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Argus Media Gulf Coast Ports Guide

A reference resource for major marine crude export terminals

Fall 2022 Edition

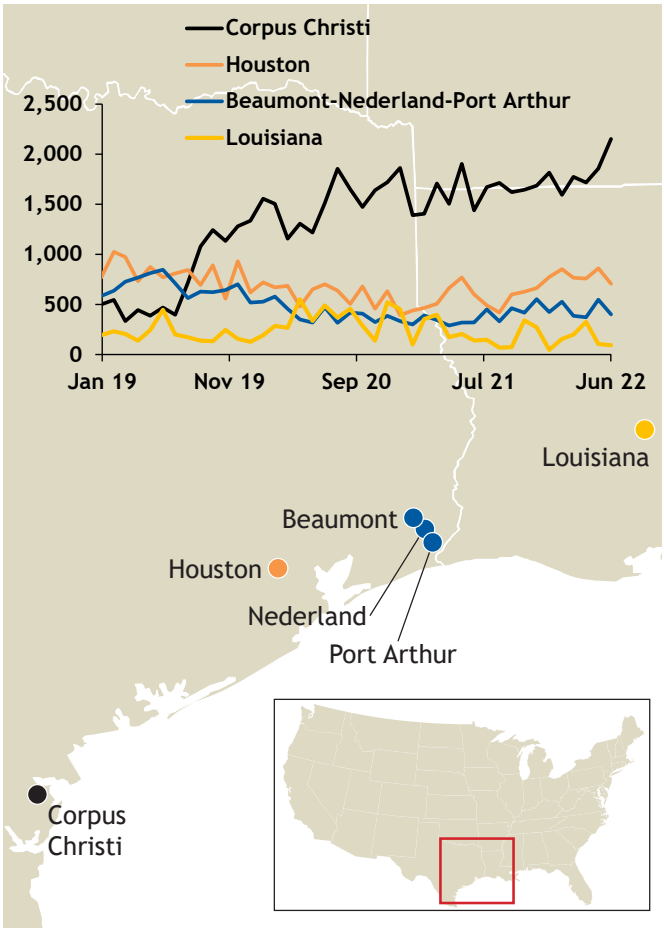
Welcome to the *Argus* Gulf Coast Ports Guide, a resource tracking major US crude export terminals.

The US Gulf coast has been at the epicenter of US crude exports since the Obama administration lifted 40-year-old restrictions on most oil exports in December 2015. Midstream companies have boosted storage capacity and added docks at US Gulf coast ports in a rush to provide more outlets for booming US crude exports. Most of those exports have been light, sweet supply from the Permian basin and Eagle Ford, as most US refiners have maxed out their ability to handle lighter supply that comprises the majority of the new production.

US crude exports have been remarkably resilient through the demand shocks unleashed by the Covid-19 pandemic as well as the Russia-Ukraine conflict, though trade patterns have shifted away from Asian destinations as European refiners have looked to replace lost Russian supply with US barrels. Exports recently hit a record high around 3.8mn b/d in July 2022 as global demand recovered from the earlier stages of pandemic lockdowns. US exports averaged about 2.98mn b/d in 2021 before recovering to 3.43mn b/d so far in 2022, according to US federal data. US crude exports surged to a weekly record of 5mn b/d in mid-August amid a widening pricing spread between US benchmark WTI and global benchmark Ice Brent. A wider spread is needed to cover the cost of transporting the crude to overseas ports in Europe, Asia and elsewhere.

One factor to keep a close eye on in coming months is the historically high rate of crude exports from the US Gulf coast, and the rising prominence of WTI as a global crude price setter.

Crude exports from key Gulf Coast ports ***'000 b/d***



— US Customs data

Petroleum
illuminating the markets

Permian production of more than 5.3mn b/d is fueling US crude exports, and a larger percentage of the US crude is headed to Europe now that EU refiners are working to wean themselves off Russian crudes. Of the nearly 3.4mn b/d of US crude exports in July, about 1.4mn b/d went to Europe.

The inaugural edition of the Ports Guide focused on three main Texas port concentrations: Houston, Corpus Christi and the Beaumont-Port Arthur-Nederland region. Those three ports accounted for 86pc of all US crude exports in 2021 and 90pc for 2022 through June, with the rest originating mostly from Louisiana ports. These three Texas port hubs also capture most of the terminals that contribute volumes to the *Argus* AGS Marker. *Argus*' formal methodology includes waterborne WTI deals at Corpus Christi and docks at Beaumont-Nederland, where at least 600,000 b/d of Permian crude can be delivered to three Aframax-capable export terminals. The list of terminals also includes Magellan East Houston, Enterprise's ECHO terminal, Speed and Genoa junctions, the Enterprise Houston Ship Channel Terminal, Seabrook and Texas City.

With this update, *Argus* Media has widened the Guide's scope to include key Louisiana facilities, which could play an increasing role in US exports as pipeline connectivity and port infrastructure improves in coming years.

The Brent factor

These Gulf coast export terminals are coming into sharpened focus in Europe, ahead of an expected major change in mid-2023 to the Brent price benchmark complex: the inclusion of WTI Midland.

The Dated Brent benchmark (North Sea Dated in *Argus* terminology) is based on the cheapest of five North Sea crudes: Brent, Forties, Oseberg, Ekofisk and Troll. Owing to falling production and trade liquidity in these streams, price reporting agencies including *Argus* are preparing to add WTI Midland to this basket – the first time a non-regional crude will be considered part of "Brent."

European demand for WTI should help to support flows of Permian basin crude to Corpus Christi, Houston and other Gulf coast ports. And it should accentuate the influence of WTI in setting the global price for light sweet crude. From June 2023, WTI cargoes are set to be included in the basket of crude grades setting the Dated Brent price in the North Sea. *Argus* analysis shows that WTI would have set the Dated Brent price on 56pc of the days from early 2019 if it had been added to the Brent basket.

This requires particular clarity on what constitutes WTI Midland crude - its quality and origin. *Argus* in coming months plans to list a subset of US Gulf terminals from which Permian-quality WTI that meets certain quality parameters and is regularly exported in 700,000 bl cargoes via Aframax vessels. This list could be used by market participants to judge whether a given cargo can be delivered into forward Brent contracts, or considered as part of the North Sea Dated price assessment process.

Based on an initial survey and regular monitoring, *Argus* expects to maintain this list and add terminals or remove them at its discretion, with due notification to subscribers to the *Argus* Crude report.

Houston: It's all about flexibility

As a crude export destination, it's hard to beat Houston's wide-ranging menu of logistical and refining options. Houston's crude exports have not seen the rampant growth of its southern neighboring port of Corpus Christi.

But Houston has the most extensive network of inbound and outbound pipelines on the Gulf coast, as well as 300mn bl of storage capacity and 12 local refineries with a combined throughput of nearly 4.5mn b/d.

It is hard to overstate the importance of the 52-mile-long Houston Ship Channel for US crude and LPG producers and exporters. It is the largest US petrochemical complex and home to 4.5mn b/d of refining capacity, the largest such concentration of facilities in the US. New and existing pipelines from the Permian basin, Eagle Ford, and the massive storage terminals of Cushing, Oklahoma, are primarily pointed toward Houston's docks.

Enterprise Products Partners, a major player in US crude exports and operator of the Enterprise Houston Ship Channel Terminal, says that Houston's local and export options are "an implicit hedge on low prices, closed arbs and volatile demand."

Houston's crude export trade relies heavily on moving Aframax and Suezmax cargoes from Ship Channel locations and reverse lightering them onto 2mn bl very large crude carriers (VLCCs) that anchor in the deeper waters of the Gulf of Mexico. However, Enterprise can partially load VLCCs at the Seaway Texas City terminal.

Port Houston in June kicked off a $1bn expansion project in partnership with the US Army Corps of Engineers, which could boost the channel's capacity by up to 50pc. Under the plan, key portions of the channel along Galveston Bay are to be widened to 700ft from 530ft, and upstream segments will be deepened to up to 46.5ft. The project is scheduled to be complete in 2025.

However, unlike port dredging plans under way in Corpus

Christi, Port Houston's expansion does not envision servicing VLCCs. Instead, Houston's plan embraces more flows of workhorse Aframax (650,000 bl capacity) and Suezmax (1mn bl capacity) tankers.

Houston's inbound pipelines offer a wide variety of light, shale, crudes from the Powder River basin in Colorado, as well as the Permian and Eagle Ford in Texas. Houston is also well-connected to Cushing and can source crude from North Dakota's Bakken shale as well as heavy sour supply from Canada.

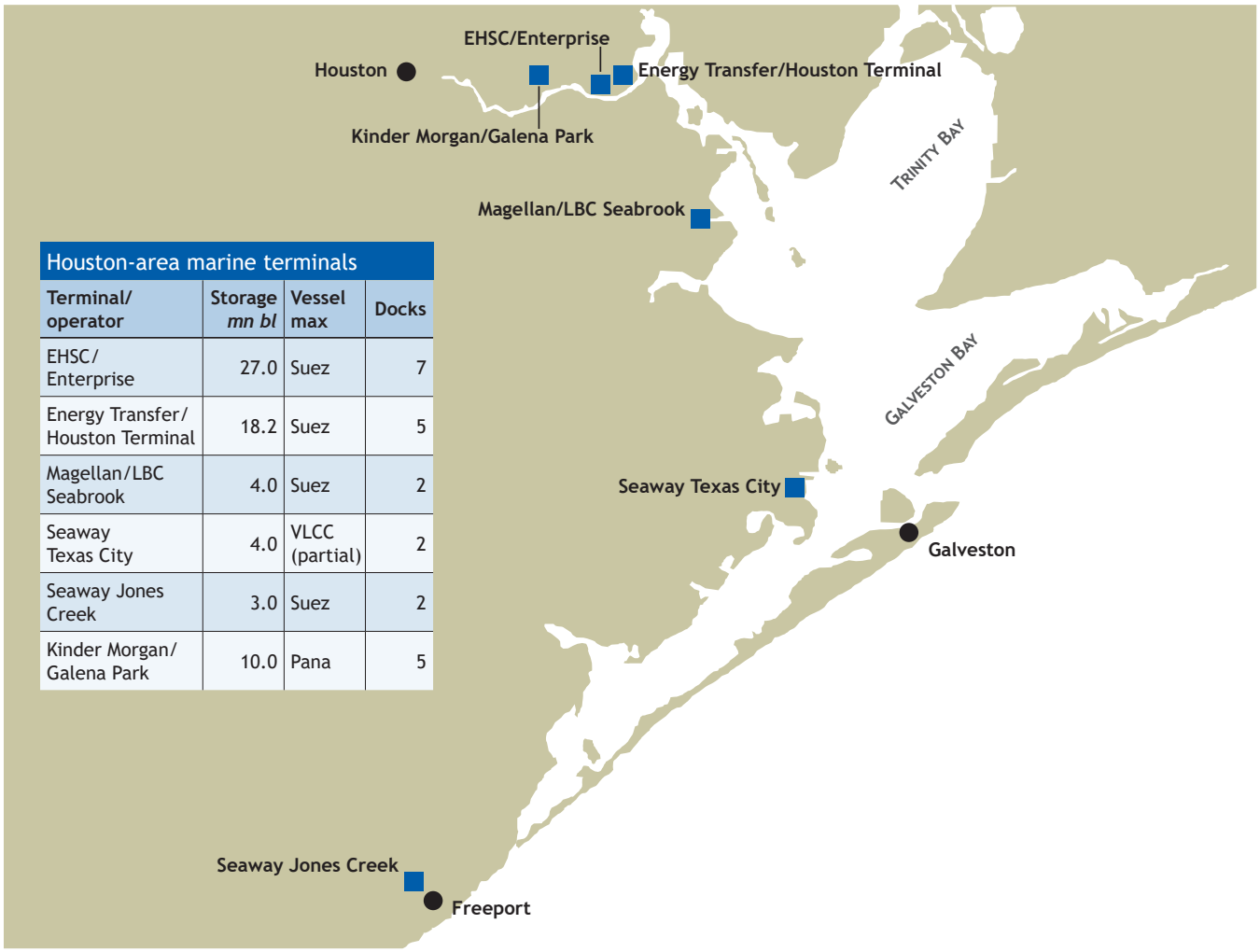
Houston is also well connected by pipeline to export docks and refineries to the east in Nederland, Texas, as well as Beaumont or St James, Louisiana.

Houston's storage tanks and domestic refining options are attractive for producers who might be uncertain about the ultimate destination for their output. Houston also has more options for co-loading vessels with different grades of crude, which a refiner could then blend to meet their specifications.

Key facilities

The **Enterprise Houston Ship Channel Terminal**, or EHSC, is situated on the Houston Ship Channel and is one of the largest facilities on the Gulf coast handling crude oil, refined products, petrochemicals and LPGs. The terminal has about 27mn bl of above-ground storage capacity across roughly 110 tanks. EHSC has seven deep-water ship docks that handle vessels that draft up to 45ft, including Suezmax tankers, and one barge dock. The terminal's location on the Ship Channel gives it a leg up on its competitors and enables it to handle larger vessels because of fewer draft and beam restrictions, Enterprise said. EHSC has access to crude supply from nearly every major US production basin through both third-party and Enterprise-owned systems. EHSC also has direct connectivity to every Houston-area refinery as well as Enterprise's nearby ECHO terminal, which connects to

Houston-area terminals



Houston-area marine terminals

Terminal/ operator	Storage *mn bl*	Vessel max	Docks
EHSC/ Enterprise	27.0	Suez	7
Energy Transfer/ Houston Terminal	18.2	Suez	5
Magellan/LBC Seabrook	4.0	Suez	2
Seaway Texas City	4.0	VLCC (partial)	2
Seaway Jones Creek	3.0	Suez	2
Kinder Morgan/ Galena Park	10.0	Pana	5

Beaumont, Port Arthur, and Texas City refiners. ECHO has 6.5mn bl of crude storage capacity across 16 tanks, as well as an additional 2.4mn bl of capacity across 5 tanks that is owned or leased by Seaway, Enterprise's 50:50 joint venture with Enbridge.

In March 2022 the ECHO terminal became one of two physical delivery points for the Midland WTI American Gulf Coast futures contract ("HOU") traded on the Intercontinental Exchange (Ice), which has direct access to 2.4mn bl of Permian crude supply with downstream connectivity to all Houston Gulf coast-area refineries and international markets.

Facility contact: Joe Fasullo, 713-381-6389 or jpfasullo@eprod.com

Energy Transfer's Houston Terminal, situated on the Houston Ship Channel, offers 18.2mn bl of storage. The facility was formerly known as the Houston Fuel Oil Terminal, or HFOTCO, before Energy Transfer acquired it when it bought Oklahoma-based SemGroup in 2019. The facility has five Suezmax-capable deepwater docks as well as seven barge docks that can handle 23 barges simultaneously. The terminal has three crude oil pipelines that connect to four refineries, as well as numerous rail and truck loading spots. In April 2022, Energy Transfer placed its 275,000 b/d Ted Collins Link pipeline into service, providing market connectivity between its Houston and Nederland terminals. The project enables the company to load and export unblended low-gravity Bakken and WTI crude out of the Houston market. The new connection gives Energy Transfer the only Houston-area terminal capable of loading neat Bakken cargoes onto fully-laden Aframax vessels.

Facility contact: Loan Tran, Senior Director of Crude Business Development, 713-989-6256

Magellan/LBC Seabrook, a 50:50 joint venture between Magellan Midstream Partners and LBC Tank Terminals, is connected to Magellan's East Houston storage terminal (MEH), and to Magellan's extensive Houston Distribution System network of pipelines that are connected to all Houston and Texas City area refineries. MEH receives Midland-quality WTI directly from the Permian basin via Longhorn (275,000 b/d capacity) and BridgeTex (440,000 b/d capacity), is one of two delivery points for the Ice Midland WTI American Gulf Coast futures contract, and is the assessment point for the *Argus* WTI Houston price index. Seabrook has 3.95mn bl of crude storage, an Aframax-capable dock with a maximum loading rate of 30,000 bl per hour, a Suezmax-capable dock with a maximum loading rate of 40,000 bl per hour, and two barge docks.

Facility contact: HoustonCrudeInquires@magellanlp.com

Kinder Morgan's Galena Park Terminal stretches across 452 acres along the Houston Ship Channel and offers over 10mn bl of storage capacity across 231 tanks. The facility has five ship docks capable of handling MR vessels, along with four barge docks. Galena Park offers rail access to the Union Pacific network and includes 12 inbound and 10 outbound pipeline connections. The terminal is connected to other Kinder Morgan facilities along the Houston Ship Channel including Pasadena and the Kinder Morgan Export Terminal via 14 cross-channel pipelines. The Galena Park Terminal also has 18 truck bays for loading and unloading trucks.

Facility contact: Clay Jeffirs, 713-450-7416

The **Seaway Texas City** system consists of two marine ship docks with a 45ft draft that facilitate crude imports and exports, as well as storage tanks and various pipelines to deliver crude to refineries in Texas City and to and from terminals in Galena Park, Enterprise's ECHO terminal, and locations along the Houston Ship Channel. The Texas City system, with a capacity of about 800,000 b/d, also handles some production from offshore Gulf of Mexico. Texas City is the only Houston-area terminal that can partially load VLCCs.

Facility contact: Brittany Johnson, 713-381-4448 or brjohnson@eprod.com

The **Seaway Jones Creek Terminal** is the terminus of the Seaway longhaul pipeline system from Cushing, which has an aggregate capacity of 950,000 b/d, depending on the type and mix of crude oil being transported and other variables. The Jones Creek Terminal is connected to Enterprise's ECHO Terminal, which enables Seaway to serve a variety of customers along the Texas Gulf coast including the Beaumont/Port Arthur area. The Jones Creek Terminal is connected to Seaway's nearby Freeport marine terminal which has two ship docks with a 42ft draft to facilitate crude imports and exports. The Freeport system has the capacity to transport 480,000 b/d.

Facility contact: Brittany Johnson, 713-381-4448 or brjohnson@eprod.com

Corpus Christi: The pure-play export hub

Corpus Christi, Texas, is no longer just a destination for light sweet US crude. Since the December 2015 lifting of the 40-year-old ban on US crude exports, the southern Texas port hub has swiftly grown to be the largest export center for Texas-produced crude. For the first 6 months of 2022 Corpus Christi loaded a record 2.2mn b/d of crude exports, breaking its previous half-year record from the same period last year by 12pc. Exports from Corpus Christi and Ingleside have consistently comprised more than half of total outbound flows since August 2020. In June exports logged a monthly record of 2.15mn b/d, comprising about 60pc of total US crude exports.

Corpus Christi is home to the Enbridge Ingleside Energy Center (EIEC), which the Canadian midstream giant bought from Moda Midstream in 2021. EIEC, which sits on the site of a former US Navy base that once handled blue-water vessels, recently has handled about 20pc of all US crude exports.

Corpus Christi loadings rose fast after the midstream build-out of late 2019 and early 2020, when more than 2.5mn b/d of pipeline capacity was constructed from the Permian basin to the coast, along with several new terminals.

This direct connectivity to the Permian basin results in a "neater" quality of WTI at the port that buyers often prefer, shifting WTI prices at Corpus Christi to a premium against Houston-based cargoes in recent years, despite fewer connected refineries in the region and limited storage capacity compared to Houston.

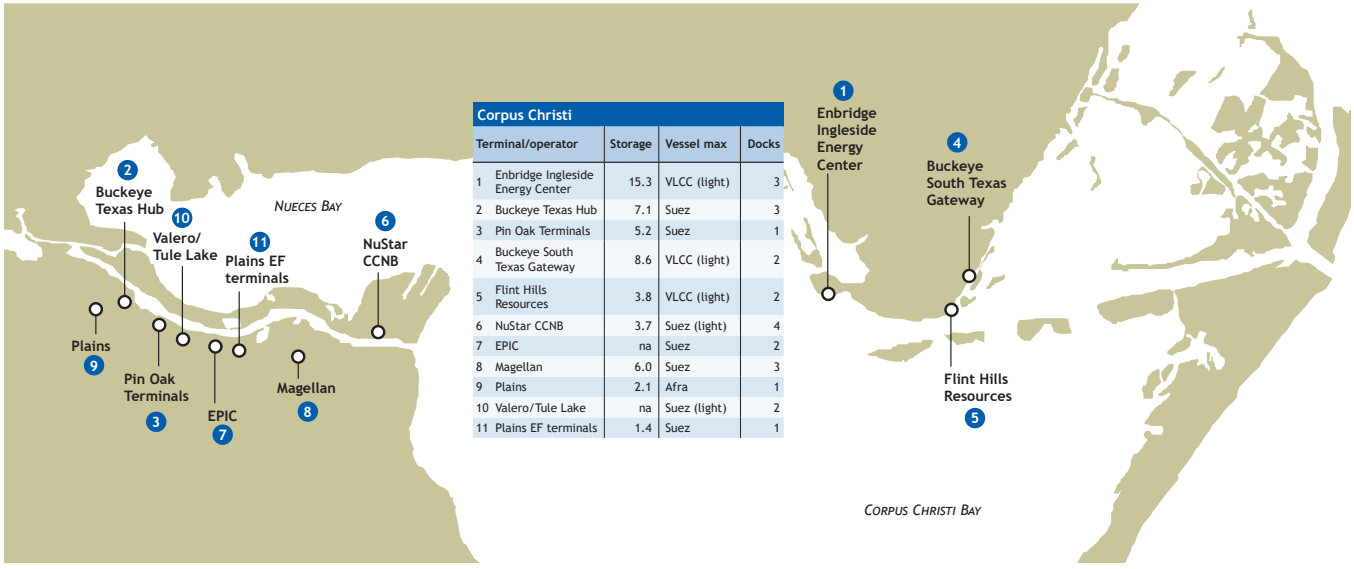
Shippers also frequently export West Texas Light (WTL) as well as Eagle Ford crude and condensate from Corpus Christi. But most terminals at the port have segregated tanks for Permian-quality WTI and pipelines have strict batching procedures. Magellan's East Houston terminal, Enterprise's ECHO terminal, and other connecting facilities in the Houston area can also receive crude directly from the Permian basin.

The Corpus Christi area, including Ingleside, is positioned to take more market share after the completion of an ongoing project to deepen and widen the Corpus Christi Ship Channel. The project aims to increase the channel depth from 47ft to 54ft and widen it to 530ft.

Phase 1 of the project, which included deepening and widening the waterway from the Gulf of Mexico to Harbor Island, is complete and Phase 2, from Harbor Island to past La Quinta Junction, is under construction. The dredging would allow Ingleside terminals — EIEC, South Texas Gateway and Flint Hills Resources — to load up to 1.6mn bl onto a VLCC. Phase 3 of the project has also recently begun work and aims to dredge the area west of La Quinta Junction through the Chemical Turning basin in the Port's Inner Harbor by mid-2023.

Following the completion of the Corpus Christi Ship Channel Improvement Project, the port will "have the deepest and widest ship channel in the entire US Gulf coast," port chief executive Sean Strawbridge said.

Corpus Christi and Ingleside terminals



Corpus Christi

	Terminal/operator	Storage	Vessel max	Docks
1	Enbridge Ingleside Energy Center	15.3	VLCC (light)	3
2	Buckeye Texas Hub	7.1	Suez	3
3	Pin Oak Terminals	5.2	Suez	1
4	Buckeye South Texas Gateway	8.6	VLCC (light)	2
5	Flint Hills Resources	3.8	VLCC (light)	2
6	NuStar CCNB	3.7	Suez (light)	4
7	EPIC	na	Suez	2
8	Magellan	6.0	Suez	3
9	Plains	2.1	Afra	1
10	Valero/Tule Lake	na	Suez (light)	2
11	Plains EF terminals	1.4	Suez	1

Key facilities

Enbridge's Ingleside Energy Center (EIEC) is one of the most operationally efficient export terminals in the US, with the ability to load more than 1.2mn bl of crude onto a VLCC, which can then complete its loading operation with a single ship-to-ship (STS) transfer at the nearby Corpus lightering zone.

The terminal is connected to Texas shale supply by way of the Cactus I, Cactus II, Gray Oak, EPIC and Harvest pipelines. It has a crude storage capacity of roughly 15.3mn bl, comprising 33 tanks holding 350,000-495,000 bl each.

Ingleside has a deepwater vessel berth for VLCCs, Suezmaxes and Aframaxes with a combined loading rate of up to 160,000 bl/hour. The facility has a draft capacity of up to 45ft.

Enbridge is also working with Humble Midstream — a subsidiary of EnCap Flatrock Midstream — to develop a low-carbon hydrogen and ammonia production and export facility at EIEC to meet higher demand for low-carbon solutions.

The **Buckeye Texas Hub** is situated along the Corpus Christi Ship Channel with access to Texas crude production by way of vessel, truck, rail and pipeline.

The facility commenced operations in 2014 and loaded its first Suezmax tanker in March 2018 after a project to expand its capabilities beyond Aframax volumes. Buckeye has a draft of at least 45ft and five vessel berths, including three deepwater docks.

The Buckeye Texas Hub can store roughly 7.1mn bl of crude, refined products and LPG.

Facility contact: Andrew Kaplun, Director, Commercial Development, 832-615-8618 or akaplun@buckeye.com

Pin Oak Terminals' Oil Dock 14 began operations in April 2020. The dock can load up to Suezmax-sized tankers at a rate of more than 40,000 bl/hour and is connected to 5.2mn bl of storage capacity at the marine terminal and nearby Taft station.

Construction of the dock was a joint effort between Pin Oak and the Port of Corpus Christi Authority. It has eight manifest loading and unloading sites alongside a private rail storage yard with UPPR class 1 railroad access.

The Port of Corpus Christi constructed the dock, mooring structures and dredging, while Pin Oak installed topside handling equipment, associated storage facilities and common carrier pipeline connections.

The terminal company, also known as Pin Oak Corpus Christi, is a joint venture between Mercuria Energy, Dauphine Midstream, Devon Energy and Tatanka Midstream.

Pin Oak is connected to the Gray Oak and EPIC pipelines, alongside the Agua Nueva Rail Terminal. Pin Oak is also connected to Cactus II and FHR's Midway Station via Pin Oak Taft.

Facility contact: Bill Woodard, Vice President, Commercial and Strategy, 918-605-0514 or bwoodard@pinoakgrp.com

Buckeye's South Texas Gateway has a throughput capacity of 800,000 b/d and is connected to Phillips 66's 900,000 b/d Gray Oak pipeline, the EPIC pipeline and the Harvest pipeline. South Texas Gateway, which commenced operations July 2020, includes two VLCC-capable deepwater berths as well as 8.6mn bl of storage capacity.

The facility is a joint venture between Philips 66 and Marathon Petroleum.

Future development plans will develop pipeline connectivity to other regional sources of supply and expand storage capacity to more than 10mn bl.

Facility contact: Sarah Manson, Senior Manager, Commercial Development, 281-546-9403

Flint Hills Resources' Ingleside terminal, strategically located at the mouth of Corpus Christi Bay, has two crude berths with a max draft of 45ft, but primarily exports out of dock 4.

The terminal loads Eagle Ford, WTI and WTL. It has storage tank capacity of 3.8mn bl and is directly connected to Flint Hills' Eagle Ford pipeline system, the Midway/Taft station and the EPIC, Gray Oak, Harvest and Cactus II pipelines.

Facility contact: John Mueller, Vice President, Commercial, 720-644-3999 or john.mueller@fhr.com

NuStar Energy's Corpus Christi North Beach (CCNB) terminal is connected to the 670,000 b/d Cactus II pipeline and the 900,000 b/d Gray Oak pipeline by way of a 30-inch pipeline from the Taft, Texas, station. The terminal is also connected to NuStar Energy's South Texas Crude System, which delivers Eagle Ford crude oil by way of NuStar's

240,000 b/d 16-inch pipeline. The terminal has 10 storage tanks with a capacity of up to 2.8mn bl of crude oil. The CCNB terminal has a sister tank farm with nine additional storage tanks with a capacity of up to 900,000 bl, which is connected to Harvest's 16-inch pipeline and can also receive crude oil by truck. Both tank farms have a combined capacity of up to 3.7mn bl of crude oil and access to four marine docks on the Corpus Christi Ship Channel, which are able to load vessels ranging in size from inland barges to Suezmax-class. The CCNB terminal has an outbound connection, by way of NuStar's 120,000 b/d 12-inch pipeline, to refineries including Citgo and Valero as well as the Magellan and Buckeye splitters in Corpus Christi.

Facility contact: Roger Rocha, Roger.Rocha@nustarenergy.com

Commercial contacts: Jonathan Piper, Jonathan.Piper@nustarenergy.com; Dilio Baptista Dilio.Baptista@nustarenergy.com

EPIC's Corpus Christi Marine Terminal, located within the Inner Harbor of the Corpus Christi Ship Channel, loads Aframax tankers from its West Dock facility, which was repurposed in late 2019 to export crude from the former IGC grain terminal.

It has a water depth of 46.5ft and can load up to 20,000 bl/hour. It accepts deliveries via the 600,000 b/d EPIC Crude Pipeline from the Permian and Eagle Ford basins and is connected to 3.5mn bl of storage at the nearby Robstown terminal.

Facility contact: Robert McQuarrie, Terminal Operations Manager, 361-600-1814

Magellan Midstream Partners' Corpus Christi (CC) Terminal is located on the Corpus Christi Ship Channel and offers 250,000 b/d of dock loading capacity at three ship berths and one barge dock berth with a maximum draft of 47ft.

The terminal offers more than 6mn bl of crude oil, refined products, and chemical storage and is the landing spot for Eagle Ford condensate from Magellan's 50pc-owned Double Eagle pipeline joint venture. Magellan also owns and operates a 50,000 b/d condensate splitter, which is located at the CC terminal.

Magellan owns 110 acres of undeveloped land with waterfront access, ability to build 10mn bl of additional storage and four ship docks on the Corpus Christi Ship Channel which provides future developmental opportunities.

Facility contact: CrudeNotices@magellanlp.com

Beaumont/Nederland/Port Arthur: Down on the bayou

Further east of Houston's densely packed grid of refineries and port infrastructure, terminal facilities along the Sabine-Neches waterway between Beaumont and Port Arthur, Texas, offer a great deal of optionality for crude sourcing and pipeline transport, with about 3mn b/d of inbound supply on six major pipeline systems.

Though it has fewer local refineries, the Beaumont area sees less vessel traffic than Houston's port facilities. The shallow draft of the Sabine-Neches channel limits vessel options to Aframax and Suezmax-class ships. The area is also a heavily travelled route for barges making local crude and refined products movements along the Intracoastal Waterway. Local refineries operated by ExxonMobil, Motiva, Total and Valero have a combined capacity of over 1.8mn b/d.

Beaumont/Port Arthur has the shallowest maximum draft of the five largest oil ports in Texas at 40ft along with the lowest air draft at 136ft and the shortest maximum beam — or ship width — at 157ft.

The Sabine Neches Navigation District, which serves the Beaumont-Port Arthur refining and logistics hub, won federal authorization in 2014 to be deepened to 48ft from 40ft to accommodate larger vessels. The district signed a partnership agreement with the Army Corps of Engineers in 2019, and the deepening project is underway, with completion expected in about 7 years. The waterway has not been improved since 1962.

However, the deepening project still would not accommodate a fully loaded Suezmax vessel. That means that larger VLCCs headed to long-haul Asian destinations would still have to be lightered in the deeper waters of the Gulf of Mexico beyond Sabine Pass.

The area is served by six pipeline systems that offer a variety of crudes ranging in geography from the offshore Gulf of Mexico, Permian basin, Bakken, the Rocky mountains and Canada. Energy Transfer operates several of these systems – the Permian Express system as well as its Bakken Pipeline system, both of which deliver to Nederland, Texas. From Nederland, crude can move on the Bayou Bridge pipeline, a joint venture between Energy Transfer and Phillips 66, to reach Louisiana refineries as well as the logistics hub at St James, the terminus of the Capline pipeline.

The reversal of the Capline pipeline from Patoka, Illinois, to St James has also opened the door for more Canadian heavy crude to reach the Louisiana coast for potential export.

Key facilities

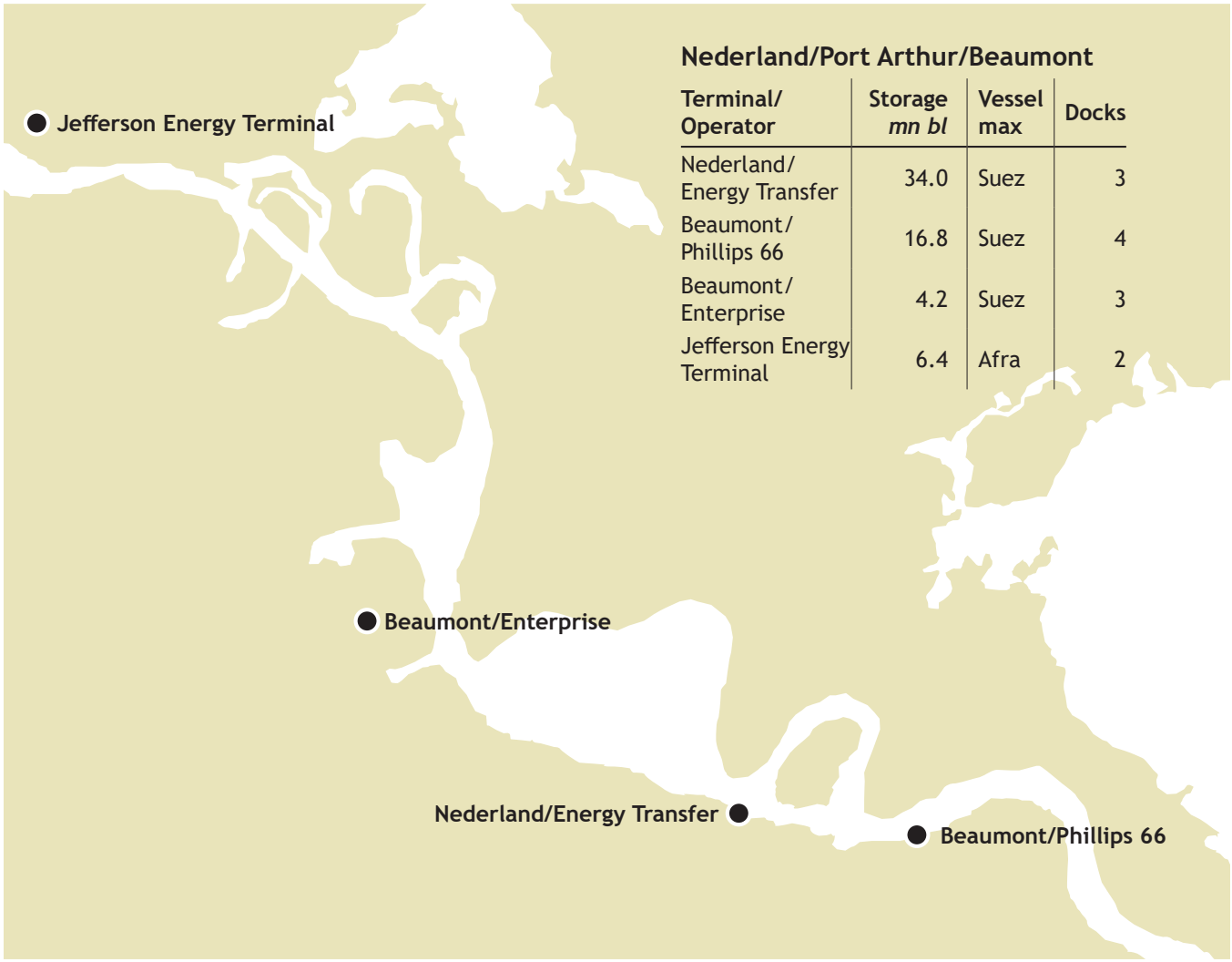
The **Energy Transfer Nederland Terminal**, formerly operated under the Sunoco Logistics name, is the biggest export terminal along the Sabine-Neches waterway and is the largest US above-ground crude oil storage facility that is singularly owned. The Nederland Terminal can receive crude oil at three of its six ship docks and three of its four barge berths, in addition to its pipeline connectivity to all major production basins and the US Strategic Petroleum Reserve. It can deliver crude oil and other petroleum products via pipeline, barge and ship. The terminal has three ship docks and three barge berths that are capable of loading crude oil for international and domestic destinations. In total, the terminal is capable of delivering over 2mn b/d of crude to Energy Transfer's oil pipelines or a number of third-party pipelines including those held by the US Department of Energy.

The Nederland Terminal provides storage and distribution services for refiners and other large transporters of crude oil and NGLs. The terminal receives, stores, and distributes crude oil, NGLs, feedstocks, petrochemicals, and bunker oils (used for fueling ships and other marine vessels). As of June 2022, the terminal has a total storage capacity of about 34mn bl in about 150 above-ground storage tanks with individual capacities of up to 660,000 bl.

Facility contacts: Alex Thom, Senior Manager of Crude Business Development, 713-989-4670

Phillips 66 Beaumont Terminal - Phillips 66 recently completed a 2.2mn bl crude storage expansion at its Beaumont Terminal on the Sabine-Neches waterway. The terminal has 16.8mn bl of crude and products storage, with 13.1mn bl devoted to crude storage. The facility has five

Beaumont-Port Arthur-Nederland terminals



Nederland/Port Arthur/Beaumont

Terminal/ Operator	Storage *mn bl*	Vessel max	Docks
Nederland/ Energy Transfer	34.0	Suez	3
Beaumont/ Phillips 66	16.8	Suez	4
Beaumont/ Enterprise	4.2	Suez	3
Jefferson Energy Terminal	6.4	Afra	2

loading spots across four docks capable of loading and discharging refined products, methanol, and crude oil. The four docks can accommodate inland barges, ocean going barges, and Panamax, Aframax, and Suezmax vessels. Phillips 66 acquired the former Unocal refinery site from Chevron in 2014.

The terminal receives crude from multiple pipeline connections including Marketlink, Seaway, Paline, Dakota Access/ETCOP, CHOPS, the SPR at Big Hill, and Zydeco, connecting it to a variety of crude grades from the Bakken shale, Cushing, Eagle Ford, Permian basin and Western Canada. Outbound pipelines such as Bayou Bridge and Zydeco, along with direct connections to ExxonMobil Baytown and the SPR at Big Hill, provide access to refining markets in Beaumont and Louisiana. The terminal in 2021 began receiving blended DRUbit™ via the PAT Pipeline, which is supplied from rail deliveries to the Port Arthur Terminal operated by US Development Group.

Facility contact: P66Terminals@p66.com

The **Enterprise Beaumont Marine Terminal** is located on the Neches River near Beaumont and has 4.2mn bl of crude storage capacity in 12 tanks. The marine terminal includes three deep-water ship docks capable of handling Suezmax vessels as well as a barge dock to facilitate imports and exports. Enterprise can feed Beaumont on its Seaway system out of its ECHO terminal in Houston, and like the other storage centers it also can serve the four large refineries in the Beaumont and Port Arthur area.

Facility contact: Micha Bedard, 713-381-4307 or mtbedard@eprod.com

The **Jefferson Energy Terminal** is located on the Sabine-Neches waterway and has 6.4mn bl of crude oil and refined products storage. The facility is currently supported by two marine docks capable of handling inland barges, ocean going barges, Panamax and Aframax vessels for crude oil and refined products and will add an additional Suezmax capable marine dock in the second quarter of 2023.

The terminal has direct pipeline connectivity to the ExxonMobil Beaumont and Motiva Port Arthur refineries and receives inbound crude oil from Cushing, Oklahoma, via the Paline pipeline system. Jefferson is also served by rail via all three of Class I carriers (BNSF, KCS, and Union Pacific) and has partnership agreements with the two Canadian-based railroads (CN and CP). The facility receives heated and unheated inbound rail volumes from all of the major production areas in North America and refined products are also railed to several major markets in Mexico.

Operations contact: Justin Payne, jpayne@jeffersonenergyco.com

Commercial contact: Matt Evans, mevans@jeffersonenergyco.com

Louisiana: Flows shift to tidewater

Louisiana has long been the heart of the US deepwater industry and home to the only US port capable of loading and unloading fully-laden VLCCs. For decades, the state's port and pipeline infrastructure was designed to route deepwater crudes like medium sour Mars and Poseidon from offshore production platforms to the state's massive refining complex, and to direct water-borne crude imports from the Louisiana Offshore Oil Port (LOOP) and its giant associated storage caverns at Clovelly northward to midcontinent refiners by way of the Capline.

However, rising US shale output and the lifting of export restrictions have tilted Louisiana's logistics infrastructure by 180 degrees on its axis to direct crude to export docks and its 3.7mn b/d of refinery capacity.

Capline opened in 1967 as a crude supply lifeline for midcontinent refineries amid growing reliance on overseas imports, providing a key supply path from St James, Louisiana, to Patoka, Illinois. The line was built during and for a bygone era in US crude markets, where the primary driver was imports traveling from the LOOP northward up the Capline to midcontinent refiners, but that pipeline was reversed in 2021 to point south.

The US shale revolution, as well as a glut of bottlenecked Canadian heavy crude supply, has flipped that equation on its head, and the critical path for US crude flows is now toward the tidewater and export markets. Louisiana port loadings have tended to trend toward medium-sour barrels rather than light-sweet ones, denoting the makeup of flows from offshore platforms like Mars and Southern Green Canyon.

In its original northbound configuration, Capline offered 1.2mn b/d of capacity and was the largest long-haul oil line in the continental US. Initial capacity on the re-configured south-facing pipeline is dramatically lower at 102,000 b/d. Plains, one of the line's three owners and its operator, has said it is in active discussions with shippers to add another 100,000 b/d of capacity to Capline at some later undetermined date.

The Capline reversal has changed crude transport dynamics in the region and put increased logistical emphasis on

Patoka as a US crude hub. Patoka is also a key junction point where the Dakota Access pipeline connects with Energy Transfer Crude Oil pipeline (ETCOP) to Nederland, Texas.

The Capline reversal as well as new inbound capacity in the form of pipelines like Zydeco, Bayou Bridge and Seahorse has put new focus on St James. As crude infrastructure hubs go, St James has a lot going for it. With nearly 40mn bl of storage and access to multiple large-capacity pipelines, St James is the blending and logistics hub for six refineries nestled along the Mississippi river with a combined capacity of about 1.7mn b/d of crude. St James can handle Aframax loadings and is also a rising focus of railed Canadian crude supply.

Just about every major variety of domestic crude can be found at St James, or soon will be. Located on the Mississippi river about halfway between New Orleans and Shell's Clovelly hub, St James is the delivery point of the Louisiana Light Sweet contract (LLS) – an offshore grade. Eagle Ford and Permian crude is shipped to St James via barge and pipeline and blended with other crudes to meet LLS specifications.

But the prize in the form of major US crude export activity will move south toward Clovelly and its 70mn bl of storage caverns that serve the LOOP, which has moved to back-to-back loading operations for VLCCs in order to optimize flows.

Key facilities

The **Louisiana Offshore Oil Port** (LOOP) for decades has been the nation's primary gateway for seaborne imports and the single largest entry point for waterborne crude. In 2018, LOOP updated its marine facilities to allow for the loading of a wide range of vessel sizes from its Marine Terminal while still retaining the ability to offload vessels.

LOOP's Marine Terminal is located about 20 miles (32km) off the coast from Grand Isle, Louisiana, and is the only US port capable of fully loading VLCCs. A joint venture between Marathon, Shell and Valero, the facility can export light sweet crude as well as heavy sour crude but is primarily known for loading medium sour grades such as Mars. VLCCs moored at LOOP's offshore single-point mooring buoy can fully load in as little as 2.5 days.

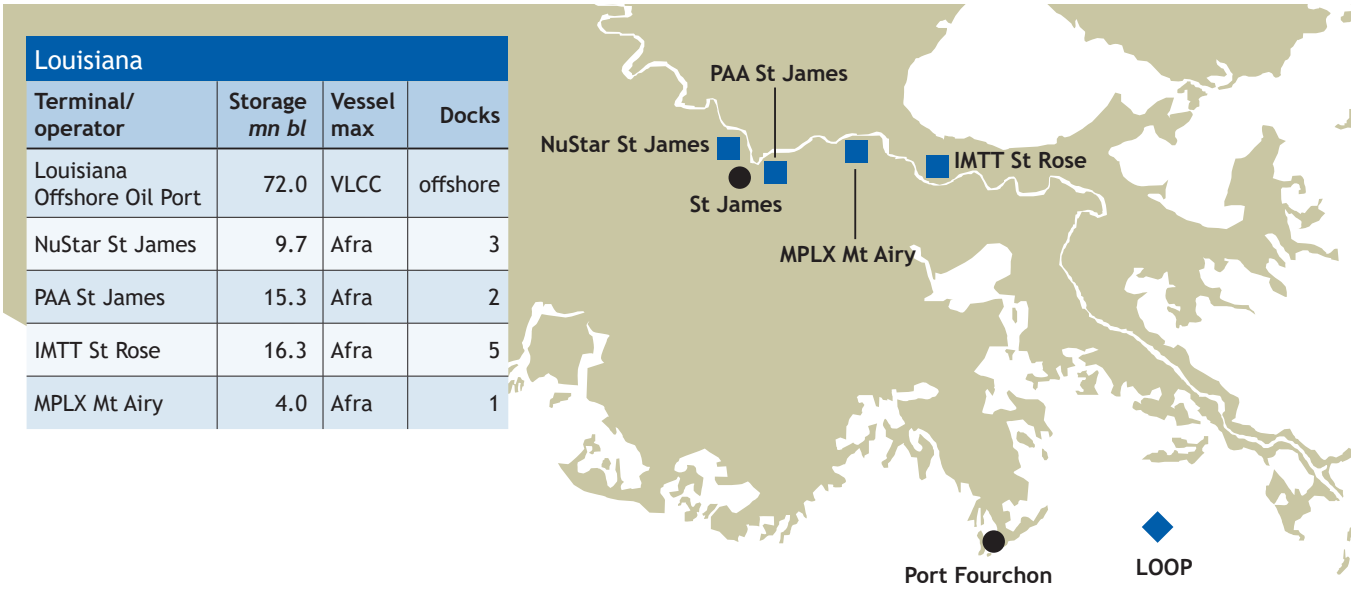
LOOP also operates a 72mn bl crude oil storage facility in Clovelly, Louisiana, about 25 miles inland and connected to its port complex by a 48-inch pipeline. Crude is stored there at eight massive underground salt caverns, which can collectively hold about 60mn bl of crude, the largest US private storage facility. LOOP also has about 12mn bl of above-ground tankage.

From Clovelly, crude can be routed northward through the LOCAP pipeline and on to St. James. The LOCAP Terminal connects to the Plains, NuStar and Sugarland terminals as well as the Capline pipeline.

Facility contact: scheduler@loopllc.com

Louisiana terminals

Louisiana			
Terminal/ operator	**Storage *mn bl***	**Vessel max**	**Docks**
Louisiana Offshore Oil Port	72.0	VLCC	offshore
NuStar St James	9.7	Afra	3
PAA St James	15.3	Afra	2
IMTT St Rose	16.3	Afra	5
MPLX Mt Airy	4.0	Afra	1



NuStar's St James Terminal has 9.7mn bl of storage capacity and serves pipelines, barges, ships and railcars. The terminal has 30 tanks ranging from 25,000-680,000 bl of shell capacity, including three heated tanks that can handle high viscosity or high pour products. The terminal has three docks with the capacity to handle a 40ft draft vessel, comparable to an Aframax, with two of the docks having vapor control. NuStar has two 120-car unit train offloading racks that are served by the Union Pacific railroad.

NuStar earlier this year began receiving crude the St James terminal via the reversed Capline pipeline from Patoka. The terminal in recent years has also seen an increase in unit trains carrying WTI, Bakken and WCS barrels to the Gulf coast.

Facility contact: Amber Byrd, Director Business Development, 210-918-2827, or amber.byrd@nustarenergy.com

Plains All American Pipeline's St James Terminal offers 15.3mn bl of storage and has a manifold and header system to allow receipts and deliveries from connecting pipelines. Nestled along the Mississippi river, Plains' terminal offers a barge berth and two ship berths. Plains' facility also offers a rail facility capable of offloading 130,000 b/d.

Facility contact: Derek Taylor, 713-646-4441

The **IMTT St Rose Terminal** along the Mississippi river has 5 deepwater tanker berths with a 45ft draft capable of loading Aframax vessels, along with 13 barge berths. The facility offers 16.3mn bl of storage capacity in tanks up to 500,000 bl. Its tanks and docks offer access to LOOP's pipeline system with links to nearby refineries and petrochemical plants. The facility is also rail-linked to the Illinois Central and Canadian National networks.

MPLX's Mt Airy Terminal is located on the Mississippi river between New Orleans and Baton Rouge, near nine lower-Mississippi refineries and adjacent to Marathon's Garyville, Louisiana, refinery. MPLX purchased the facility from Pin Oak in 2018 for about $450mn. The facility offers about 4mn bl of storage and can load about 120,000 b/d across its dock. MPLX has said it could potentially expand storage capacity to 10mn bl and add a second dock.

About Argus

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