

Pacific Northwest Refineries: Cheap Crude and a Captive Market Margins Helped by Advantaged Crude and Less Competition

Morningstar Commodities Research

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Data Sources for this Publication

- ▶ Alaska Dept. of Revenue
- ▶ California Energy Commission
- ▶ ClipperData
- ▶ CME Group
- ▶ Crude Postings
- ▶ EIA

To discover more about the data sources used [Click Here](#)

Better Performance

The five refineries in the U.S. Pacific Northwest performed better in 2016 than rivals on the East or Gulf coasts for two main reasons. First, the changing pattern of North American crude supply has worked to their advantage. Faced with the threat of dwindling mainstay crude supplies from Alaska, refiners in Washington state replaced 22% of their slate with North Dakota Bakken crude shipped in by rail. They have also enjoyed advantaged access to discounted crude supplies from western Canada. Second, Northwest refiners face less competition for refined product customers than rivals on the East and Gulf coasts, meaning they have a captive market that often translates to higher margins.

This note provides highlights from our recently published Outlook describing the changing crude supply picture for Washington state refineries as well as regional refined product demand and margin performance. The outlook also details operations and prospects for each refinery, concluding with a summary of winners and losers. For a copy of the full report, please contact Commodity-Research@morningstar.com

Refineries

Five refineries in Washington state with a combined 634 mb/d capacity serve the Pacific Northwest. BP, Shell, Tesoro, Phillips 66, and U.S. Oil own these refineries - located in the Energy Information Administration's Petroleum Administration for Defense District 5 or West Coast region (Exhibit 1).

Exhibit 1 Washington State Refineries

Refinery	Location	Capacity (mb/d)
BP West Coast Products	Ferndale, WA	227
Shell Oil Products	Anacortes, WA	145
Tesoro	Anacortes, WA	120
Phillips 66	Ferndale, WA	101
US Oil & Refining	Tacoma, WA	41
Total		634

Source: EIA,

These refineries primarily serve the 11.2 million residents of Washington state and Oregon. They also meet a portion of refined product needs in the Canadian province of British Columbia that has only one

refinery. The refineries are relatively isolated from competitive oil markets both in the U.S. and overseas. The West Coast is 10 days' travel by tanker from the U.S. Gulf Coast, three weeks from Asia, more than four weeks from Europe, and no pipelines deliver crude oil across the Rockies. Most refinery output is consumed by local demand, and refiners face little competition from outside the region. To the south, California refineries produce specialized gasoline and diesel blends to meet California Air Resources Board requirements that are more expensive than Washington specifications, meaning they can only supply the Puget Sound region competitively in the event of refinery outages or other supply disruptions. To the north, British Columbia is underserved, with only one 55 mb/d refinery at Burnaby and other products delivered long distance by pipeline from Edmonton.

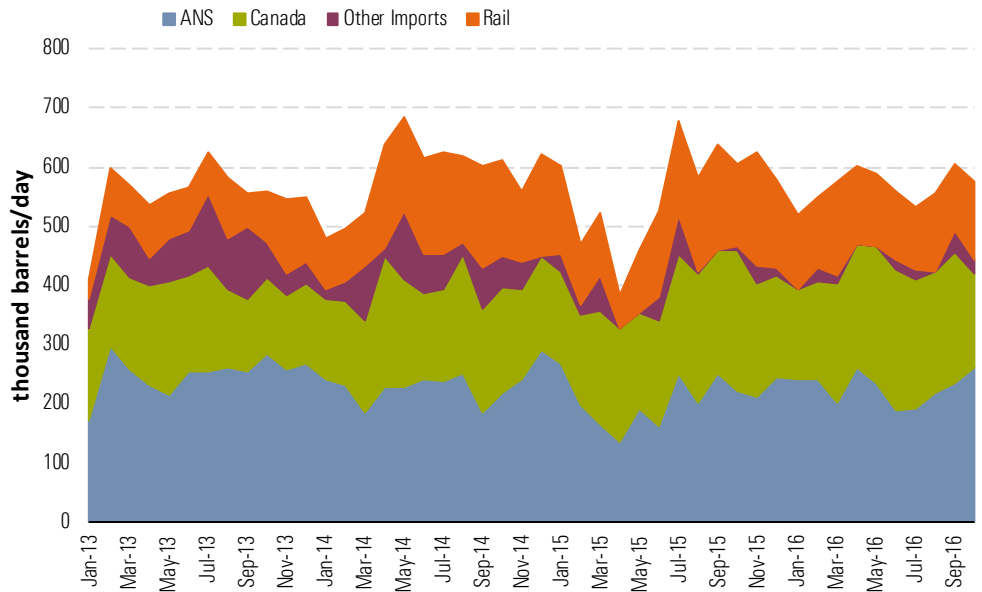
Refineries in Utah and Montana serve parts of eastern Washington and Oregon via pipeline, but the extent of competition from these suppliers is constrained by pipeline capacity as well as the physical barrier of the Cascade Mountains. Because there is less competition to meet refined product demand from outside the region, prices for gasoline and diesel in the Pacific Northwest are higher than in other regions of the U.S. – boosting refinery margins.

Crude Supply

Washington refineries get their crude feedstock from three main sources: Alaska, Western Canada, and North Dakota. The first refineries in the region were built in the 1950's to process Western Canadian crude delivered via the 300 mb/d Kinder Morgan Trans Mountain pipeline from Edmonton, Alberta, to Burnaby, British Columbia, and via a southern lateral to Puget Sound refineries. Since the 1970's Alaskan crude or ANS has become a staple for West Coast refiners. Most ANS is produced in Prudhoe Bay on the north coast of Alaska and shipped to refineries in Washington and California by pipeline and tanker, with smaller quantities going to Hawaii and exports. ANS production has been falling since the mid-80's leaving West Coast refiners looking for alternative supplies in the shape of increased imports. Then in the shale era after 2012, all the Pacific Northwest refiners except Shell built rail terminals to take delivery of Williston Basin light sweet crude from the Bakken Shale formation in North Dakota. Shell abandoned their application for a permit to build a rail terminal in October 2016 in the face of increased public and environmental opposition.

During the past 3 years Washington refiners have replaced non-Canadian imports and declining ANS production with increased volumes of Bakken and Canadian crude. The replacements were motivated by discounted prices for Bakken crude stranded in the Midwest by lack of infrastructure as North Dakota production boomed and discounts for Canadian crude caused by increased congestion on pipelines out of Western Canada. Exhibit 2 summarizes crude feedstock sources for Washington state refineries between January 2013 and October 2016.

Exhibit 2 Crude Supply to Washington State Refineries



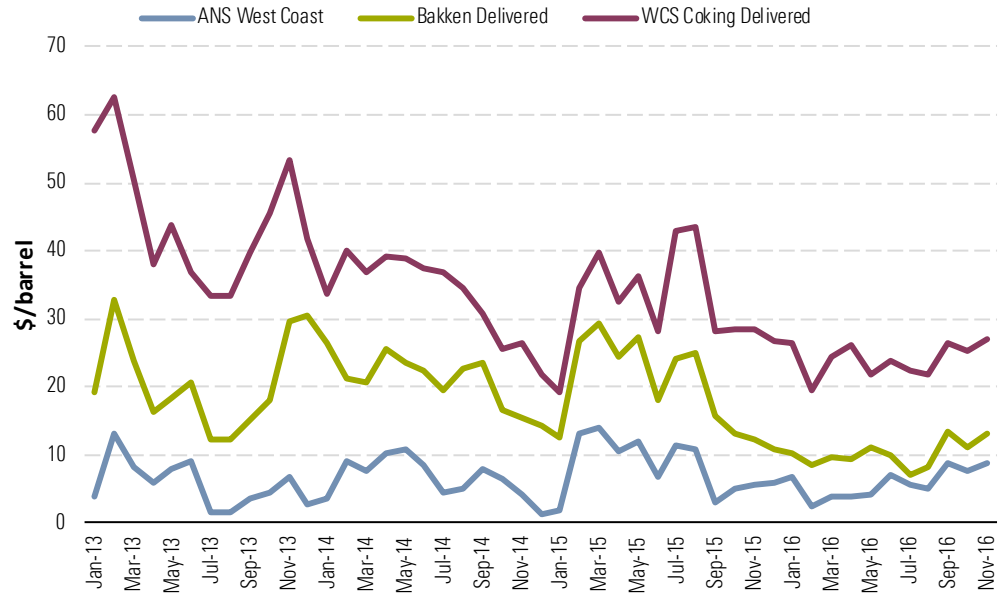
Source: Morningstar, ClipperData, EIA, CEC

Our analysis shows that in 2016 through October, Alaska remained the largest crude supplier to Washington refineries, with a monthly average of 228 mb/d, or 40% of the total (up from 37% in 2015). Canada was the second-largest supplier, with an average 200 mb/d, or 35% of the total, with rail providing 122 mb/d, or 22% of supply (down from 25% in 2015), and other imports 13 mb/d, or 2%.

Refining Margins

Pacific Northwest refineries have processed more Bakken and Canadian crude at the expense of ANS and other imports in the past three years because of higher refining margins (the difference between refined product prices and crude feedstock plus transport costs). Exhibit 3 shows our estimate of monthly average refining margins for ANS, Bakken and Western Canadian heavy crude benchmark Western Canadian Select or WCS. For ANS and Bakken crudes we used refining yields published by Tesoro indicating Bakken crude produces 13% more gasoline and diesel than ANS. For WCS we used a 6-3-2-1 coking spread. This calculation assumes three barrels of gasoline; two barrels of diesel, and one barrel of fuel oil are produced for every six barrels of crude. We estimated regional product prices for gasoline, diesel, and fuel oil based on CME group data to calculate the value of refined products and then subtracted the crude price, adding \$10/barrel to the Bakken price to reflect rail transport costs and a \$2.60/barrel pipeline tariff to the WCS crude price. The ANS price, is a West Coast delivered price quoted by the Alaska Department of Revenue.

Exhibit 3 Refining Margins



Source: Morningstar, Tesoro, CME Group, Alaska Department of Revenue, Flint Hills

Our analysis shows that the WCS coking margin was the highest throughout the period, with Bakken crude coming in next and ANS producing the lowest refining margin. In 2013, WCS produced an average “windfall” \$45/barrel margin that has declined since to an average \$32/barrel in 2015 and \$24/barrel in 2016 through November. This narrowing margin reflects falling crude prices in general since the end of 2014, but although Canadian crude production has declined since then in response to lower prices, the pipeline congestion out of Canada continues to cause price discounting. Estimated Bakken refining margins have declined by half in 2016 through November to an average \$10/barrel compared with the heady days of 2013 and 2014 when they averaged more than \$20/barrel, reflecting a narrowing spread between Bakken and ANS crude prices. ANS margins remained flat throughout the period and still only reached 60% of Bakken margin levels in 2016.

The main beneficiaries of high WCS margins were BP and Shell that have coking units at their refineries that can extract the most value from heavy Canadian crude. The other three refineries process light and medium heavy Canadian crudes that are typically more expensive. Replacing ANS crude with Bakken barrels improved margins at all these refineries but Tesoro, BP and U.S. Oil appear to have taken the most advantage of this opportunity while Shell missed out by not having a rail terminal and Phillips 66 did not fully utilize their rail terminal.

Winners and Losers

Our analysis of the Puget Sound refineries (detailed in the Outlook) lead us to the following conclusions about their relative performance:

- ▶ All five refineries benefited from increased North American crude production that resulted in advantaged feedstock prices.
- ▶ Shell did not take advantage of crude delivered by rail from North Dakota.
- ▶ Both Shell and BP were in a strong position to benefit from bargain-priced heavy Canadian crude that the other refiners cannot process in significant quantities due to lack of investment in coking units.
- ▶ Phillips 66 continues to process significant volumes of ANS and not fully utilize Bakken crude by rail whereas Tesoro and U.S. Oil have virtually eliminated ANS processing
- ▶ As a small independent with a less sophisticated plant, U.S. Oil are the most vulnerable to adverse market conditions in this region
- ▶ The “isolation” advantage of the Pacific Northwest (higher product prices and lower competition) has given all these refiners a cushion against market forces after the crude price collapse in 2014
- ▶ If the Trans Mountain pipeline is expanded in 2019 it will provide considerable opportunity to upgrade or expand Puget Sound refineries
- ▶ If the Dakota Access pipeline is built then Bakken crude supplies may become less competitive in the Northwest
- ▶ Upcoming risks in ship fuel markets will adversely impact the three refineries that do not have coking capacity to upgrade fuel oil. ■■

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