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CORPUS CHRISTI BAY - AN UPDATE ON THE SOUTH TEXAS PORT CITY'S CRUDE OIL EXPORT INFRASTRUCTURE

February 25, 2018

Corpus Christi, TX, is quickly becoming a strategic hub for U.S. crude oil exports. Since the repeal of the crude oil export ban in December 2015, crude exports from the Sparkling City by the Sea have increased to nearly 500 Mb/d — and that may be just the beginning. Numerous pipeline and terminal projects have been announced to receive, store and ship out a lot more crude from the Permian and Eagle Ford shale plays, with an increasing share of those barrels destined for the international market. Today, we discuss recent developments in crude exports out of South Texas.

RBN has written often about crude oil pipelines to Corpus Christi and refineries, storage and ship docks in Corpus and nearby Ingleside. They were covered in a Drill Down Report and, most recently in the “Take It to the Limit” blog series last spring. Part 1 of that series discussed the facts that Permian production is rising fast, and that a significant share of the new pipelines being developed to accommodate Permian growth would flow to the South Texas coast. RBN’s Growth Scenario shows Permian crude oil production rising by about 300 Mb/d a year through the early 2020s — topping 3 MMb/d late this year, 4 MMb/d in late 2020 and pushing 5 MMb/d by 2023. Further, recent increases in oil prices could accelerate the pace of that growth, not just in the Permian but in the recently rebounding Eagle Ford, where production now averages more than 1.3 MMb/d. Part 2 described extensive crude-related infrastructure already in place in Corpus; Part 3 recounted recent increases in exports out of Corpus-area docks, including Occidental Petroleum’s (Oxy) new Ingleside Energy Center Terminal in Ingleside (across the bay from Corpus); and Part 4 described a few of the projects under way to increase Corpus’s capacity for shipping out more and more crude.

A lot has happened in the past few months since that series was written. Before we get to that, let’s recap some of what’s already there. First, Corpus Christi is home to three refineries and two condensate splitters (simple refineries) with a combined capacity of 795 Mb/d. According to Baker & O’Brien estimates, these refineries can process about 550 Mb/d of domestic light crude oil and condensate. Remember that these refineries were built before domestic light crude oil was in surplus and that their configurations don’t support 100% light crude oil processing. Since the refineries can only handle some of the light crude and condensate that flows to Corpus from the Eagle Ford (on a number of pipelines with capacities totaling about 1.8 MMb/d) or from the Permian on Plains All American’s 390-Mb/d Cactus Pipeline (which currently feeds into the Eagle Ford JV pipeline to get to Corpus Christi), the balance needs to be sent out of the port on ships, either Jones Act vessels to other U.S. destinations or on ships bound for export markets. Figure 1 shows that the total volumes being shipped out of the Port of Corpus Christi have been rising over the past two years, and that an increasing share of those volumes are exports (blue bar segments).



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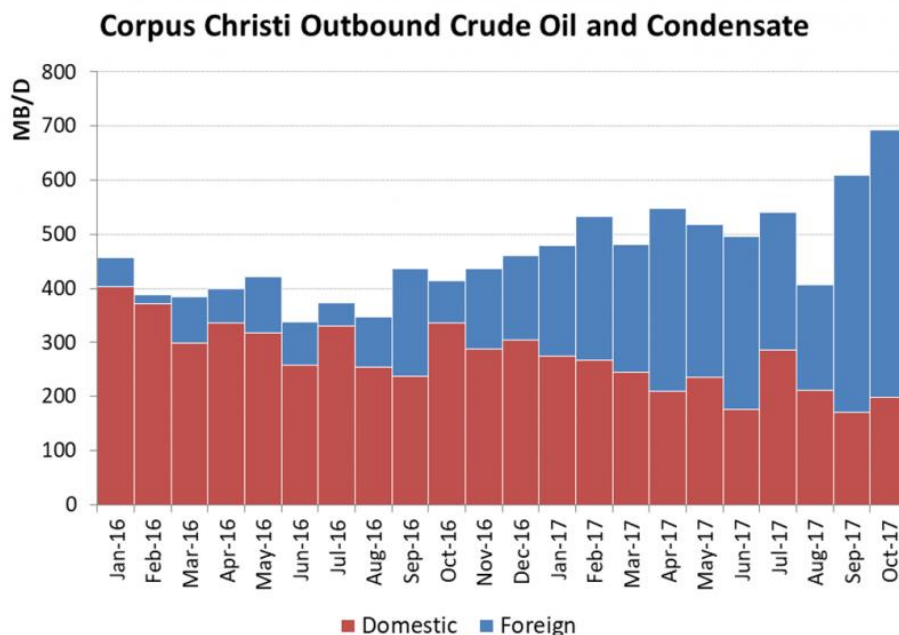


Figure 1. Source: Port of Corpus Christi

These volumes are poised to continue growing based on a host of new infrastructure projects serving the Corpus' crude market. Five new or expanded crude oil pipelines directed to the Corpus Christi area — with a combined capacity of more than 2 MMb/d — have been proposed in recent months, with nearly all of the crude oil sourced from the Permian Basin. It is unlikely that all of the pipelines will be built — at least within the 2019-20 time frames their developers are targeting — but at least a few will go forward. Here's what's been proposed so far:

- **Magellan Permian** — Magellan Midstream Partners is developing a new crude oil pipeline with origin points in Crane, Orla and Midland (in the Permian in West Texas) and possibly Helena or Gardendale (in the Eagle Ford in South Texas) that will deliver to Corpus Christi and Houston (purple dashed line in figure 2). Initial capacity will be 350 Mb/d, but the pipeline is expandable to 600 Mb/d; the estimated in-service date is the fourth quarter of 2019. There are several interesting things about this pipeline: (a) it provides shippers the option to choose their destination (Corpus Christi or Houston), (b) Magellan will allow committed shippers to designate third-party shippers to use their capacity at the incentive tariff, and (c) it will be a "batched" pipeline to help maintain crude oil quality — a common complaint from refiners of domestic sweet crude (see Refined, Piped, Delivered – They're Yours for a primer on batching).
- **EPIC Pipeline** — EPIC is a new 730-mile crude oil pipeline from Orla, TX (in the Permian's Delaware Basin) to Corpus Christi (orange dashed line in Figure 2). The 590-Mb/d pipeline will have 440 Mb/d of capacity from the Permian and an additional 150 Mb/d of capacity from the Eagle Ford. The pipeline will run parallel to EPIC's NGL pipeline, which is currently under construction. The estimated start-up for the crude pipeline is 2019.



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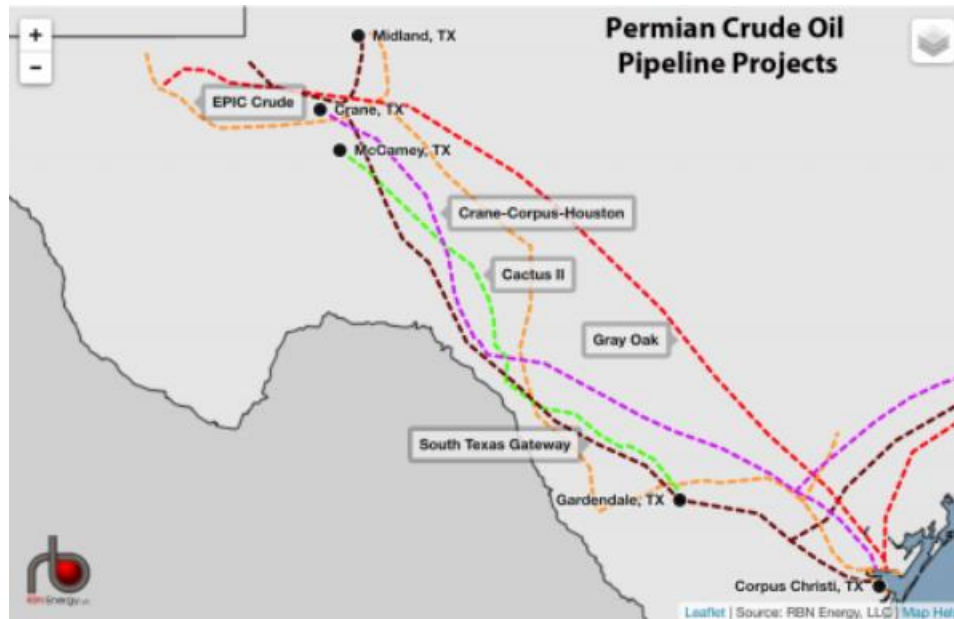


Figure 2: Proposed Crude Pipelines to Corpus Christi. Sources: Company Presentations and RBN

- **Cactus II** — Cactus Pipeline is an existing pipeline owned by Plains All American that runs from the Permian to Gardendale, TX (in the Eagle Ford). Through a connection into Plains and Enterprise Products Partners' Eagle Ford JV Pipeline, Permian crude flowing on Cactus can currently reach Corpus Christi. Plains has been developing an expansion called Cactus II (green dashed line in Figure 2) that will add two pipelines to the existing system and increase the Cactus system's total capacity from 390 Mb/d to 575 Mb/d by the third quarter of 2019. In January 2018, Plains and Trafigura announced they had signed a long-term deal for Trafigura to transport 300 Mb/d of Permian crude oil on the new line to Corpus Christi (See We Gotta Get Out of This Place).
- **Gray Oak** — In December 2017, Phillips 66 and Enbridge announced an open season on a joint-venture (JV) pipeline that will be called Gray Oak (red dashed line in Figure 2). The pipe will transport crude oil from Permian origin points in West Texas's Reeves, Loving, Winkler, and Crane counties to Corpus Christi, Freeport, and Houston. The dual market access is similar to what Magellan is aiming to do with its Permian to Corpus Christi and Houston pipeline. Initial capacity on Gray Oak is expected to be 385 Mb/d, with an in-service date in the second half of 2019.
- **South Texas Gateway** — South Texas Gateway pipeline (dark brown dashed line in Figure 2) is a new 600-Mb/d line planned by Buckeye Partners to bring crude oil from the Permian to Corpus Christi and Houston (similar to Magellan and Phillips 66/Enbridge). Origin points will include Wink, Midland, and Crane, TX. Buckeye is currently holding its open season for shipper commitments with an expected in-service date in 2020.



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With all this new crude oil potentially headed for Corpus Christi, commercial storage facilities and the Port of Corpus Christi are making investments to get the oil to market. We'll start with some of the storage facility projects and finish with port investments. RBN has covered many of the existing facilities in the market in the past (including in the "Take It to the Limit" series), so we won't dive into the minute details of those. Suffice it to say that existing commercial (non-refiner) crude oil storage in the Corpus Christi and Ingleside areas totals about 15.8 MMbbl ("Current Capacity" column in Figure 3).

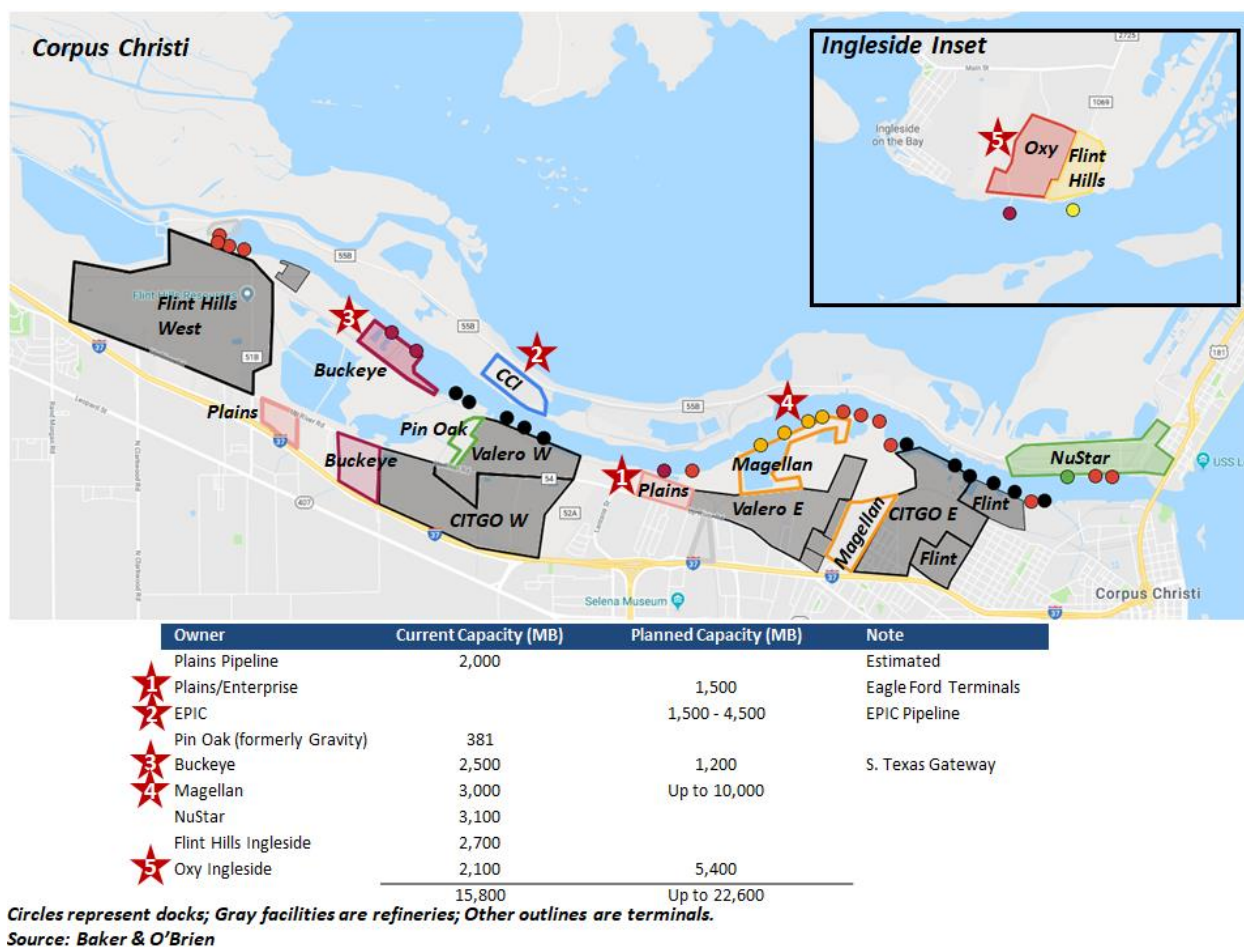


Figure 3. Source: Baker & O'Brien

Six new facilities or expansions of facilities have been announced in Corpus Christi (numbered stars and "Planned Capacity" column in Figure 3):

- **Eagle Ford Terminals (#1 star)** is a JV between Plains and Enterprise, which is building a new terminal on the Corpus Christi Ship Channel at the former Encycle/Texas, Inc. facility property. The new terminal will have a new dock and 12 crude storage tanks with a combined capacity of 1.5 MMbbl. The facility is estimated to be in service in 2018.
- **EPIC** (formerly owned by a JV of TexStar, CCI, and Ironwood) broke ground on a new crude oil



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storage facility (#2 star) in December 2017. CCI acquired the property several years ago and at one time had envisioned building a condensate splitter there. The new terminal will be the landing point for the new EPIC Pipeline. Initial capacity of the terminal in 2019 is estimated at 1.5 MMbbl, expandable to 4.5 MMbbl.

- **Buckeye** will expand the storage capabilities at its facility (#3 star) by 1.2 MMbbl and add a fifth deepwater dock to help accommodate flows from its planned South Texas Gateway pipeline project.
- **Magellan's** existing facility in Corpus Christi (#4 star), sandwiched between Valero and CITGO, is being expanded by at least 1 MMbbl of new crude storage, and the company has noted that it is permitted to build another 1 MMbbl. Recently, Magellan acquired additional property along the ship channel and announced plans to build up to 10 MMbbl of crude oil storage and four deep-water docks. Permitting is currently underway for the new facility, with plans for construction of the initial tankage to be completed in 2020.
- **Occidental** announced it was exploring a potential expansion of 5.4 MMbbl at its Ingleside facility (#5 star), but that the project had not yet received Oxy board approval.
- **Harvest Pipeline and Vitol** (not shown on map) announced in December 2017 that they will jointly develop a terminal on a 22-acre site leased from the Port of Corpus Christi. No information has been provided on the terminal's capacity.

With all these crude oil barrels hitting the water in the future, the Port of Corpus Christi is ambitiously pursuing infrastructure projects to enable business to continue booming — its vision is to be the "Energy Port of the Americas." The main focus of the port's projects is to allow larger ships to enter the port by (1) clearing the height limitations and (2) reducing the depth limitations. On the height side, a new Harbor Bridge now under construction will provide 205 feet of air-draft clearance. Construction is scheduled to be complete in 2021. The second major port project is the dredging of the ship channel. The Port of Corpus Christi announced last year that it was moving forward with a project to increase the channel depth to 54 feet from the current 47 feet, while still hoping to receive necessary funding from Congress. The dredging project will allow the channel to accommodate fully laden Suezmax tankers. As crude oil exports continue to increase, the port is hoping to eventually dredge the channel to 74 feet to allow Very Large Crude Carriers (VLCCs) into the inner harbor. Dredging to 74 feet is still a long ways off, so some companies (such as Magellan) have tossed around the idea of a potential offshore loading facility that could handle VLCCs.

The Texas oil landscape is continually evolving. Just eight years ago, in the summer of 2010, combined production from the Permian Basin and Eagle Ford crossed the 1 MMb/d mark. Since then, combined production has grown to over 4 MMb/d and the ban on crude exports has been lifted, providing tremendous opportunities for the Corpus Christi area. We can't wait to see what comes next.

"Corpus Christi Bay," written by Texas singer/songwriter/guitarist Robert Earl Keen is a selection from his fourth album, "A Bigger Piece of the Sky," released on October 8th, 1993. Many consider it his finest album, bringing together various elements of Americana alternative country styles rooted in Texas music.



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