

THE ECONOMIC IMPACT

TO THE CANADIAN ECONOMY OF CRUDE OIL PIPELINE TRANSPORTATION

Overview

The recent crisis in Ukraine, combined with the strong [growth in Canadian oil exports](#) since the world began to emerge from the [COVID-19-induced](#) recession, are leading to high and increasing demand for Canadian crude oil.

A significant portion of Canada's yearly merchandise trade comes from oil exports. In 2020, [82 percent](#) of total Canadian crude oil production was exported. Pipelines are critical for moving crude oil exports from Canada in order to gain access to global markets. A full [88 percent](#) of Canada's crude oil is moved through pipelines. The surge in oil exports to meet growing global oil demand has put the spotlight on the role of pipelines in the Canadian economy.

Given the importance of pipelines in connecting domestic oil production to refineries across the globe, this CEC Fact Sheet examines the benefits to the Canadian economy of transporting crude oil through pipelines. This study focuses on the economic benefits of operating a pipeline rather than estimating the economic impact of the pipeline's construction.¹

Using a custom tabulation from Statistics Canada, we show the direct and indirect impacts on employment, GDP, output, and labour income from the transportation of Canadian crude oil through pipelines.

Pipelines and crude oil exports

Canada has an extensive [117,000 kilometre](#) network of transmission pipelines [that](#) move crude oil, natural gas, and refined petroleum products within provinces and across provincial and international boundaries to domestic and U.S. markets.

According to Statistics Canada, in 2020, the Canadian [pipeline network](#) delivered over 3.6 million barrels per day of crude oil and refined petroleum products, such as gasoline and diesel.

Four significant pipelines transport crude oil from the Western Canadian Sedimentary Basin region to refineries across Canada and the U.S. These pipelines are the Enbridge Canadian Mainline, Keystone, Trans Mountain, and the Express pipeline.

In 2020, Canada exported over 2.9 million barrels per day of crude oil through pipelines, mainly to the U.S. (see Table 1). The Enbridge Canadian Mainline transports 58 percent of all Canadian crude oil exports to the U.S.

¹ There are four sets of mode of crude oil transportation available to producers— pipelines, rail, trucks, and marine tankers. This study focuses on the economic contribution of transporting crude oil through pipelines. This study does not examine the safety and environmental cost-benefits of transporting crude oil through pipelines.

Table 1

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

Source: Canada Energy Regulator, 2021.

Simulating the impact on Canada’s economy from transporting one million barrels of crude oil through pipelines

The economic impact on employment, GDP, output, and labour income arising from each barrel of oil transported through pipelines is very relevant to current discussions about the role of crude oil in Canada’s future. It also illustrates the role Canada can play in providing medium to long-term energy security to the United States, Europe, and other vulnerable emerging and developing countries in the face of supply disruptions arising from the Russia-Ukraine conflict.

The estimates presented in this Fact Sheet are derived from a custom simulation performed by Statistics Canada. Through this custom simulation (see Table 2), we estimate the benefits in jobs, nominal GDP, outputs, and labour income to the Canadian economy from transporting one million barrels of oil through pipelines. We also estimate the indirect effects of such export activities on other sectors in Canada.

- Each one million barrels of crude oil transportation through pipelines will add \$23.2 million to nominal GDP in 2022;
- Each one million barrels of crude oil transportation through pipelines will support 69 direct and indirect Canadian jobs in 2022;
- Each one million barrels of crude oil transportation 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 transportation through pipelines will add \$6.5 million to labour income in 2022.

Table 2

Impact on Canada’s economy from transporting one million barrels of crude oil through pipelines

2022

	Output	GDP	Labour income	Jobs
	\$ millions			Number of jobs
Direct impact	25.4	17.0	2.8	20
Indirect impact	11.1	6.2	3.6	49
Total impact	36.5	23.2	6.5	69

Notes:

1. Output consists primarily of the value of goods and services produced by an industry.
2. GDP, also referred to as gross value added at basic prices, can be defined as the unduplicated value of the goods and services produced in the economy.
3. Jobs include employee jobs (full-time, part-time, and seasonal) and self-employed jobs.
4. Based on the estimated cost of transporting one million barrels of oil through pipelines.

Source: Statistics Canada, 2021, Custom Tabulation

Conclusion

As global oil demand has surged after COVID-19, Canada's crude oil exports have also significantly increased in 2021 compared to 2020 and will likely continue to grow in 2022 and beyond.

Particularly in the event of a prolonged Russia-Ukraine conflict, it is worth noting that every barrel of crude oil that flows through pipelines has a positive impact on the Canadian economy.

In fact, in 2022, each one million barrels of crude oil that flow through the pipelines in Canada adds \$23 million to GDP. These benefits should be emphasized in public policy discussions about the need for more pipeline infrastructure to transport Canadian crude oil to global markets

Methodology

There are several ways to estimate the impact of an industry or activity on the Canadian economy. This type of analysis can be done using an Input/Output Model (I/O Model) or some form of Computational General Equilibrium (CGE) model. The CGE model can generate different results because CGE models don't require restrictive assumptions like fixed price I/O models. Each model has its benefits and shortcomings. Over the past number of years, there has been debate about the strengths and weaknesses of I/O models in assessing the contribution of industry sectors to the Canadian economy.²

This Fact Sheet estimates the economic benefits to the Canadian economy from transporting one million barrels of crude oil through pipelines. The estimates presented in this paper are derived from a Statistics Canada custom tabulation drawn from the Supply and Use Tables (SUTs). The SUTs capture and present the production of products by domestic industries, imports of products, and their use, either as inputs, final consumption, investment, and exports.

The total impact from transporting one million barrels of crude oil through pipelines, including direct and indirect impacts, can be quantified using input-output multipliers derived from the 2017 SUTs. According to Statistics Canada, these multipliers "... provide a measure of the interdependence between an industry and the rest of the economy" (Statistics Canada, 2018).

As Statistics Canada notes, although there is a lag from the 2017 data, the structure of the Canadian economy evolves slowly, so the lag should have a minimal impact on the estimates of GDP, jobs, and output (Statistics Canada, 2020).

Assumptions

The study makes a number of assumptions. It assumes no supply constraints, no relative price effect, and the assumption of fixed proportion (Leontief) technology in production. The model assumes a short-run time horizon, and the economy is in equilibrium during the short period. To derive the calculations in this study, we needed an estimate of crude oil transportation costs charged by companies in the pipeline industry. This study assumes the cost for transporting one barrel of pure bitumen from Fort McMurray to the U.S. Gulf Coast (USGC) refinery is an estimated [\\$25.41](#) per barrel. This estimate is derived from public data available on the Altex Energy website for the cost of transporting crude oil via pipelines. The price includes a pipeline toll, dilution cost (normalization of bitumen), diluent penalty, and embedded costs. For more detail, see [Economics of Rail versus Pipeline](#).

Definitions

Pipeline transportation is defined by NAICS subsector 4861 (crude oil and other pipeline transportation). It includes industry groups primarily engaged in the transport of crude oil by pipeline. It excludes NAICS 4862 (Pipeline transportation of natural gas) and NAICS 4869 (Other Pipeline transportation). **GDP** is defined as the unduplicated value of goods and services produced in the economy. **Output** consists primarily of the value of goods and services produced by an industry. **Jobs** include employee jobs (full-time, part-time, and seasonal) and self-employed jobs. **Direct impact** is the impact directly attributed to the shipping of crude oil. **Indirect impact** covers economic activities associated with supplying intermediate inputs (the current expenditures on goods and services used up in the crude oil and other pipeline transportation process) to the directly affected industries.

² For an in-depth discussion and comparison between I/O Models and CGE Models, refer to G. Kent Fellows and Jennifer Winter (2018), *Getting to Know Models: A Primer and Critique on Input-Output and Computable General Equilibrium Models and their Uses for Policy and Project Analysis*.

References (all links live as of March 10, 2022)

Altex Energy (Undated), Economics of Rail versus Pipeline <<https://bit.ly/3lxK6O5>>; Canada Energy Regulator (December 2018), *Western Canadian Crude Oil Supply, Markets, and Pipeline Capacity* <<https://bit.ly/3rubwYJ>>; Canada Energy Regulator (2021), *Canada's Pipeline System 2021* <<https://bit.ly/3GdtbrT>>; Kent Fellows and Jennifer Winter (2018), *Getting to Know Models: A Primer and Critique on Input-Output and Computable General Equilibrium Models and Their Uses for Policy and Project Analysis*, University of Calgary, School of Public Policy <<https://bit.ly/3mQ9jSY>>; Lennie Kaplan and Mark Milke (2021), *Circling the Earth 11 Times: Key Facts about the Canada-US Energy Pipeline Network*, CEC Fact Sheet #29 <<https://bit.ly/3G7q1G2>>; Statistics Canada (Undated), Supply, Use and Input-Output Tables, 2019 <<https://bit.ly/2GOS3tk>>; Statistics Canada (2018), National and Provincial Multipliers, Surveys and Statistical Programs, Documentation: 15F0046X <<https://bit.ly/32L4L8q>>; Statistics Canada (2020), *The Decline in Production and Investment in Canada's Oil and Gas Sector and its Impact on the Economy*, Economic Insights 11-626-X, No. 109 (July) <<https://bit.ly/32LbTlb>>; Statistics Canada (2021), Pipeline Transportation Impact Derived from the 2017 Supply and Use Tables, Custom Tabulation; Statistics Canada (2021b), Table 36-10-0434-06: Gross Domestic Product (GDP) at Basic Prices, by Industry, Provinces and Territories <<https://bit.ly/3pq2OYX>>; Ven Venkatachalam and Lennie Kaplan (2022), Projected impact of increased oil and gas, CEC Fact Sheet #48 <<https://bit.ly/3vXsCAI>>. Ven Venkatachalam and Mark Milke (2021), *50,000 New Miles: A Comparison on New Oil and Gas Pipelines Worldwide*, CEC Fact Sheet #5 <<https://bit.ly/3df1kuU>>.

Notes

This CEC Fact Sheet was compiled by Ven Venkatachalam and Lennie Kaplan at the Canadian Energy Centre (www.canadianenergycentre.ca). 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 source data. The authors and the Canadian Energy Centre would like to thank and acknowledge the assistance of two anonymous reviewers in reviewing the data and research for the initial edition of this Fact Sheet. Image credits: Trans Mountain Corporation

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