FRASER RESEARCH BULLETIN

FRASER INSTITUTE

April 2019

The Cost of Pipeline Constraints in Canada, 2019

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Summary

- Despite the steady growth in crude oil production (and exports), new pipeline projects in Canada continue to face delays related to environmental and regulatory impediments as well as political opposition. In September 2018, western Canadian oil production reached 4.3 million barrels per day but the takeaway capacity on existing pipelines remained constant at around 3.9 million barrels per day.

- Canada's lack of adequate pipeline capacity has imposed a number of costly constraints on the country's energy sector including an over-dependence on the US market and reliance on more costly modes of energy transportation. In 2018, these factors, coupled with the maintenance downtime at refineries in the US Midwest, resulted in significant depressed prices for Canadian heavy crude (Western Canadian Select) relative to US crude (West Texas Intermediate) and other international benchmarks.

- In October 2018, Canadian heavy crude (WCS) traded at only about 40 percent of the US crude (WTI) price, which represented a discount of 60 percent. In November, the price differential widened even further and reached almost 70 percent, meaning that WCS was sold at only 30 percent of WTI.

- In 2018, after accounting for quality differences and transportation costs, the depressed prices for Canadian heavy crude oil resulted in CA$20.6 billion in foregone revenues for the Canadian energy industry. This significant loss is equivalent to approximately 1 percent of Canada's national GDP.

- In response to the drastic price discount for Canadian crude in late 2018, the Alberta government introduced a temporary production limit on oil producers. Since the initial curtailment measure was implemented in 2019, the price differential has narrowed. However, building new export pipelines remains the only long-term solution to ensure that oil producers receive fair value for their products.

- Overall, given the accumulation of lost potential revenue for the energy sector in recent years and the staggering loss in 2018 alone, the case for expanding Western Canadian oil pipeline capacity is critical.

Introduction

In recent years, Canada's lack of adequate pipeline capacity has resulted in depressed prices for Canadian heavy crude, and thereby lost revenue for producers and the economy as a whole. The price differential between the Canadian crude oil price (Western Canadian Select or WCS) and US crude (West Texas Intermediate or WTI) widened substantially in late 2018, resulting in large discounts borne by Canadian crude oil producers.

To date, construction of export pipelines has been lagging as major pipeline projects have been delayed or cancelled. These include Enbridge's Northern Gateway Pipeline and TransCanada's Energy East and Eastern Mainline projects, which have been cancelled due to a number of factors including significant regulatory hurdles, political opposition, and changing market conditions. Canada's remaining pipeline projects—the Trans Mountain Expansion, and Line 3 Replacement Project along with Keystone XL—continue to face delays mainly due to environmental and regulatory concerns and political opposition. More specifically, Enbridge's Line 3 was expected to come online in late 2019 but the pipeline likely will not enter service until the second half of 2020 as a result of permitting delays.

The inability to build new pipelines has resulted in, and continues to result in, the increased shipment of oil by rail—a more expensive (and slightly less safe) mode of transportation—leading to higher costs for Canadian producers. The issue of inadequate transportation capacity has also resulted in rising crude oil inventories, putting Canadian oil into storage rather than into the market. However, despite increased transport of crude by rail, the excess supply of crude oil resulted in an extraordinarily high price discount in late 2018. More specifically, in October 2018, WCS was traded at only about 40 percent of the WTI or a discount of 60 percent. In November, the differential widened even further and reached almost 70 percent, meaning that WCS was sold at only 30 percent of WTI. As a result, the Alberta government introduced a temporary 8.7 percent reduction in oil production on companies starting January 2019 in an attempt to address excess supply and insufficient export capacity. Since the initial oil curtailment was announced the discount has narrowed. However, building pipelines remains the only long-term solution to ensure that oil producers receive fair value for their products.

This bulletin expands on our earlier research on this topic and updates the amount of revenue lost in 2018 due to depressed prices for Canadian crude oil that resulted from insufficient pipeline capacity.

Reasons behind the Canadian crude oil discount and the case for pipelines

In 2018, Canadian oil producers commanded substantially lower prices for their crude oil relative to other international benchmark prices. Part of the differential between the Western Canadian Select (WCS) price, Canada's primary heavy crude benchmark, and the West Texas Intermediate (WTI) benchmark price is natural and can be attributed to quality differences between the two products and the costs associated with transporting oil from Alberta to US refining hubs.[1]

[1] For more information, see our earlier work on the subject (Aliakbari and Stedman 2018). Overall, the price differential between WCS and other world oil prices at any point reflects crude oil quality differences, transportation costs, and the supply and demand for crude oil in each region.

While there is and will always be a natural differential between the WCS and WTI prices, in recent years Canada's insufficient transportation infrastructure and pipeline bottlenecks dramatically increased the differential beyond its natural level. Specifically, while Canadian oil production (and exports) has been rising steadily, construction of pipeline infrastructure has been lagging. As the National Energy Board (NEB) has reported, in 2018 western Canadian oil production continued to grow and by September had reached 4.3 million barrels per day, but the takeaway capacity on existing pipelines remained constant at around 3.95 million barrels per day (NEB, 2018a). With the ongoing delays for both the Trans Mountain expansion project and the Line 3 replacement project, it remains uncertain when oil producers can expect additional pipeline capacity to come online.

According to Natural Resources Canada, Canada has a network of 840,000 kilometers of pipelines carrying crude oil to domestic and US refineries (NRC, 2018). The current crude oil pipeline capacity leaving Western Canada is estimated at 3.9 million barrels per day. However, several pipeline projects were expected to enter service and increase export capacity but have yet to come online. For example, Kinder Morgan's Trans Mountain Expansion project was expected to increase the capacity of the existing pipeline from 300,000 barrels per day to 890,000 barrels per day in late 2019 (TransMountain, n.d.). The project was initially approved by the government of Canada in November 2016. The federal government's approval was granted after the National Energy Board determined that the project was in the public interest and recommended the approval of the expansion. However, in May 2018, the federal government nationalized the Trans Mountain pipeline and expansion project in a last-ditch effort to add pipeline capacity after political opposition to the expansion left the Kinder Morgan reluctant to proceed.

Following the purchase of the pipeline, a Federal Court of Appeal decision reversed the federal government's approval of the project in August 2018, citing inadequate consultation with First Nations and concerns over marine tanker traffic. This decision nullified the previous approval of the project and sent the project back to the National Energy Board for further environmental assessments, including assessing the impact of increased oil tanker traffic on the region's endangered resident killer whale population. Following this assessment, the National Energy Board once again recommended the approval of the project in February 2019 subject to 16 new conditions in addition to the 156 conditions it had originally proposed in its previous report (Aliakbari, 2019). The federal government must now review the NEB report and decide whether to proceed with the project. The federal government is also in the process of renewed consultations with Indigenous communities but the deadline for completing consultations is unknown. Therefore, the future of the Trans Mountain expansion project remains uncertain as a result of ongoing and potential regulatory, political, and legal issues.

In addition, Canadian oil producers were expecting the pressure from insufficient pipeline capacity to improve in late 2019 as Enbridge's Line 3 replacement project was scheduled to come online. However, according to a statement released by the company in early March 2019, the pipeline likely will not enter service until the second half of 2020 as a result of ongoing delays with the environmental permitting process in Minnesota (Orland, 2019). Despite receiving approval from a Minnesota regulator in late March, the company continues to face permitting delays at the local level (Adams-

Heard, 2019). Once the pipeline enters service, the project will transport crude from Alberta to Wisconsin where it will connect with pipelines leading to the US Gulf Coast. This replacement project is expected to increase pipeline capacity by 370,000 barrels per day (Enbridge, n.d.).

Moreover, TransCanada's Keystone XL pipeline project has been in regulatory and legal limbo for over 10 years. In March 2019, the company asked the US Ninth Circuit Court of Appeals to lift an injunction on its Keystone XL pipeline and is waiting on a decision from the Nebraska Supreme Court on a challenge to its route through the state. Based on the delays associated with Keystone XL, it is uncertain when the company will begin construction and whether it will miss the 2019 construction season (Morgan, 2019).

The insufficient pipeline capacity available to transport Canadian crude to US destinations has forced increased shipments by rail. According to data provided by the NEB, crude oil exports by rail have steadily increased since March 2018 and reached a record 353,789 barrels per day in December (NEB, 2019). Of course, those Canadian oil producers that have resorted to shipping by rail have had to absorb the higher transportation costs. The more that oil producers have to depend on rail because of insufficient pipeline capacity, the greater the average WCS transportation cost and the spread between WCS and WTI prices.

Although the volume of oil shipped via rail spiked in 2018, using rail transportation to ship crude oil has its limitations. As reported by the NEB, in 2018, shipments of crude by rail accounted for only 6.2 percent of the volume of rail freight in Canada, meaning that oil producers wishing to transport their commodity by rail had to compete for rail space with many other products (NEB, 2018a). Moreover, additional rail capacity could not be added to the existing transportation capacity quickly as it takes time to acquire specialized tank cars and locomotives, develop the associated loading and unloading infrastructure, and train staff (NEB, 2018a).

The inadequate transport capacity resulting from both insufficient pipeline capacity and rail export capacity was reflected in rising crude oil inventories in Alberta in 2018. Many oil producers were forced to put excess production into storage tanks until sufficient transport capacity was available. Specifically, in 2018, based on data provided by the Alberta Energy Regulator, crude oil inventories increased by 12.6 percent (AER, 2018).[2]

In addition, maintenance downtime at refineries in the US Midwest was another factor that exacerbated the WTI–WCS price differential in late 2018. The shutdown of these refineries, the biggest customers for Canadian heavy crude, reduced demand and thereby resulted in a lower price for Canadian crude oil. In particular, a maintenance shutdown in late 2018 at the BP Whiting refinery in Indiana likely contributed to the steep oil price discount as this refinery buys approximately 250,000 barrels per day of heavy crude from Canada. The Whiting refinery shutdown exacerbated the crowded schedule of refinery maintenance in the US Midwest, leaving about 829,000 barrels per day of capacity unavailable through October 2018 according to analysts (Canadian Press, 2018). In addition, Canadian heavy oil producers expected the new Sturgeon refinery near Edmonton to be operational by mid-2018, but that facility did

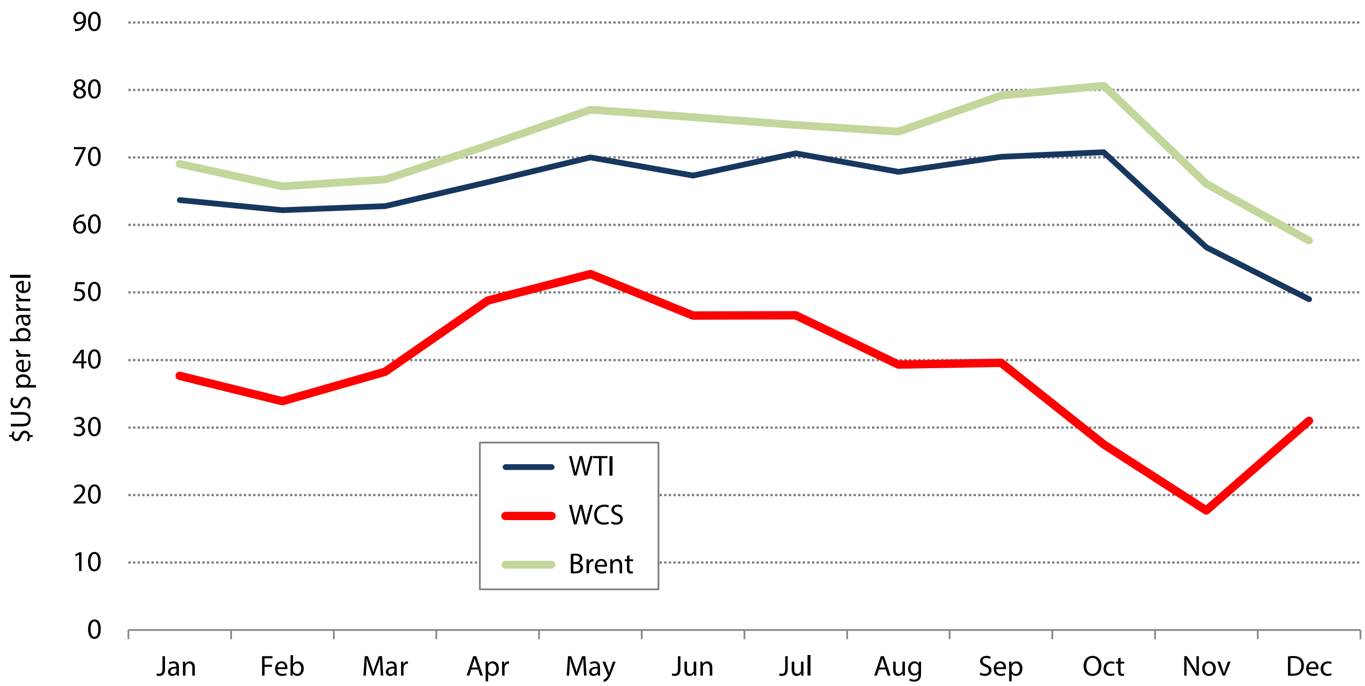
[2] Crude oil closing inventories increased from 10,405,942.4 cubic meters in January 2018 to 11,716,388.5 cubic meters in December 2018.

not enter service until the end of 2018, meaning that more heavy crude was likely transported through Canada's existing and overcrowded pipelines or by other means (Global News, 2018).

Figure 1 illustrates the depressed value of Canadian heavy crude oil (WCS) relative to the US benchmark (WTI) and the Brent crude global benchmark in 2018. As shown, the WCS price was substantially below the prices of both WTI and Brent. Specifically, in 2018, the differential averaged a discount of US$26.50 per barrel, with a discount of more than US$40.00 per barrel in October. Note that between 2009 and 2012, when transportation constraints were not apparent, the price differential, on average, was approximately $US11.17 per barrel, which can be considered the natural differential (Aliakbari and Stedman 2018). In November, while WTI sold for US$56.70 per barrel, WCS reached its lowest price point and sold for only US$17.70 per barrel.

Figure 2 illustrates the WCS –WTI differential as a percentage of the WTI price in 2018. In 2018, WCS, on average, was sold for 59 percent of the WTI price, or a discount of 41 percent. As shown previously, between 2009 and 2012, the average WTI–WCS differential was only 13 percent of the WTI price (Aliakbari and Sted-

Figure 1: Western Canadian Select (WCS) versus Global Benchmark Prices in 2018



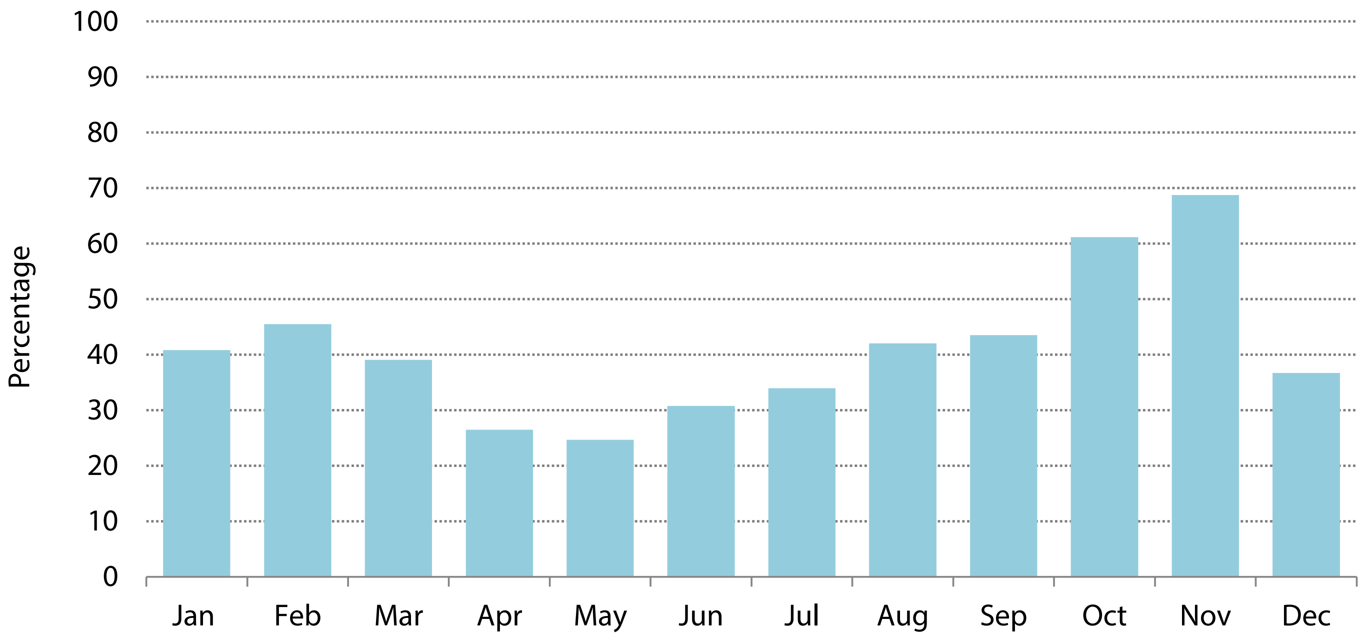
Note: WTI or West Texas Intermediate is light, sweet crude, ideal for refining into gasoline. WCS, or Western Canadian Select, is heavy blended crude oil that generally commands a lower price than WTI. Brent crude is similar to WTI and comes from sites in the North Sea; the price for Brent crude is a one of the benchmarks against which many other crude prices are measured.

Source: Oil Sands Magazine, 2019.

man 2018). More specifically, in October 2018, WCS traded at only about 40 percent of the WTI price, a discount of 60 percent. In November, the differential widened even further and reached almost 70 percent, meaning that WCS was sold at only 30 percent of WTI.

While building pipelines to secure access to the US Gulf Coast is important as it will reduce the existing price differential, gaining access to new overseas markets is even more crucial. Currently nearly 99 percent of Canadian heavy crude gets exported to the United States, meaning that the US is essentially still Canada's only export market for crude oil. Given soaring US oil production in recent years and competition from American producers, finding new customers for Canadian heavy crude is critical. As a result, building Keystone XL and the Line 3 Replacement pipeline, which are set to expand capacity to the US market, are important, but expanding the Trans Mountain pipeline to gain access to new customers in Asia, where demand for oil is growing, would be even more beneficial. The Trans Mountain expansion project, which is meant to triple capacity on the existing pipeline that transports crude between landlocked Alberta and the Pacific coast, is currently facing considerable political opposition from the British Columbia government. In particular, in February 2019, BC Premier John Horgan reaffirmed his government's commitment to "fight" the expansion project (Canadian Press, 2019). Based on ongoing and potential political, regulatory, and legal issues, the in-service date remains uncertain.

Figure 2: Western Canadian Select (WCS) discount to West Texas Intermediate (WTI) in 2018



Source: Oil Sands Magazine, 2019.

Table 1: Estimated foregone revenue for the Canadian energy industry in 2018 as a result of pipeline constraints

WTI Price at Cushing, OK ($US per barrel)	Trans-portation cost ($US per barrel)	Quality difference ($US per barrel)	Natural discount ($US per barrel)	Potential WCS ($US per barrel)	WCS price at Hardisty, AB ($US per barrel)	Lost revenue per barrel ($US)	Total heavy crude exports to the US (Million barrels per day)	Total lost revenue ($CA billions)
64.77	7.20	4.66	11.86	52.91	38.30	14.61	2.98	20.62

Notes:

1) Transportation cost is an average pipeline toll (based on Enbridge and Keystone's two existing pipelines) to ship crude from Hardisty, Alberta, to Cushing, Oklahoma.

2) The reason for the adjustment is to allow a comparison between the two types of oil: WCS is a much heavier crude than WTI. In order to adjust for quality difference, we calculated a five year average price difference (2014-2018) between LLS (Light Louisiana Sweet crude, which has simillar quality to WTI) and Maya (a Mexican Seaborn heavy crude of similar quality to WCS). Both LLS and Maya are priced at the US Gulf Coast.

3) The natural discount is the sum of transportation cost and quality difference.

4) We converted $US to $CA based on the average exchange rate for year 2018 as published by the Bank of Canada.

Source: Bank of Canada, 2018; CAPP, 2018; US EIA 2018, Oil Sands Magazine, NEB (2018b)

Inability to build new pipelines has lost revenue for Canada

The lack of adequate takeaway capacity in recent years has resulted in depressed prices for Canadian heavy crude (WCS) relative to the US (WTI) and global benchmarks, which has caused oil producers—and subsequently the whole economy—to lose revenue. This section updates our previous work on the subject and estimates the foregone revenues for Canada's energy industry in 2018 due to constrained capacity and the subsequent Canadian heavy crude discount.

According to the analysis summarized in table 1, after accounting for quality differences and transportation costs, in 2018 the discounted price for Canadian heavy crude resulted in a revenue loss of CA$20.6 billion for the energy industry. This significant loss, which is associated with an average price differential of US$26.50 per barrel, was equivalent to almost 1 percent of Canada's national GDP in 2018 (Statistics Canada, 2018).

Specifically, we estimated the natural differential (accounting for quality differences and transportation cost) to be approximately US$11.90 per barrel, which is substantially less than the existing differential of US$26.50 per barrel. As a result, while Canadian oil producers received US$38.30 for every barrel exported to the US, with suitable pipeline capacity they could have received a WCS price of US$52.90, a difference of 38 percent. In other words, Canadian producers lost US$14.60 per barrel of exported crude. Given that Canada exported almost 3 million barrels of crude a day to the US in 2018, the revenue that was lost due to capacity constraints in 2018 alone was roughly CA$20.6 billion.

As shown previously, from 2013 to 2017, the discounted price for Canadian heavy crude resulted in a revenue loss to the energy sector of CA$20.7 billion (Aliakbari and Stedman 2018). Given the accumulation of lost potential revenue for the energy sector and the staggering loss in 2018 alone, the case for expanding Western Canadian oil pipeline capacity takes on new urgency.

In late 2018—on November 28—in response to the drastic discount for Canadian crude, Alberta's government announced that it was negotiating the purchase of rail cars so it could ship 120,000 additional barrels of crude oil a day out of Alberta (Alberta, 2019a). The government expects the first 15,000 barrels per day of this new added capacity will begin in December 2019, increasing to 120,000 barrels per day by August 2020. In addition, the Alberta government also introduced a temporary production limit on oil producers in an attempt to address the excess supply and insufficient export capacity. On December 2, 2018, the provincial government mandated that the production of raw crude oil and bitumen be reduced by 325,000 barrels per day, an 8.7 percent reduction in oil production (Alberta, 2018). The government eased the oil production cut in February 2019 and production increased by 75,000 barrels per day. The Alberta government also announced a further increase of 25,000 barrels per day in April 2019, resulting in an overall increase of 100,000 barrels per day from the initial November limit (Alberta, 2019b). Since the initial curtailment measure was announced the discount has narrowed. However, building new export pipelines remains the only long-term solution to ensure that oil producers receive fair value for their products.

Conclusion

Canada's steep oil price discount is mainly a result of insufficient pipeline capacity, which has dramatically lowered the market price for Canadian crude oil and resulted in lost revenue for oil producers and for the economy. In 2018, after accounting for quality differences and transportation costs, Canada's energy industry lost CA$20.6 billion in foregone revenue due to the country's lack of pipeline capacity. The revenue loss is substantial, not just for Canada's energy industry, but for the whole Canadian economy. Those losses will continue until new pipelines come online. Overall, these results highlight Canada's critical need for additional pipeline capacity.

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Acknowledgments

The authors wish to thank the anonymous reviewers for their suggestions and feedback. Any remaining errors or oversights are the sole responsibility of the authors.

As the researchers have worked independently, the views and conclusions expressed in this paper do not necessarily reflect those of the Board of Directors of the Fraser Institute, the staff, or supporters.

ISSN 2291-8620

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