MORNINGSTAR®

Diluent Recovery Justified in Today's Canadian Market

Case study comparison.

Morningstar Commodities Research
27 January 2020

Sandy Fielden
Director, Oil and Products Research
+1 512 431-8044
sandy.fielden@morningstar.com

Data Sources for This Publication
CME Group

To discover more about the data sources used, click here.

Saves $10/Barrel

Earlier this month (January 2020) we detailed two December proposals by Canadian rail terminal operators to build diluent recovery units (see "Rail Operators Plan Canadian Diluent Recovery"). These facilities would remove solvent known as diluent from Western Canada's Oil Sands crude prior to shipping it to market by rail. Diluent adds as much as 40% by volume to Canadian dilbit crude blends to facilitate pipeline flow. Lengthy permit delays out of Canada in recent years caused congestion and price discounting on pipelines, making rail alternatives attractive. Our analysis shows a DRU investment reducing rail costs by $10/barrel and competing neck and neck with pipeline tariffs. This note is a DRU economics case study.

Bitumen

Bitumen is a viscous crude extracted from oil sands in Northern Alberta, Canada, using two primary processes. The first is surface mining involving excavation and onsite refining into lighter synthetic crude. The second is steam assisted gravity drainage, or SAGD, where heated water is pumped underground to melt bitumen and drain it to a second well for removal to the surface. Because surface mining is expensive, most recent production projects use SAGD. Bitumen extracted by SAGD is too viscous to flow in a pipeline at ambient temperatures, so it is blended with a range of lighter hydrocarbon components known as diluent to create a dilbit crude. The most common diluent sources are crude condensate extracted from wet gas at the wellhead and plant condensate extracted from natural gas at a processing plant. Operating temperature and bitumen density determine diluent levels in the blend.

Assumptions

Our analysis assumes a 37% diluent and 63% bitumen dilbit blend. We used pricing from CME Group for Western Canadian Select—the benchmark Canadian dilbit crude. Producers at SAGD plants in Alberta ship dilbit to one of two market hubs by pipeline—Edmonton or Hardisty, Alberta. Our case study is based on analysis of the proposed Cenovus DRU at that company's Bruderheim pipeline and rail terminal.

From Bruderheim, dilbit can be shipped to the U.S. market by pipeline if the producer has committed capacity. Since pipeline capacity is tight, incremental dilbit production is shipped by rail to reach the U.S. market. Today, dilbit is railed from Bruderheim to U.S. destinations including the Gulf Coast "as is," meaning the diluent remains in the blend. The DRU that Cenovus plans will remove the diluent using a

distillation tower. Removing the diluent in Edmonton allows a producer to ship relatively pure bitumen to market in heated rail cars and recycle the recovered diluent to the production region.

Cenovus estimates the capital cost of its DRU to be $0.8 billion-$1.0 billion—a significant investment. Our analysis compares netbacks at Bruderheim for a producer shipping a 100% bitumen barrel to the Gulf Coast using a DRU with the equivalent barrel sent by pipeline or rail without removing the diluent.

Bitumen Via DRU

Producers deliver dilbit to Bruderheim from the production facility by pipeline. The DRU would heat the dilbit and pass it through a distillation tower to remove the diluent. The pure bitumen output would then be shipped on heated railcars to a Gulf Coast terminal for sale to refiners.

In this case the producer only pays rail freight for one barrel of 100% bitumen. If the same 100% bitumen barrel goes by rail or pipeline as blended dilbit then only 63% of the barrel is bitumen, meaning the shipper moves 100/63 or 1.59 barrels of dilbit to ship one barrel of bitumen including 0.59 barrels of diluent.

After using the DRU to remove the diluent, the Bruderheim 100% bitumen netback is simple to calculate based on the price of bitumen at the Gulf Coast minus rail transport cost of approximately $18 and an estimated $2.50 DRU process fee for a total $20.50/barrel. Since there's no reported price for pure bitumen at the Gulf Coast, we implied this from the price of WCS dilbit crude in Houston that averaged $55.97/barrel during the first 15 days of January 2020 by assuming the dilbit is 37% diluent and subtracting that value from WCS. The Gulf Coast plant condensate diluent price average in the same period was $51.25/barrel so the value of the diluent is 37% of $51.25 or $18.96, implying the 63% bitumen is worth $55.97 – $18.96 or $37.01/barrel. That translates to 100/63 * $37.01 = $58.74 for one barrel of 100% bitumen. If the value of one bitumen barrel in Houston is $58.74 then the netback at Bruderheim is $58.74 minus $20.50 transport and DRU fee = $38.24/barrel.

Dilbit by Pipeline

To ship the same barrel of pure bitumen by pipeline a producer needs to send 1.59 barrels of dilbit containing 0.59 barrels of diluent. The diluent must be purchased in Alberta and its value in Houston is typically lower because there is a surplus of condensate in the Gulf Coast region. In our example, average condensate prices in Edmonton over the first half of January were $59.37/barrel and in Houston (Mt. Belvieu plant condensate) $51.25/barrel—a difference of $8.12/barrel. The pipeline dilbit shipper therefore loses 0.59 * $8.12 or $4.77 for every 100% bitumen barrel shipped.

Shippers pay pipeline tariffs to ship the redundant diluent along with the bitumen, meaning the published pipeline tariff is increased by 59% to cover the diluent. In our example, the Enbridge walk-up tariff for uncommitted shippers from Edmonton to Houston is $10.41 /barrel (January 2020) that increases to $16.55 for a100% bitumen barrel.

The Edmonton pipeline netback for a barrel of 100% bitumen is therefore the bitumen price in Houston of $58.74/barrel minus the pipeline tariff of $16.55 and the losses on diluent of $4.77 or $37.42 for each 100% bitumen barrel shipped.

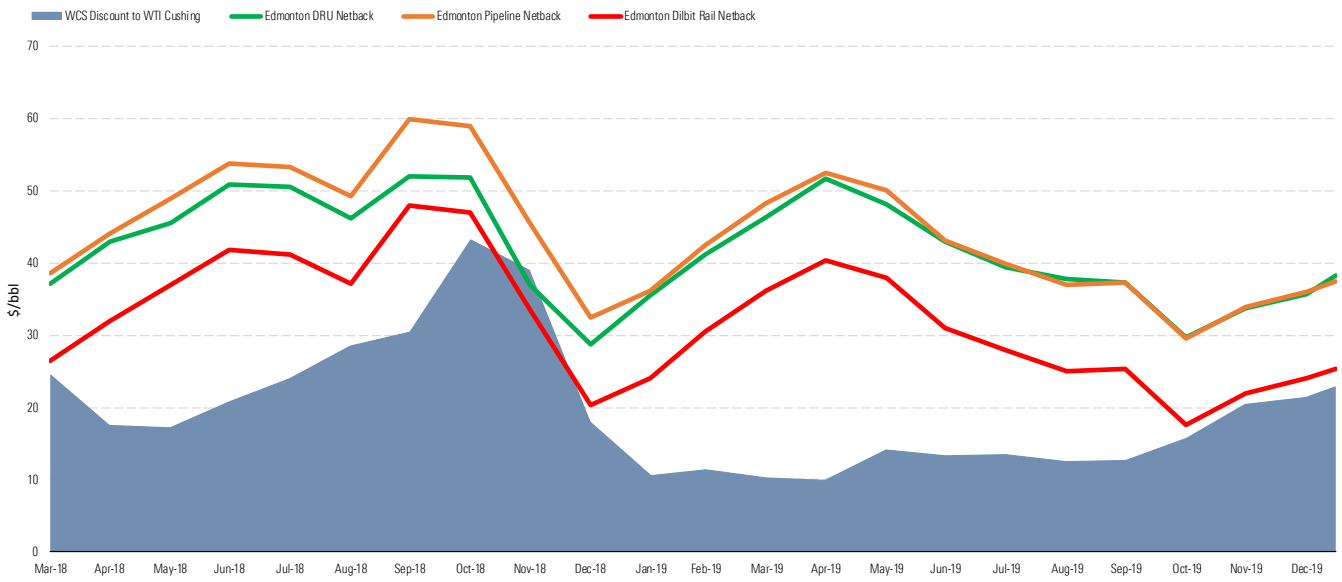
Dilbit by Rail

The same diluent add-ons apply to dilbit shipped by rail. The rail cost is assumed to be $18/barrel including terminal fees, freight, and rail car lease but there is no DRU fee in this case. However, the $18 tariff is increased by 59% to cover the cost of diluent, meaning the tariff to carry a 100% bitumen barrel would be 1.59 * 18 or $28.62. The diluent loss is the same as the pipeline—$4.77 for each bitumen barrel.

The Edmonton rail diluent netback for a barrel of 100% bitumen is the bitumen price in Houston of $58.74 minus the rail tariff of $28.62 and the diluent loss of $4.77 or $25.35/barrel.

Exhibit 1 shows estimated comparative monthly average Edmonton netbacks for DRU rail, pipeline dilbit and rail dilbit on a monthly basis between March 2018 and January 2020. The shaded area is the monthly average discount for WCS in Alberta versus U.S. benchmark West Texas Intermediate crude delivered to Cushing, Oklahoma.

Exhibit 1 Comparative Bruderheim Netbacks and WCS Discounts



Source: CME Group, Morningstar.

Payback

The chart shows the DRU and pipeline netbacks running neck and neck during 2019. The DRU would have produced a higher netback than pipeline during the first half of January 2020—the worked

example for our case study. The DRU reduces the rail cost for dilbit considerably—by an average of $9.96/ bitumen barrel over the past 22 months. Assuming pipeline capacity out of Alberta is constrained then the DRU would justify the investment in less than four years. That estimate is based on $10/barrel saving and one unit train per day with 120 rail tank cars shipping 60,000 barrels of pure bitumen. Every unit train saves 60,000 * $10 = $600,000 per day. An initial investment of $800 million in a DRU would pay back in 1,333 days or 3.65 years.

Rail Versus Pipe

Our analysis shows the DRU rail case running neck and neck with pipelines in recent months. However, we only reviewed one pipeline use case—the walk-up shipper that typically pays the highest tariff. If we applied discounted committed shipper rates, the pipeline cost would fall considerably, making pipeline a clear winner. Arguably, a new shipper or existing shipper with new barrels is uncommitted and would pay the walk-up pipeline rate. Exhibit 1 shows the WCS discount narrowing at the end of 2018 when the Alberta government announced production quotas to cap producer output. When that happened pipeline advantage increased because a narrower discount renders more expensive rail tariffs uneconomic. This suggests that the DRU advantage will shrink if adequate pipeline capacity opens. That would reduce DRU throughput and extend the payout period.

Conclusion

Our analysis suggests that based on estimated performance over the past two years, the DRU investment would be justified. And that will likely remain the case if rail transport is required to clear Canadian Oil Sands crude production above current pipeline capacity. The risk to this type of investment arises if additional pipeline capacity opens to reduce or remove the need for rail transport.

About Morningstar® Commodities Research™

Morningstar Commodities Research provides independent, fundamental research differentiated by a consistent focus on the competitive dynamics in worldwide commodities markets. This joint effort between Morningstar's Research and Commodities & Energy groups leverages the expertise of Morningstar's 23 energy, utilities, basic materials, and commodities analysts as well as Morningstar's extensive data platform. Morningstar Commodities Research initially will focus on North American power and natural gas markets with plans to expand coverage of other markets worldwide.

Morningstar, Inc. is a leading provider of independent investment research in North America, Europe, Australia, and Asia. The company offers an extensive line of products and services for individuals, financial advisors, and institutions. Morningstar's Commodities & Energy group provides superior quality market data and analytical products for energy data management systems, financial and agricultural data management, historical analysis, trading, risk management, and forecasting.

For More Information

+1 800 546-9646 North America
+44 20 3194 1455 Europe
commoditydata-sales@morningstar.com

MORNINGSTAR®

22 West Washington Street
Chicago, IL 60602 USA