from oil and gas production by province from 2000 to 2019 (LHS)

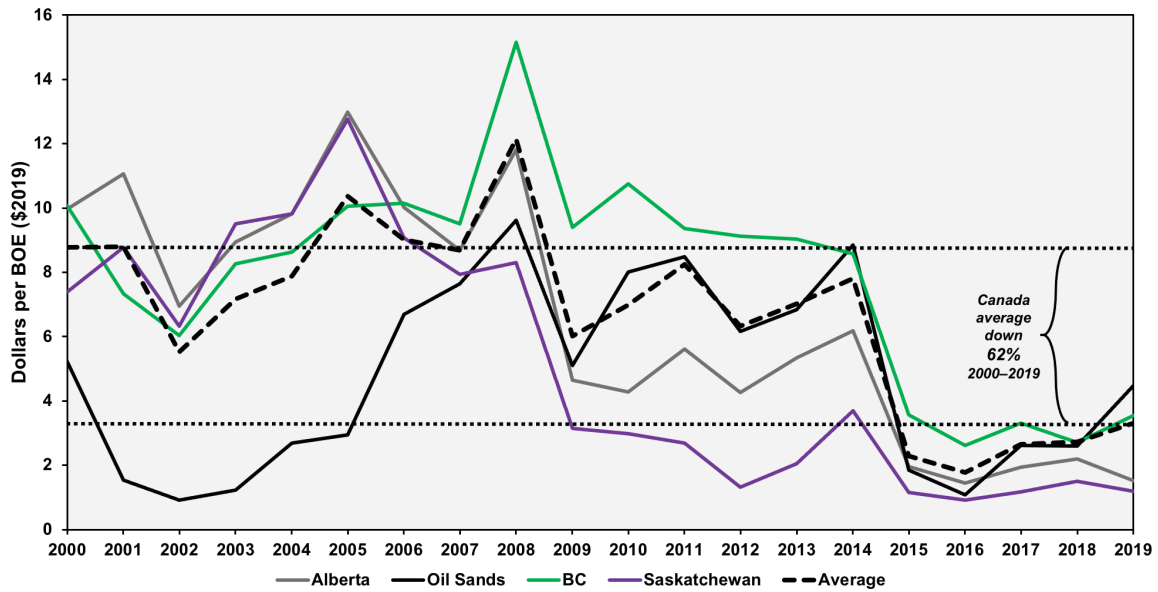
Total Canadian oil and gas production is also shown (RHS).



Notes: "Oil sands" is primarily Alberta oil sands and "offshore" is Newfoundland offshore.

Source: Canadian Association of Petroleum Producers, *Statistical Handbook*, <https://www.capp.ca/resources/statistics/> (accessed October 21, 2020).

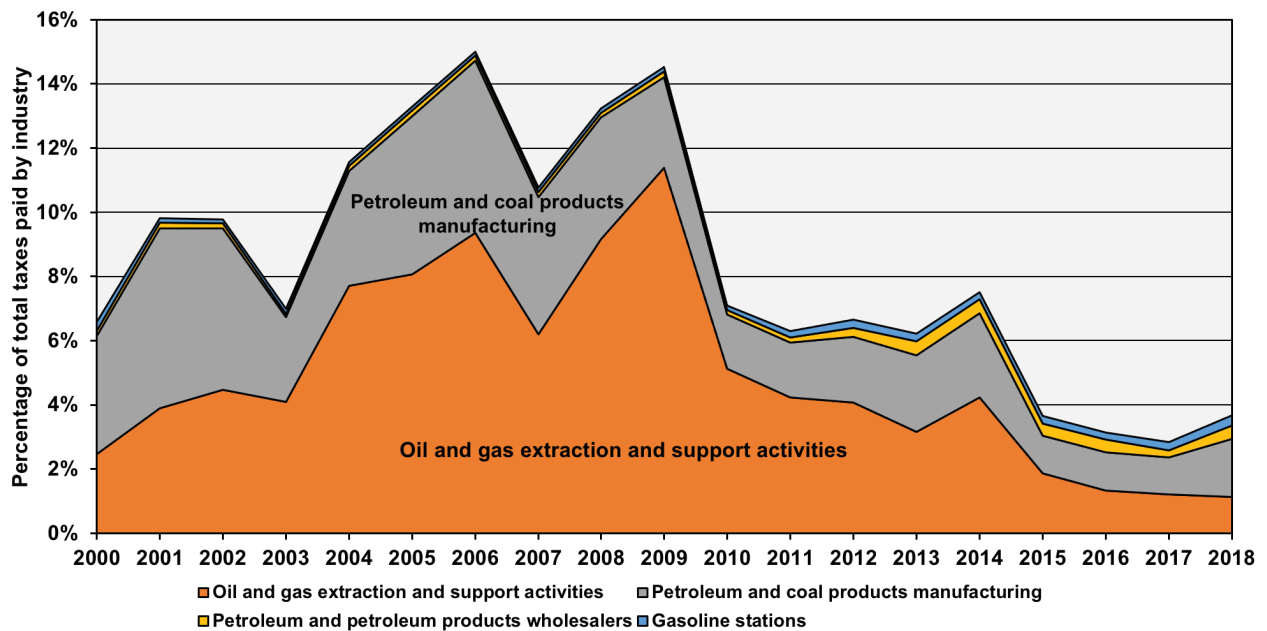
Figure S3: Royalty revenue from oil and gas production by province in dollars per barrel of oil equivalent (BOE) from 2000 to 2019



Note: "Oil sands" refers primarily to Alberta oil sands.

Source: Canadian Association of Petroleum Producers, Statistical Handbook, <https://www.capp.ca/resources/statistics/> (accessed October 22, 2020).

Figure S4: Tax contribution of the oil and gas sector as a percentage of total industrial taxes paid by industry in Canada from 2000 to 2018



Source: Statistics Canada, Table 33-10-0006-01, <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3310000601> (accessed August 25, 2020).

- If 420 thousand barrels per day (kbpd) of announced expansions on existing export pipelines, which were not included in the CER estimate of existing export capacity, are added, the 330 kbpd Enbridge Line 3 expansion project now under construction in Minnesota is not needed either. (Announced expansions include 190 kbpd on the existing Enbridge mainline, 140 kbpd through reversal of Enbridge’s Southern Lights pipeline, and 90 kbpd remaining on a permit for expansion of the capacity of the existing TC Energy Keystone pipeline.)
- Developing a liquefied natural gas (LNG) export industry in BC will render BC’s CleanBC plan impossible to achieve. The CER evolving scenario forecast for BC would mean that its oil and gas sector alone would exceed the CleanBC 2050 target by 93 per cent, even if every other sector of the BC economy reduced emissions to zero. If emissions from the three LNG export terminals now either proposed or under construction are included, BC would miss its 2050 target by 147 per cent. Despite the emissions implications, both the BC and federal governments have provided subsidies for BC LNG exports.

Canada’s existing plans to build pipelines and other export infrastructure to facilitate production growth must change to meet its emissions-reduction targets.

The CER evolving scenario clearly shows oil and gas production growth will result in certain failure to meet Canada’s emissions-reduction targets, so a stark change in direction is needed. The good news is that production growth is not related to energy needs at home, as domestic demand in Canada for oil and gas is projected to drop in the years and decades ahead. Rather, it is oil and gas exports that are driving the projected production growth.

Although the Canadian government intends to rely on carbon capture and storage (CCS) to achieve a significant part of its targets,⁷ as well as purchasing carbon offsets, there are serious questions as to the efficacy of that approach. CCS has been demonstrated at small scales compared to the reductions required, and much of the captured carbon dioxide has been used for enhanced oil recovery. This use of industrial carbon removal (ICR) has led researchers to conclude: “We found that the commercial ICR (C-ICR) methods being incentivized by governments are net CO₂ additive: CO₂ emissions exceed removals.”⁸ The practice of purchasing carbon offsets is also controversial, as it does not result in net emissions reductions in many cases.⁹

Canada, as a northern country with high heating loads in the winter, does face a significant challenge in reducing emissions by meeting domestic energy use exclusively with renewables like wind and solar energy. That means some fossil fuels will likely need to be part of the country’s energy mix for the foreseeable future. As noted above, in 2019, 77 per cent of our end-use energy demand came from fossil fuels. The CER evolving scenario shows that rate dropping to 64 per cent by 2050, which still amounts to a significant share of domestic energy consumption. Oil and gas are finite resources and Western Canada, where most of these resources are produced, is a mature exploration region. Given that these resources will be needed at some level for the foreseeable future, and that they are a major source of

7 Joel Dryden, “When asked about emission targets, Freeland says carbon capture plans will ‘turbocharge’ industry,” *CBC*, April 25, 2021, <https://www.cbc.ca/news/canada/calgary/chrystia-freeland-duane-bratt-alberta-carbon-capture-1.6001762>.

8 June Sekera and Andreas Lichtenberger, “Assessing Carbon Capture: Public Policy, Science, and Societal Need,” *Biophysical Economics and Sustainability* 5, no. 14 (2020), <https://doi.org/10.1007/s41247-020-00080-5>.

9 Robert Watt, “The Fantasy of Carbon Offsetting,” *Environmental Politics* (2021): 1–20, <https://www.tandfonline.com/doi/full/10.1080/09644016.2021.1877063>.

emissions, we should be retaining remaining resources to meet our own needs rather than expanding the export market.

Clearly, if Canada is to have any hope of meeting its emissions-reduction targets, the oil and gas production sector will have to reduce emissions to a level far below what is projected in the CER evolving scenario production forecast. Cutting production will have some economic impacts, even though the economic contributions from oil and gas production have already declined markedly in the past two decades. The industry certainly won't disappear, as Canadians will need oil and gas at some level for decades, and reducing production will prolong the lifespan of these finite resources for Canada's domestic use.

The need to radically reduce fossil fuel production to meet net-zero targets has also been recognized by the International Energy Agency (IEA) in its recent *Net-zero by 2050* report.¹⁰ The IEA concluded:

- “Net zero means a huge decline in the use of fossil fuels. They fall from almost four-fifths of total energy supply today to slightly over one-fifth by 2050.”
- “Beyond projects already committed as of 2021, there are no new oil and gas fields approved for development in our pathway, and no new coal mines or mine extensions are required. Unabated coal demand declines by 90% to just 1% of total energy use in 2050. Gas demand declines by 55% to 1,750 billion cubic metres and oil declines by 75% to 24 million barrels per day (mb/d), from around 90 mb/d in 2020.”
- “Making net-zero emissions a reality hinges on a singular, unwavering focus from all governments — working together with one another, and with businesses, investors and citizens.”

The IEA's report underscores the contradiction between Canada's commitment to achieving net-zero by 2050 and its policies of building export pipelines to facilitate increased production and the development of an LNG export industry.

With respect to the oil and gas production sector, a credible plan to reduce emissions must include the following:

- Reduce or eliminate the growth in production for exports that is projected through 2050 by CER in its evolving scenario, which forecasts that net oil exports will grow 42 per cent and net gas exports will grow 186 per cent over the 2019 to 2050 period.
- Reduce current exports to the extent possible to reduce the production emissions associated with them. Some 53 per cent of 2019 net oil production was exported along with 15 per cent of net natural gas production.
- Cancel export pipeline projects that are not needed as evidenced by the CER evolving scenario projection, including TMX and the Line 3 expansion. Cancelling TMX would save \$12.6 billion tax dollars (less expenses to date), which could then be devoted to investments in infrastructure to give Canadians an alternative to high levels of energy consumption.

If oil and gas production increases will not result in strong growth in jobs and government revenues and will result in Canada missing its emissions-reduction targets, why would the country allow these increases to happen?

¹⁰ International Energy Agency, May, 2021, *Net Zero by 2050: A Roadmap for the Global Energy Sector*, <https://www.iea.org/reports/net-zero-by-2050>.

Providing incentives to reduce consumption in all sectors and encourage growth in carbon-free energy must, of course, be emphasized. However, these incentives will not achieve emissions-reduction targets on their own unless oil and gas production emissions are also reduced compared to current projections.

Canada must take a step back and look at the big picture of emissions sources and the possibilities for reducing them. If oil and gas production increases will not result in strong growth in jobs and government revenues and *will* result in Canada missing its emissions-reduction targets, why would the country allow these increases to happen? The path ahead to achieve Canada's emissions-reduction targets will be difficult, and reducing emissions from the energy sector will be a critical part of the solution.

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