

In full swing: North America's crude prices and changing takeaway capacity

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The first half of 2018 saw crude production continuing to rise in North America, particularly in the Permian and Western Canada. US crude exports are also on the rise, which would indicate a positive outlook for North America's crude market overall. However, ample production growth and constrained takeaway capacity have combined to create a tight market with big discounts.

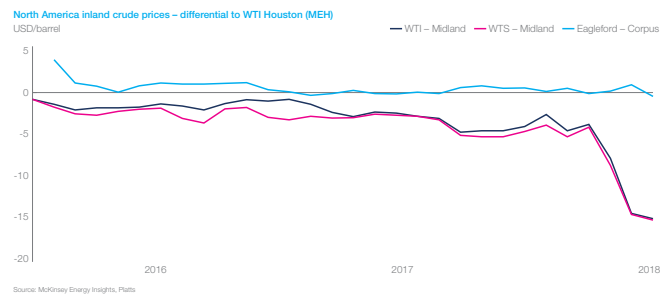
North America is getting longer in crude

The US has a growing supply of crude ready to be exported to international refiners looking to experiment with running US crudes as substitutes for other light and medium crudes from regions like the Middle East now the US crude export ban has been lifted. However, exporting from the Gulf using the largest crude tankers has been a challenge. The Louisiana Offshore Oil Port (LOOP) is currently the only Gulf Coast terminal that can accommodate very large crude carriers (VLCCs), which are what many overseas buyers, particularly those in Asia, want to use to transport crude to keep costs down and benefit from the economies of scale given the ships' size. Though other new terminals are in the works, it will likely be at least another two years before the first one will be ready for VLCC exports. The most promising project is the Corpus Christi Harbor Island port terminal expansion, which will be able to accommodate 120 VLCCs per year. Until then, the largest tankers will continue to be loaded by smaller tankers shuttling the crude out to the larger tankers anchored offshore, adding time and costs to US crude export deliveries.

While the crude export dilemma is causing US crude prices to fall slightly, they are still strongly linked to the international market. The real impact on prices comes from supply levels and logistical constraints in inland regions such as the Permian and Western Canada.

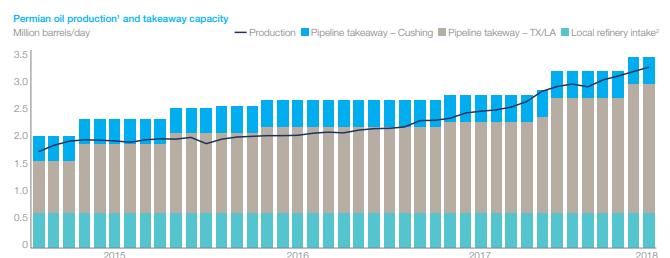
Permian prices have collapsed as production overwhelms pipeline capacity

Exhibit 1: Recently Permian crude prices have dropped compared to Gulf Coast prices as pipelines reach capacity



The Permian has seen production grow over 60% since January 2017, reaching an all-time high of 3.2 million barrels per day in May 2018. This surge in production has placed significant pressure on infrastructure and has complicated logistics as operators attempt to transfer crude out of the Midland area to an end market. Underutilized in early 2017, pipelines quickly began to fill up and reached capacity at the end of 2017, largely due to the rapid increase in Permian production. With takeaway capacity constrained, Midland price assessments collapsed as producers struggled to get crude to a demand market, falling over USD10 a barrel from March to May 2018.

Exhibit 2: Pipeline capacity is full which is starting to put pressure on operators to get crude out by truck and rail until expansion projects are live



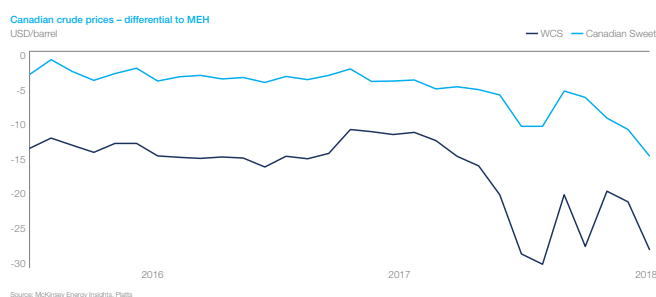


This cyclical pattern is typical. Increased demand for pipe capacity causes the market to be tight and differentials to coastal crudes to widen, driving up pipe utilization. With increasing utilization, additional investments are made to expand current capacity, which often leads to overcapacity and differentials narrowing as pipe tariffs fall. Then utilization drops, and investments slow until utilization rises again. We saw this pattern emerge in early 2013, when about 500 thousand barrels per day of Permian takeaway capacity was added after booming production in 2011-12 exceeded existing pipe capacity—and prices fell significantly as a result. This pattern happened again in 2013-2014, and we saw another wave of additions in 2015 bring another 500 thousand barrels per day of Permian takeaway capacity, mostly from the Cactus and Permian Express II pipes.

With current Permian pipeline capacity constrained, rail would be considered as the next best option for transporting crude, and it has been done in the Permian in the past. However, this is not without its own challenges. Many of the rail terminals in the Permian have in recent years been converted to supplier terminals, mostly for production materials like frac sand, and using them to transport crude would involve retrofitting and readjustments, which have yet to happen. In response to current constraints, Murex, a distribution company operating one of the few rail terminals in the Permian, has announced its plans to double its' crude takeaway capacity to 75 thousand barrels per day starting in Q3 2018. Until the first wave of takeaway pipe investments is completed in 2019, we expect Permian differentials to Gulf Coast crude to remain high until more capacity is brought online to move the growing production.

Canada differentials to Gulf Coast crudes rise as pipes fill

Exhibit 3: Canadian crude is seeing deep discounts versus Gulf Coast crudes



Canadian crude price differentials to Gulf Coast WTI reached an all-time high of USD29.50 a barrel in January 2018 as Canadian prices fell in Q4 2017. Compared to the Permian, Canadian prices fell faster and more dramatically, largely because pipes from Canada never had significant excess capacity, so even small increases in production growth led takeaway capacity to be severely constrained and become very tight in late 2017. Congestion in the Cushing area, largely due to increased Permian volumes, has also contributed to the continued high differential between Canadian and Gulf Coast crude prices as significant volumes of Canadian crude is routed down through the Midwest and Cushing.

Canada's main back up to pipeline capacity is also rail, but even this is getting tighter with fewer rail cars available due to stricter safety standards and political pressure to use the rail space for agricultural products. Rail companies prefer long term commitments, but producers hesitate to agree to long term rail transport since they want the flexibility to move to pipeline transport as soon as the capacity becomes available. In addition to takeaway capacity constraints in Western Canada affecting Canadian crude prices, tightness anywhere in the logistics system connecting Canada to the Gulf Coast—particularly Cushing—can affect prices.

There are a handful of projects planned to increase takeaway capacity for Western Canadian crude, however, there is a lot of ambiguity around them and



their likelihood to be completed. With the first projects not expecting to be completed until at least late 2019, we expect differentials to remain relatively high until then. As Permian bottlenecks are alleviated, the Canadian differentials will likely soften slightly as the Cushing congestion is improved.

Strong inland crude differentials are expected to remain for the remainder of 2018

Overall, we expect to see pipeline investments catch up with the tight market in the Permian in late 2019, when an additional 1.6 million barrels per day of confirmed takeaway capacity will be added. Another 1 million barrels per day of capacity is still undecided, and that figure includes Energy Transfer's Permian-Houston-Nederland pipe with 600-1,000 thousand barrels per day of capacity. On the Canadian side, the tightness in the market should loosen as the Permian bottlenecks are cleared and fewer Permian barrels travel to Cushing. However, the bottlenecks out of Western Canada will still limit Canadian crude pricing until they are relieved.

Based on the forecast in our pipeline additions database, we believe the Permian market and capacity will rebalance by late 2019, but production forecasts using our North America Supply Model predict that the Permian will add another 3 million barrels per day by 2025. This should guarantee that this cycle of tight markets and big discounts will reoccur in the Permian and ripple out to Canadian markets as well.

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