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# Can Small Refineries Succeed in North Dakota and Texas?

## Economics favor larger operators.

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### Morningstar Commodities Research

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### Data Sources for This Publication

U.S. Energy Information Administration  
CME Group  
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### Lack of New Capacity

The latest Energy Information Administration refining report released in June shows crude throughput capacity virtually unchanged at the end of 2017 versus 2016, at 18.6 million barrels/day after increasing by 1 mmb/d between 2010 and 2016. Primary crude distillation capacity is not expected to increase more than a tiny fraction in 2018 either. This lack of new capacity comes even as U.S. crude production continues to break records, reaching 10.5 mmb/d in April 2018. Existing plants are getting a workout, as the volume of crude refiners process increased by 2.2% year on year in 2017 to 16.9 mmb/d and notched an all-time record 17.8 mmb/d in the week ending June 22, 2018, according to the EIA. Although major oil companies like ExxonMobil have announced plans to expand existing Gulf Coast refineries to process additional shale crude in the coming years, there is little talk of building new large-scale plants. That isn't the case at the opposite end of the refining market, with plans under way from several small players to build greenfield plants in North Dakota and Texas. This note looks at prospects for new-build small refineries.

### Shale Expansions

Last year we reviewed refinery capacity expansions since 2010 (see our July 2017 note "[Refiners Slow Response to Shale Bounty](#)"). Gulf Coast capacity expanded by 1.2 mmb/d during the seven-year period as export-led demand drove plant expansions and the artificial barrier of a crude export ban pushed down prices for abundant shale crude. Additions to existing plants were led by Valero with topping units in Houston and Corpus Christi, Texas, while a number of midstream companies built simple distillation towers known as condensate splitters in Corpus Christi (Buckeye, Magellan) and Houston (Kinder Morgan), as described in our June 2017 note "[Condensate Splitters Face Gulf Coast Headwinds](#)." These capacity additions to process light shale crude have not performed well since the export ban was lifted in December 2015, reducing discounted prices for domestic crude that can now just as easily be shipped overseas. This year, as domestic crude production increased to record levels, major U.S. refiners are wrestling over whether to increase domestic processing capacity, given the static market for refined products. As we discussed in a March note (see "[Exxon Bets On Downstream U.S. Returns](#)"), ExxonMobil is considering Gulf Coast capacity expansions to meet growing product export demand in countries like Mexico.

### North Dakota

At the other end of the refining market, small companies are planning to build startup plants in shale-producing regions. The most advanced of these is Meridian Energy Group's plan for a privately financed 55mb/d refinery in Belfield, North Dakota, which received its permit to construct Phase 1 from the North

Dakota Health Department on June 12, 2018. The first phase of Meridian's Davis refinery will be limited to primary crude processing through two 27.5 mb/d atmospheric distillation units, naphtha and distillate hydrotreating units, a catalytic reformer, and a hydrogen production unit. Phase 2 will add secondary processing, including vacuum distillation and hydrocracking. The plant will produce gasoline, diesel, jet and natural gas liquids (propane and butane).

Feedstock will come from nearby Bakken crude production in North Dakota, with abundant cheap natural gas providing fuel for the plant's boilers. Meridian originally planned to operate the Davis refinery through tolling arrangements, with local producers paying a processing fee to convert crude to products. This approach did not attract enough interest from producers after crude prices improved in North Dakota since the Dakota Access pipeline came on line to Midwest and Gulf Coast markets in June 2017. Meridian has instead entered into agreements with regional firms to purchase and distribute refined products. The refinery will have about 330 thousand barrels of refined product storage onsite, as well as rail and truck loading terminals.

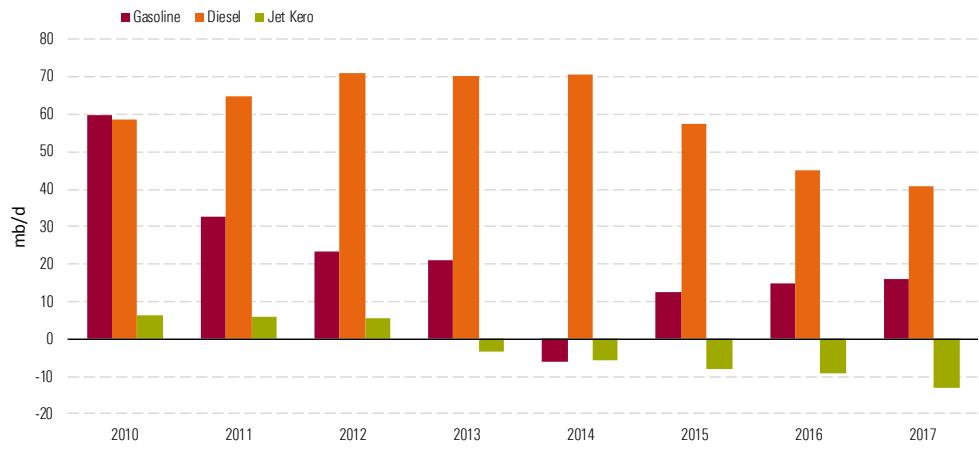
The new refinery is being built just two years after the June 2016 sale to Tesoro (now Andeavor) of another new-build plant in North Dakota, the 50/50 MDU Resources and Calumet joint-venture 20 mb/d Dakota Prairie refinery. That refinery opened a year earlier in May 2015, just 21 miles east of Meridian's plant, and was sold at a loss to Andeavor following cost overruns and operating losses. Meridian believes the additional complexity of the Davis refinery over Dakota Prairie will allow it to better respond to changes in market conditions. Andeavor is running the Dakota Prairie plant successfully as part of its larger refinery fleet (that will soon become part of Marathon), including the nearby 74 mb/d plant in Mandan, North Dakota. Plans for several other simple distillation plants in North Dakota at the height of the first shale boom in 2014 were abandoned or placed on hold prior to construction after the crude price crash in 2015, including the Dakota Oil Processing Trenton Diesel refinery, American Energy Holding's 20 mb/d Devil's Lake refinery, the Three Tribes 20 mb/d refinery in Makoti, North Dakota, and a Quantum Energy proposed 40 mb/d refinery in Berthold, North Dakota.

To better understand the economics of Meridian's Davis refinery, we looked at regional petroleum supply/demand and refining margins.

As noted, North Dakota has two refineries, both operated by Andeavor, at Mandan and Dickinson, North Dakota, with combined capacity of 93.5 mb/d. The EIA includes these refineries in its northern Midwest region covering the Dakotas, Wisconsin, and Minnesota with 540 mb/d total capacity. According to the EIA, these refineries produced an annual average 352 mb/d of gasoline, 137 mb/d of diesel, and 28 mb/d of jet kero between 2010 and 2017. EIA prime supplier sales data shows demand for gasoline in the region was flat over the past eight years, averaging 374 mb/d between 2010 and 2017. Over the same period, diesel demand averaged 197 mb/d and jet kero demand averaged 25 mb/d. Except for jet kero after 2013, regional refinery output failed to meet demand, especially for diesel. Exhibit 1 shows regional demand minus refinery output between 2010 and 2017. These deficits are currently met by refined product supply from outside the region. The diesel deficit of 41 mb/d in 2017 is the key market

opportunity for Meridian's new refinery, although that deficit has fallen by 42% since 2014 as new refining capacity came on line.

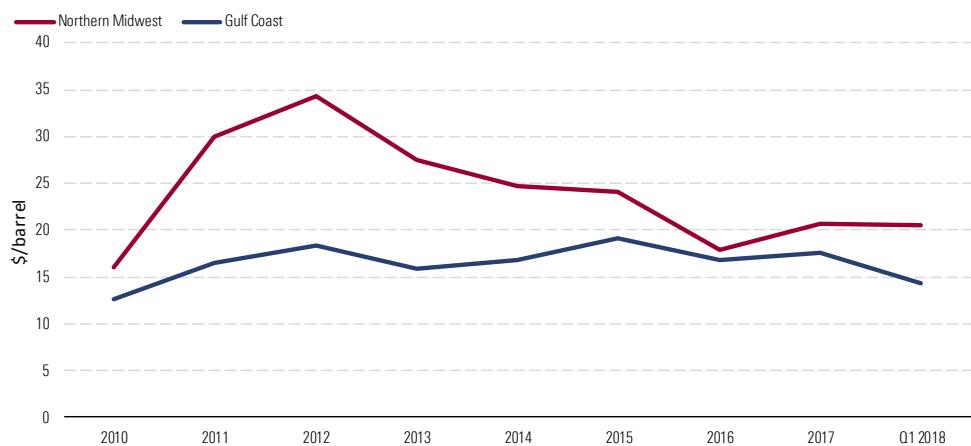
**Exhibit 1** Refined Product Demand Deficit in Northern Midwest Refining Region



Source: EIA, Morningstar

As detailed in our March 2017 Midwest refining outlook (see "[Heavy Bets Pay Off for Midwest Refiners](#)"), refining margins in this region have been very attractive over the past eight years in light of discounted shale and Canadian crude costs and robust local product prices. Our estimate of the 3-2-1 crack spread for refineries in this region, based on EIA refiner sales prices and cost of crude acquisition, is an average \$24.42/barrel, with 2017 values averaging \$20.73/barrel. This margin compares favorably with Gulf Coast equivalents, which averaged \$16.70/barrel between 2010 and 2017 and \$17.55/barrel in 2017 (Exhibit 2).

**Exhibit 2** Northern Midwest and Gulf Coast 3-2-1 Crack Spread Margins



Source: EIA, CME Group, Morningstar

Taken together, the regional refined product deficit and attractive margins suggest the Davis refinery can succeed in North Dakota. However, the key challenge for the operator will be keeping refined product distribution costs competitive. The 3-2-1 crack spread doesn't take into account distribution costs that will be higher for the Davis refinery than for its nearby rival Andeavor's Dakota Prairie and Mandan plants. The Mandan refinery is served by NuStar's North pipeline, which ships refined product output to distribution terminals in North Dakota and Minnesota. Product not distributed locally from Dakota Prairie can be shipped over the 90 miles to Mandan by truck to take advantage of the pipeline. In contrast, the Davis refinery will rely on more expensive truck or rail transport to reach distribution terminals, meaning its competitive economic radius is limited.

### **Texas**

Another three small refineries are being proposed in Texas, with their economic rationale based on proximity to crude oil production and Mexico's growing refined product import demand.

The most advanced of these projects is the 100 mb/d MMEX Resources Pecos Refining plant, announced in March 2017 to be located 50 miles northeast of Fort Stockton, Texas, on a spur of the Texas Pacifico railroad close to Permian Basin shale production. In November 2017 MMEX held a groundbreaking ceremony to start construction of the Phase 1 10 mb/d distillation unit to be completed by the end of 2018. The first phase of this refinery will produce distillate blends to serve local demand from drilling service companies. Company SEC filings indicate that it will build a larger 100 mb/d refinery on the same site that will market and distribute refined products via rail to Western U.S. and Mexican markets.

Raven Petroleum announced a second new Texas refinery plan in November 2016. The South Texas Energy Complex will include a 55 mb/d refinery located in Duval County, Texas, at Hebbronville, just outside of Laredo, close to the Eagle Ford shale basin. The refinery will include a rail terminal on the Kansas City Southern railroad and focus on exports to Mexico. This project has yet to file an air permit application with the Texas Commission on Environmental Quality.

A third small Texas refinery proposal came this April from Dallas- and Mexico City-based Mexiship Ocean International and San Antonio-based Refinery Equipment Operating Company. The partners are planning an energy park complex and logistics center in a rural area of Maverick County near Eagle Pass, Texas, in the Eagle Ford Basin. The proposed complex includes a 20 mb/d refinery, storage terminals, and cross-border pipelines for refined products, natural gas, and fiber-optic cable. The refinery will process condensate or light sweet crude from the Eagle Ford into gasoline, diesel, and other refined products for export to Mexico. Long-term plans include building a similar complex across the border in neighboring Piedras Negras, Coahuila, Mexico.

These small Texas refineries have similar ambitions to the condensate splitters built at Corpus Christi and Houston over the past few years. The operator's plans are thus far limited to simple refining or "topping" plants that will produce transport fuels for the growing Mexican market. The economics of such plants are dependent on beneficial crude feedstock costs and high refined-product prices, since they are located some distance from their intended market and will have high distribution costs. At the

moment, pipeline congestion in the Permian means that crude costs are at bargain-basement levels, but they are not expected to stay that way for more than a year or so. As shown above with our North Dakota analysis, Gulf Coast refining margins have been lower than the Midwest over the past eight years because it is a highly competitive market. The combination of lower margins, higher distribution costs, and exchange-rate risk through selling into Mexico does not bode well for these projects.

### **Economics Favor Large Operators**

Smaller "niche" refineries are attractive to startup investors because of their lower cost compared with the larger complex plants operated by large oil companies. The distance between shale crude producing basins and demand centers represents an opportunity for nimble competitors to grab margin from the big boys. However, the advantages of flexibility in crude processing and refined product blending in fast-changing markets appear to favor larger operators over small ones in the long run. **IM**

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