Sixfold Increase in Renewable Diesel Capacity Coming!

Demand driven by West Coast low-carbon initiatives.

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Data Sources for This Publication
EIA
CME Group
CARB

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

High Margins

A close relationship with petroleum refining is attracting significant investment from U.S. refiners in renewable diesel plants. The growth in renewable diesel demand is spurred by carbon legislation on the West Coast but could also help address diesel shortages resulting from IMO 2020 regulations. The opportunity is expected to produce high margins for plant operators. Our analysis shows renewable diesel margins in California averaging as much as 4 times the value of petroleum diesel cracks. Plant expansions and new builds planned in the next five years are expected to increase domestic renewable diesel capacity sixfold to 2.3 billion gallons/year or 150 thousand barrels/day. This note details the market and opportunity.

Renewable vs. Biodiesel

It's important to distinguish between renewable diesel and its close equivalent, biodiesel. Both use similar feedstock materials—vegetable oils and fats that can be recycled or produced from crops like soybeans. Biodiesel is produced by a chemical reaction with methanol. Renewable diesel is manufactured by hydrotreating and isomerizing the feedstock in units like those in oil refineries. Renewable diesel is chemically like petroleum diesel and nearly identical in its performance characteristics. It can be dropped into petroleum diesel at high blending levels without affecting quality. Biodiesel contains oxygen that makes it less compatible with regular diesel, meaning that blend volumes are limited to between 5% and 20%. Renewable diesel can also be coprocessed with petroleum diesel at oil refineries.

RFS

The U.S. renewable diesel market is driven by environmental legislation. The 2007 federal Renewable Fuel Standard requires refiners and importers to blend increasing volumes of renewable fuels with gasoline and diesel based on targets set by the Environmental Protection Agency. The majority of renewable fuel targets—currently about 15 billion gallons a year—apply to gasoline blended with ethanol from corn (see our recent note Trump Walks Ethanol Mandate Tightrope). The RFS target for biodiesel fuel is 2.1 billion gallons for 2019, which can be met using biodiesel or renewable diesel. Just like gasoline, renewable diesel or biodiesel blenders receive Renewable Identification Numbers for each gallon they blend, which can be surrendered to meet their renewable volume obligation or sold to third parties that are short RINs. Renewable diesel attracts more RINs than biodiesel because it can be blended in larger percentages.

LCFS

Outside the federal RFS mandate, renewable diesel growth is driven by existing and upcoming carbon fuel standards at the state level. Low-carbon legislation is led by California's 2011 low-carbon fuel standard, administered by the California Air Resources Board, which sets standards to incrementally decrease the carbon intensity of gasoline and diesel. The initial LCFS target was a reduction of 10% by 2020 compared with a 2010 base year. That target was extended and expanded in September 2018 to 20% by 2030. Much like the RFS program, refiners and blenders are required to either produce low-carbon fuels or purchase credits to demonstrate compliance. Renewable diesel generates a larger number of LCFS credits than other fuels because of its low carbon intensity, making it more attractive than biodiesel for refiners trying to meet ever-increasing LCFS standards.

California's LCFS program was replicated by a similar initiative in Oregon starting in 2016 and is currently under consideration by Washington state. LCFS legislation was implemented by the province of British Columbia in 2010 and is currently under construction at the federal level for the whole of Canada. The low-carbon combination of California, Oregon, British Columbia, and potentially Washington state makes the West Coast the largest market for renewable diesel.

Market Share

Energy Information Administration data show monthly average consumption of biodiesel and renewable diesel combined during 2018 was 124 thousand barrels/day, of which 119 mb/d was produced domestically and the balance imported, mainly from Asia. Given that domestic renewable diesel capacity is currently only 23 mb/d, most of the demand is met using biodiesel. Total biodiesel and renewable diesel penetration of the 4.0 million barrels/day U.S. petroleum diesel market was just 3% during 2018, according to the EIA. In contrast, renewable and biodiesel sales in California in 2018 averaged 37 mb/d or 14% of the 266 mb/d state diesel market. The good news for renewable producers is that state mandates increase volume targets on an annual basis.

Unlike the RFS gasoline mandate, which has angered refiners, renewable diesel represents a better opportunity to profit from RIN and LCFS credits. Ethanol mandates for gasoline ran into trouble because the biofuel is kept separate from gasoline in pipelines since it attracts water, meaning that blending happens at the distribution terminal not refineries. That meant some refiners with RIN obligations don't realize them from blending and must purchase them from third parties, often at high cost. Because it can be blended seamlessly, renewable diesel doesn't create the same RIN mismatch, and the ability of refiners to coprocess renewable diesel gives them flexibility to increase output when prices justify.

IMO 2020

Although International Maritime Organization-mandated changes to ship fuel specifications due in January 2020 are beginning to sound like a well-worn panacea for refiners, the regulation does benefit renewable diesel producers. That's because IMO ship fuel mandates demand very low sulfur content. To meet that need, refiners must replace significant volumes of high-sulfur residual oil in the bunker market. Although there are various approaches, the easiest are to replace high-sulfur fuel with low-

sulfur marine diesel or to blend down the sulfur content in fuel oil with low-sulfur diesel. Both increase demand for low-sulfur renewable diesel.

Plant Capacity

All this increased potential demand for low-sulfur diesel has led to a flurry of renewable diesel investment proposals in the past year. Our survey of currently planned new domestic capacity shows that, if built, the proposed new plants could increase U.S. output more than sixfold in the next five years to the end of 2024. Exhibit 1 lists the proposed new plants and one expansion by location, owner, capacity, and year of completion. Most of these investments involve partnerships between renewable energy and oil companies, with three large U.S. independent refiners—Valero, Phillips 66, and Marathon—leading the way.

Nonrefiner investments include the 600 million gallons/year NEXT Renewable Fuels plant proposal in Port Westward, Washington, which has a long-term supply agreement with Shell, and the 300 mmgy World Energy plant in Paramount, California, on the site of a shuttered Delek Energy refinery.

Exhibit 1 Renewable Diesel New U.S. Plant Capacity Planned Through 2024

Location	Owner	New Capacity (mmgy)	Year in Service
Ferndale, WA	Renewable Energy Group / Phillips 66	250	2022
Dickinson, ND	Marathon	169	2020
Port Westward	NEXT Renewable Fuels	600	2021
Reno, NV	Ryze Renewables/P66	54	2019
Las Vegas, NV	Ryze Renewables/P67	115	2020
Norco, LA	Diamond Green Diesel (expansion)	400	2021
Paramount, CA	World Energy	306	2020
Hull, IA	ReadiFuels	34	2020
Port Arthur, TX	Diamond Green Diesel (proposed)	400	2024
	Total	**2328**	

Source: Company presentations, Morningstar.

The largest existing U.S. plant, operated by Diamond Green Diesel, a joint venture between Valero and Darling Ingredients, is in Norco, Louisiana, adjacent to Valero's 215 mb/d Norco refinery. Diamond Green plans to expand the Norco plant by 400 mmgy from a current 275 mmgy, to 675 mmgy capacity, and on Sept. 9, it announced an engineering and development cost review for a new plant in Port Arthur, Texas, where Valero also has an existing oil refinery. The new plant would produce 400 mmgy of renewable diesel as well as 40 mmgy of renewable naphtha. The final investment decision on this plant is expected in 2021 with operation commencing in 2024.

Phillips 66 is involved in two new-build joint venture renewable diesel proposals. One is a project with Ryze Renewables to build two small renewable diesel plants in Reno and Las Vegas with 54 and 115 mmgy capacity, respectively. Phillips 66 is also finalizing an investment decision with partner Renewable Energy Group to build a 250 mmgy plant in Ferndale, Washington, adjacent to its 105 mb/d refinery. Marathon acquired the new-build 19 mb/d Dickinson, North Dakota, Dakota Prairie refinery with its

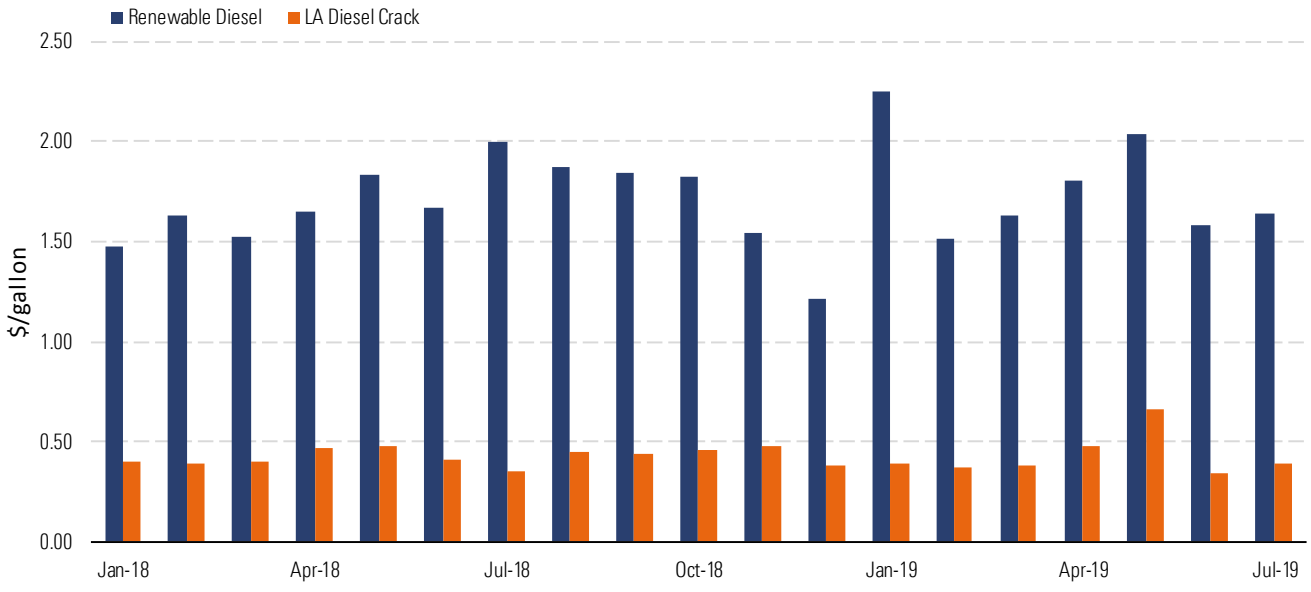
acquisition of Andeavor in March 2017 and plans to convert it to a renewable diesel plant producing 11 mb/d or 169 mmgy by 2020. Finally, a 34 mmgy plant is planned in Hull, Iowa, by ReadiFuels. These expansions and new builds represent a total 2.3 billion gallons/year of capacity.

One noteworthy trend is the attraction of locating renewable diesel plants close to existing refineries because of the similarities in processing. That opens the possibility that marginally economic refineries could shut down or reduce petroleum fuel production in favor of renewable diesel. The owners of the recently closed Philadelphia Energy Solutions refinery in Pennsylvania have been approached by S.G. Preston to use the site as a renewable fuel plant. Refineries also have the option of coprocessing renewable diesel in their existing units to boost diesel yields.

Margins

Aside from a growing renewables market, this rush of investment is spurred by the prospect of financial returns that are currently as much as 4 times the equivalent margin for petroleum diesel. We calculated monthly average margins for renewable diesel in the California market between January 2018 and July 2019 based on a Diamond Green Diesel investor presentation analysis and compared them with a petroleum diesel crack spread (Exhibit 2). The calculation takes the price of CARB diesel in Los Angeles and adds the values of biodiesel RIN and LCFS credits to estimate the realized value of renewable diesel. A plant feedstock cost is then subtracted, based on prompt Chicago soybean oil futures. This margin averaged $1.71/gallon between January 2018 and July 2019. We then calculated the crack spread for CARB diesel against West Coast delivered Alaska North Slope crude to estimate a comparable refining margin. The diesel crack averaged only $0.43/gallon over the same period, or just 25% of the renewable diesel margin.

Exhibit 2 Renewable Diesel and Petroleum Diesel Crack Spread Margins, California



Source: CME Group, CARB, EPA, Morningstar.

Conclusion

Renewable diesel is an attractive market for U.S. refiners offering good returns, growth, and synergy with existing plants. The opportunity allows refiners to protect their share of the diesel market against renewable poachers instead of largely losing out to ethanol producers as they have with gasoline. Renewable diesel offers high margins when RIN sales and LCFS credits are added, and we expect tight supply to continue pushing up values as carbon regulation and IMO needs increase demand for low-sulfur diesel. With only about 3% renewable penetration of the roughly 4 mmb/d U.S. diesel market in 2018, refiners would be foolish to avoid at least investing in coprocessing facilities in coming years.

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