WHITE PAPER

The Texas Crude Triangle: Driving Global Crude

Co-authored by ICE and General Index

Is the US crude oil pricing system broken beyond repair? As Permian production surges and Houston takes center stage, is it time to leave Cushing behind and embrace a new, more accurate pricing model? Discover how the ICE Midland WTI (HOU) contract could be the future of US crude pricing.

Introduction

US crude oil pricing is broken.

And when something breaks, most will first ask, “can this be fixed?” But this often leads to patches and workarounds, to patches of patches, and workarounds of workarounds. When is it time to let go of the familiar and move to something better?

US crude pricing faces this question as developments since the early 2010s in US crude markets have shifted the industry and its center of activity from the midcontinent to the US Gulf Coast, while the patched historical crude pricing system has remained rooted to the past, full of workarounds, and disconnected from reality.

Cushing, A Destination Past

Cushing, Oklahoma, once held the central role in the US crude oil market. Known as the "Pipeline Crossroads of the World," Cushing's significance stemmed from its strategic location in the heart of the United States, where multiple pipelines converged, allowing for efficient distribution of crude oil to refining centers.

However, the Shale Revolution, which began in the early 2010s, popularized a wave of new oil production techniques, particularly hydraulic fracturing and horizontal drilling. This technological leap unlocked vast reserves of oil in the Permian Basin and other shale formations, dramatically increasing domestic crude oil production.

This surge in production initially fed into Cushing, as it was the main storage hub and pricing benchmark. But the limitations of Cushing's infrastructure became apparent. The hub was increasingly constrained by its storage capacity – currently a modest 78 million bbls of working storage (Source: EIA) – and logistical challenges, especially as the pace of production growth accelerated.

78M bbls

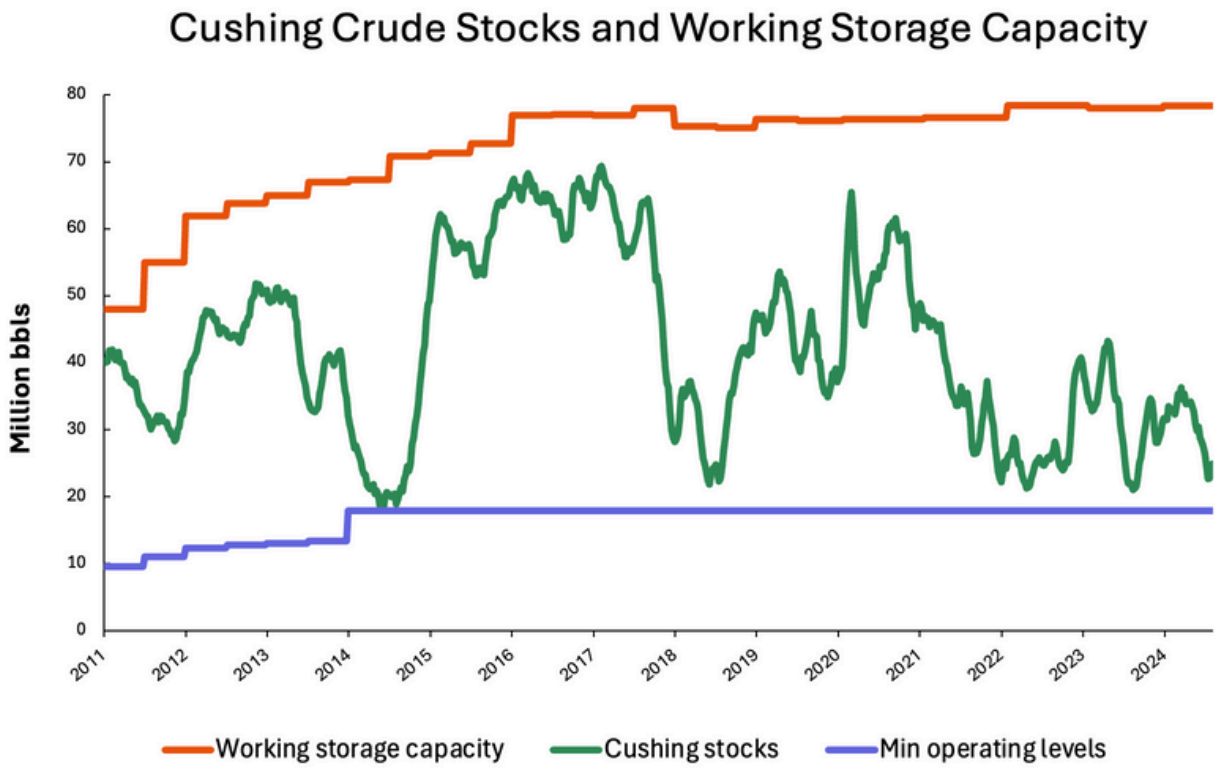
working storage capacity in Cushing

GENERAL INDEX ICE

The lifting of the US crude oil export ban in late 2015 added another layer of complexity. For years, domestic oil producers were restricted from selling crude oil abroad, but the removal of this restriction opened international markets. This shift created a new demand for US crude oil, which, coupled with the growing production from the Permian, began to outstrip Cushing's capacity to handle and distribute the volumes efficiently.

As a result, Cushing's role as the preeminent oil hub diminished. Flows from the Permian began to find a more welcome home on the US Gulf Coast (USGC), as pipeline flows from Midland to Cushing fell to between 400-500 thousand bpd in recent years – about half of Midland to Cushing pipeline capacity (Source: Platts and ICE).

Storage levels at Cushing fluctuated more frequently, and the hub's capacity constraints became more evident especially as inventory-driven price volatility for NYMEX WTI occurred, most notably during instances where stored volumes neared operational minimums and maximums.



(Source: EIA and ICE)

Note: minimum operating levels are estimated. Prior to 2014, minimum operating levels are estimated at 20% of working storage capacity. From 2014 onwards, minimum operating levels are set equal to all-time low Cushing stock levels set in 2014.

WTI vs “WTI”

WTI Midland is literally a different crude grade than “WTI” Cushing quality. In addition to WTI Midland having a different pricing location than WTI Cushing, it has a different origin and a different quality. WTI Midland is Midland-origin and Midland-quality crude. WTI Midland is significantly better quality than WTI Cushing crude: it is lighter, sweeter, and has lower metals content.

In contrast, “WTI” Cushing quality, or US Domestic Sweet (DSW), is typically met by blending crudes. These include various West Texas Intermediate grades, such as Permian extra light or condensates, as well as other crudes such as Canadian heavy sour. As a result of blending, WTI Cushing (DSW) can have “dumbbell” crude quality issues – refining industry jargon for crude that produces too much “light ends” (light products) and too much residual fuel oil, and not enough of the gasoline and middle distillates that refiners prefer to make and sell.

In the US crude market, traders often refer to DSW as simply “WTI”, leading to confusion regarding its assay, specifications, and composition. This confusion has led some participants to buy “WTI” without scrutinizing the exact product and receiving a blended crude that did not meet their specifications. However, buyers in the US and globally are increasingly discerning about the quality of the crude they purchase.

Houston Takes Center Stage

The decline of Cushing's dominance has coincided with a meteoric rise in the significance of Houston as the central location for price formation for US crude oil. Houston, situated on the USGC, benefits from its proximity to major export terminals as well as domestic USGC refining capacity; its advanced infrastructure makes it a prime location for crude oil trading and distribution.

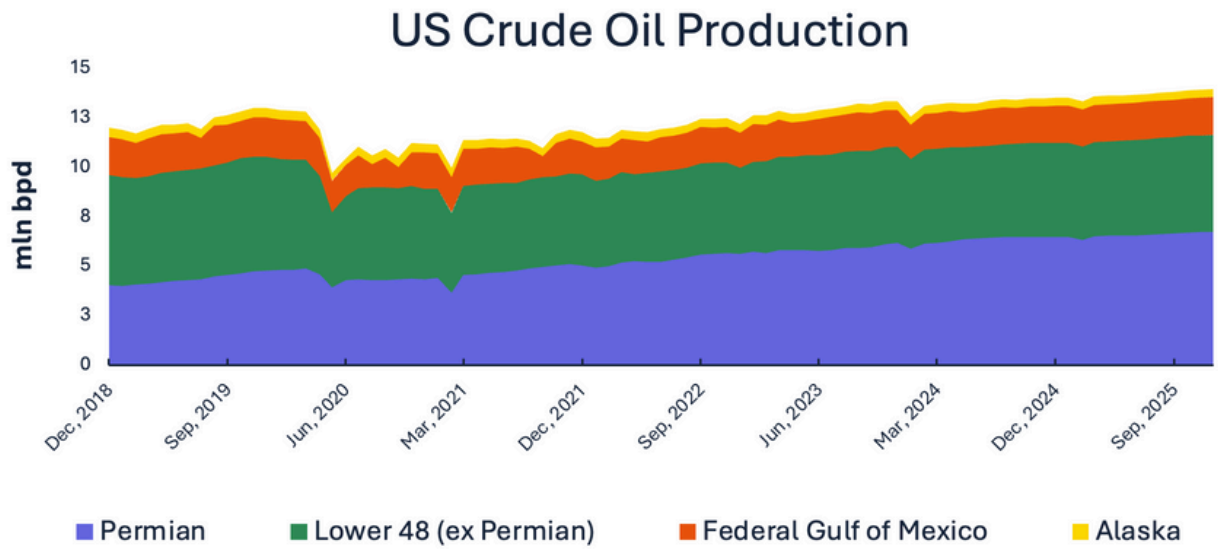
The growth of Permian production has played a critical role in this shift. As more crude oil began to flow from the Permian, the need for efficient export routes became paramount. Houston, with its extensive network of pipelines, 2.6 million bpd of refining capacity, deepwater ports, and nearly double the crude storage capacity of Cushing, emerged as the optimal destination for this booming production.

From 2007 through 2024, US production nearly tripled to approximately 13 million barrels per day (bpd), with exports exceeding 4 million bpd (Source: EIA). Permian production surpassed 6 million bpd, accounting for nearly 49% of all US crude production, approximately two-thirds of US crude exports, and about three-quarters of all crude receipts into the USGC refining complex. It should also be noted that, as shown in the chart below, there are almost no exports of WTI Cushing (DSW).

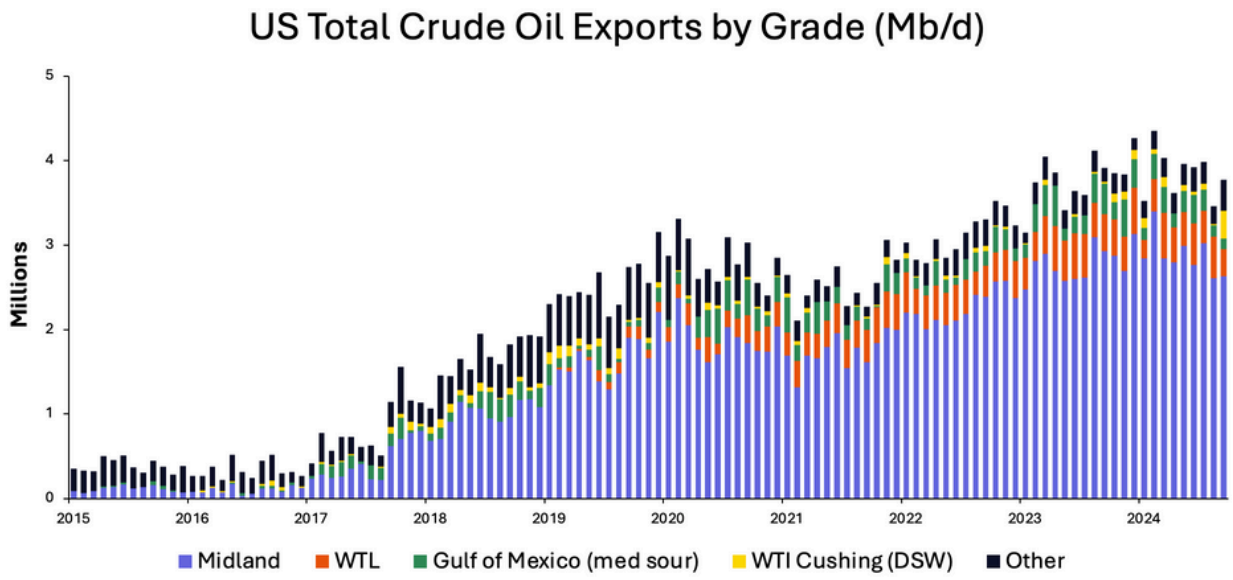
Permian production is still projected to rise significantly, increasing its already crucial role in the US crude oil production landscape. EIA forecasted in September 2024 that Permian crude production will reach an average of 6.57 million bpd by 2025, reflecting a 4% increase from the 2024 average. This growth rate surpasses the overall US crude production growth rate of 3.2%.

6.57M bpd

Permian crude production by 2025



(Source: EIA)

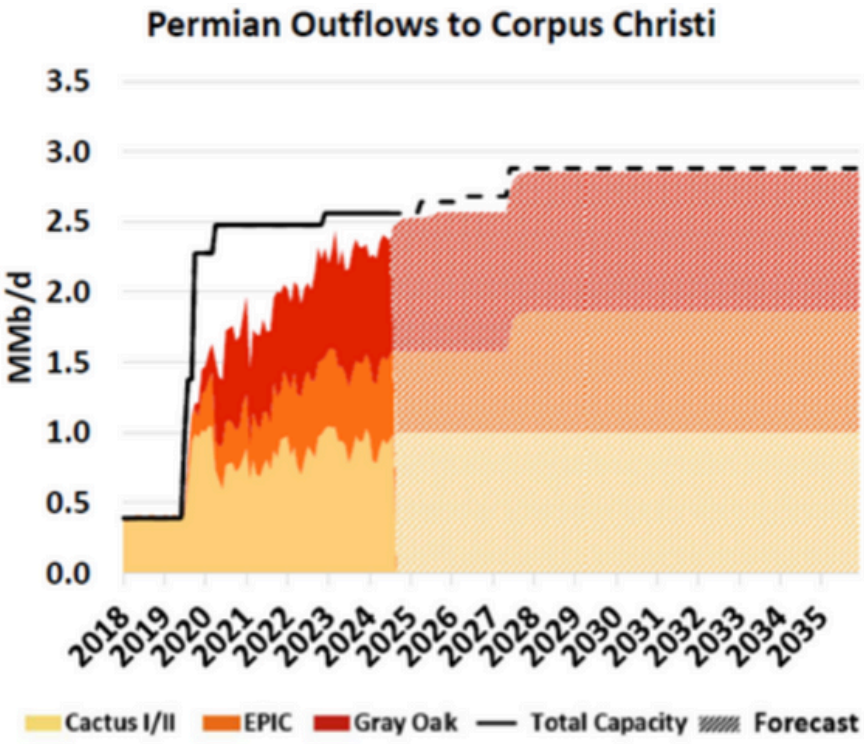


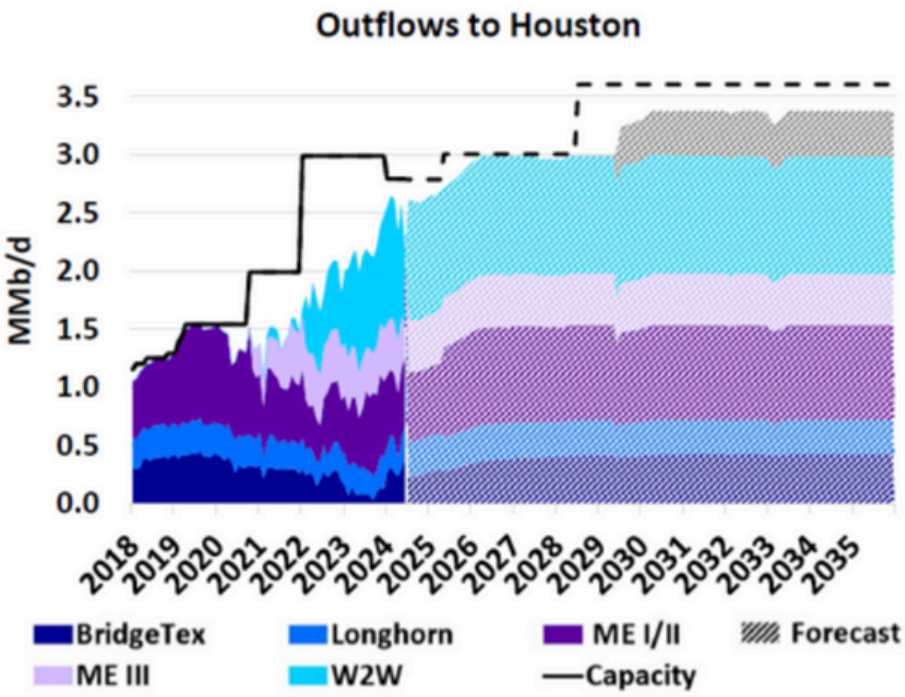
(Source: Kpler)

As Permian production continues to grow and outpace the overall US crude oil production growth rate, pricing WTI Midland at Houston will become increasingly more important (Source: EIA). “Pure” WTI (i.e., Midland-origin and Midland-quality crude) is demanded by refiners the world over and it meets the quality specifications for delivery into the Brent complex (see below).

Houston vs Corpus Christi

Houston's importance is further highlighted when considering Corpus Christi volumes, which are priced relative to Houston. Comparing the two locations, Houston handles nearly 2 million bpd of U.S. crude oil exports, while Corpus Christi accounts for slightly more, at nearly 2.2 million bpd. Together, these two locations constitute almost all U.S. crude exports (Source: EIA). Permian pipeline flows to Corpus Christi have been essentially running at maximum capacity, while there is still spare capacity from the Permian to Houston. This means that in the next couple of years, Houston crude exports are expected to continue to grow, while exports from Corpus Christi are projected to remain roughly steady.





(Source: RBN Energy)

There is another important difference between Houston and Corpus Christi. Houston is both a key US domestic refining center and a key export center. In contrast, Corpus Christi is mainly an export market, with much less refining capacity than Houston. This means that from a price formation perspective, Houston better reflects the interplay between the US domestic market and the European and Asian export markets.

The addition of WTI Midland to the Brent complex

In mid-2023, WTI Midland crude was added to the Brent basket and became part of the Brent complex. Until then, "Brent" referred to a basket comprised of five different North Sea crudes (Brent, Forties, Oseberg, Ekofisk, and Troll, commonly referred to as BFOET).

WTI Midland was included in Dated Brent assessments starting in May 2023. Similar to earlier changes in its history, the addition of WTI Midland to the Brent basket was driven by declining output in North Sea crude grades. Additional crude was necessary to add volumes to physically underpin the Brent benchmark.

The May 2023 addition of WTI Midland to the Brent complex has been widely considered to be smooth and successful. Regarding the impact on pricing, from May 2023 through July 2024, WTI Midland was the most competitive grade that set the price of Dated Brent approximately 50-60% of the time. This was largely in line with expectations prior to the change.

Regarding the impact on physical volumes, before WTI Midland was added, less than 10 cargoes of BFOET (the old basket) traded per month in the Dated Brent Market on Close (MOC) window. From June 2023 through July 2024, an average of 11 cargoes of Midland per month traded in the Dated Brent MOC window. In other words, with the addition of Midland, volumes have approximately doubled. Again, this was broadly in-line with expectations.

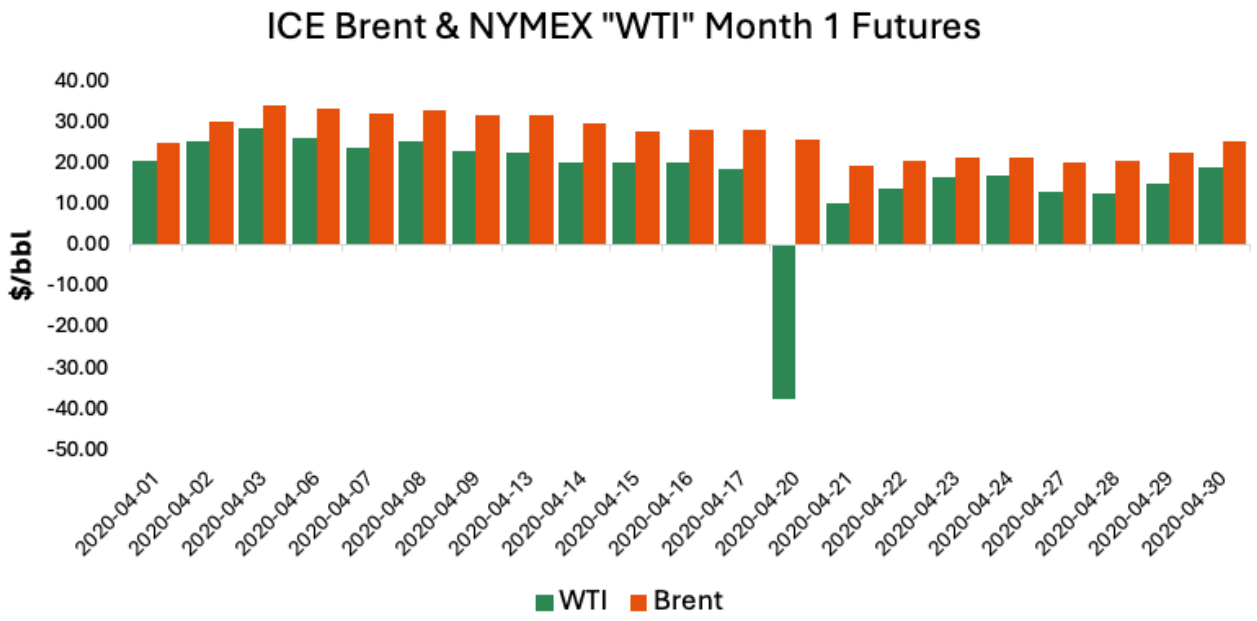
Looking at Midland cargoes delivered into the Dated Brent MOC window, the majority are exported from Houston terminals. Within Houston, most of the cargoes are loaded from the Enterprise EHSC and ONEOK Seabrook terminals on the water; terminals connected to the Enterprise ECHO and ONEOK MEH delivery locations for the ICE HOU contract. It is important to note that Enterprise EHSC and ONEOK Seabrook are the only two terminals that guarantee the quality of WTI Midland crude.

Unnecessary Volatility for NYMEX WTI Cushing

Futures prices significantly influence physical spot prices for Midland crude oil, which are quoted against NYMEX "WTI" at Cushing. A pivotal moment in US crude trading history occurred on April 20, 2020, when the front-month May 2020 NYMEX "WTI" contract settled at an unprecedented -$37.63 per barrel. On the same day, the front-month June 2020 ICE Brent contract settled at +$25.57 per barrel.

In the spring of 2020, the world oil market was in the midst of a massive collapse in demand, driven by the impact of COVID, combined with severe oversupply. As a result, there was a rapid buildup in crude oil and refined product inventories globally, including the US, which drove market fears of running out of storage space and exerted severe downward pressure on prices.

By May 1, 2020, Cushing stocks had built to 63.2 million barrels, or 83% of working capacity, leaving only 13.1 million barrels spare. In addition, from early/mid-April through early May, all remaining storage space at Cushing had reportedly been leased; none was available to the market. The extremely high crude stocks and lack of spare capacity at Cushing were the primary reasons that NYMEX WTI Cushing prices fell to -$37.63.



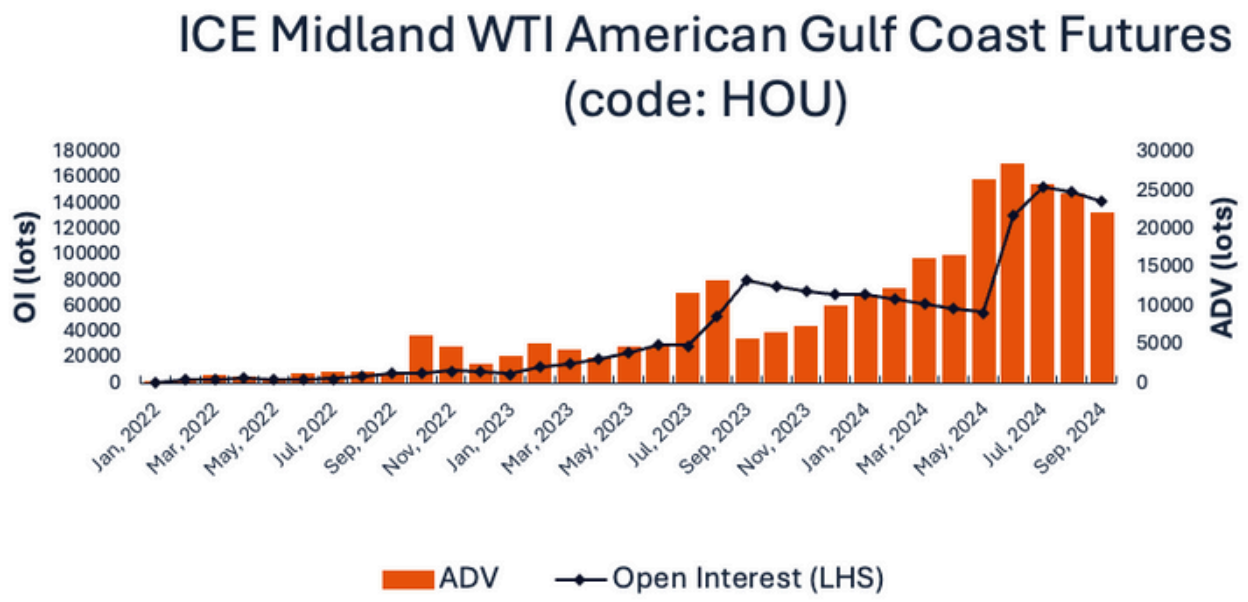
HOU by ICE & General Index (GX)

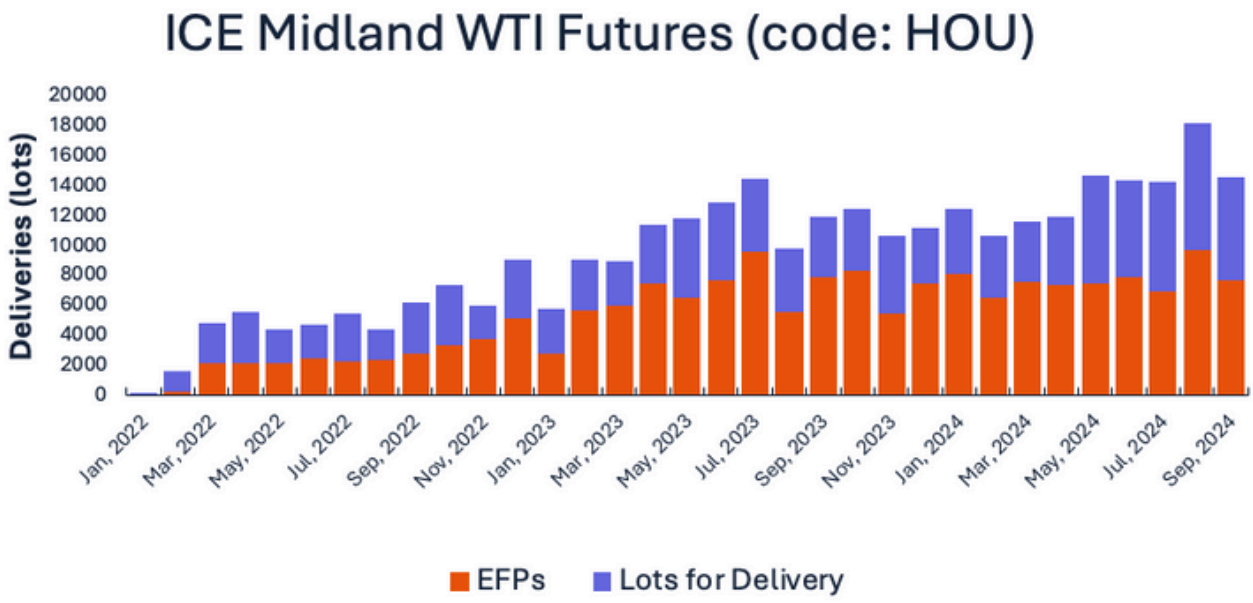
Pricing US crude based on Cushing is antiquated, fraught with irregularities, and creates confusion for buyers unfamiliar with the US market. Houston now stands as the true representative market for US crude, and pricing there completely avoids two of the most obscure issues – devoid of any clear rationale – that have bewildered newcomers and troubled seasoned market players alike:

1. Storing volumes in Cushing before transporting to the Gulf Coast for export; and
2. A three-day purely physical trading window during the trade month with no futures, swaps, or hedging options.

Recognizing the structural shift in US crude oil markets, the Intercontinental Exchange (ICE) introduced the ICE Midland WTI (HOU) contract – a physically deliverable futures contract for WTI Midland barrels at the MEH and ECHO terminals in Houston.

Since the relaunch of HOU in January 2022, trading activity has been growing. Both average daily volumes (ADV) and open interest (OI) have been trending higher (see chart). In addition, physical deliveries, both via the HOU contract and through the Exchange for Physicals (EFP) mechanism, have also been gaining momentum (see chart).





(Source: ICE)

The addition of Midland to the Brent complex has been a key factor. However, speaking more broadly, the growth in HOU trading activity has been driven by price risk management and supply risk management for the growing volumes of Midland crude produced and exported for processing by refiners in the US, Europe, and Asia.

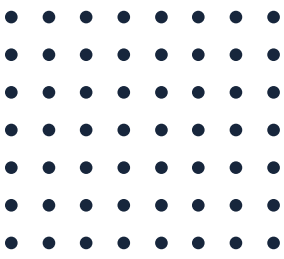
For price risk management the HOU contract streamlines hedging for USGC exposure, offering a simpler, more efficient and cost-effective solution for producers, refiners, and traders.

For supply risk management, going to expiry in the HOU contract results in guaranteed physical delivery of on-spec and ratably delivered Midland WTI crude oil; these barrels can then be run in US domestic refineries or exported to European and Asian refiners. Deliveries of on-spec crude can also be made via the EFP mechanism.

In partnership with ICE, GX has introduced new crude prices for 23 key markets at 11 critical locations linked to the HOU futures contract, establishing a robust liquidity pool and harnessing GX's objective pricing approach to ensure reliable pricing for all market participants.

This new, grounded-in-reality, pricing structure eliminates Cushing from the equation, focusing exclusively on Houston deliveries. By aligning futures and physical markets and removing the complex three-day physical window, GX offers a streamlined solution that simplifies trading, scheduling, and risk management, better reflecting the realities of both US and global crude markets and minimizing unnecessary price volatility.

Current US crude oil pricing is broken and in need of replacement, but the replacement is already here – ICE HOU and GX pricing.



About the authors

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Mike Wittner is Global Head of Oil Market Research for Intercontinental Exchange. Mike joined ICE in 2019. He leads a robust research effort to continuously analyze and anticipate changes in oil market structure and fundamentals. Mike and his team support oil sales and business development at ICE in creating new contracts and evolving existing contracts, in order to meet the hedging, trading, and investment needs of its customers around the world.

With more than 30 years of experience in oil market analysis, Mike has extensive knowledge of the global and regional crude oil and refined product markets, geopolitics, and non-fundamental oil market drivers.

From 2007-2019, Mike was the Global Head of Oil Research for Société Générale Corporate & Investment Banking, where he was a Managing Director. He was directly responsible for short-term and long-term global oil market analysis and forecasting. Mike was ranked in the top 4 for oil market research in 2009-2019, according to Risk and Energy Risk magazines, including 7 consecutive years at #1 in 2013-2019. Before that, he held a similar position at Crédit Agricole, as well as senior analytical roles at Koch Supply & Trading, the International Energy Agency, and PIRA Energy Group (now part of S&P Global Platts). Before getting his MBA, Mike worked as a geologist and project manager for an engineering firm and as an analyst at the Central Intelligence Agency.

Mike holds a BS in Geology from Cornell University and a MBA in International Business from George Washington University.

Mike is a regular speaker at industry conferences and seminars. His commentaries on oil market developments have been frequently quoted in the international media and he has appeared regularly on broadcast news. Media interviews have included CNBC, Bloomberg TV, CNN, BBC, CBC, Wall Street Journal, Financial Times, New York Times, Economist, Bloomberg Business Week, the wire services, and the energy trade press.

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Pricing Director, General Index

Corey Stewart is Pricing Director – Americas, with a primary focus on North American crude oil markets. Prior to joining General Index earlier this year, he directed Americas crude oil fundamentals analysis at the London Stock Exchange Group (LSEG) and was regularly consulted by energy companies, governments, and financial institutions for his views on global energy markets. He began his career at Valero, where he was an integral part of the company's Strategic Planning & Market Analysis team.

About ICE

Intercontinental Exchange, Inc. (NYSE: ICE) is a Fortune 500 company that designs, builds, and operates digital networks that connect people to opportunity. We provide financial technology and data services across major asset classes, helping our customers access mission-critical workflow tools that increase transparency and efficiency.

ICE's futures, equity, and options exchanges — including the New York Stock Exchange — and clearinghouses help people invest, raise capital, and manage risk. We offer some of the world's largest markets to trade and clear energy and environmental products.

Our fixed income, data services, and execution capabilities provide information, analytics, and platforms that help our customers streamline processes and capitalize on opportunities. At ICE Mortgage Technology, we are transforming U.S. housing finance, from initial consumer engagement through loan production, closing, registration, and the long-term servicing relationship.

Together, ICE transforms, streamlines, and automates industries to connect our customers to opportunity.

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About General Index

General Index (GX) delivers commodity prices based on data, not journalism. Their daily energy prices are calculated algorithmically based on thousands of trades collated from 170+ data partners, using consistent methodologies and a compliant approach (aligned with IOSCO and EU/UK Benchmark Regulation requirements).

GX produces 3,656 daily prices in crude oil, refined products, biofuels, marine fuels, hydrogen and carbon markets, and pride themselves on being the most customer-centric pricing provider in the industry – delivering more fair, competitive and efficient benchmarks. Market-leaders such as Shell, BP, ExxonMobil, TotalEnergies, Oxy, BASF, Rio Tinto, Wood Mackenzie, Man Group and ADNOC use GX benchmarks for analysis and trading.

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