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## Heavy Barrel Competition in the US Gulf Coast: Can Canadian Heavy Barrels Compete?

Authors: Andrea Orellana  
Dinara Millington

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CANADIAN ENERGY RESEARCH INSTITUTE  
150, 3512 – 33 Street NW  
Calgary, Alberta T2L 2A6  
Email: [info@ceri.ca](mailto:info@ceri.ca)  
Phone: 403-282-1231

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# Executive Summary

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The collapse in oil prices worldwide is affecting the industry widely and is expected to slow the pace of upstream investment around the world – including in heavy crude oil development in Canada. Still, growth in Canadian heavy crude oil production is already largely locked in until 2020, due to new projects in construction coming on-stream. As Western Canadian crude oil production continues to grow, the leverage of these resources for economic benefits to the nation will depend on the ability to connect this growing supply with downstream demand.

As a consequence of the rapid growth in American oil production, inland refining markets in the US Midwest (current recipients of most of the Canadian heavy imports) have been flooded with cheap, high quality tight crude oil, which leaves Canadian heavy crude oil subject to price markdowns (due to lower quality and bottlenecks in their delivery infrastructure). This situation provides Canadian producers a financial incentive to expand market access in the United States, Canada, and beyond. It also highlights the risk of overreliance on limited markets and the need for options.

The US Gulf Coast (USGC) is one of the world's largest refining centers, and its considerable heavy oil processing capacity presents the largest opportunity for Western Canadian heavy crude oil supply, making it Canadian heavy producers' first target for market access. This study evaluates how much Canadian heavy crude oil could be potentially exported to the US Gulf Coast. The study also reveals the dynamics of the US Gulf Coast refining sector and what would be the netbacks for Canadian producers in the short and long term.

Canadian heavy crude oil competes for market share in the US Gulf Coast with heavy crude oil from Latin American producers, mainly Mexico, Venezuela, Brazil and Ecuador. Mexico and Venezuela are the main heavy crude oil exporters to the US Gulf Coast, accounting for over 45 percent of total crude oil imports to the US Gulf Coast (an average of 1.5 million barrels per day [MMbpd] out of the total 3.2 MMbpd imported to Gulf Coast refineries in 2015).

Over the last 10 years, heavy crude imports from Mexico and Venezuela have decreased by over 1 MMbpd as a consequence of declining reservoirs as well as insufficient upstream investment. This leaves a considerable gap for Canadian producers to establish a new market share in the Gulf. If oil sands could displace most of the Mexican and Venezuelan imports, the opportunity for bitumen blends and conventional heavy oil could be approximately 1.5 MMbpd. In the latest years heavy Canadian barrels are starting to reach the Gulf in increasing volumes, both by rail and the existing Enbridge system. However, current transportation infrastructure is not enough and market access would depend on the development of more pipeline projects that integrate Western Canada with the US Gulf Coast.

Western Canadian production has always had limited access to the US Gulf Coast market, especially because of the lack of infrastructure connecting Cushing, Oklahoma (the primary US hub for Western Canadian crude oil) to refineries in Texas. To support market access to the Gulf

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Coast, more than 1.2 MMbpd of pipeline capacity from the US Midwest to the Texas Gulf Coast has been installed. Enbridge decided to reverse the direction of flow of their Seaway Pipeline, adding 400,000 barrels per day (bpd) of capacity from Cushing to Freeport, Texas. The TransCanada Gulf Coast Pipeline (the first stage of the now rejected Keystone XL pipeline) transports another 520,000 bpd from Oklahoma to Texas. Additional lines that improve crude oil delivery from Illinois to Cushing, Oklahoma have also been built, such as Enbridge's Flanagan South and the Southern Access pipeline.

Additionally, rail shipments from Western Canada to the US Gulf Coast will likely continue to increase. Future rail shipping capacity is expected to increase by up to 250,000 bpd in 2016 and 600,000 bpd in 2018. Crude-by-rail shipments to the US Gulf Coast averaged 56,000 bpd in 2015. Crude-by-barge has become a frequently used transport mode for producers looking for alternative transportation alternatives from Cushing to the Gulf Coast. Depending on distances travelled, it can cost between \$12/bbl to \$20/bbl<sup>1</sup> to move oil by rail or barge, compared to a total cost of \$5/bbl to \$13/bbl for pipeline transportation. Rail costs are significantly higher than pipeline, which favours pipeline transportation among Western Canadian producers wanting to get their product to the US Gulf market in a profitable way.

Overall, Western Canadian heavy crude oil production is expected to grow from 2.6 MMbpd in 2015 to 4.7 MMbpd in 2035, more than 2 MMbpd over the next twenty years. Domestic demand for heavy crude oil from Canada has been continuously growing over the last few years, as Canadian refineries continue to transition from offshore imports to Western Canadian feedstocks. Domestic demand for heavy crude oil is expected to increase by approximately 50 percent and reach over 800,000 bpd by 2035. Net heavy Canadian available exports are the result of subtracting domestic demand from heavy (including bitumen) crude oil production, and is expected to grow to volumes larger than 3.5 MMbpd over the next five years, and then slow down to about 1 MMbpd of growth from 2020 to 2035.

Shipments to the east and west coast of Canada, where heavy crude could reach offshore markets, are also being proposed as a way to reach attractive offshore markets, such as Asia and Europe. These projects, expected to come online potentially by 2020, will create new export outlets for Western Canadian crude oil to Asian and European markets. Politics (both local and international) as well as prices are expected to play a role in shaping future trade flows of Canadian heavy crude oil.

Access to new markets is expected to have a positive effect on the prices received by Canadian producers in the US, Europe and Asia. TransCanada's Energy East pipeline, anticipated to be in service by 2020, will carry 1.1 MMbpd of Western Canadian crude from Alberta and Saskatchewan to marine terminals in Quebec and New Brunswick (shipping to European and other markets), as well as refineries in Eastern Canada. Kinder Morgan's Trans Mountain Expansion (TMX) is expected to add 590,000 bpd of shipping capacity from Alberta to the West Coast by 2019, increasing potential volumes exported to Asian markets. Enbridge's Northern

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<sup>1</sup> All amounts are US dollars

Gateway project, with a capacity of 525,000 bpd from Alberta to the West Coast would increase Canada's export capacity to Asian markets by 2020.

Although these major pipeline projects have faced delays in their approvals and opposition from some stakeholder groups, it is anticipated they will come online over the next five years. By transporting Western Canadian crude volumes to markets outside North America, these projects will decrease the available heavy crude exports to the US. The rate at which these projects will decrease net available heavy crude exports to the US will depend on the amount of Western Canadian heavy crude oil (excluding high API synthetic crude oil) to be transported using these pipelines to international shipping terminals.

Figure E.1 displays the forecasted potential heavy crude exports to the US, after discounting for heavy crude volumes transported to other international markets through Energy East (EE), the Trans Mountain Expansion (TMX) and Northern Gateway (NG). In order to account for the uncertainty surrounding these transportation projects and the volumes of heavy crude oil they will take, three different scenarios with different transportation quotas are considered. The first and more conservative scenario predicts that no major coast pipeline is built and all available exports are destined to the US. The second scenario projects that only the Energy East and the Trans Mountain Expansion pipelines are carried forward<sup>2</sup>. Within this approach, two different transportation quotas are considered: one where 50 percent of the pipeline capacity is used to transport heavy crude oil, and the second one where 75 percent of the pipeline capacity is used to transport Western Canadian crude oil to other international markets.

The third scenario predicts that all three pipeline projects (EE, TMX and NG) will come online and transport heavy crude to international markets. Both transportation quotas are considered for this scenario as well. Lines in Figure E.1 display the potential heavy crude oil exports to the US after the different scenarios and transportation quotas are considered. Volumes being transported to Asia, Europe and other international markets are subtracted from the net available heavy crude exports out of Western Canada (if applicable) and the lines represent the potential heavy crude exports to the US.

Overall, the potential heavy crude exports from Western Canada to the US vary between 2.5 MMbpd and 3.9 MMbpd by 2035. The red line (75 percent capacity, all three pipelines operating), displays the lower end of the range, while the black line (all exports to the US, no coast pipeline capacity) displays the upper end of the forecasted range of potential heavy crude exports to the US.

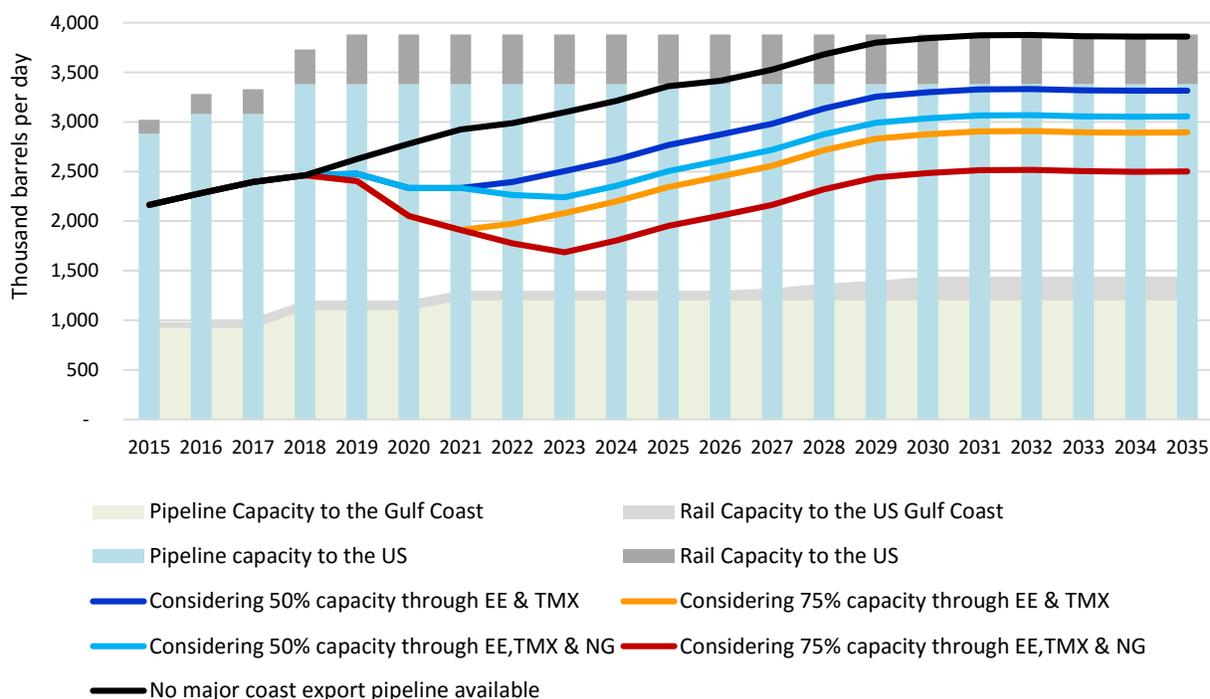
The bars in Figure E.1 display the total export transportation capacity from Alberta to the US. Light blue columns represent the existing pipeline capacity (from both Hardisty and Edmonton) to the US, while grey columns display the crude-by-rail capacity. It is clear that under the current

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<sup>2</sup> Although Northern Gateway has been approved by the Governor Council (in June 2014), the 209 conditions and further discussions with indigenous communities are still pending and need to be resolved in order to move forward.

production growth forecast, transportation infrastructure from Western Canada to the US seems to be sufficient to transport the predicted potential heavy exports.<sup>3</sup> However, if none of the major export pipelines proposed (Energy East, Trans Mountain Expansion or Northern Gateway) come online and all heavy exports are directed to the US, transportation capacity could be heavily constrained and dependent on expansions of the railway system.

**Figure E.1: Potential Heavy Crude Exports to the US**



Source: CERI

The area in light green represents the pipeline transportation capacity to the US Gulf Coast, followed by the crude-by-rail capacity, displayed in light grey. The creation of pipeline infrastructure to the east and west coast of Canada, and subsequent new export outlets for Western Canadian heavy crude oil, will have a positive effect on the current transportation constraints to the US Gulf Coast. With these projects coming forward, it is expected that almost half of the total available heavy exports to the US could be directed to the US Gulf Coast Market.

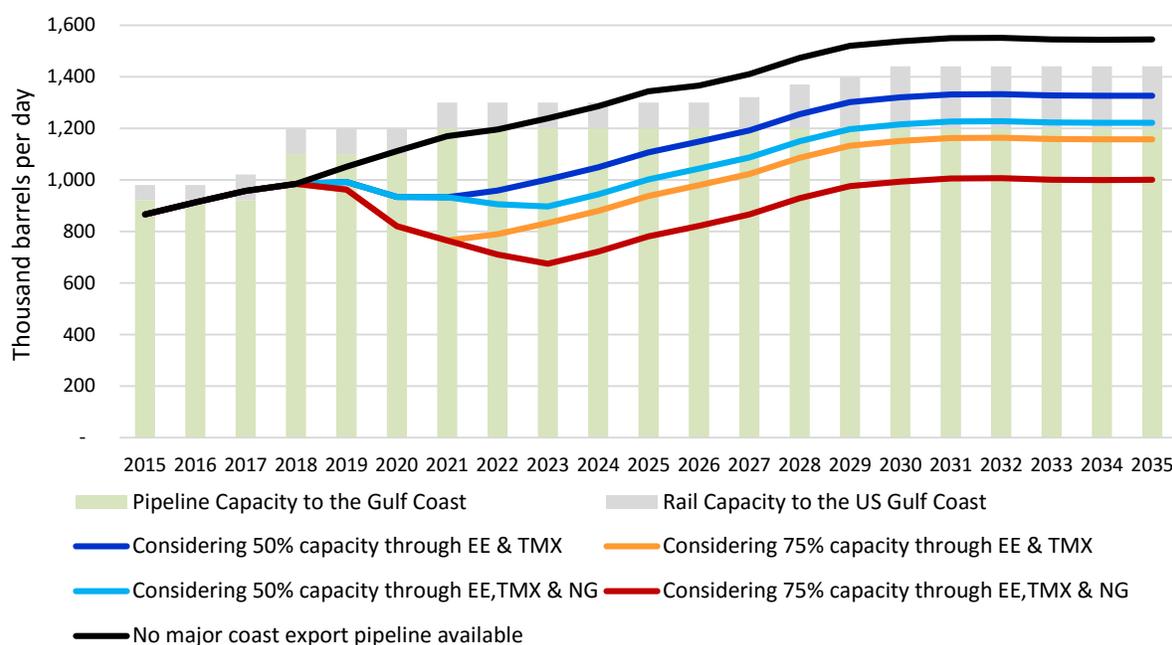
The US Midwest (PADD 2) will continue to absorb most of the Canadian heavy exports to the US. Besides having prime infrastructure connecting this area with Alberta, there are agreements in place between Canadian producers and US Midwest fuel refiners (i.e., Cenovus, Husky, and

<sup>3</sup> Western Canadian light volumes (high quality synthetic crude oil, or SCO) are expected to be exported to international markets where it would receive more competitive prices than in the US market, which is oversupplied with domestic light tight oil. It will also supply Eastern Canadian refineries, which are configured for light feedstocks. Taking these into consideration, it is not expected to see large volumes of SCO being shipped to the US in the future.

Imperial, among others who depend on supply agreements with integrated refineries) that will continue to be active for the next decades. According to Hart Energy report,<sup>4</sup> contracts with integrated refineries in the US Midwest account for approximately 1.3 MMbpd of crude oil imported to PADD 2, approximately 60 percent of the total heavy exports to the US. This leaves 40 percent of the potential exports to the US to be redirected to the US Gulf Coast.

Figure E.2 displays the potential heavy crude exports to the US Gulf Coast (estimated as 40 percent of the total exports to the US). Lines represent the different scenarios and transportation quotas also considered for Figure E.1. The green columns show the forecasted pipeline transportation capacity to the US Gulf Coast, while the grey columns represent the predicted crude-by-rail capacity to the Gulf Coast from either Canadian or US Midwest terminals.

**Figure E.2: Potential Heavy Crude Exports to the US Gulf Coast**



Source: CERI

It is clear that the creation of pipeline infrastructure and shipping routes to international markets other than the US would favour market access of Western Canadian heavy crude oil into the US Gulf Coast. By allocating heavy production to other markets such as Asia and Europe, Canadian producers are able to reduce their overland dependence on the US market, reduce their supply to that market and overcome pipeline constraint issues to the US Gulf Coast.

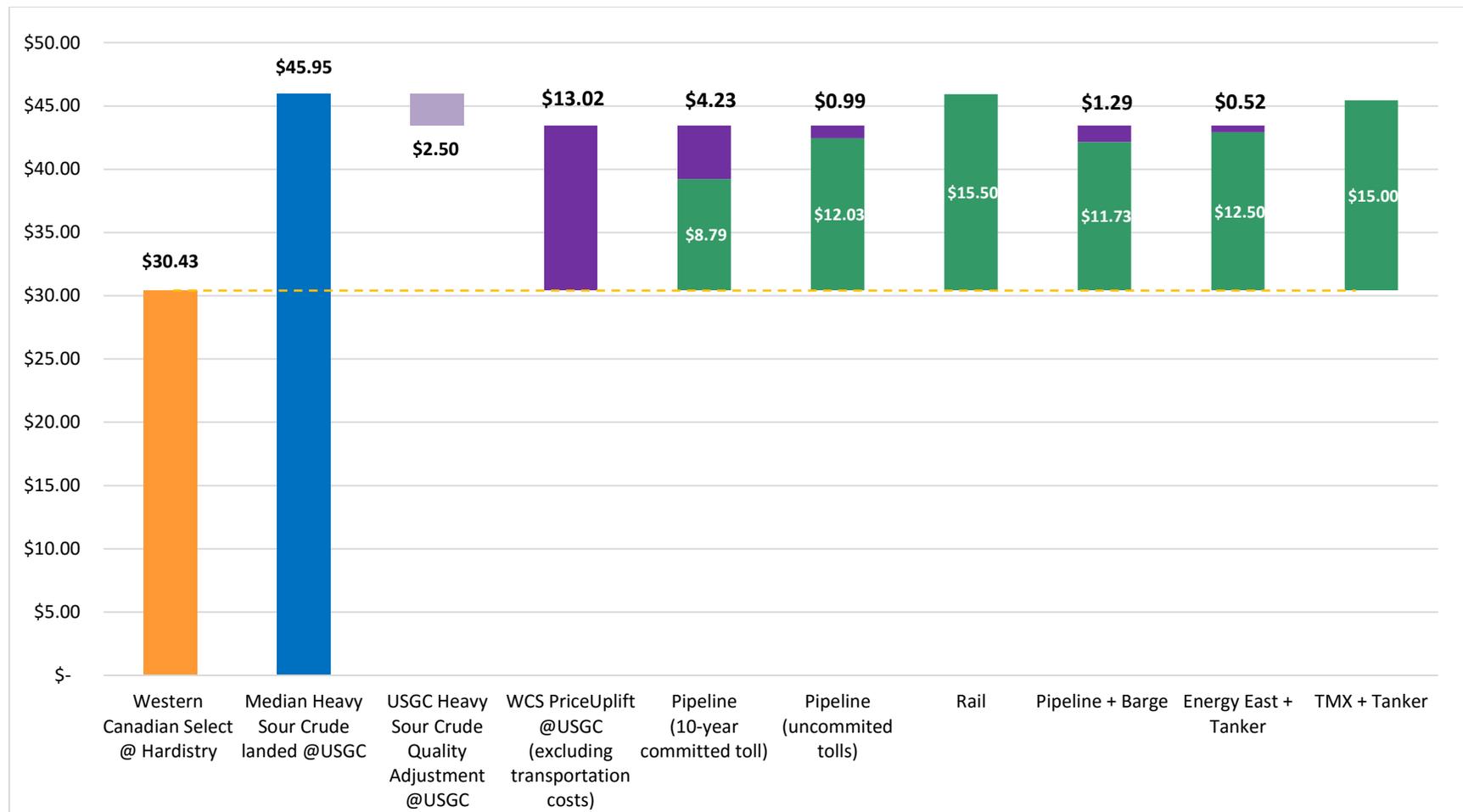
Although the need to expand and reach new markets for oil sands is pressing, production and pipeline projects associated with oil sands have come under increased scrutiny, contributing to delays and uncertainty. Project economics are not alone in shaping future markets for oil sands.

<sup>4</sup> Hart Energy, Refining Unconventional Oil, 2012.

Although not every factor will influence future markets for oil sands, some of the most prominent ones include regulatory processes, local concerns, greenhouse gas emissions (GHG) and climate change policies, as well as indigenous people's rights in Canada.

Figure E.3 displays the overall analysis of the netbacks (in Canadian dollars) Canadian producers could receive for a Western Canadian Select (WCS) equivalent Heavy Crude Barrel, under 2015 average market conditions. The first component of the analysis is the orange bar, which represents the average WCS price at Hardisty in 2015 (\$30.43/bbl). This is in effect reflective of the price Western Canadian heavy producers are currently receiving at Alberta.

Figure E.3: US Gulf Coast Netback Analysis for Canadian Heavy Crude Oil Producers



Source: CERI

The blue column shows the average price heavy sour crude imports (mostly Mexican and Venezuelan) receive at the US Gulf Coast. A quality adjustment (displayed in the third column) is applied in order to better reflect the potential prices of Canadian heavy crude oil. This is, for the most part, diluted bitumen, which is assessed against Latin America imports, which are less acidic and easier to refine.

The difference between WCS at Hardisty and the estimated WCS price at the USGC (after applying the quality adjustment) is the gross possible price uplift Canadian producers could receive at the Gulf Coast. Simultaneously, this \$13.02/bbl figure is the maximum amount producers would be willing to pay for transportation costs in order to receive positive netbacks at said target market.

Netbacks to Canadian producers, after taking into account transportation costs, are shown in purple in columns five to ten for the different modes of crude transportation analyzed. Shipping using existing pipeline routes proves to be the most profitable way for Canadian heavy crude oil to reach the US Gulf Coast market.

Canadian producers' willingness to spend more on alternate transportation and ship their product using rail, barge or tanker seems to have shifted after crude oil prices started to fall dramatically. Most Western Canadian heavy crude oil production comes from very expensive oil sands mining or in situ steam heating operations, which are designed to produce consistently for decades and are costly to shutter in a downturn. Under the current price market, crude netbacks for heavy crude oil production in Western Canada are dramatically low, further justifying investment in shipping to the US Gulf Coast.