# Low-Tech Rockies Refiners Enjoy High Margins
## Expansion constrained by limited regional demand.

**Morningstar Commodities Research**
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**Data Sources for This Publication**
U.S. Energy Information Administration
CME Group
To discover more about the data sources used, click here.

### Lofty Crack Spreads

Refiners in the five states that make up the U.S. Energy Information Administration's Petroleum Administration for Defense District 4, or PADD 4, (Montana, Wyoming, Utah, Colorado, and Idaho), enjoy higher margins than every other region of the country except California. Crack spreads for domestic crude in PADD 4 averaged $25/barrel between 2014 and 2017 while those for Canadian crude averaged $31/barrel. These lofty margins reflect an abundance of crude – both from indigenous production and Canadian and North Dakota supplies passing through the region on their way to Midwestern and Coastal markets. Local refiners have their pick of these supplies at competitive prices while also enjoying the highest average diesel prices in the nation and gasoline prices second only to California.

Margins are expected to stay strong during the next several years, due to growing crude production in the region (especially shale output from the Niobrara formation in Wyoming and Colorado) and in the close by Williston basin in North Dakota as well as Western Canada. However, refinery expansion to take advantage of robust margins is practically limited by slow demand growth in the land-locked Rockies market.

This note provides highlights of our latest refinery outlook for PADD 4. For a full version of the report please contact commodity-research@morningstar.com

### Refineries

PADD 4's 15 refineries producing transport fuels have 1.7 mmb/d of capacity between them – an average of just 47 mb/d. Yet major oil companies such as ExxonMobil and Chevron as well as top independents Phillips 66 and Andeavor own plants in the region despite their lacking economies of scale usually desired by larger players. Private equity companies have also invested in regional refineries as evidenced by Par Petroleum's recent (2016) purchase of the Newcastle refinery in Wyoming. These 15 refineries were all operating 20 years ago and have remained viable during an era of industry consolidation and concentration.

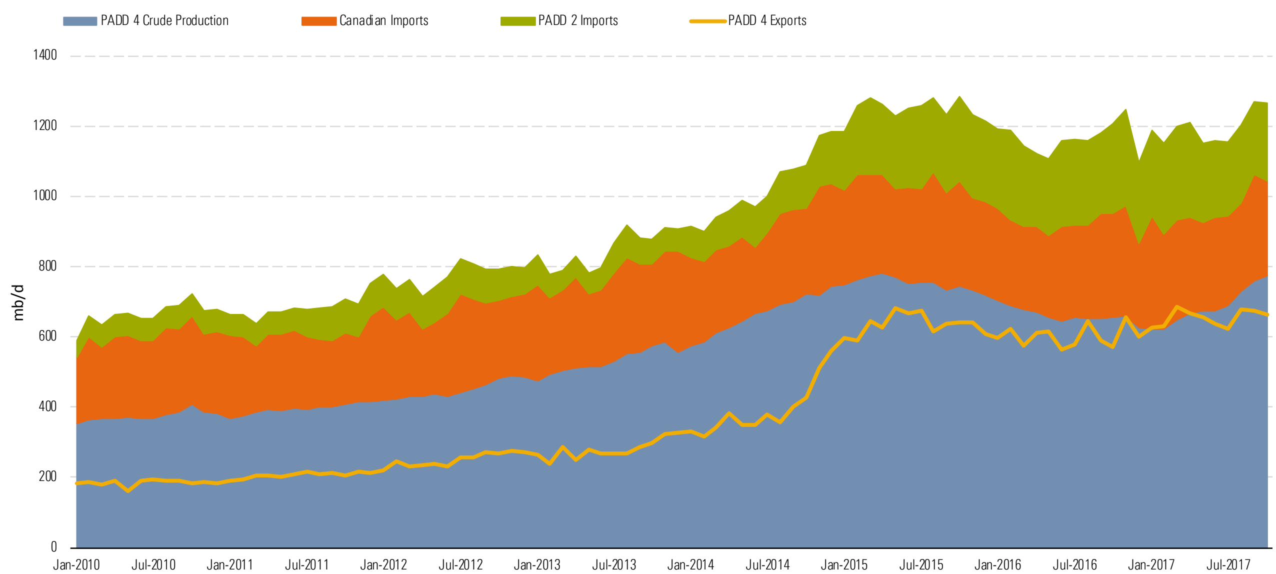
PADD 4 refineries produced an average 534 thousand barrels/day, or mb/d, of transport fuels in 2016 to meet demand of 571 mb/d. Significant refined product volumes were imported into PADD 4 from Kansas (PADD 2) and exported from PADD 4 to the Dakota's (PADD 2) and Nevada (PADD 5). Rockies refineries are of medium complexity—with only six of the 15 plants having coker units to fully process heavy crude. The five refineries in Utah are specially equipped to process waxy crudes from the Uinta Basin.

### Crude Supply

In the seven years since 2010, Rocky Mountain refiners have enjoyed a growing embarrassment of riches in crude supplies. Not only has local output increased in the four out of five states that produce crude, but feedstock flows through the region have also increased from growing production in Canada to the north and North Dakota to the east. Available crude in the region greatly exceeds local refining capacity such that in 2016 an average 50% of supplies were exported to other refining destinations with much of that volume simply passing through the Rockies on long-haul pipelines. Although drilling slowed in 2015 after the oil price crash, local production recovered in 2017 and increasing volumes are now being shipped to the Midwest Cushing, Oklahoma, trading hub in PADD 2.

Exhibit 1 shows monthly EIA data for PADD 4 crude by origin (Rockies production, Canadian imports, and PADD 2 imports from North Dakota) between January 2010 and October 2017 (latest data). During this period, annual average total regional crude supply increased by 73% from 664 mb/d in 2010 to 1163 mb/d in 2016 and reached 1264 mb/d in October 2017. Refineries in the region processed an average 544 mb/d in 2010 increasing by 10% to 598 mb/d in 2016, leaving an excess for export that grew by 325 % from 185 mb/d in 2010 to 602 mb/d in 2016 (yellow line).

**Exhibit 1** PADD 4 Crude Sources

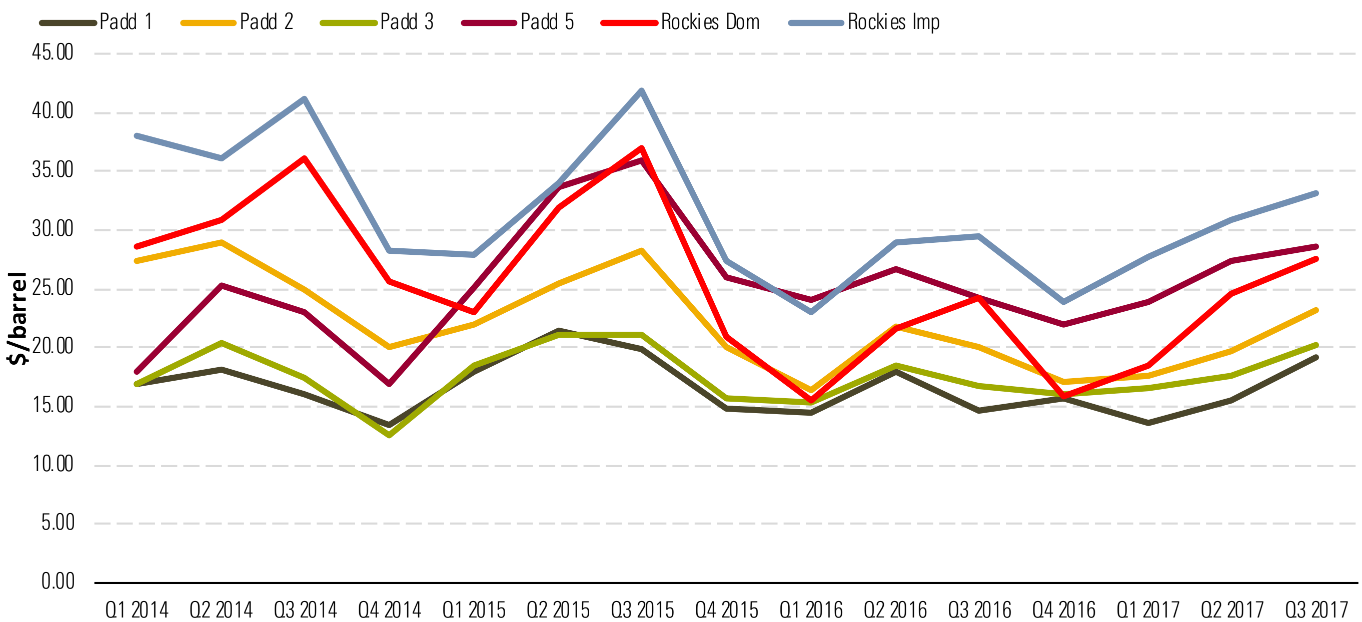



Source: EIA, National Energy Board, Morningstar

## Crack Spreads

Crack spreads are notional refining margin estimates for typical plants with primary and secondary processing units designed to maximize production of transport fuels. The calculation does not consider refining costs or crude and product transportation but provides a useful comparison between refining regions. The cracks are calculated using average prices for refinery product sales of gasoline and diesel and refiner feedstock acquisition costs provided by EIA. The 3-2-1 crack is a rule-of-thumb $/barrel refining margin for two barrels of gasoline and one barrel of diesel produced from three barrels of crude. Exhibit 2 shows average 3-2-1 crack spreads for refineries in PADD 1 (Atlantic Coast, black line), PADD 2 (Midwest, yellow), PADD 3 (Gulf Coast, green), PADD 5 (West Coast, purple) as well as 3-2-1 cracks for PADD 4 refineries processing domestic crude (red) and Canadian imports (blue), over a 16-quarter period between first-quarter 2014 and third-quarter 2017.

**Exhibit 2** Regional Average 3-2-1 Crack Spreads




Source: EIA, Morningstar

The data shows that, relatively speaking, Rockies refiners processing imported Canadian crude experienced the highest margins every quarter for the past four years, with an overall average crack spread of $31.40/barrel between first-quarter 2014 and third-quarter 2017. Rockies refineries processing domestic crude had the third-best margins on average, with $25.33/barrel—just $0.11/barrel lower than second-place PADD 5. The crack spread for Rockies refiners using Canadian crude was a significant $6.06/barrel higher than the PADD 5 average. PADD 2 cracks ranked fourth at an average $22.05/barrel, or $3.28/barrel below the Rockies average for domestic crude. Refineries in the Rockies performed far better than those on the Gulf Coast (average $17.66/barrel) and the East Coast ($16.58/barrel).

### Winners and Losers

PADD 4 refineries have benefited greatly from surging crude production in the U.S. and in western Canada over the past seven years. The plants that invested in coking capacity to process heavy Canadian crude have enjoyed the best margins. With high volumes of crude expected to continue passing through the region from Canada and North Dakota and local production in the Rockies increasing as well, the future of these plants seems assured. However, the lack of refined product demand growth makes further investment in upgrades and expansions unlikely.

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