Pemex Updates Maya Formula to Reflect IMO 2020
Current fuel oil elements removed.

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Revenue Protection

Mexican national oil company Pemex has updated its formulas used to price crude exports of heavy sour Maya crude to the Americas, Europe, the Middle East, and India starting in December. The change comes because the current formula for Maya crude references high-sulfur fuel oil prices that are likely to be volatile after new International Maritime Organization regulations come into effect in January 2020, dramatically reducing the permitted sulfur content in ships bunker fuel. The new formulas remove all references to fuel oil and sour crude, leaving it up to Pemex to adjust values for sulfur quality using the K factor. That decision protects Pemex's revenue against lower values for fuel oil after IMO 2020 but could present competitive challenges for the company going forward. This note compares the old and new Maya formulas.

Crude Decline

Mexico is nearly a year into the regime of Andrés Manuel López Obrador—known universally as AMLO—who took office in December 2018 following a July election victory. Since then, AMLO has slowed or reversed many of the energy market reforms initiated by his predecessor and emphasized government investment in Pemex to expand upstream crude and natural gas production and downstream refining (see our August 2018 note Slower Mexican Reforms Threaten U.S. Refiners). So far, investment in crude production has not stemmed a yearslong decline in Mexico's output from its peak of 3.38 mmb/d in 2004 to 1.83 mmb/d in 2018 and an average 1.69 mmb/d between January and August 2019, according to SENER. With production falling, Mexico's crude exports have declined as well, down 13% in the past decade from 1.36 mmb/d in 2010 to 1.18 mmb/d in 2018 and an average 1.14 mmb/d between January and August 2019. The U.S. share of Mexico's crude exports has fallen from 87% of the total in 2010 or 1.18 mmb/d to 55% or 0.67 mmb/d in 2018 as volumes shipped to Europe and Asia increased. Mexico shipped an average 0.62 mmb/d to the United States between January and August 2019.

Maya Formula

All Mexico's exports to the U.S. these days are heavy sour crude Maya, which has a typical API gravity of 21.8 and sulfur content of 3.3%. In the past, Mexico shipped smaller volumes of Isthmus and Olmeca, which are light sour crudes, to the U.S. and Europe but it hasn't exported Olmeca since August 2017 or Isthmus since May 2018, as domestic refineries need them. When processed through a hydroskimming refinery with low upgrading capability, Maya crude outputs as much as 56% heavy residual fuel from every barrel. Residual fuel has limited value except as ship bunkers and fuel for power generation, and it contains high sulfur levels. More-sophisticated refineries with coking units can process residual fuel into

more-valuable refined products like gasoline and diesel. Pemex currently markets Maya to U.S. and European customers using a formula referencing U.S. Gulf HSFO for American buyers and Northwest European high- and low-sulfur fuel prices for buyers in Europe, India, and the Middle East.

Old Recipe

The current Maya formulas have three components (Exhibit 1). The first reflects Maya's heavy sour quality, which leaves refiners that don't have sophisticated capacity with a large high-sulfur fuel oil yield that typically sells for a negative margin—less than the original crude price. So, the Pemex formula for Maya delivered to the U.S. contains 40% each of West Texas Sour crude—a medium sour domestic grade—and Gulf Coast HSFO to reflect its high sulfur content. In Europe, the Maya formula contains a 50% fuel oil component made up of high- and low-sulfur fuel prices.

The second component of the Maya formula is a light sweet crude element. In the U.S. formula, this is a 20% weighting based on international benchmark Brent and Gulf Coast benchmark Light Louisiana Sweet. In the European version, the light sweet reference is just Brent. These crudes are typically more valuable than high-sulfur crudes and better reflect the yields a sophisticated refiner can extract from Maya by processing the residual fuel.

The third formula component is the K factor published monthly in advance by Pemex, which allows the company to adjust the value for competitive or logistical purposes. For example, by adjusting the K factor upward, Pemex can price Maya out of a destination market or discount to undercut competitor grades.

Exhibit 1 Old Mexican Maya Price Formulas

AMERICAS:
MAYA = 0.40 (WTS + USGC HSFO) + 0.10 (LLS + BRENT DTD) + K

EUROPE, INDIA AND THE MIDDLE EAST:
MAYA = 0.527 (BRENT DTD) + 0.467 (F.O. No.6 3.5%S) - 0.25 (F.O. No.6 1%S - F.O. No.6 3.5%S) + K

Source: Pemex.

Revamp

PEMEX revamped the Maya formulas starting in December because they no longer accurately represent market values and are likely to be heavily discounted after IMO 2020. For example, in the U.S., the Gulf Coast LLS grade is now thinly traded in the wake of the developing crude export market (see our April 2018 note The Future of LLS). Nowadays, Permian West Texas Intermediate grade delivered at the Magellan East Houston terminal is a more widely traded light sweet grade at the Gulf Coast. The current Americas Maya formula also references WTS, which was subject to price discounting during 2018

because of congestion at Midland in the Permian producing region where it is traded. That location difference made WTS less suitable for inclusion in the Maya formula, since Pemex was obliged to use the K factor to adjust for the impact of WTS discounts in the formula.

More problematic for Pemex was the reference to high-sulfur fuel oil in the Americas and Europe Maya formulas. These prices are likely to experience volatility during the next year in the runup to and early implementation of IMO 2020. That's because ship bunkers are the main market for HSFO, and most vessels will have to switch to the ultra-low-sulfur fuel oil mandated by the regulations unless they install expensive scrubber units to remove sulfur emissions from exhaust. Although some shippers are making the adjustment to install scrubbers, the returns on that investment are still unclear (see our March note Heavy Sour Crude Shortage Disrupts IMO 2020 Response). The regulation is likely to heavily discount HSFO prices, negatively affecting Maya formula values.

New Recipe

The new Maya formulas (Exhibit 2) are simpler than their predecessors because they only reference light sweet crudes. The Americas formula replaces the previous light sweet crude LLS and Platts Brent dated elements with a 65% weighting to the newer Argus WTI MEH benchmark and a 35% weighting to Brent ICE futures. The Europe formula is a simple 100% weighting to ICE Brent. All references to sour crude WTS in the Americas formula and to HSFO have gone.

Exhibit 2 New Mexican Maya Price Formulas as of December 2019

AMERICAS:
MAYA = 0.65 WTI HOU + 0.35 ICE BRENT + K

EUROPE, INDIA AND THE MIDDLE EAST:
MAYA = ICE BRENT + K

Source: Pemex.

Comparing the Recipes

Pemex has replaced the HSFO and WTS elements in its Maya formulas and updated the light sweet crude reference to reflect the prominence of WTI MEH Houston as a Gulf Coast crude marker over LLS. But while the changes remove the downside risk of volatile prices for sulfur quality after IMO 2020, the new formulas shift responsibility for valuing an appropriate discount for heavy sour Maya to light sweet benchmarks Brent and WTI away from the market and into the hands of Pemex via the somewhat blunt instrument that is the K factor. That means Pemex anticipates an appropriate sulfur quality differential when it publishes the K factor ahead of time at the end of the month before delivery. That shift puts more pricing power in the hands of the seller but deters buyers if the adjustment turns out to be

misjudged and Maya prices are uncompetitive. In that case, the typical producer response is to discount the K factor in the subsequent month's formula to correct any perceived prior error. That burdens the K factor with providing both retrospective and anticipatory signals that are then hard for the market to interpret. From Pemex's perspective, by only referencing more valuable light sweet crude, its formulas are guaranteed higher values that can then be discounted to compete in the market without automatically losing any value by referencing sour crude or fuel oil directly.

Competition

The success of the new Maya formulas will ultimately depend on their competitiveness in the market. At the U.S. Gulf, Maya competes with other crude grades priced using producer formulas, including Saudi Arabia's Arab Heavy (2.75% sulfur and 27.8 API gravity). Arab Heavy for the U.S. market is priced using the Argus Sour Crude Index plus an adjustment factor. The ASCI price is an index based on trades for three medium sour offshore Gulf of Mexico crudes: Mars, Poseidon, and Southern Green Canyon. Our analysis shows that over the past two years, Pemex made a wider range of K factor adjustments to keep the Maya formula competitive than the Saudis made to Arab Heavy. Between October 2017 and September 2019, both crudes followed similar trends, but the Saudi adjustment factor ranged over $2.65/barrel during the two years compared with $8.65/barrel for the Maya K factor, suggesting the latter required more adjustment to stay competitive. Since the new Pemex formulas have no reference to sour crude or fuel oil, we expect the adjustments that Pemex needs to make with the K factor will continue to move over a wider range to stay competitive.

Market Forces

Pemex needed to update its Maya formulas before IMO 2020, if only to remove outdated references to WTS and HSFO. The changes it has made simplify the formulas for buyers but pass the buck on a market reference to sulfur values. The reality is that absent sophisticated refinery investment, Maya produces a lot of HSFO that reduces value relative to light sweet crudes like Brent and WTI. Refiners with tertiary capacity to process the fuel oil expect a discount for Maya over lighter, more expensive grades to justify their configuration investment. If Maya formulas don't deliver a market discount, then buyers will avoid them. The sulfur differential between light sweet and heavy sour crudes is probably the most important indicator of refining value for crude buyers after IMO 2020 comes into effect in January. By placing that value entirely in its own hands rather than referencing market forces, Pemex risks losing market share to competitor grades. ▌M▌

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