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Oklahoma Swing – The Cushing Crude Hub

Inventory Roller Coaster, New Projects Are Reminders of Its Relevance



- Cushing, the ‘Pipeline Crossroads of the World,’ has a staggering 94 MMbbl of crude storage, 3.7 MMb/d of inbound pipeline capacity and 3.1 MMb/d of outbound pipes.
- The hub receives crude from a number of key production areas, including Western Canada, the Bakken, the Rockies, SCOOP/STACK and the Permian.
- About half of the pipeline capacity out of Cushing heads to Gulf Coast refineries and export docks; the other half delivers oil to inland refineries.
- The crude hub is also the delivery point for NYMEX’s futures contract for WTI; much of the activity at Cushing involves blending various crudes to meet the WTI spec.
- Rising production, growth in crude exports and other factors are driving the development of new pipelines into and out of Cushing, and new storage.

1. Introduction

The storage and trading hub in Cushing, OK, plays critically important roles in both the physical and financial sides of the crude oil market. Located at a central point for receiving crude from a wide range of major production areas — Western Canada, the Bakken, the Rockies, SCOOP/STACK and the Permian among them — the hub also has numerous pipeline connections to Gulf Coast refineries and export docks, and to a large number of inland refineries. And, with Cushing’s 94 MMbbl of storage capacity and status as the delivery point for NYMEX futures contracts for West Texas Intermediate (WTI), the hub’s inventory levels and the WTI-at-Cushing price are closely watched market barometers.

But like a lot of other U.S. energy infrastructure in the Shale Era, Cushing’s place in the energy world has been in flux. Most importantly, there’s this: Permian production has been surging, the ban on U.S. oil exports is a fading memory, and the Gulf Coast — not Cushing — is where most U.S. crude production wants to go. That is not to say that Cushing is no longer important. Far from it.

Cushing’s combination of inbound pipelines, storage tanks, connecting pipes within the hub, and outbound pipes provide producers, refiners, marketers, and exporters with extraordinary flexibility. For instance, if a refinery in Kansas, Illinois or Kentucky — or South Korea, for that matter — wants to receive a crude blend with a specific API gravity and sulfur content, Cushing terminals and the pipelines linked to them can make that happen. Or, if the futures market indicates that WTI prices will be significantly higher six or nine months from now, a marketer or trader can easily arrange to store large volumes of crude at Cushing to take advantage of that pricing outlook.

Also, while both CME Group and the Intercontinental Exchange (ICE) recently launched Houston WTI futures contracts to reflect pricing in the region that now dominates U.S. demand from refineries and exports, the volumes traded on those contracts are miniscule compared to Cushing. The CME Cushing WTI contract is the Dow Jones Industrial Average of U.S. crude benchmarks, and is likely to remain so for the foreseeable future.

It has been a wild ride for Cushing inventory levels in recent months, for a number of reasons. For an extended, two-and-a-half-year period — from April 2015 through October 2017 — the volume of crude stored at the hub stayed in a relatively narrow range, within 10% or so of 60 MMbbl, according to the Energy Information Administration (EIA; see Figure 1). Inventory stability typically is seen as an indicator of a well-balanced WTI market. From November 2017 to March 2018, however, storage levels plummeted from 64 MMbbl to 28 MMbbl, and after a modest uptick this past spring, the volumes stored fell again to as low as 22 MMbbl in parts of July, August and September.

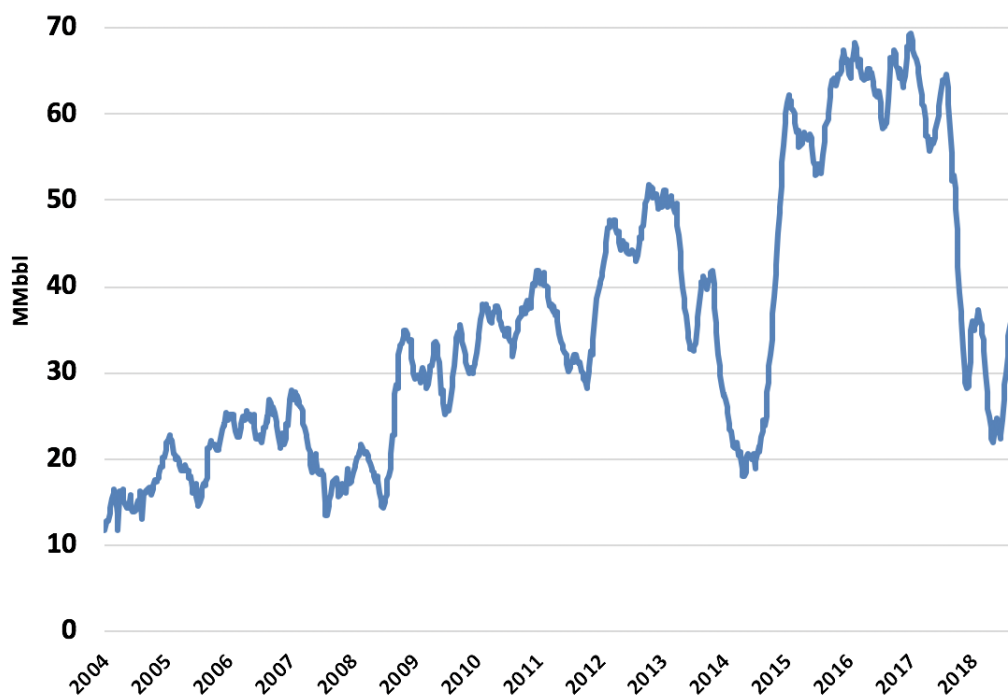


Figure 1 – Cushing Inventory Levels, 2004-to-Present; Source: EIA

This steep downward trend in Cushing inventories was largely influenced by financial incentives, or lack thereof. Generally speaking, forward curves — such as for WTI at Cushing — can be either upward sloping (contango) or downward sloping (backwardated) or some combination of both, depending on the market’s outlook for the future price. In a contango market, the future

price of crude might be several dollars-per-barrel higher than the current spot price. This creates a very clear financial incentive for traders to put oil into storage. Traders can store their barrels in a tank at Cushing, sell into that higher-priced futures market, and then pull the volume out when that future contract date is reached. Depending on the length of the term to lease space at Cushing, the cost can range from \$0.15/bbl per month for short-term deals (a few months) to \$0.40/bbl per month or more for a longer-term deal (a year or more, particularly when the forward curve is in steep contango). If a trader can sell into a future higher-WTI market, where crude is being valued at a higher price than the cost to rent the storage space, there is profit to be made. During years of contango markets, inventories generally rise as traders take advantage of that timing spread.

Backwardation, like the market saw in late 2017 and through much of 2018, is the exact opposite. In a backwardated market, the future price of crude is lower than the spot price, and traders are not incentivized to store crude because the backwardated market does not support paying for storage.

Since bottoming out in mid-September, Cushing inventory levels have been rebounding strongly — they have increased 11 of the past 12 weeks and stood at just over 39 MMbbl as of the week ended December 7, 2018, a 79% gain since their late-summer nadir. What has changed? For one thing, the spot price for WTI at Cushing has fallen from just under \$70/bbl in mid-September to just over \$50/bbl in recent days. For another, the forward curve has shifted from backwardation to contango — or at least relatively flat prices. Figure 2 shows the forward curves from the first day of each of the past six months (June is blue line, July is black line etc.), as well as the forward curve as of December 14, 2018 (red line across the bottom).

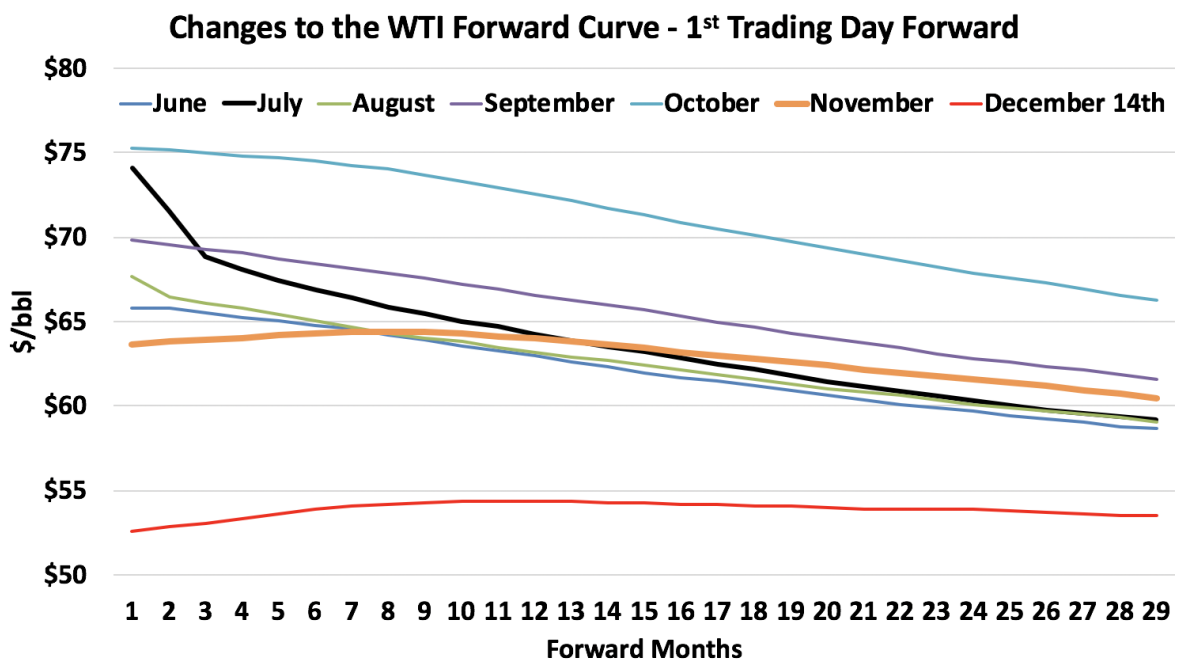


Figure 2 – Changes in Forward Curve in 2018; Source: RBN

For the June-through-October period in 2018, the forward curve for the next 29 months was backwardated, but by November the market had shifted toward contango. As the red line for the December 14 forward curve shows, the WTI-Cushing price for the prompt month (January 2019) stood at about \$52/bbl, and futures prices rose gradually through October 2019 to about \$54/bbl

before flattening out in the months thereafter. In other words, there is once again a financial incentive — albeit it relatively small — to store crude at Cushing.

1.1 More Pipelines Into and Out of the Hub

Much attention has been paid in recent months to rising production in the Permian and to new pipelines that will transport Permian/WTI crude directly to the Gulf Coast — bypassing Cushing in the process. What is often overlooked, however, is the fact that at least some of the Permian's incremental output is flowing to Cushing (via Plains All American's Basin pipeline system, now in the final stage of its Sunrise expansion project), and that new pipeline capacity into Cushing is being added to accommodate production growth in Western Canada, the Bakken, the Rockies and SCOOP/STACK. As discussed in this report, Tallgrass Energy recently increased the capacity of its Pony Express Pipeline from Wyoming and Colorado by 50 Mb/d (to 400 Mb/d) and is planning a further 300-Mb/d expansion. Similarly, a joint plan by Kingfisher Midstream and Ergon — the latter of which owns Blueknight Energy Partners' general partner — is building the 90-Mb/d Cimarron Express from the STACK play in Kingfisher County, OK, to Blueknight's storage terminal Cushing. Also, TransCanada continues to pursue its long-planned Keystone XL pipeline. While that 830-Mb/d pipeline from Western Canada to Steele City, NE, will not flow directly to Cushing, the Steele City-to-Cushing leg of the existing Keystone Pipeline will enable more crude to be delivered to the Oklahoma hub.

Perhaps even more importantly, significant amounts of new pipeline capacity out of Cushing are being planned, primarily to allow more crude to be transported to the Gulf Coast. For example, Tallgrass is planning the 700-mile, 800-Mb/d Seahorse Pipeline from Cushing to the St. James, LA, crude hub and a planned marine terminal downriver from New Orleans. Also, Magellan Midstream Partners and Navigator Energy Services have proposed the Voyager Pipeline, which would transport at least 250 Mb/d from Cushing to the Magellan East Houston (MEH) terminal in Houston. Then there is Phillips 66, which is pursuing the development of the 400-Mb/d Red Oak Pipeline from Cushing to Corpus Christi, TX; it would come online by the fourth quarter of 2020. Also, DCP Midstream and SemGroup announced in early December that they plan to convert the existing Southern Hills NGL pipeline from the Cushing area to Houston to crude service. Still more plans for new pipeline capacity out of Cushing are in the works.

This Drill Down Report begins with a brief review of Cushing's history (Section 2), followed by a detailed look at the hub's terminals and storage capacity (Section 3); existing pipelines into and out of Cushing (Section 4 and Section 5), respectively; the hub's role in crude blending (Section 6); and the new pipeline and storage projects being planned (Section 7). Section 8 sums up where Cushing stands today.

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