

Producers, Refiners View Strategies to Trim Texas' Glut of Ultralight Condensate Oil

By Jesse Thompson

ABSTRACT: Hampered by the federal oil export ban, producers are seeking alternative means to bring to global markets the burgeoning supplies of ultralight condensate oil drawn from the Eagle Ford Shale region of South Texas.

The shale revolution has vastly boosted supplies of the ultralight crude oil known as condensate, particularly in the Eagle Ford Shale region of South Texas.

Condensate is used to produce a variety of products, often by combining it with heavier types of oil. Supplies have overwhelmed U.S. firms' capacity to put the condensate to use.

A U.S. ban on oil exports—including condensates—largely prevents the sale of condensate to foreign companies. Drilling companies, refiners and petrochemical producers have employed various ways to deal with the condensate surplus, with some producers skirting the export ban. Regulators have taken notice, too, allowing limited condensate exports by two firms.

Still, much uncertainty remains in the marketplace over what form exports of condensate will take.

Defining Condensate

Condensate is an ill-defined family of substances, often referred to as ultralight crude due to its low density.¹ Heat and pressure underground keep the substances gaseous, but when they come out of the well, they condense into a liquid, much like water on the outside of a cold drinking glass.

The American Petroleum Institute uses an index to indicate how dense various oils are relative to water—called API gravity: The higher the API, the lighter the oil. Generally, condensate API gravity exceeds 50. By comparison, West Texas Intermediate crude oil has an API of 39, while heavier crudes such as Canadian oil can have an API of 25 or lower. Condensates occupy the border between what are usually referred to as natural gas liquids (NGLs), such as ethane and propane, and crude oil.

Increasing Supplies

The Eagle Ford Shale accounted for 1 percent of the nation's oil production in 2008; the share rose to more than 17 percent by mid-2014. One-sixth of new barrels produced between 2009 and 2013 were an ultralight type called lease-condensate, according to the most recent data from the Energy Information Agency (EIA).² Over that period, Texas was responsible for 72 percent of U.S. condensate production growth.

The Eagle Ford produced 83 million barrels of condensate—27 percent of the U.S. supply and 52 percent of the Texas supply—in 2013. The sudden glut of ultralight liquids, which sell at a discount, drove South Texas producers to focus their drilling efforts on areas rich with heavier oils (*Chart 1*).

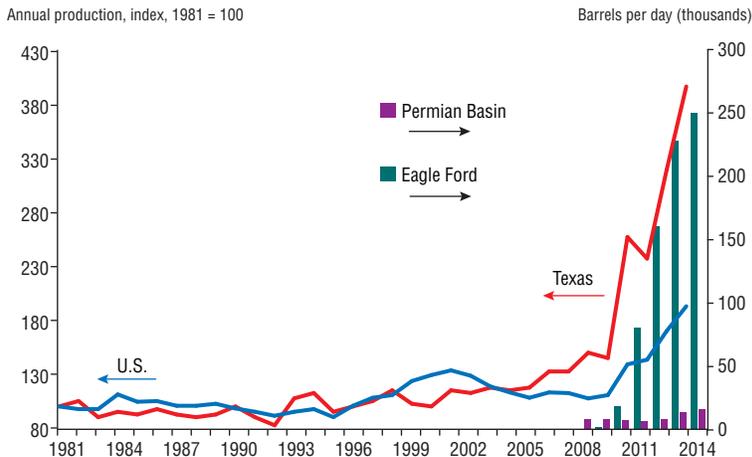
Thus, while oil production growth in the Eagle Ford remains healthy, condensate growth has fallen off, from 70 percent of total Eagle Ford oil production in 2009 to 20 percent in the first half of 2014. With such an unexpectedly rich resource of condensate, producers are seeking any route they can find to deliver it to customers.

A primary use for condensate is as a diluent. Heavy crude producers want to sell their product to refiners for processing but often need to dilute their oil with something lighter for transport and delivery. A barrel of heavy crude with a low API can be blended with condensate that has a high API to create oil with a gravity somewhere in between.

Refiners convert the diluted barrel into a variety of products. Some of the condensate that goes into a barrel of oil comes through the refining process little changed and is shipped back to heavy crude producers to repeat the process. This creates a loop in which the value of the condensate is based largely on the needs of heavy crude producers, as much

Chart
1

Texas' Eagle Ford Drives Condensate Production



NOTE: Permian Basin and Eagle Ford production for 2014 is based on January–September data.
SOURCES: Energy Information Agency; Texas Railroad Commission.

as the products derived from condensate itself. U.S. heavy crude production isn't growing, according to EIA estimates, but as long as that loop between heavy crude producers and refineries is expanding globally, international demand for diluent will grow with it.

Condensate is also used in petrochemical plants. Many use condensate to make the chemical building blocks for products such as plastics or car tires. Foreign petrochemical manufacturers dependent on naphtha—a mix of substances resembling condensate that usually comes from refineries—could be major buyers of U.S. condensate as they seek to lower their costs to compete with U.S. companies whose production is based on low-cost domestic ethane, an NGL.³

In the refinery, condensate is also split or processed into several different products. Some goes directly into diesel and jet fuel, some is blended into gasoline and some becomes solvents for industrial applications.

Even with many petrochemical and refinery uses, there are limits to how much condensate the U.S. can process.

Depressed Crude Wellhead Prices

The operating rates of U.S. refineries have climbed since the end of the recession to as high as 90 percent in 2013 and 95 percent in 2014. Along the Gulf

Coast and in the Midwest, the share of total operable refining capacity in use has frequently exceeded 90 percent the past two years. However, those plants have limited capacity to refine ultralight crudes. Particularly along the Gulf Coast, home to almost half of U.S. refining capacity, operators for most of the past 30 years invested in technologies to process greater volumes of heavier crudes.

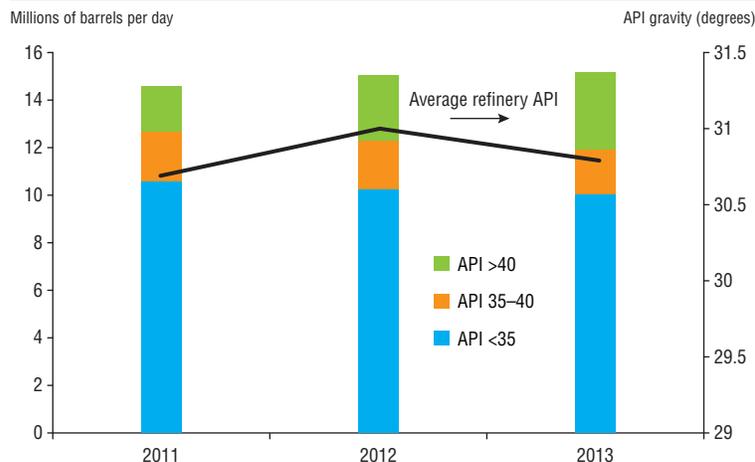
From 1986 to 2008, the API gravity of oils entering Gulf Coast refineries steadily declined from 35 to 27.8. It nearly recovered to 30 by early 2013 before falling again through the year. New refinery units along the Gulf Coast and higher operating rates at refineries on the East and West coasts will increase the amount of ultralight crude the U.S. can process over the next several years. Still, the capacity in many parts of the U.S. is near its limit. In those facilities, processing too light a mix would diminish profitability because of inefficient refinery use or sale of a suboptimal product mix (Chart 2).

Oils with an API gravity of 40 or more (light crudes and condensate) account for almost all U.S. crude production growth, EIA analysis shows. Thus, imports of similar crudes have fallen to zero, practically eliminating shipments from Nigeria and other light crude producers. Imports of heavy crudes with an API of 25 degrees or less have declined somewhat but are little changed as a

▶ New refinery units along the Gulf Coast and higher operating rates at refineries on the East and West coasts will increase the amount of ultralight crude the U.S. can process. Still, the capacity in many parts of the U.S. is near its limit.

► Many analysts believe it's inevitable that ultralight inventories will continue to rise as long as the export ban remains. The trapped and growing inventories could lower domestic light crude prices relative to their global counterparts.

Chart 2 | Refinery Mix Gets Heavier as Crude Supply Gets Lighter



NOTE: Domestic supply calculated as domestic production plus imports.

SOURCES: Energy Information Administration; DrillingInfo; Colorado Department of Natural Resources; Texas Railroad Commission; author's calculations.

share of refinery input. Heavy crude imports are down from nearly 24 percent of all oil that went into U.S. refineries in mid-2009 to 21.4 percent in late 2013.

Many analysts believe it's inevitable that ultralight inventories will continue to rise as long as the export ban remains. The trapped and growing inventories could reduce domestic light crude prices relative to their global counterparts. A further lowering of the price producers receive at the wellhead would discourage drilling in condensate-rich areas. However, there is a way around the export ban.

Export Regulatory Uncertainty

Crude oil cannot be exported, but refined products can.⁴ Investing in a “splitter” is one way around the ban. Splitters cut the condensate into lighter and heavier parts that then qualify as “refined” products under the law. Split-condensate can be consumed or exported as light and heavy naphthas, diesel, kerosene and gas oil. Hundreds of millions of investment dollars have been committed to this export strategy (*Table 1*).⁵

For example, Kinder Morgan Energy Partners is building a \$360 million complex on the Houston Ship Channel expressly to store, split and export products derived from Eagle Ford condensate at a rate of 100,000 barrels per day, with

room to grow. The facility is scheduled to become fully operational in second quarter 2015.

Even as planned projects make their way through engineering, permitting and construction, the rules governing condensate may be shifting. The Department of Commerce's Bureau of Industry and Security issued a judgment in June allowing Pioneer Natural Resources and Enterprise Product Partners to export condensate.⁶ The action didn't overturn the export ban, nor was it a finding that condensate differs from crude oil under the law. It stated that a stabilization process the two companies employed (in which NGLs and natural gas are removed) was sufficient to legally qualify the material they produced as refined. The resulting product is not subject to the export ban.

Indeed, some firms have taken it upon themselves to export stabilized condensate from Texas without an export permit, both testing regulators' will to enforce the ban and perhaps forcing a clarification of the rules.⁷

Following that reasoning, many firms may rethink the need for a splitter, while still others continue to review the decision, hoping to better understand what exports of condensate might look like in the near future. The resulting uncertainty may defer some planned Gulf Coast splitter projects.

Plant-Condensate Exports

A chemically close substitute for condensate—plant condensate, also known as pentanes plus, which comes from natural gas—provides some clues regarding the potential impact of increased condensate processing. Rather than being composed of the lightest parts of oil, like condensate, pentanes plus is made of the heaviest parts of unprocessed natural gas.

Pentanes plus has never been considered crude and has never been subject to the export ban. It is liquid and has roughly the same potential uses as condensate. Net exports of pentanes plus are a dramatic example of what the shale revolution has done for the U.S. energy trade balance. After decades of being an importer of this fuel, the United States is now a net exporter, principally to Canada (Chart 3).

The U.S. exported 50 million of the 127 million barrels of pentanes plus produced in gas plants in 2013 (40 percent) and 32 million of the 78 million barrels produced in the first half of 2014 (42 percent).

The Eagle Ford, which produced 83 million barrels of condensate in 2013, is on track for 91 million barrels in 2014. Adding only Eagle Ford condensate production to total pentanes plus output would result in a nearly two-thirds increase in the volume of exportable U.S. energy products in 2014.

Future Determination

The condensate supply glut has led to swollen inventories, strained refinery capacity, and likely diminished drilling in some parts of the country. Producers continue to face uncertainty while the export ban remains in place. But some combination of reduced light crude production (due to lower prices), increased refinery capacity and efforts to skirt the ban should ultimately alleviate the glut.

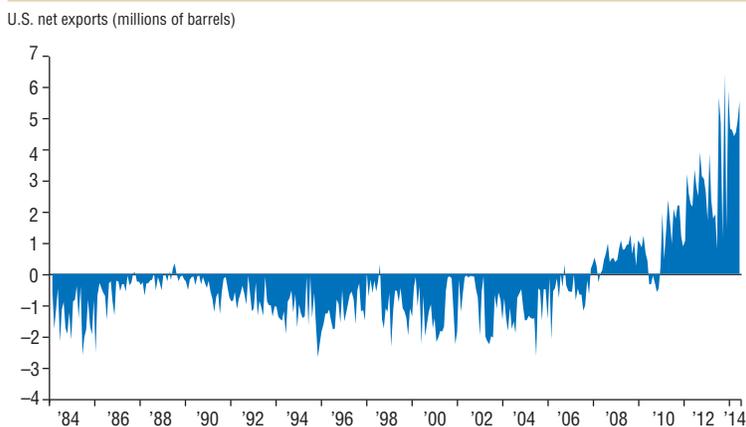
Producers in the Eagle Ford Shale, as in other regions, have been attempting to direct condensates to other uses and shift production to heavier oils as they await better pricing and word on whether the U.S. will liberalize or eliminate the oil export ban.

Table 1 Proposed and Existing Condensate Splitter Projects in Texas

Company	Startup date	Capacity (thousands of barrels/day)	Estimated capacity (thousands of barrels/day)	Location
BASF and Total Petrochem	2000	75	75	Port Arthur
Kinder Morgan Energy Partners—Phase 1	2014:Q4	50	50	Houston
Kinder Morgan Energy Partners—Phase 2	2015:Q2	50	50	Houston
Trafigura	2015	50	50	Corpus Christi
Martin Midstream	2016:Q1 & Q2	Up to 100	100	Corpus Christi
Castleton Commodities	TBD	TBD	75	Corpus Christi
Magellan Midstream	TBD	TBD	100	Corpus Christi

SOURCE: Turner, Mason and Co.

Chart 3 Exports of Natural-Gas-Derived Pentanes Plus Soar



SOURCE: Energy Information Agency.

Regardless of what form new export rules may take, the Eagle Ford continues to expand the list of energy products exported from the Texas Gulf Coast.

Thompson is a business economist at the Houston branch of the Federal Reserve Bank of Dallas.

Notes

¹ See "Fifty Shades of Condensates—Which One Did You Mean?" by Rusty Brazier, RBN Energy LLC, Oct. 22, 2012, <https://rbnenergy.com/fifty-shades-of-condensates%E2%80%93which-one-did-you-mean>.

² For simplicity, lease-condensate is referred to subsequently as "condensate."

³ See "Booming Shale Gas Production Drives Texas Petrochemical Surge," by Jesse Thompson, Federal Reserve

Bank of Dallas *Southwest Economy*, Fourth Quarter, 2012, and "Shale Revolution Feeds Petrochemical Profits as Production Adapts," by Jesse Thompson, Federal Reserve Bank of Dallas *Southwest Economy*, Fourth Quarter, 2013.

⁴ See "Crude Oil Export Ban Benefits Some . . . but Not All," by Michael D. Plante, Federal Reserve Bank of Dallas *Economic Letter*, vol. 9, no. 7, 2014.

⁵ See "To Split or Not to Split—That Is the Question," by Ryan Couture, Turner, Mason and Co., Sept. 8, 2014, www.turnermason.com/blog/2014/09/08/to-split-or-not-to-split.

⁶ See "With or Without Splitting? Changing Lease Condensate Export Definitions," by Sandy Fielden, RBN Energy LLC, June 25, 2014, <https://rbnenergy.com/with-or-without-splitting-changing-lease-condensate-export-definitions>.

⁷ See "BHP Billiton to Export Condensate Overseas," by Jennifer A. Dlouhy, *Fuel Fix*, Nov. 4, 2014, <http://fuelfix.com/blog/2014/11/04/bhp-billiton-to-export-condensate-overseas>.