Canadian Energy Centre (CEC) Submission to Environment and Climate Change Canada

Overview Report

Options to cap and cut oil and gas sector greenhouse gas emissions to achieve 2030 goals and net-zero by 2050

NOVEMBER 2022

Canadian Energy Centre

INDEX

BACKGROUND

Under its *2030 Emissions Reduction Plan* (ERP), the federal government is targeting the Canadian oil and gas sector for emissions reductions of 42 percent below 2019 levels by 2030 (from 191 MT to 110 MT, or an 81 MT reduction), while further lowering emissions of the oil and gas sector at a pace and scale needed to achieve net zero by 2050. Canadian oil sands emissions are required to fall from 84 MT in 2019 to 55 MT in 2030, a decline of 29 MT, or nearly 35 percent.

In the discussion paper, *Options to Cap and Cut Oil and Gas Sector Greenhouse Gas Emissions to Achieve 2030 Goals and Net Zero by 2050*, the federal government is proposing to use a regulatory approach to implement an overall oil and gas emissions cap of 110 MT, as of 2030, and an oil sands implied emission cap of 55 MT, as of 2030, with an overall emissions cap presumably close to 0 MT by 2050. The federal government is seeking input on two regulatory implementation options:

- **Option 1:** A new cap-and-trade system under the Canadian Environmental Protection Act, 1999 (CEPA); and
- **Option 2:** Modification of the current carbon pricing approach under the Greenhouse Gas Pollution Pricing Act (GGPPA).

CEC has identified two pertinent questions from the federal discussion paper on which it would like to comment.

- How do you envision the future of the oil and gas sector in the Canadian economy or your community?
- 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?

In approaching these two questions, the CEC is concerned that the discussion paper does not provide any detailed modeling of the economic impacts of emissions caps and cuts on the oil and gas sector in 2030 and 2050 under the two regulatory options (cap and trade and carbon pricing), particularly as it relates to such key industry performance indicators as production, GDP, investment, and employment. This is a critical shortcoming of the discussion paper and constrains the ability of affected stakeholders to provide informed feedback on the two regulatory options proposed to achieve the 2030 targets and net zero by 2050.

CEC believes that quantifying the economic impacts of net zero on Canada's oil and gas sector is critical for business planning purposes. Oil and gas companies and governments alike must be able to identify, assess and manage the risks that the 2030 targets and 2050 net zero present. Only then will companies be able to mitigate the risks by adopting low emissions technologies such as Carbon Capture, Utilization and Storage (CCUS), hydrogen, and Direct Air Capture (DAC), among others. And only then will governments be able to respond to those risks by establishing appropriate fiscal and regulatory instruments to incent private sector investment in these low emissions technologies.

Given the discussion paper's shortcomings, CEC asked Navius Research to undertake detailed modeling to assess the impacts to Canadian oil and gas sector emissions, production, technology adoption, GDP, investment and jobs under various net zero policy pathways.

Recognizing the economic impacts of net zero and emissions caps and cuts on the Canadian oil and gas sector will help the government form responsive policies and regulations that encourage private sector investment in the low emitting technologies, like CCUS, hydrogen, and DAC, which will be needed to sustain production, GDP and employment in the sector.

MODELING APPROACH

Over the past decade, governments in Canada have implemented numerous policies and regulations to encourage businesses and individuals to reduce their emissions. Achieving Canada's net zero targets by 2050 will require these existing policies and regulations to be significantly strengthened, but also require the implementation of new policies and regulations that will yield additional emission reductions at the lowest possible cost to the oil and gas sector.

Estimating the regional, sectoral, technological and economic impacts on Canada's oil and gas sector of achieving Canada's net zero emissions target requires a modeling framework that captures the complexity of the energy economy.

The model used for our economic analysis is the Navius Research g-Tech model. As a Computable General Equilibrium (CGE) model, gTech provides a detailed accounting of the types of energy-related technologies available to households and businesses. In total, gTech includes over 95 sectors and over 300 technologies across 70 end-uses.

gTech is the most comprehensive model available for forecasting the techno-economic impacts of climate policy in Canada. Its representation of technological change, macroeconomic dynamics and fuels markets mean that it is ideally positioned to forecast how achieving net zero emissions by mid-century in Canada will affect technological change, energy consumption, GHG emissions and the economy (Navius, 2022).

To examine the impacts of net zero on the Canadian oil and gas sector through 2050, Navius simulated a number of climate change policy scenarios, for the CEC. Navius based those scenarios on the role that three key technologies (CCUS, hydrogen and DAC) will play in Canada's net zero future. This was accomplished by simulating different future cost trajectories for each technology, specifically, medium adoption, using a reference cost case trajectory, low adoption, using a high-cost case scenario, and high adoption, using a low-cost case scenario.

- **Current policy (reference):** This scenario includes all existing federal and provincial climate change policies implemented to date, with no additional policy intervention. The federal carbon pricing backstop remains capped at $50 per tonne of carbon dioxide equivalent ($50/tCO2e) through 2050, with an output-based pricing system (OBPS) in place.
- **Announced policy (reference case):** This scenario includes policies announced in the *A Healthy Environment and Healthy Economy* (HEHE) climate plan and Canada's 2030 Emissions Reduction Plan (ERP). This includes a carbon price that rises to $170/tCO2e by 2030, implementation of the Low Carbon Fuel Regulation, and the CCUS tax credit.
- **Net zero policy (reference cost case):** Net zero is defined in this analysis as net zero emissions of all greenhouse gases (GHGs) across all sectors and regions of Canada's economy. This scenario includes the HEHE and 2030 ERP climate plans and phases in an emissions cap starting in 2035 to achieve net zero emissions by 2050. The federal carbon pricing backstop increases in $15/tCO2e increments annually and reaches $170/tCO2e in 2030 and remains at that level through 2050, with an output-based pricing system (OBPS) in place. This scenario assumes that a certain amount of offsets are available nationally via land-use, land-use change and forestry (30 MT CO2e in 2030 and 103 MT CO2e in 2050), based on a recent report by Nature United. This scenario assumes that the United States implements its own stringent climate policy. The oil and gas emissions cap is simulated as a tradeable performance standard,

where 100 percent of the credit market revenues are recycled back to the oil and gas sector. Technology adoption costs are considered at the mid-range of the cost curve.

- **Net zero policy (low-cost case):** Net zero is defined in this analysis as net zero emissions of all GHGs across all sectors and regions of Canada's economy. This scenario includes the HEHE and 2030 ERP climate plans and phases in an emissions cap starting in 2035 to achieve net zero emissions by 2050. The federal carbon pricing backstop increases in $15/tCO2e increments annually and reaches $170/tCO2e in 2030 and remains at that level through 2050, with an output-based pricing system (OBPS) in place. This scenario assumes that a certain amount of offsets are available nationally via land-use, land-use change and forestry (30 MTCO2e in 2030 and 103 MT CO2e in 2050), based on a recent report by Nature United. This scenario assumes that the U.S. implements its own stringent climate policy. The oil and gas emissions cap is simulated as a tradeable performance standard, where 100 percent of the credit market revenues are recycled back to the oil and gas sector. Technology adoption costs are considered at the lower range of the cost curve.
- **Net Zero (50/50) (2050):** Net zero (50/50) follows the announced policy scenario out to 2030, before phasing in a cap on oil and gas emissions from 2035 onwards to reach net zero emissions by 2050. This scenario assumes that a certain amount of offsets are available nationally via land-use, land-use change and forestry (30 MT CO2e in 2030 and 103 Mt CO2e in 2050), based on a recent report by Nature United. This scenario assumes that the United States implements its own stringent climate policy. The oil and gas emissions cap is simulated as a tradeable performance standard, where 50 percent of the credit market revenues are recycled back to the oil and gas sector and 50 percent are rebated to individual households. Technology adoption costs are considered at the mid-range of the cost curve.

We compare these various climate change policy and regulatory scenarios in order to evaluate economic impacts, and the adoption rates for low emitting technologies, between 2020 and 2050.

Note that Navius did not simulate an emissions cap to the 2030 targets. The net zero scenarios follow the trajectory of the 2030 ERP announced policies out to 2030, and then puts in place an emissions cap from 2035 onwards.

The views expressed in this paper represent the views of the Canadian Energy Centre (CEC), solely, and do not, in any manner, represent the views of Navius Research.

KEY ASSUMPTIONS

Several assumptions underlie our scenarios, including:

- Under the reference case, crude oil prices average $66.00 2020 USD per barrel over the forecast period.
- Overall Canadian oil and gas emissions under announced policy are 106 Mt in 2030, 4 Mt under the proposed 110 Mt oil and gas emissions cap.
- Revenues raised under the emissions cap are all either returned to oil and gas firms to be used for investment in low emitting technologies, such as CCUS, DAC, and hydrogen, or 50 percent is returned to oil and gas firms and 50 percent is returned to households.

CEC is also examining the impacts of incremental carbon pricing for the oil and gas sector, such as the application of a $100 per tonne incremental price. CEC will be providing this analysis to ECCC in a subsequent amended submission.

OVERVIEW

CEC is concerned that the federal discussion paper, *Options to Cap and Cut Oil and Gas Sector Greenhouse Gas Emissions to Achieve 2020 Goals and Net Zero by 2050*, does not provide any detailed modeling of the economic impacts of an emissions cap and cuts on the Canadian oil and gas sector in 2030 and 2050 under the two regulatory options (cap and trade and carbon pricing), particularly as it relates to such key industry performance indicators as production, GDP, investment, and employment.

This is a critical shortcoming because it constrains the ability of affected stakeholders to provide informed feedback on the two regulatory options proposed to achieve 2030 targets and net zero by 2050.

While global oil and gas prices are still the main driver of production and economic growth in the oil and gas sector, net zero policies and regulations have a significant impact on these variables.

Government policy and regulatory design do matter and need to be considered carefully. For example, under a net zero scenario where revenues under the emissions cap are recycled 50 percent to oil and gas firms and 50 percent to households, the negative impacts on the oil and gas sector are very pronounced. The negative impacts on oil and gas production, employment, and GDP are as follows.

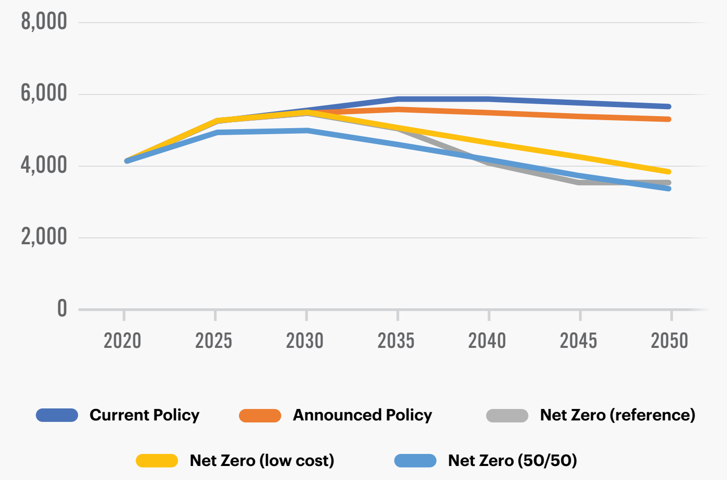
Oil and gas sector production

- Oil production is 508,000 barrels per day lower in 2030 and 2.054 million barrels per day lower in 2050 under net zero 50/50 than under current policy (see Figure ES1).
- Oil sands production is 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 (see Figure ES2).

Figure ES1

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

2020-2050 | Thousands of barrels per day

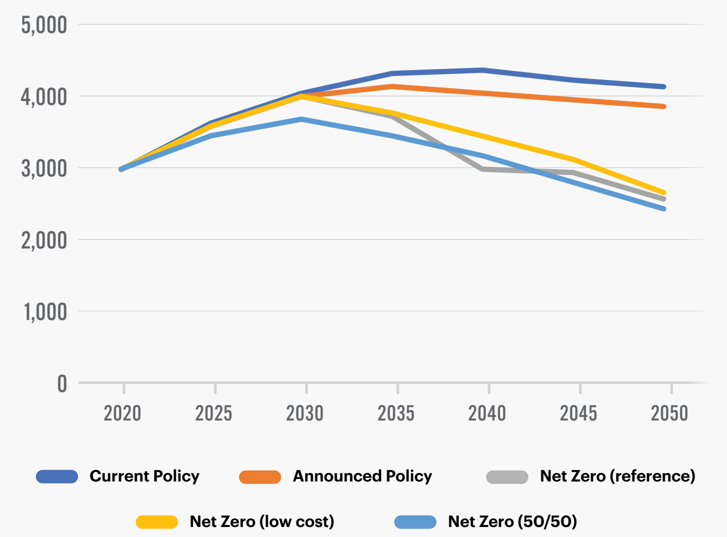


Source: Derived from the Navius Research gTech model.

Figure ES2

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.

- Natural gas production is 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 (see Figure ES3).

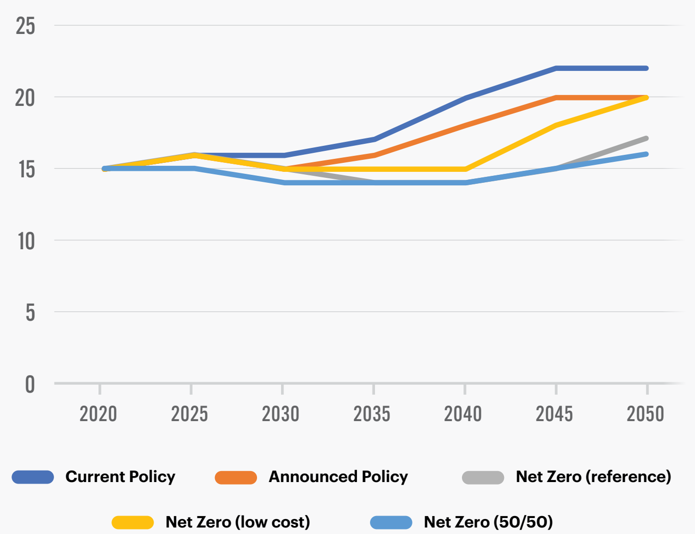
Oil and gas sector employment

- Oil and gas sector employment is 13,000 or 6.7 percent lower in 2030 and 39,000 or 19.9 percent lower in 2050 under net zero 50/50 than under current policy (see Figure ES4).
- Oil sands sector employment is 4,000 or 8.9 percent lower in 2030 and 18,000 or 42.9 percent lower in 2050 under net zero 50/50 than under current policy (see Figure ES5).

Figure ES3

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

2020-2050 | Billion cubic feet per day

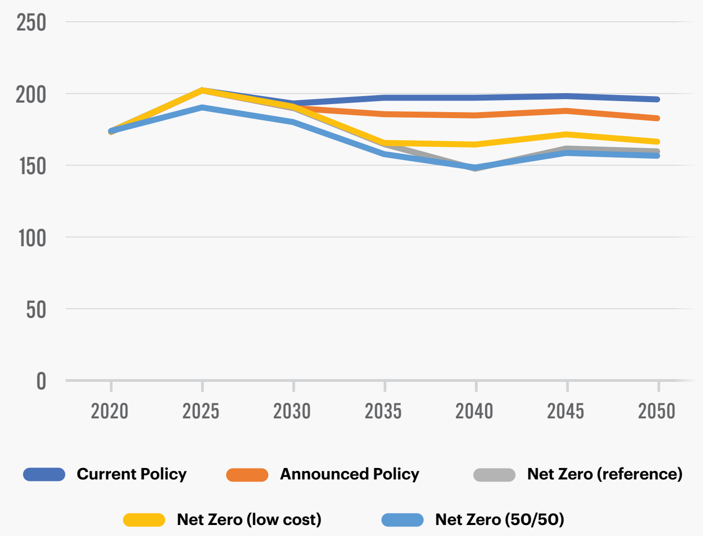


Source: Derived from the Navius Research gTech model.

Figure ES4

Projected Canadian oil and gas sector employment under current policy, announced policy, and net zero

2020-2050 | 000's

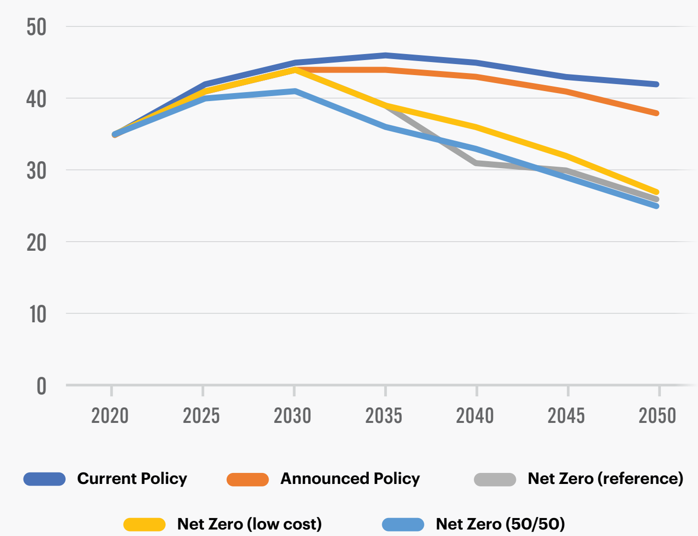


Source: Derived from the Navius Research gTech model.

Figure ES5

Projected Canadian oil sands sector employment under current policy, announced policy, and net zero

2020-2050 | 000's



Source: Derived from the Navius Research gTech model.

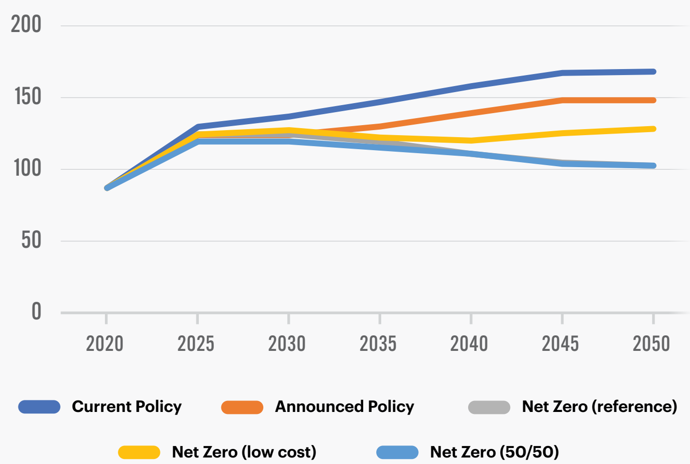
Oil and gas sector GDP

- Oil and gas sector GDP is $18 billion or 13.1 percent lower in 2030 under net zero than under current policy, while in 2050, oil and gas GDP is $65 billion or 38.7 percent lower under net zero than under current policy (see Figure ES6).
- Oil sands sector GDP is $5 billion or 10.2 percent lower in 2030 under net zero than under current policy, while in 2050, oil sands sector GDP is $32 billion or 65.3 percent lower under net zero than under current policy (see Figure ES7).

Figure ES6

Projected Canadian oil and gas sector GDP under current policy, announced policy, and net zero

2020-2050 | Billions of 2020$

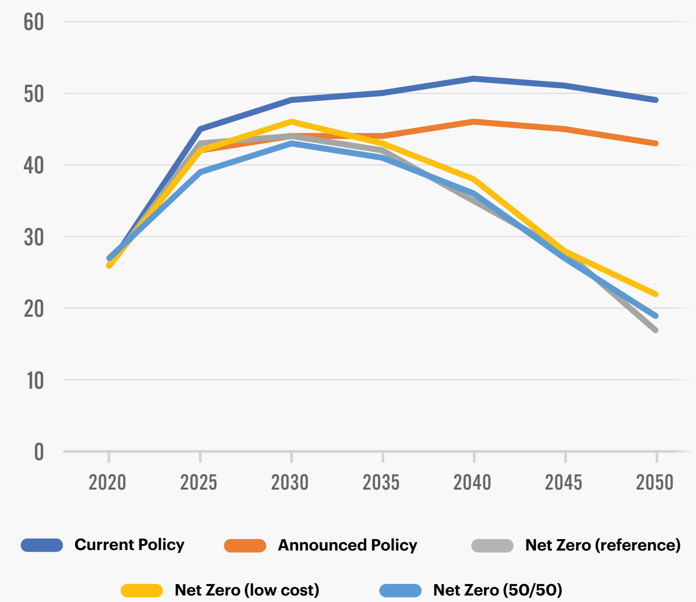


Source: Derived from the Navius Research gTech model.

Figure ES7

Projected Canadian oil sands sector GDP (includes upgrading) under current policy, announced policy, and net zero

2020-2050 | Billions of 2020$



Source: Derived from the Navius Research gTech model.

Oil and gas sector technology adoption and impacts on key economic variables

Adoption rates and costs of CCUS, hydrogen and DAC will play a key role in mitigating some of the negative economic impacts of net zero policy on the oil and gas sector and oil sands sector.

Efforts to encourage early adoption and lower the cost of DAC, hydrogen, and CCUS should be emphasized by government policymakers to reduce the negative economic impacts of net zero for the oil and gas sector.

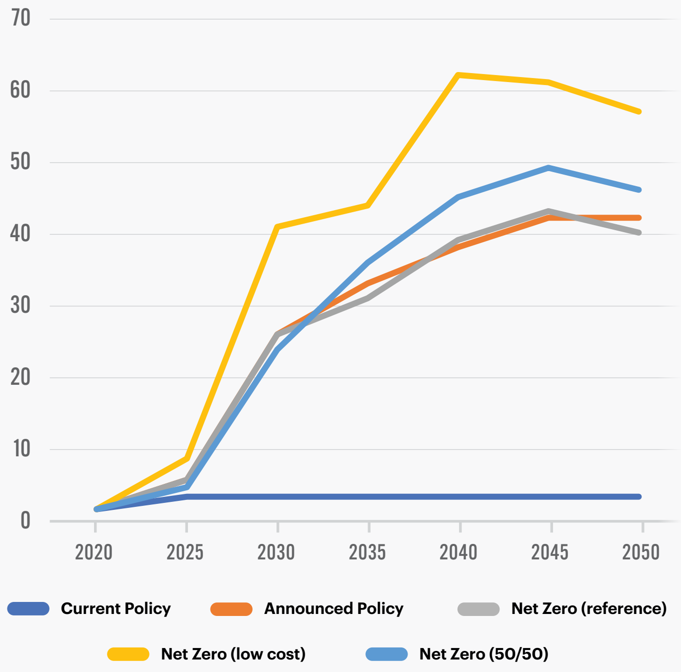
For example:

- CCUS adoption in the oil and gas sector in the net zero low-cost case is 41 MT in 2030 or 15 MT higher than under the net zero reference cost case, and 57 MT in 2050 or 17 MT higher, than in the net zero reference cost case (see Figure ES8).
- CCUS adoption in the oil sands in the net zero low-cost case is 34 MT in 2030 or 14 MT higher in 2030 and 44 MT in 2050 or 15 MT higher than in the net zero reference case (see Figure ES9).

Figure ES8

Projected CCUS adoption in Canada's oil and gas sector under current policy, announced policy, and net zero

2020-2050 | Billions of 2020$

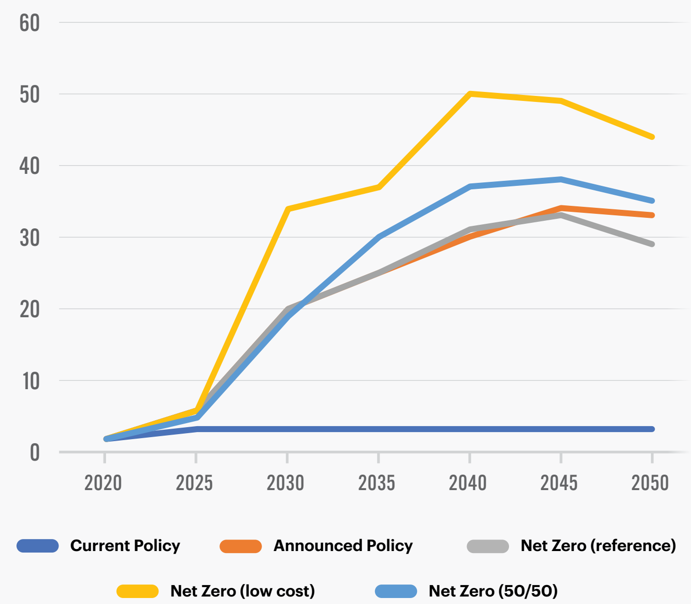


Source: Derived from the Navius Research gTech model.

Figure ES9

Projected CCUS adoption in Canada's oil sands sector under current policy, announced policy, and net zero

2020-2050 | MT



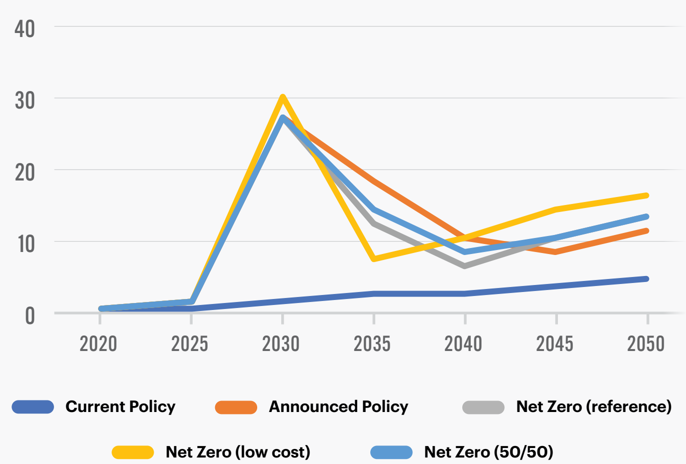
Source: Derived from the Navius Research gTech model.

- Hydrogen consumption in the oil and gas sector in 2030 is 30 PJ in the net zero low-cost case, 3 PJ higher than in the net zero reference cost case, and 16 PJ in 2050, 3 PJ higher than in the net zero reference cost case (see Figure ES10).
- Hydrogen consumption in the oil sands sector in 2030 is 23 PJ in the net zero low-cost case, 4 PJ higher than the in the net zero reference cost case, and 14 PJ in 2050, 5 PJ higher than in the net zero reference cost case (see Figure ES11).
- DAC adoption reaches 264 Mt overall in 2050 in the net zero low-cost case, 42 Mt higher than under the net zero reference cost case (see Figure ES12).

Figure ES10

Projected hydrogen consumption in the oil and gas sector under current policy, announced policy, and net zero

2020-2050 | PJ

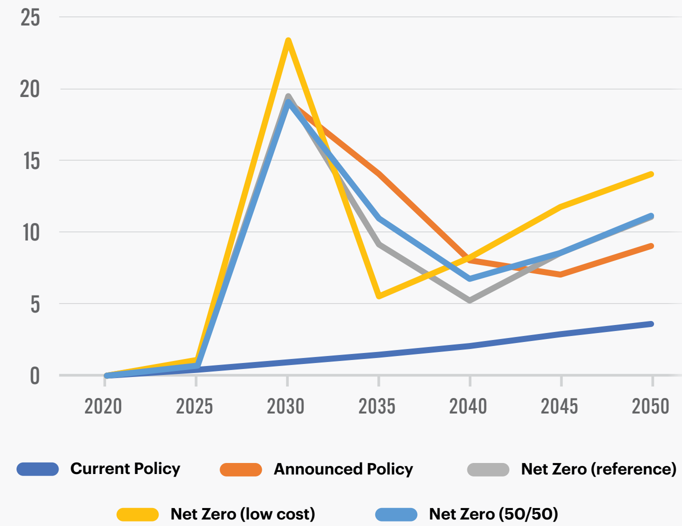


Source: Derived from the Navius Research gTech model.

Figure ES11

Projected hydrogen consumption in the oil sands sector (includes upgrading) under current policy, announced policy, and net zero

2020-2050 | PJ

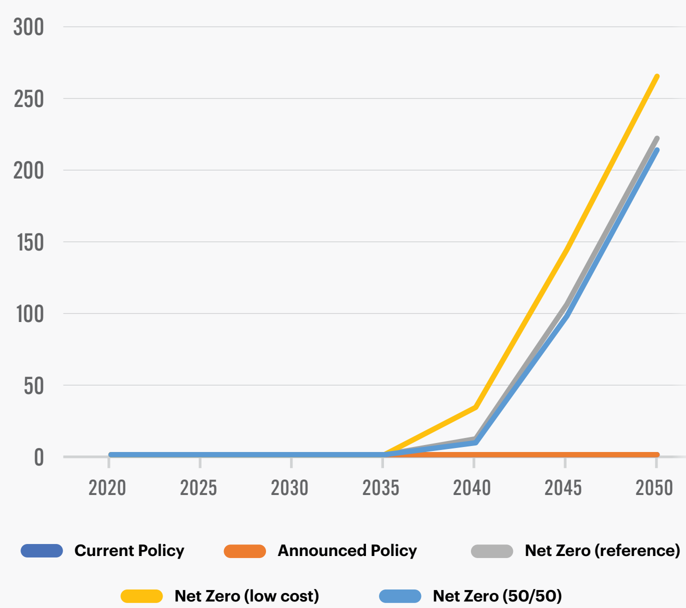


Source: Derived from the Navius Research gTech model.

Figure ES12

Projected DAC adoption under current policy, announced policy, and net zero

2020-2050 | MT



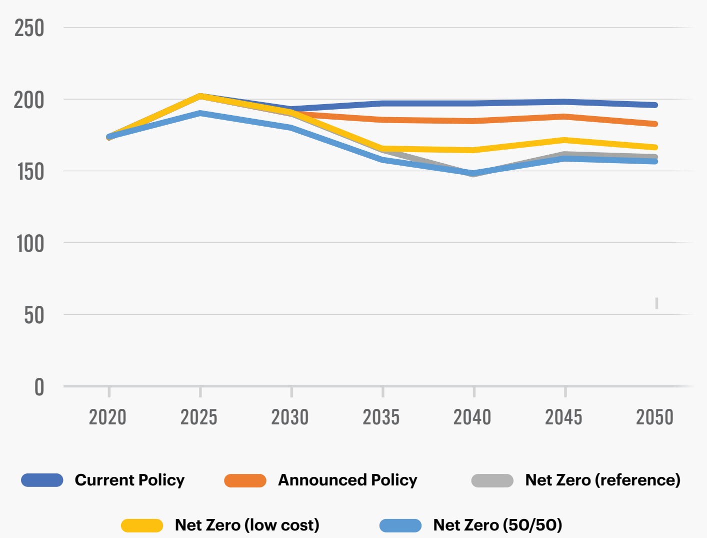
Source: Derived from the Navius Research gTech model.

- Employment in the oil and gas sector is 1,000 higher in 2030 under the net zero low-cost case than under the net zero reference cost case, and 7,000 higher in 2050 under the net zero low-cost case than under the net zero reference cost case (see Figure ES13).
- Employment is 1,000 higher in the oil sands sector in 2050 under the net zero low-cost case than under the net zero reference cost case (see Figure ES14).
- Oil and gas sector GDP is $3 billion higher in 2030 and $25 billion higher in 2050 in the net zero low-cost case than under the net zero reference cost case (see Figure ES15).
- Oil sands sector GDP is $2 billion higher in 2030 and $5 billion higher in the net zero low- cost case in 2050 than under the net zero reference cost case (see Figure ES16).

Figure ES13

Projected Canadian oil and gas sector employment under current policy, announced policy, and net zero

2020-2050 | 000's

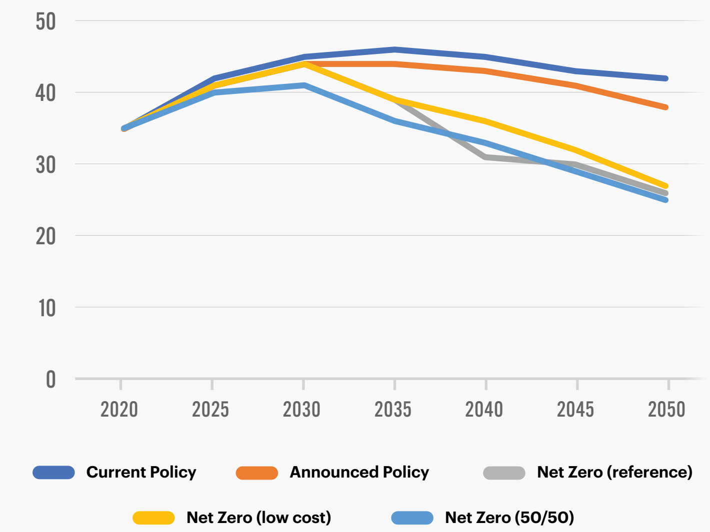


Source: Derived from the Navius Research gTech model.

Figure ES14

Projected Canadian oil sands sector employment under current policy, announced policy, and net zero

2020-2050 | 000's

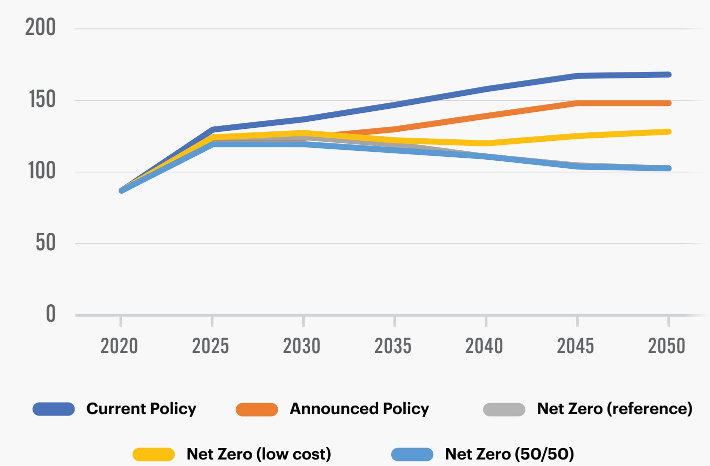


Source: Derived from the Navius Research gTech model.

Figure ES15

Projected Canadian oil and gas sector GDP under current policy, announced policy, and net zero

2020-2050 | Billions of 2020$

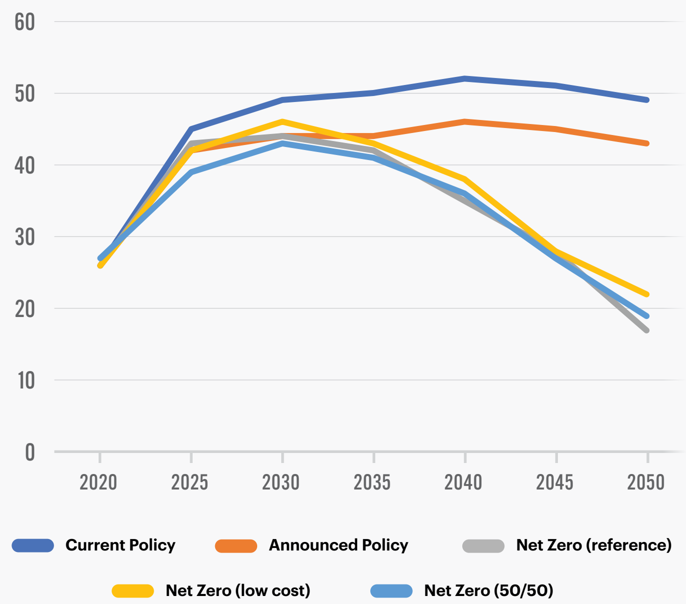


Source: Derived from the Navius Research gTech model.

Figure ES16

Projected Canadian oil sands sector GDP (includes upgrading) under current policy, announced policy, and net zero

2020-2050 | Billions of 2020$

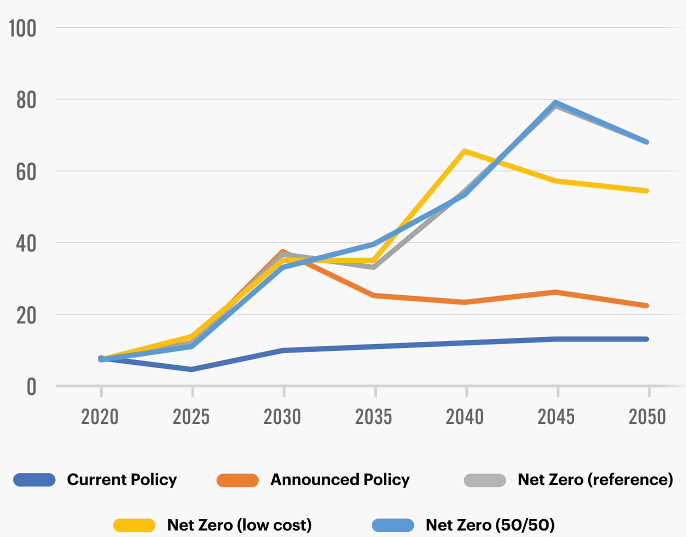


Source: Derived from the Navius Research gTech model.

Figure ES17

Projected CCUS employment under current policy, announced policy, and net zero

2020-2050 | 000's



Source: Derived from the Navius Research gTech model.

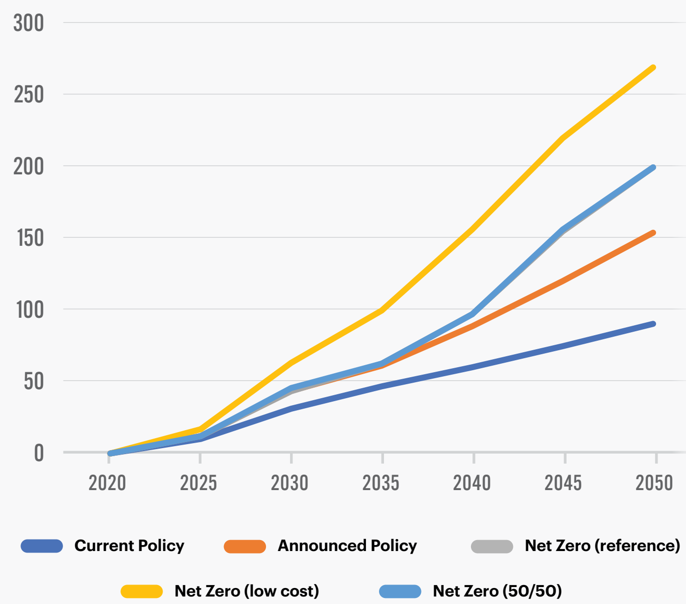
Increased adoption of CCUS, hydrogen and DAC also has a positive impact on employment and GDP in those emerging technology sectors.

- Under current policy, CCUS employment is 9,000 in 2030 and 12,000 in 2050. Under the net zero reference cost case, employment in the CCUS sector is 37,000 in 2030 and 68,000 in 2050, while under the net zero low-cost case, employment in the CCUS sector is 35,000 in 2030 and 54,000 in 2050 (see Figure ES17).
- Employment in the hydrogen sector is 30,000 in 2030 and 87,000 in 2050 under current policy. Under the net zero low-cost case, employment in the hydrogen sector is 63,000 in 2030 and 267,000 in 2050 (see Figure ES18).

Figure ES18

Projected hydrogen employment under current policy, announced policy, and net zero

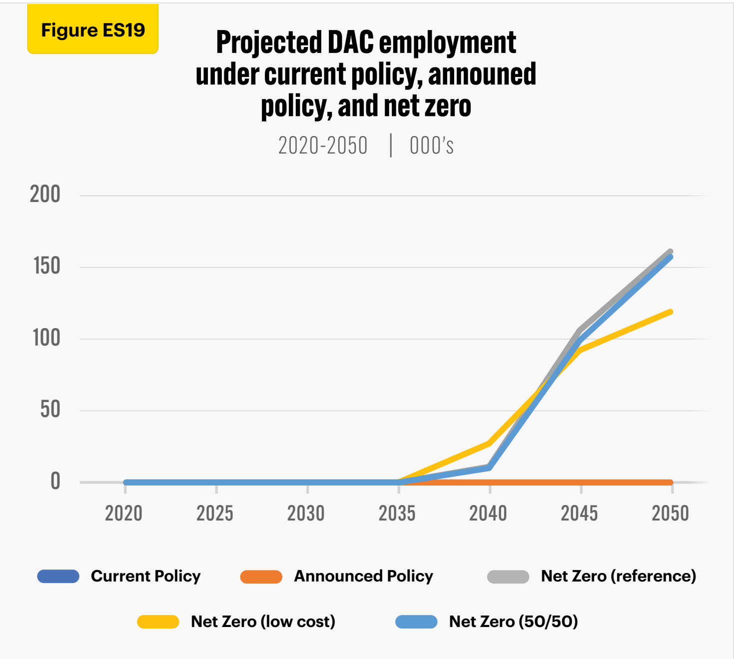
2020-2050 | 000's



Source: Derived from the Navius Research gTech model.

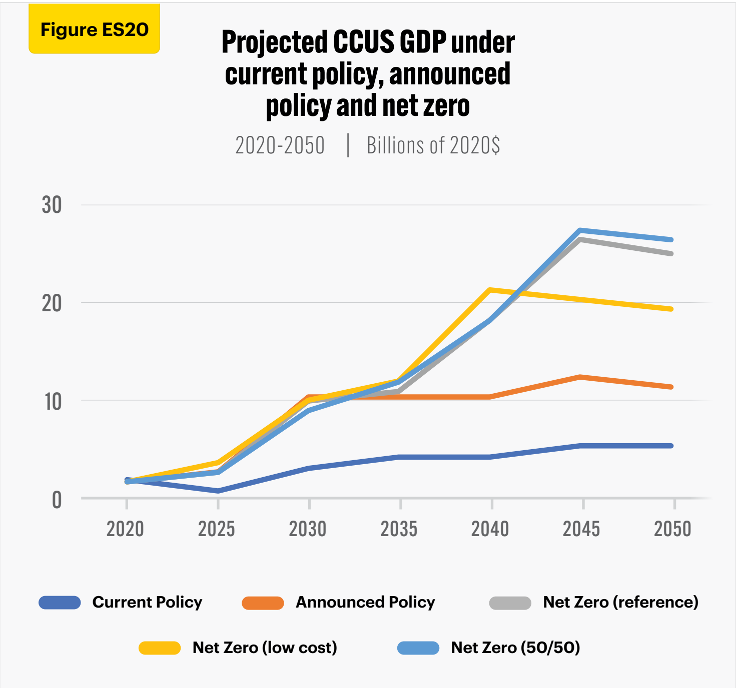
- Employment in the DAC sector is zero in 2050 under current policy. Under the net zero low-cost case, employment is 119,000 in 2050 (see Figure ES19).
- Under current policy, GDP in the CCUS sector is $3 billion in 2030 and $5 billion in 2050, while under the net zero low-cost case, GDP in the CCUS sector is $10 billion in 2030 and $19 billion in 2050 (see Figure ES20).
- Under current policy, GDP in the hydrogen sector is $5 billion in 2030 and $16 billion in 2050, while under the net zero low-cost case, GDP in the hydrogen sector is $10 billion in 2030 and $48 billon in 2050 (see Figure ES21).

Figure ES19



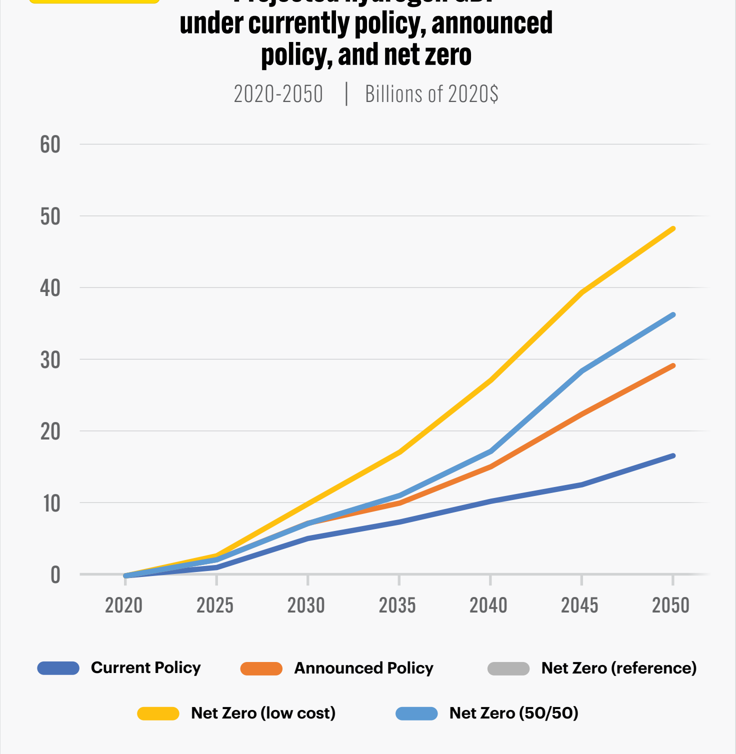
Source: Derived from the Navius Research gTech model.

Figure ES20



Source: Derived from the Navius Research gTech model.

Figure ES21



Source: Derived from the Navius Research gTech model.

- Under current policy, GDP in the DAC sector is $0 billion in 2050, while under the net zero low-cost case, GDP in the DAC sector is $24 billion in 2050 (see Figure ES22).

Unfortunately, at this time, appropriate policies and regulations to enable the oil and gas sector to reach the required level of technology adoption to attain net zero have yet to be developed, and this delay could be discouraging some of the early technology adoption critical to future sector competitiveness.

The Canadian oil and gas sector has the potential to be one of the cleanest barrels of choice on the world stage. In this respect, low emitting technologies can make a difference for Canada.

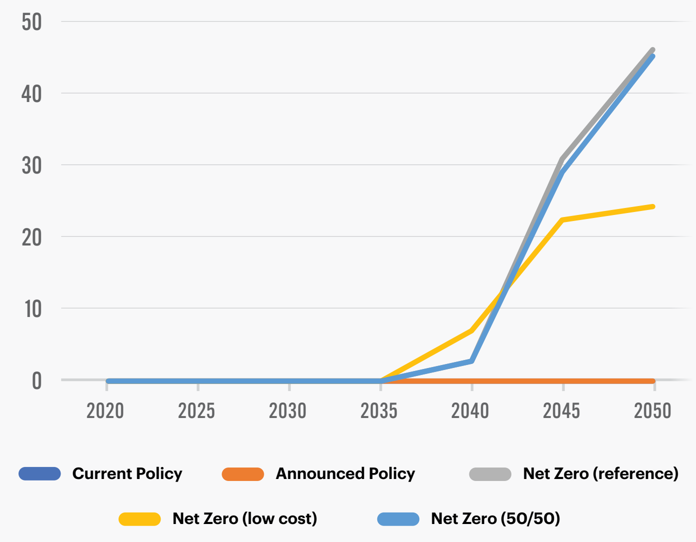
The federal discussion paper's failure to establish a baseline for the economic impacts of net zero and emissions cap and cuts on the oil and gas sector does a disservice to affected stakeholders who are trying to evaluate how the uptake of low emissions technologies can reduce their risks and help them remain competitive during the coming energy transition.

We urge Environment and Climate Change Canada (ECCC) to publicly release its detailed modeling of the economic impacts of net zero and placing emissions caps and cuts on the Canadian oil and gas sector, so that a proper evaluation of the two regulatory approaches on the sector can be undertaken by affected stakeholders.

Figure ES22

Projected DAC GDP under current policy, announced policy, and net zero

2020-2050 | Billions of 2020$



Source: Derived from the Navius Research gTech model.

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Navius Research (2022). Introducing gTech. <https://bit.ly/3LMltJb>.

About the Canadian Energy Centre

The Canadian Energy Centre (CEC) was established in October 2019. The CEC mandate is to promote Canada as the supplier of choice for the world's growing demand of responsibly produced energy. CEC is an independent provincial corporation, primarily funded by the Government of Alberta's industry-funded Technology, Innovation and Emissions Reduction (TIER) Fund.

CEC Submissions

Research informs both the advocacy and content activities of the CEC. The goal of CEC research is to identify key issues of importance to Canada's oil and gas sector, find and analyze applicable data not readily accessible and/or not in one document, and compile the data and analysis in a public-friendly format for any audience, be it a member of the public, media, industry, and government

All percentages in this submission 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 author

This CEC Submisison was compiled by Lennie Kaplan, Executive Director of Research for the Canadian Energy Centre.

Acknowledgments and Notes

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