# For Better or Worse: Pemex and Shell Pledge 10 More Years

Deer Park refinery joint venture extended.

**Morningstar Commodities Research**
Aug. 27, 2018

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

### Silver Anniversary

Twenty-five years ago, in 1993, Mexican national oil company Pemex purchased a 50% stake in Shell's Deer Park, Texas, refinery. The joint-venture partners entered into a 30-year processing agreement under which each would purchase half of the refinery's crude feedstock and own half the output. Separately, Pemex agreed to supply as much as 200 thousand barrels/day of Mexico's heavy sour Maya crude to Deer Park and Shell agreed to supply Pemex with 35-40 mb/d of gasoline to help meet Mexico's refined product deficit. The partners recently agreed to an early extension of the deal by 10 years from 2023 to 2033, while reducing the supply of Maya crude after 2023 to 70 mb/d, to be sold at a fixed price. This note looks at the benefits of this joint venture to both parties.

### The Deal

The Deer Park refinery is at the center of the largest Gulf Coast refining complex along the Houston Ship Channel. Shell owns an adjacent petrochemical steam cracker. When the joint venture began in 1993, Deer Park was a less sophisticated 225 mb/d plant. The partners used the $1 billion that Pemex invested for its share to upgrade the refinery to process Mexico's heavy sour export-grade Maya crude. By 2001, plant capacity had increased to 340 mb/d, including up to 240 mb/d of heavy crude. The initial plan was for Pemex to supply Maya to meet half the refinery's feedstock, expanded to 200 mb/d in 1999, then amended in 2008 to 170 mb/d until 2023. At the time, easier-to-refine light sweet crude was becoming scarce and more expensive, prompting Gulf Coast refiners to invest in complex processing capacity to break down abundant and cheaper heavy crude into lighter, more valuable components. Since then the shale revolution has reversed the tables by creating a surplus of light sweet crude, and Gulf Coast refiners find themselves paying higher prices for heavy crudes in the light of falling Venezuelan and Mexican production of these grades.

### Pemex Benefits

Under the original deal, Pemex enjoyed four major benefits from the Deer Park joint venture. The first was to secure a large U.S. customer for its Maya crude in 1993 at a time when few refineries were equipped to process heavy grades, meaning it was selling at a discount. The deal still provides a solid base for Mexico's crude exports. According to data from the Energy Information Administration, Deer Park imported an average 180 mb/d of Maya between 2014 and 2017. These volumes represented about 14% of Mexico's total crude exports during those years according to Pemex.

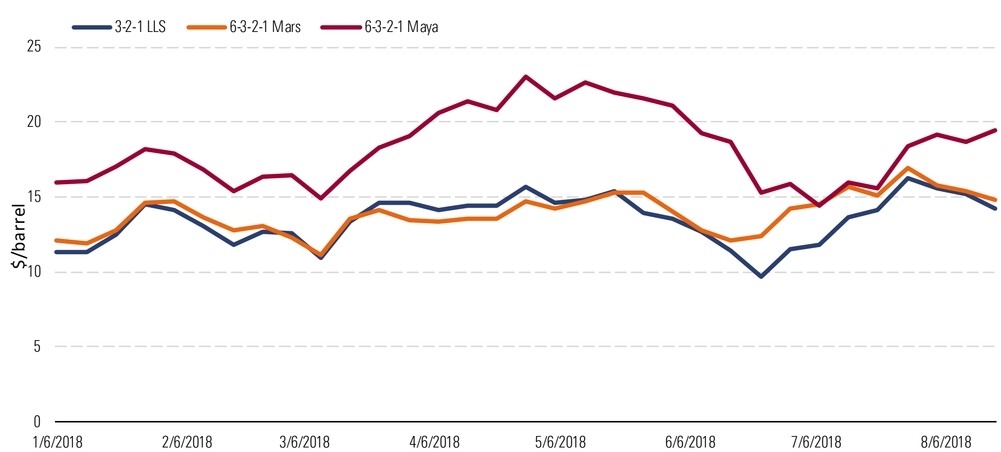
The second Pemex benefit was a guaranteed supply of gasoline needed to meet domestic demand. We discussed Mexico's growing dependence on imported fuels in a note earlier this month (see "Slower

Mexican Reforms Threaten U.S. Refiners"). Deer Park provided high-quality unleaded "clean" gasoline needed to reduce pollution in metropolitan areas that Mexico's unsophisticated refineries could not produce in the 1990s. According to Texas Rail Road Commission reports, Deer Park produced an average 102 mb/d of gasoline during the three years prior to May 2018, of which Pemex gets 50%, or 51 mb/d. As Mexico's import needs have ballooned, the significance of Deer Park's 50 mb/d contribution has declined from 13% of the country's overall gasoline imports in 2010 to 9% in 2017, but the refinery's contribution is still significant.

The third benefit to Pemex is exposure to U.S. refining technology and expertise. Unfortunately, this has not rubbed off on Mexico's domestic refining industry, which has suffered from low investment and declining output and still lacks upgrading capacity to process heavy crude at three of its six refineries.

Pemex's fourth benefit has been a share of refinery profits. Precise numbers are not publicly available, but our analysis has shown that the highest refining margins on the Gulf Coast come from processing heavy crudes like Maya (see our August 2016 note "Gulf Coast Refiners Enjoy Higher Margins From Processing Heavy Crude"). This is still the case in 2018. Exhibit 1 shows comparative Gulf Coast crack spread margins for this year. The average 3-2-1 crack for light sweet LLS crude on a weekly basis through August 18, 2018, was an estimated $13.47/barrel (blue line). The average 6-3-2-1 crack for medium sour Mars crude averaged $13.90/barrel (orange line), and the average Maya 6-3-2-1 crack was $18.35/barrel, or $4.88/barrel more than LLS (red line).

**Exhibit 1** Gulf Coast Crack Spreads




Source: CME Group, Morningstar

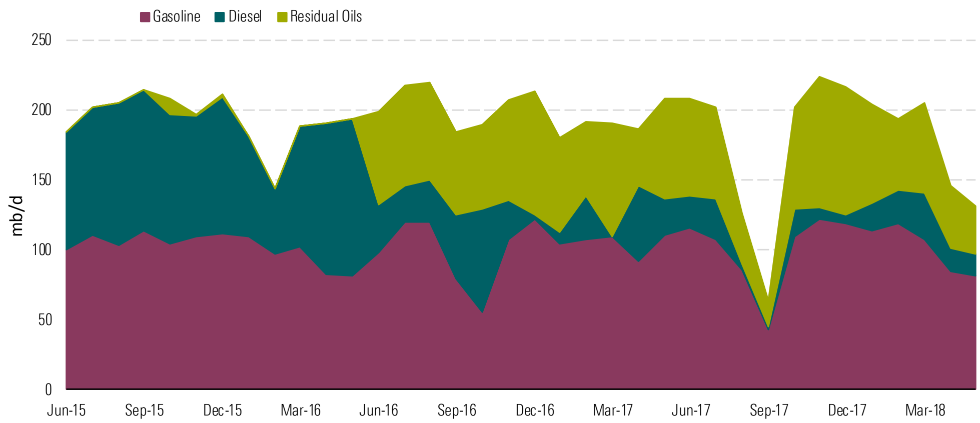
## Shell Upside

For Shell, the joint venture has provided a secure supply of heavy Maya crude from nearby Mexico for 25 years. Today, that secure supply remains important, given the collapse of Venezuelan production (see our July note "PDVSA Meltdown Creates Caribbean Opportunity") and the impending reimposition of sanctions on Iran that reduce that nation's exports of heavy crude. In the future, however, supplies of heavy crude to the Gulf Coast are expected to increase, especially as pipeline infrastructure from Canada is built out. The Deer Park refinery is already processing some Canadian heavy crude (about 19 mb/d in the first five months of 2018 according to EIA), but if the delayed 850 mb/d TransCanada Keystone XL pipeline is completed from Hardisty, Alberta to Cushing, Oklahoma during the early 2020s, it will facilitate Gulf Coast access for several hundred thousand additional barrels/day of Canadian heavy crude via southbound pipelines from Cushing . This prospect of crude competition probably explains the reduced volume of Maya sales after 2023 from 170 mb/d to 70 mb/d, believed to be written into the Shell-Pemex renewal agreement. Shell will benefit from the ability to shop around for lower prices in a competitive market when Canadian crude arrives in force. Pemex will lose out in that scenario because it's heavy crude will fetch lower prices, so the company is looking further afield to sell more exports to refineries in India and China, where the heavy crude supply is tighter. Pemex has already reduced crude shipments to the U.S from 75% of total exports in 2013 to 54% of exports in 2017, while increasing exports to Asia from 10% to 27% over the same period.

Shell has also benefited from easy access to the Mexican market for its refined product output. Average U.S. gasoline exports to Mexico more than doubled between 2010 and 2017 from 214 mb/d to 462 mb/d. As detailed above, Deer Park has contributed at least 50 mb/d to that export boom in recent years, allowing the refinery to expand throughput at a time when domestic markets for refined product have been relatively static. Shell also benefits from the partnership by gaining opportunities to participate in the long-term development of Mexico's downstream market for transport fuels, because of its close connections with Pemex (see our May 2017 note "Mexican Downstream Opportunity for U.S. Refiners").

Although the long-term Maya supply agreement can be seen as a limitation on refinery feedstock flexibility, Deer Park has benefited indirectly from Pemex's focus on gasoline supplies at the expense of other fuels. The joint agreements only stipulate gasoline supply to Mexico, not diesel or jet fuel. The absence of a committed customer network for Deer Park's diesel output gives them flexibility to integrate the refinery closely with Shell's adjacent petrochemical plant. An example is the recent reconfiguration of the plant's 67 mb/d hydrocracker, normally used to make diesel. This can now be adapted to produce higher volumes of hydrowax, used as a feedstock for the petrochemical cracker, when margins for that unit are higher than those for producing diesel. Exhibit 2 shows refined product output from the refinery over the past three years to May 2018, based on TRRC reports. In the 12 months from June 2015 to May 2016, diesel yields (dark green shaded area) amounted to 28% of plant output, dropping to 9% during the following 12 months and to 6% between June 2017 and May 2018, while other residual fuels, including hydrowax (light green shading), increased to an average 20% of output. The gasoline yield (purple) was a steady 32% throughout. Note the big dip in refinery output in September 2017 was the result of hurricane Harvey.

**Exhibit 2** Selected Refined Product Output—Deer Park




Source: TRRC, Morningstar

## Fixed-Price Hedge

Our understanding of the new Shell-Pemex agreement, as reported by Petroleum Argus, S&P Global, and trade press in Mexico, but not publicly available, is that it includes a fixed price for Maya crude sold to Deer Park during the extension of the deal between 2023 and 2033, at $59.35/barrel. Such a fixed price negotiated five years in advance, to apply to a 10-year period in the future, is, to put it mildly, highly unusual. One side or the other of a fixed-price deal like this would usually lose out in a stand-alone arrangement if market prices moved against them.

But this is not a standalone deal. It represents both cost savings on hedging and some upside from the refinery for both parties. Looking first at hedging costs, Pemex and the Mexican government have spent billions of dollars since 2000 on a hedging program for the country's crude exports, according to a Bloomberg analysis published in 2017. Every year, Pemex buys Asian style average price put options to establish a floor price for crude exports. The program floor price was set at an average $46/barrel for 2018, according to Bloomberg. If crude prices fall below the target price, Pemex exercises its put options to obtain $46/barrel. If prices are higher than the floor, the options expire worthless, and Pemex takes the market price. By negotiating a fixed price with Shell for 70 mb/d of Maya, Pemex avoids hedging costs on this portion of its crude exports. It receives the fixed price of $56.35/barrel, whatever happens in the market.

Still, the company remains exposed to the risk that actual crude prices turn out to be higher than $56.35/barrel. Pemex's protection in that case comes from the refinery, where it splits profits with Shell. If market crude prices turn out to be $70/barrel, then Deer Park gets its supply at a big discount ($70 - $56.35 or $13.65/barrel) and should make higher margins on refined product sales. Pemex at least gets 50% of that upside margin. Conversely, if crude prices fall below $56.35, Pemex gets the higher fixed crude price and shares only 50% of any downside losses the refinery incurs from paying too much for crude supplies. Shell will also save on potential hedging costs and receive downside protection from refinery margins.

**Conclusion**

As the refining party to this joint venture, the deal has suited Shell for the past 25 years by providing secure supply and a source of funds to develop a sophisticated Gulf Coast refinery. It has negotiated more crude supply flexibility from the agreement extension, at the expense of exposure to fixed price crude after 2023. By extending the agreement, Pemex ensures sales of its flagship Maya crude to the U.S. as Canadian competition threatens, as well as retaining a profitable investment in the world's most sophisticated refining location on the Gulf Coast.

The Shell-Pemex deal emphasizes the benefits of long-term joint ventures between refiners and producers. This lesson should not be lost on U.S. producers looking for long-term buyers for growing export volumes.

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