
Permian Crude Takeaway & Pricing



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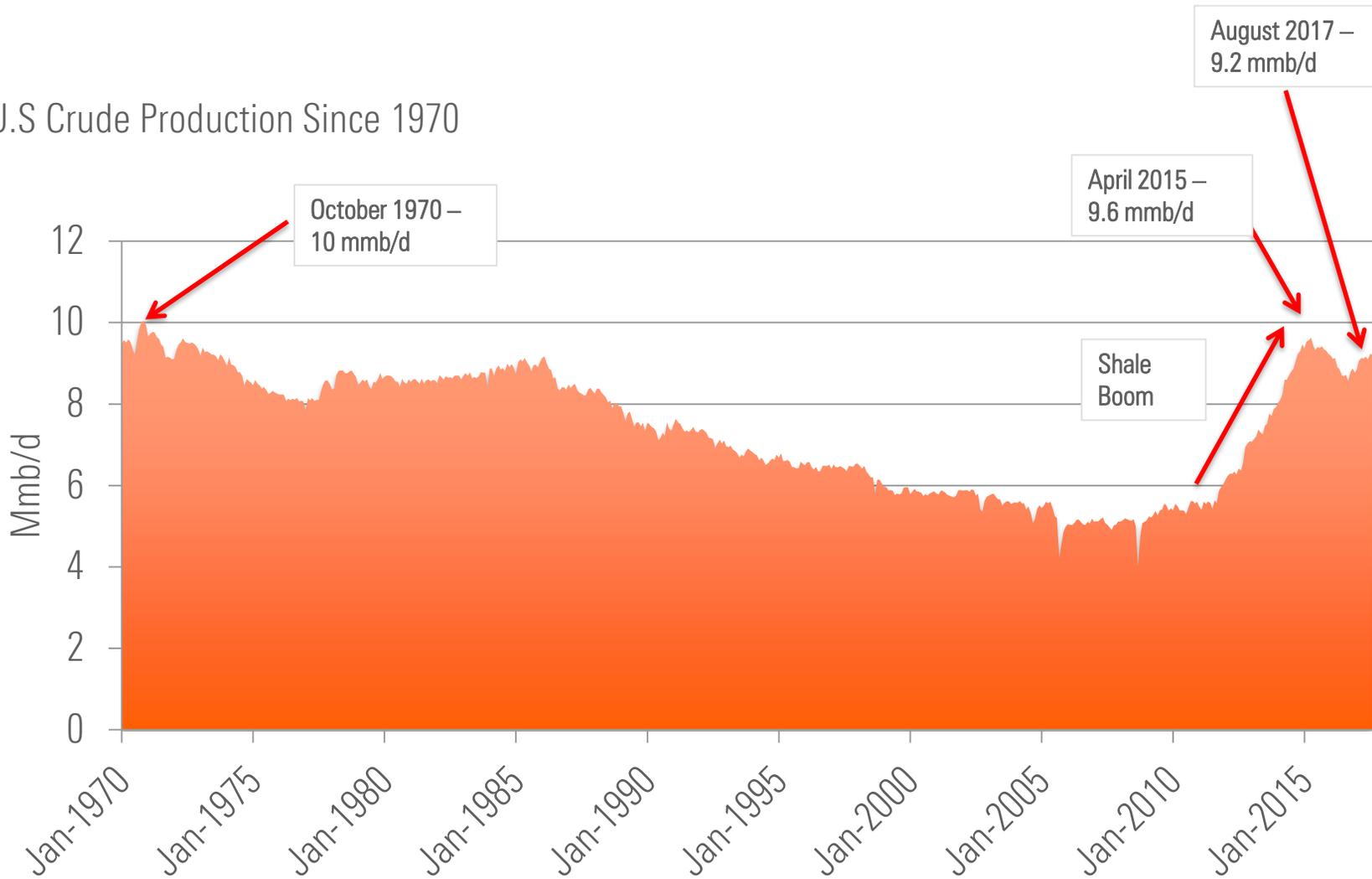
November 9, 2017 – New York Energy Forum

Agenda

- ▶ Oil Shale Boom & Plumbing
- ▶ Permian Takeaway
- ▶ Changing Gulf Coast Balance 2010 - 2017
- ▶ Export Infrastructure
- ▶ Prices and the Permian Spigot

Oil Shale Boom & Plumbing

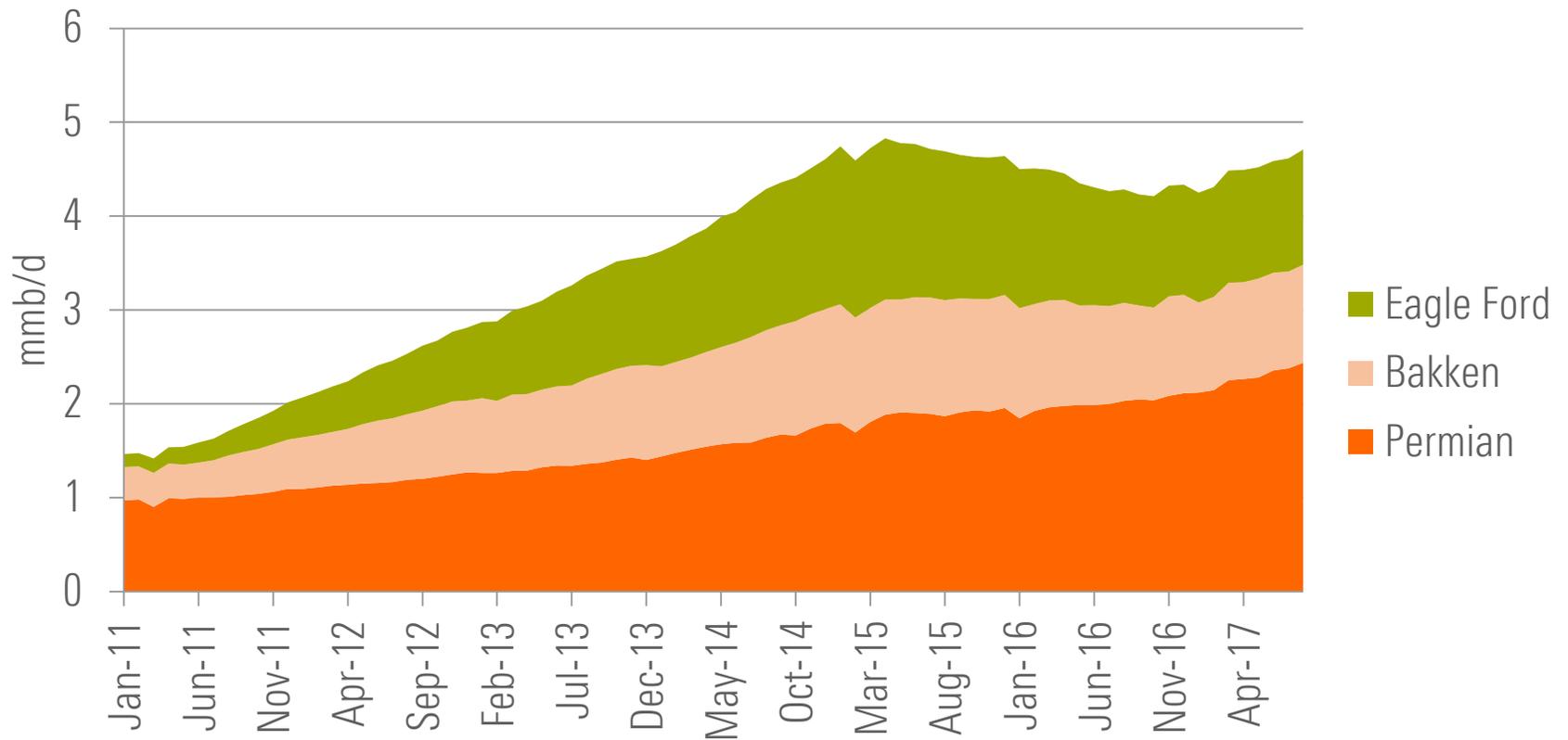
U.S Crude Production Since 1970



Source: EIA, Morningstar

Three Plays That Shook the World

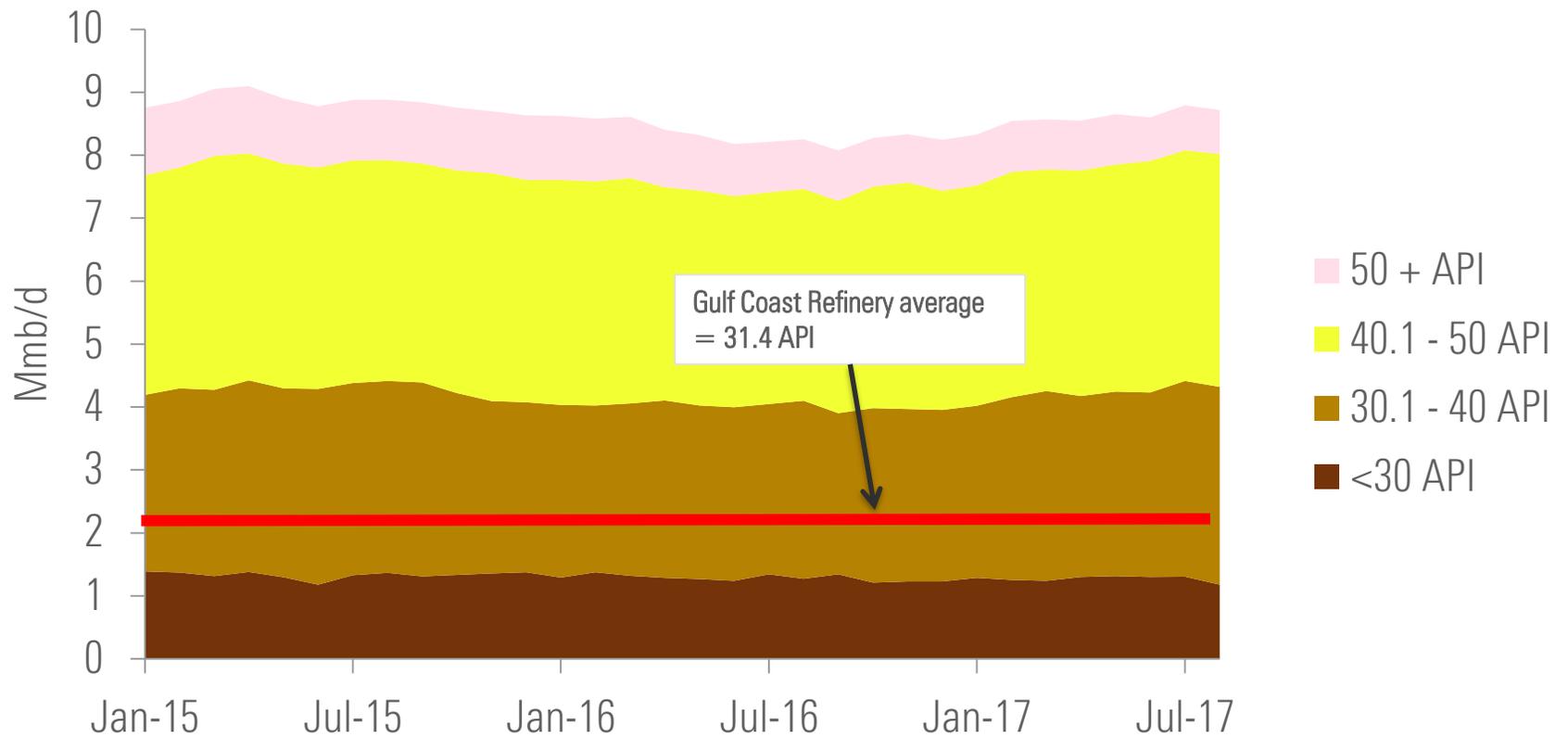
- ▶ Permian 100 years old - up 1.5 mmb/d since 2011
- ▶ Bakken up 0.7 mmb/d since 2011
- ▶ Eagle Ford up 1.1 mmb/d since 2011



Source: EIA

Frothy Crude – Getting Lighter

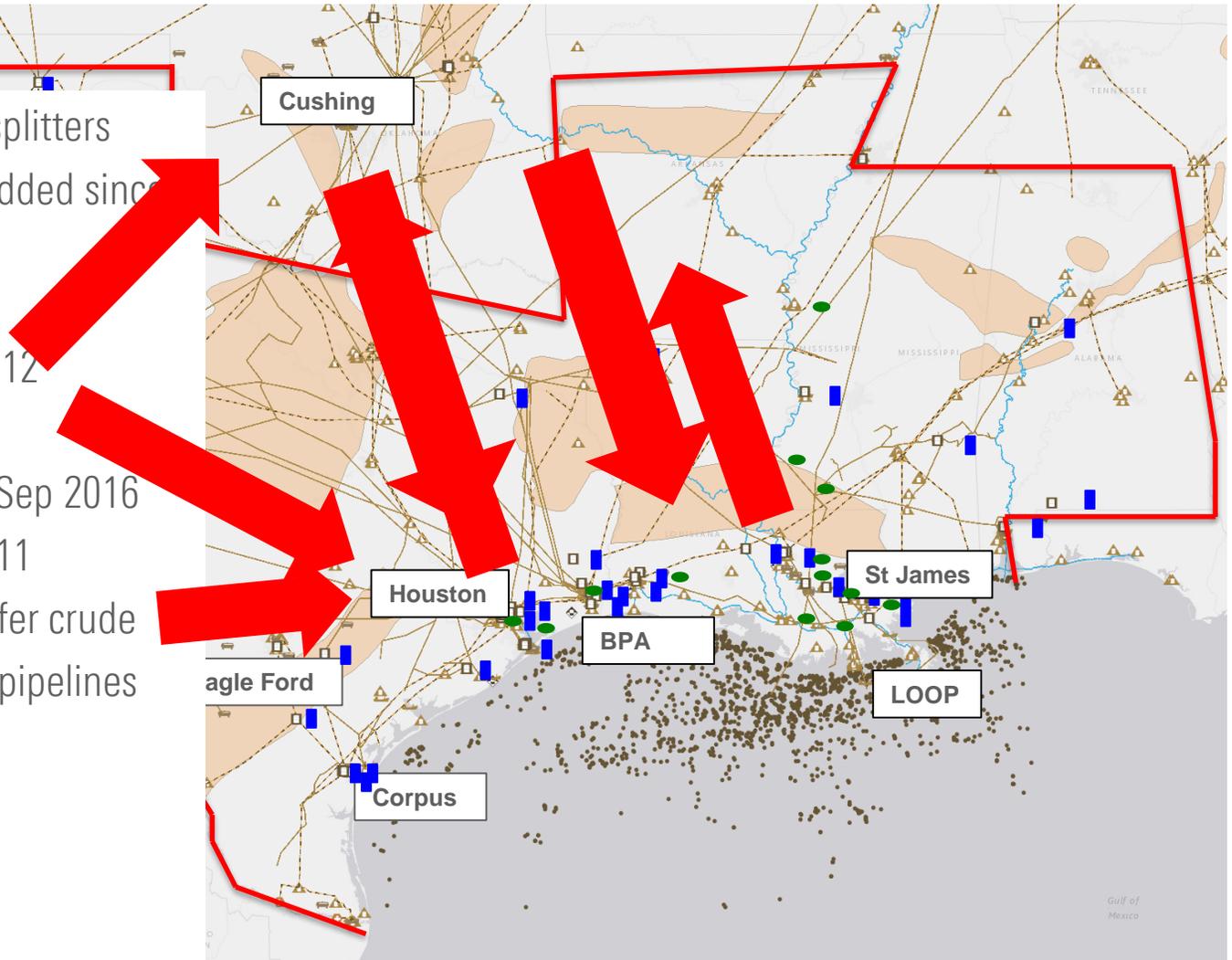
- ▶ API measures crude density
- ▶ Shale crude is light and sweet
- ▶ Refineries configured for heavier crude
- ▶ Creates a quality mismatch



Source: EIA, Morningstar

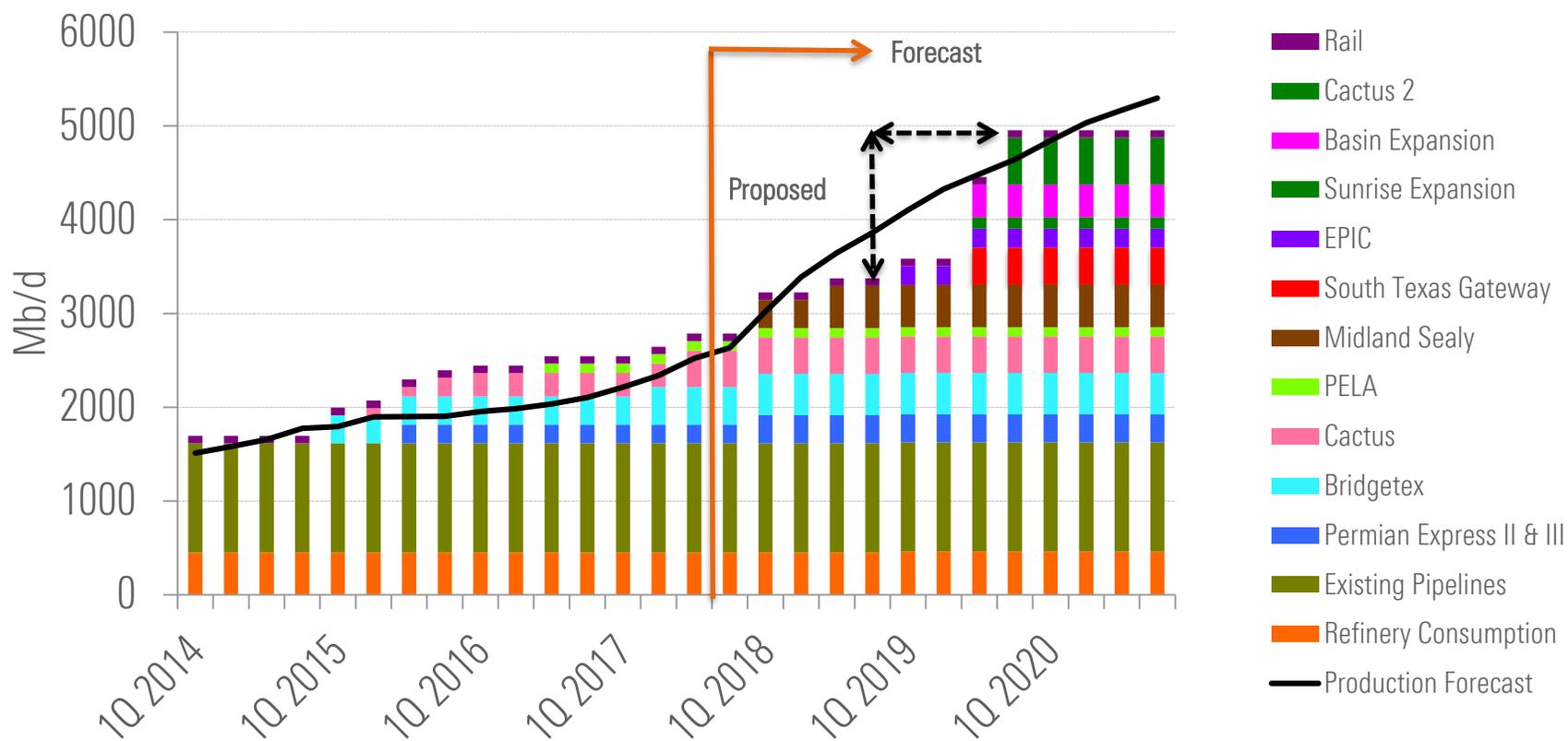
New Plumbing at the Gulf Coast

- 47 Refineries & 5 Condensate splitters
 - 9.8 mmb/d capacity (1.2 added since 2010)
- 18 Unload Rail Terminals
 - ~1.7 mmb/d built since 2012
- Storage
 - 291 mmBbl tank capacity Sep 2016
 - 85 mmBbl added since 2011
- 17 Marine Ports in use to transfer crude
- 26 Long distance transmission pipelines
 - ~ 6.5 mmb/d capacity



Permian Takeaway Infrastructure

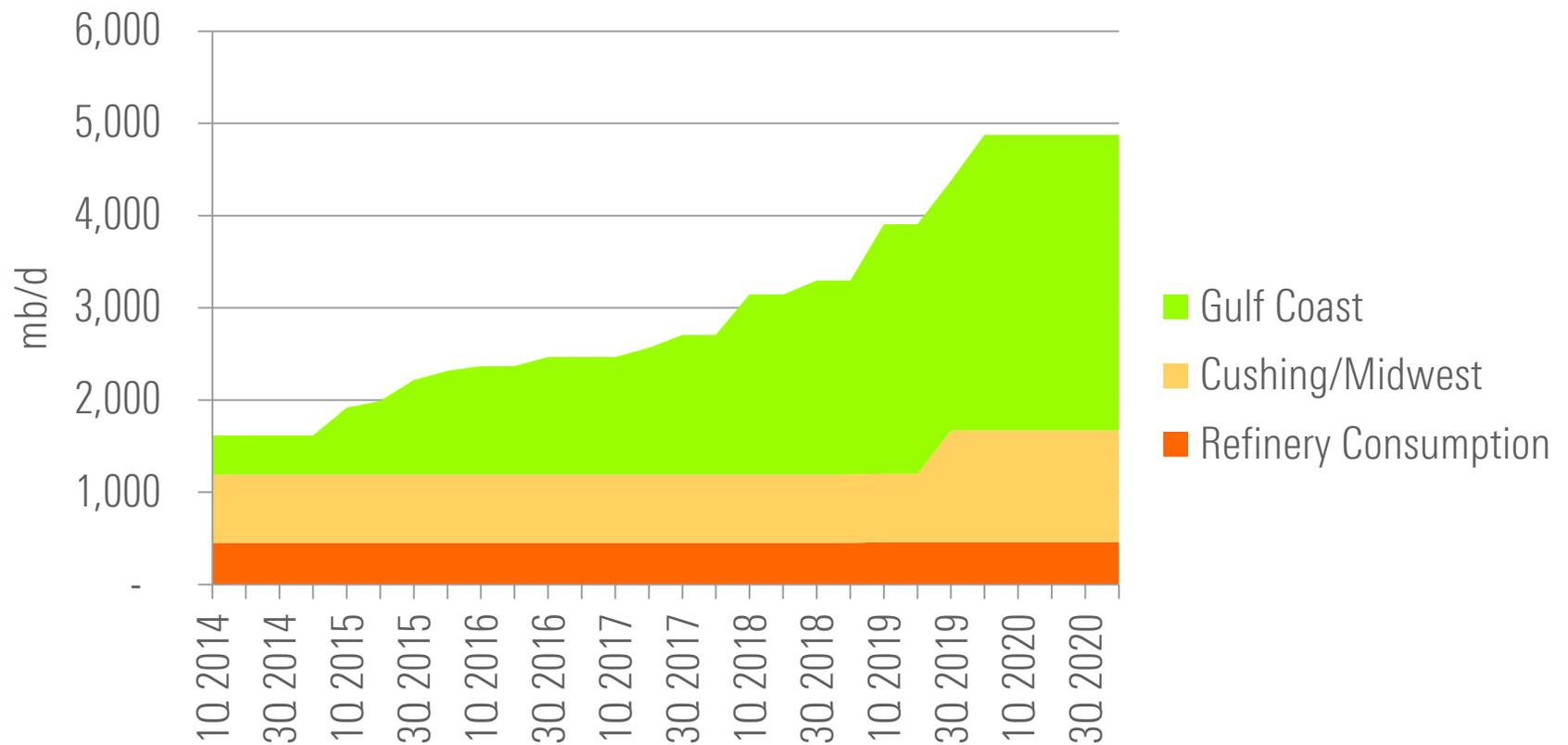
- ▶ Rapid pipeline build out in response to growing production
- ▶ Production forecast to double from 2.6 mmb/d at end 2017 to 5.2 mmb/d in 2020
- ▶ Additional 1.6 mmb/d pipeline capacity proposed



Source: Company Filings, Morningstar

Permian Takeaway Capacity: Destinations

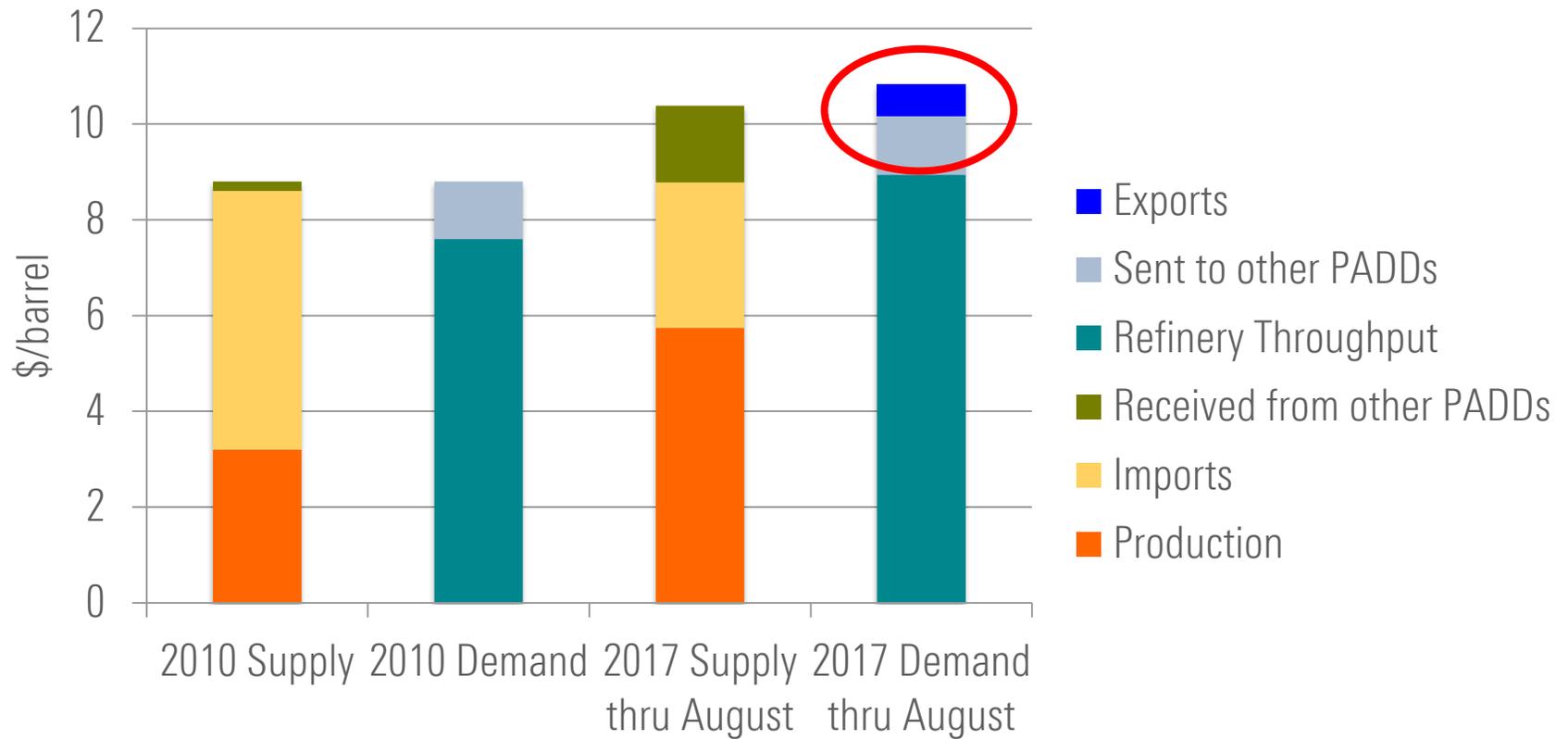
- ▶ ~ 450 mb/d processed in Permian refineries
- ▶ Traditional market = Cushing & Midwest
- ▶ Most new production goes to Gulf Coast



Source: Company Reports, Morningstar

Changing Gulf Coast Crude Balance 2010 - 2017

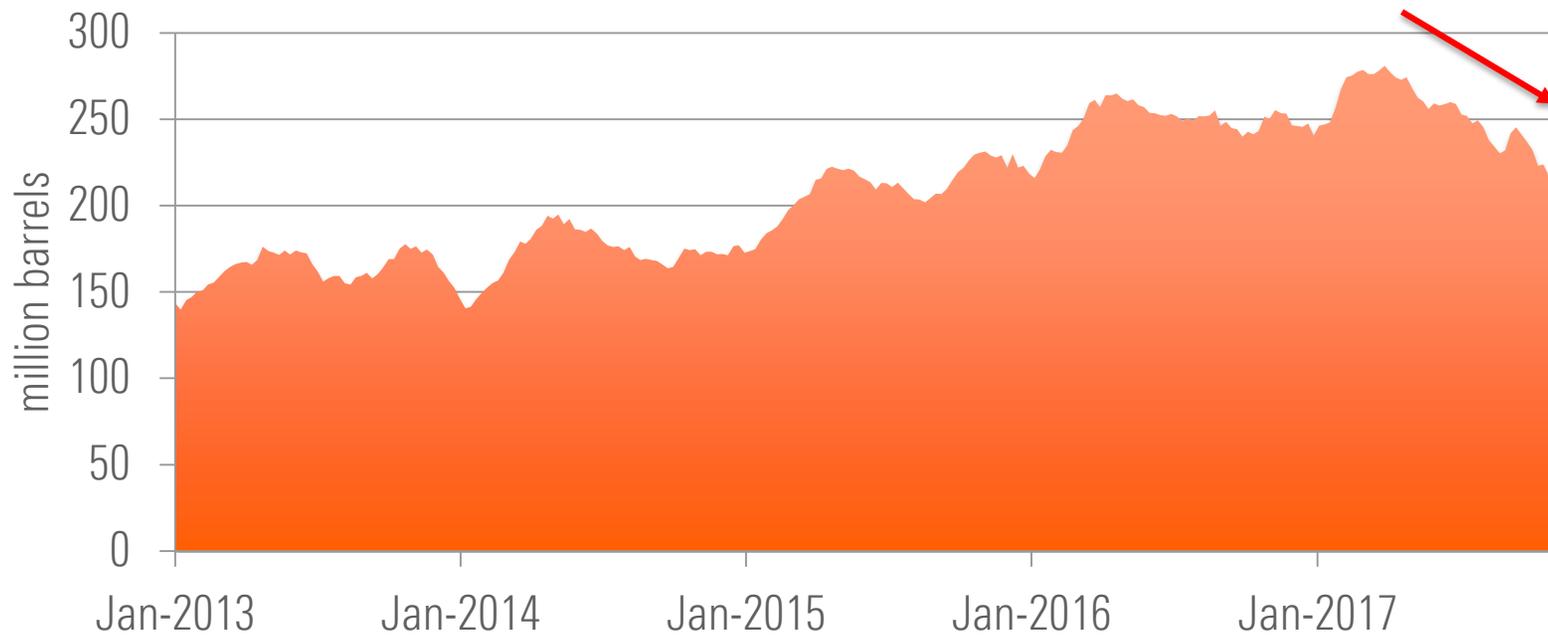
- ▶ 2010 - 8.8 mmb/d, 2017 supply mostly imports, demand all domestic - balanced
- ▶ 2017 – 10.3 mmb/d, supply, 10.8 mmb/d demand – stock draw and exports



Source: EIA, Morningstar

Gulf Coast Inventory

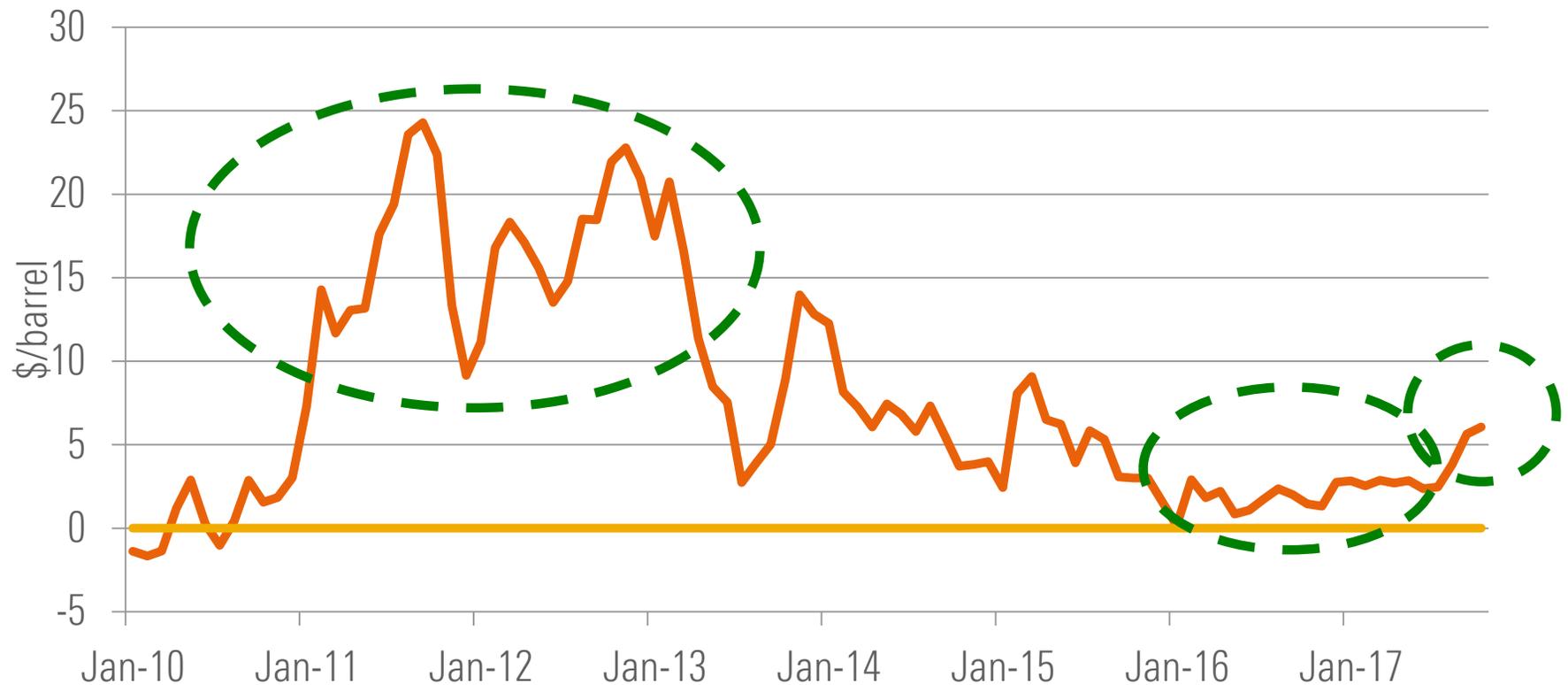
- ▶ Increasing since 2013 as new flows reach Gulf Coast
- ▶ Record high 281 mmbbl in early April 2017
- ▶ Falling since then (except Harvey) 219 mmbbl Nov 3, 2017



Source: EIA

Brent Premium Over WTI

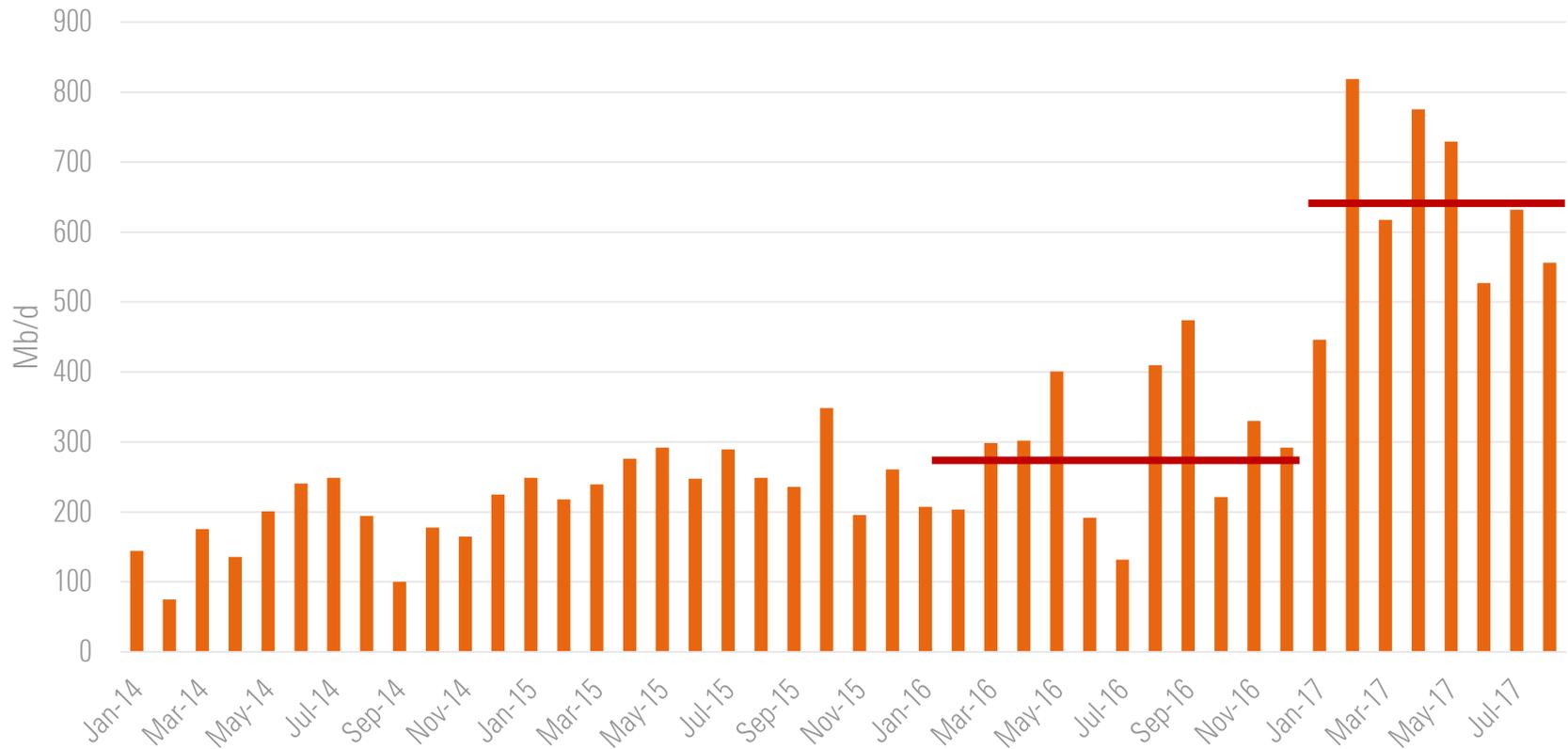
- ▶ Brent is international marker and WTI is domestic price
- ▶ Shale congestion 2011 – 2013 blows out Brent premium
- ▶ End of export ban flattens premium until August 2017



Source: CME Group

Gulf Coast Exports - Monthly

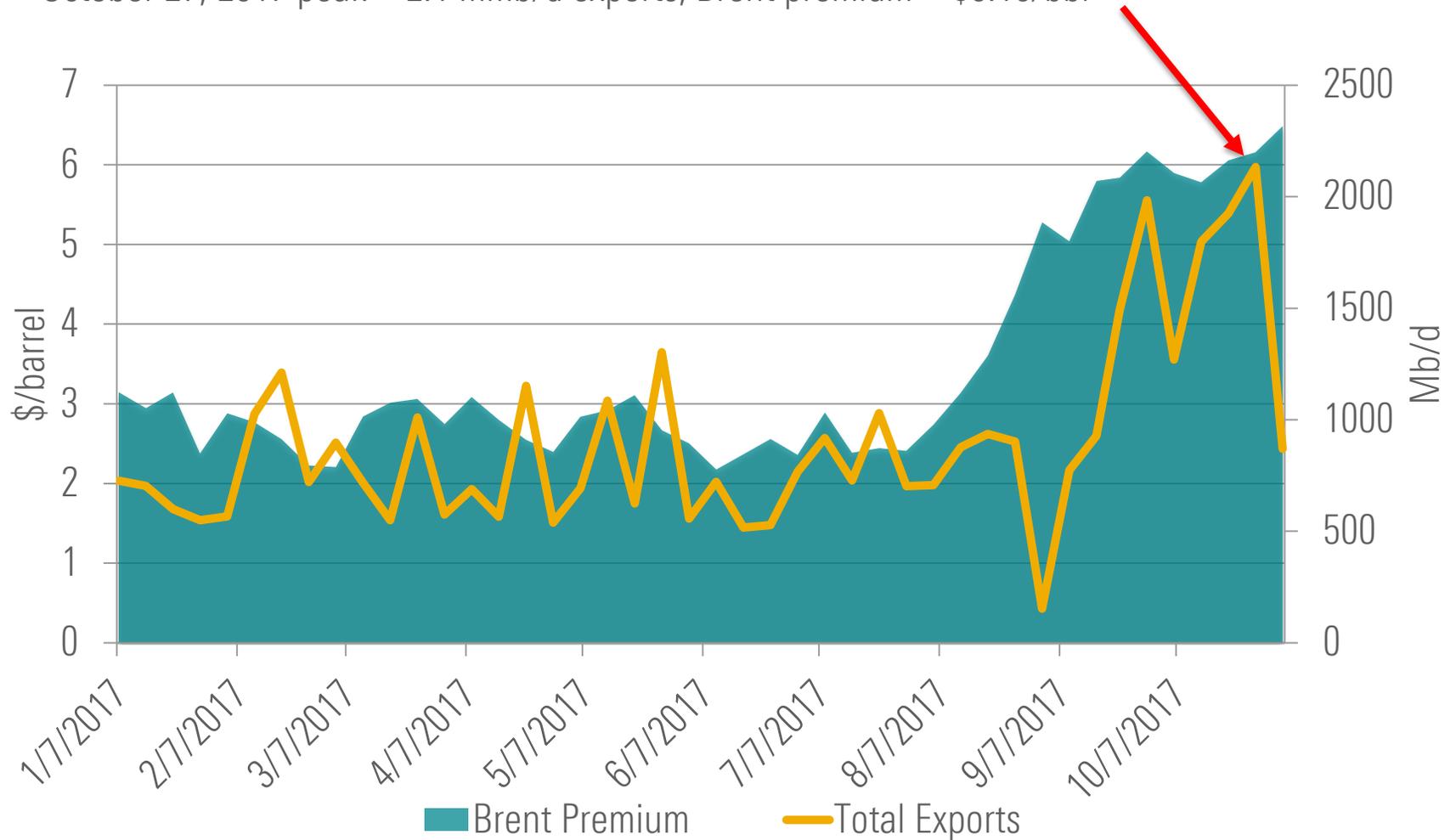
- ▶ Exports restricted prior to December 2015
- ▶ 2016 average 280 mb/d
- ▶ More than doubled to 638 mb/d average through August 2017



Source: U.S. Customs, Morningstar

(Total) Crude Exports and Brent Premium

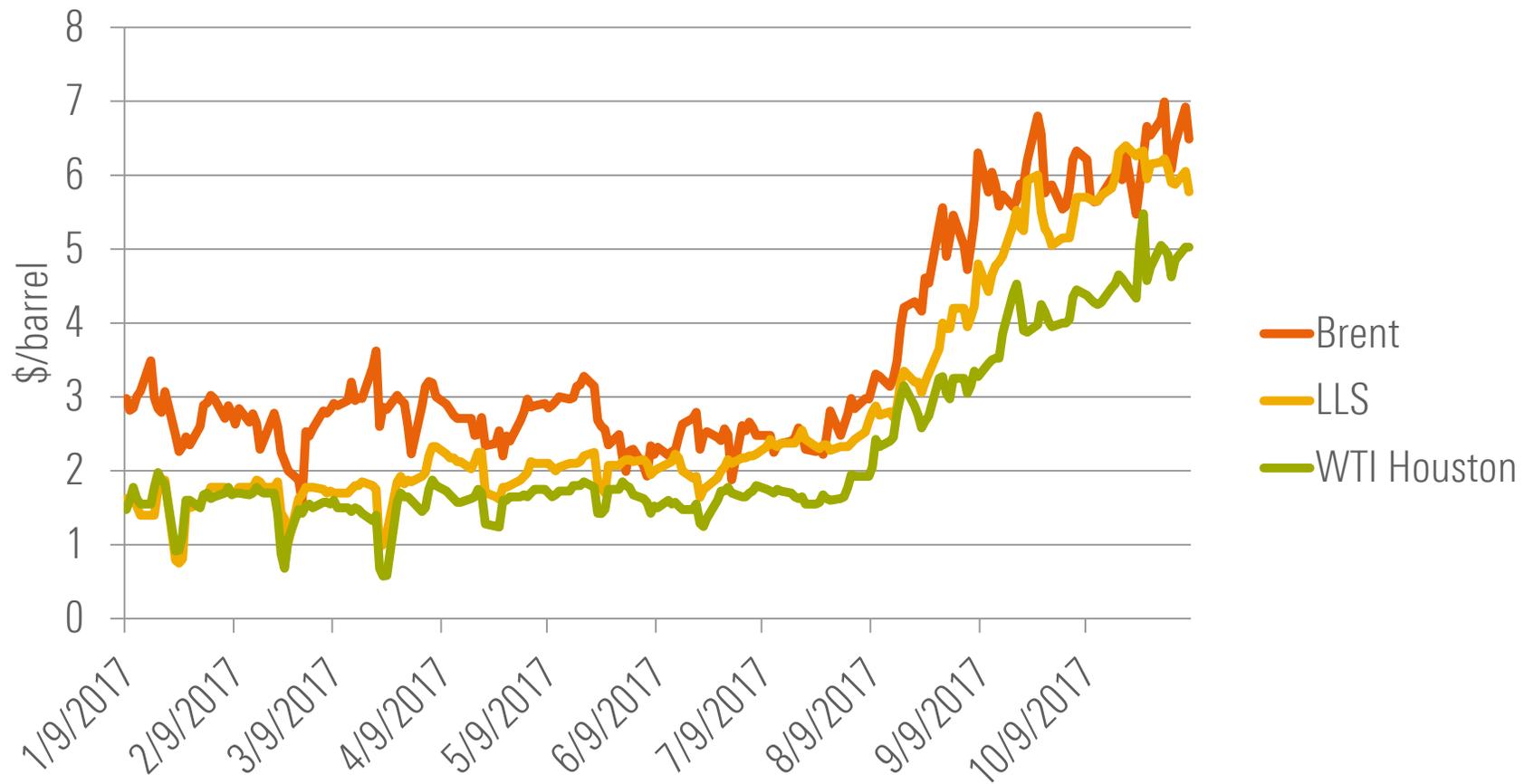
- ▶ Brent premium above \$3/barrel encourages exports
- ▶ October 27, 2017 peak = 2.1 mmb/d exports, Brent premium = \$6.16/bbl



Source: EIA, CME Group, Morningstar

Gulf Coast Premiums to WTI Cushing

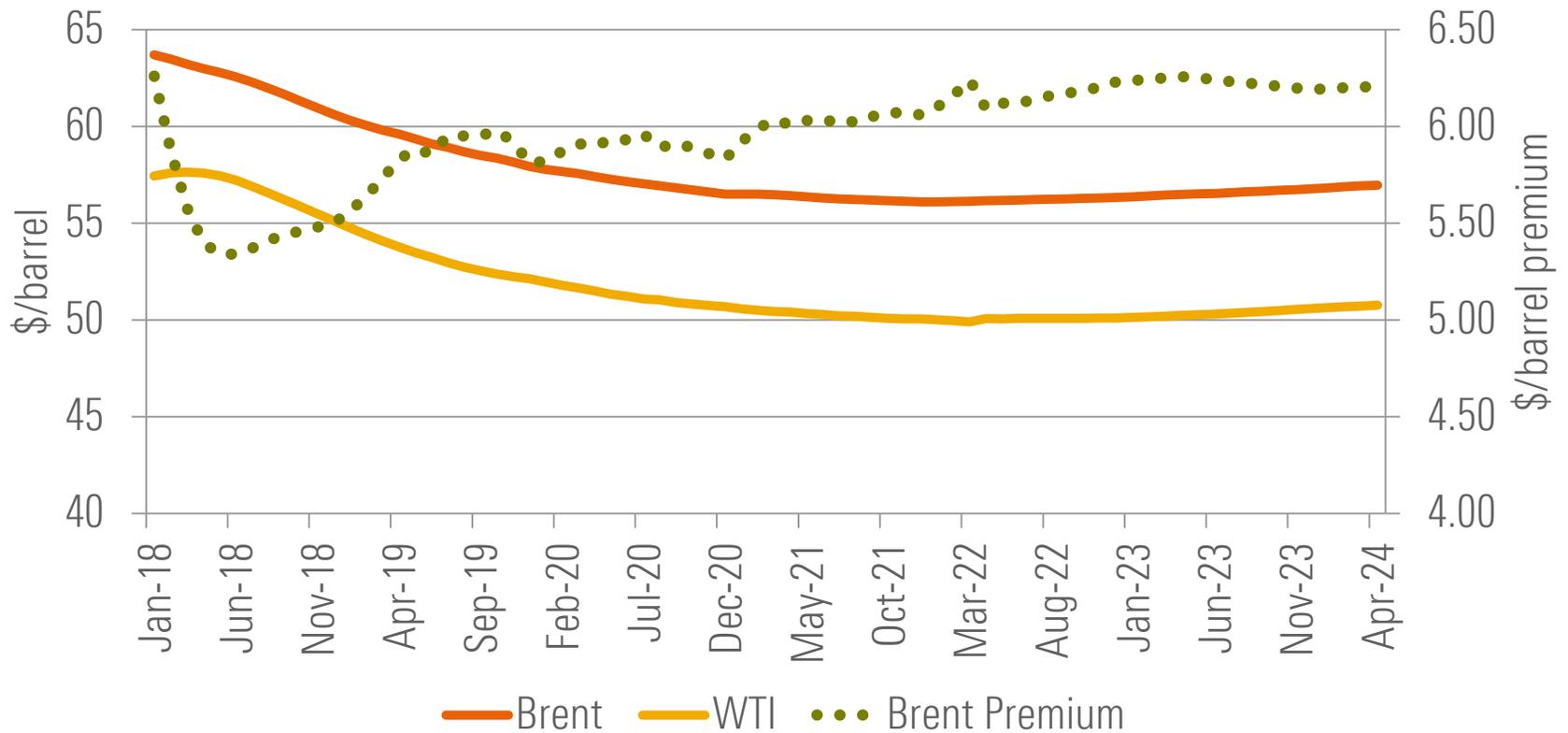
- ▶ Brent premium over WTI Cushing does not account for Gulf Coast transport
- ▶ LLS at Gulf Coast is priced too close to Brent for export
- ▶ WTI Houston premium supports exports



Source: Argus Media, CME Group, Morningstar

Forward Curves November 7, 2017

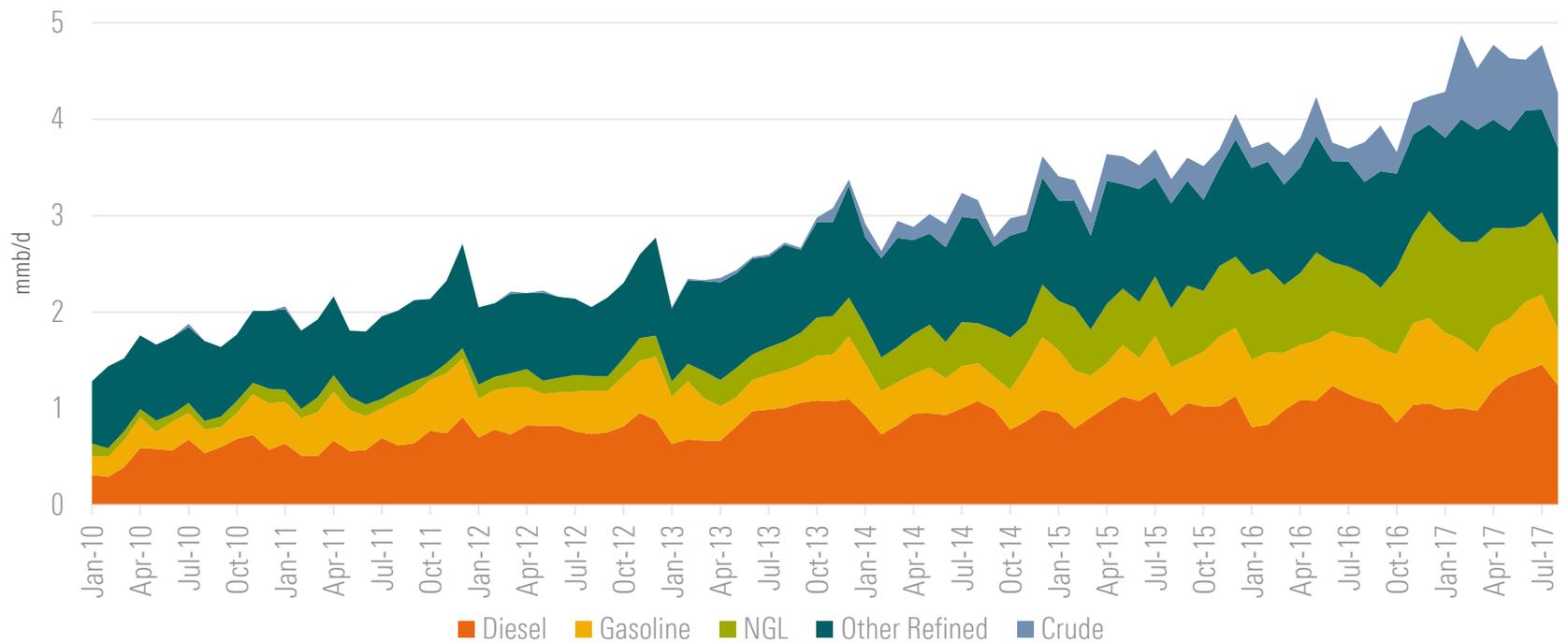
- ▶ Brent & WTI curves backwarddated through 2021
- ▶ Brent premium declines in 2018 but recovers to \$6/barrel in 2020
- ▶ Exports likely to continue



Source: CME Group, Morningstar

Infrastructure: Gulf Coast Dock Flows

- ▶ 2010 average daily refined product export was 1.7 mmb/d
- ▶ 2016 average was 3.6 mmb/d – more than double (2017 to August = 3.9 mmb/d)
- ▶ Crude exports small by comparison (14% in 2017)



Source: EIA

Storage at Terminals

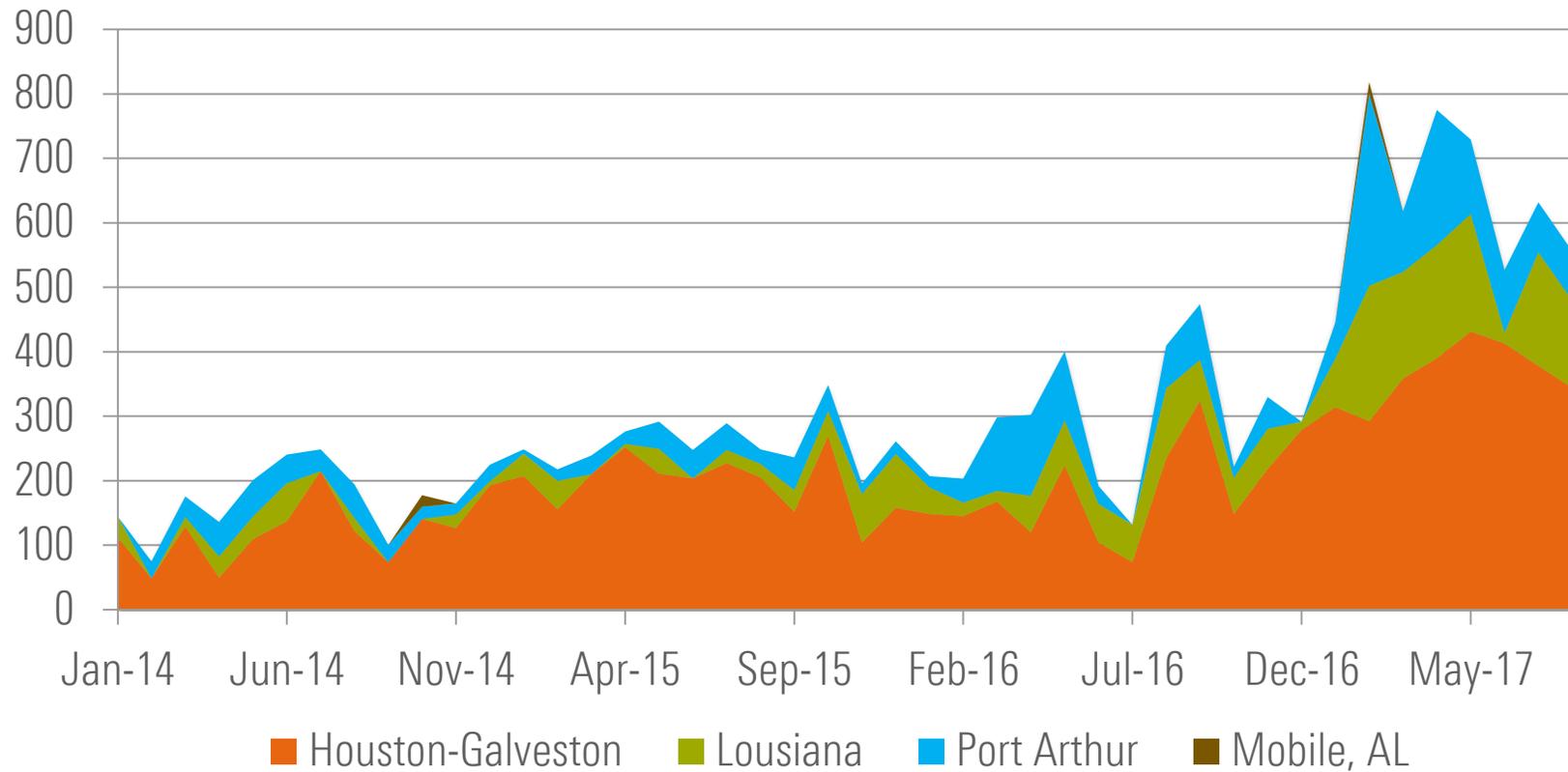
- ▶ 85 mmbbl added 2011 to 2017 in Gulf Coast region – helps staging for exports
- ▶ 56 mmbbl more to come

| Terminal Region | Storage 2011(mmbbl) | Crude Storage Additions 2011-2017 (mmbbl) | Planned Additions 2018 and beyond (mmbbl) |
|---|----------------------------|--|--|
| Brownsville | | | 4 |
| Corpus Christi | | 18 | 3 |
| Houston, Freeport, Texas City, Galveston, Seabrook | 21 | 35 | 21 |
| Beaumont Port Arthur | 29 | 6 | 13 |
| St. James | 8 | 22 | |
| LOOP | 67 | 5 | 3 |
| Krotz Springs | | | 13 |
| Total | 125 | 85 | 56 |

Source: Company Reports, Morningstar

Gulf Coast Exports – Loading Region

- ▶ Houston – Galveston Dominates 2014-2015
 - ▶ Corpus Christi hidden
- ▶ Louisiana and Port Arthur Growing in 2017



Source: U.S. Customs, Morningstar

Marine Dock Terminals

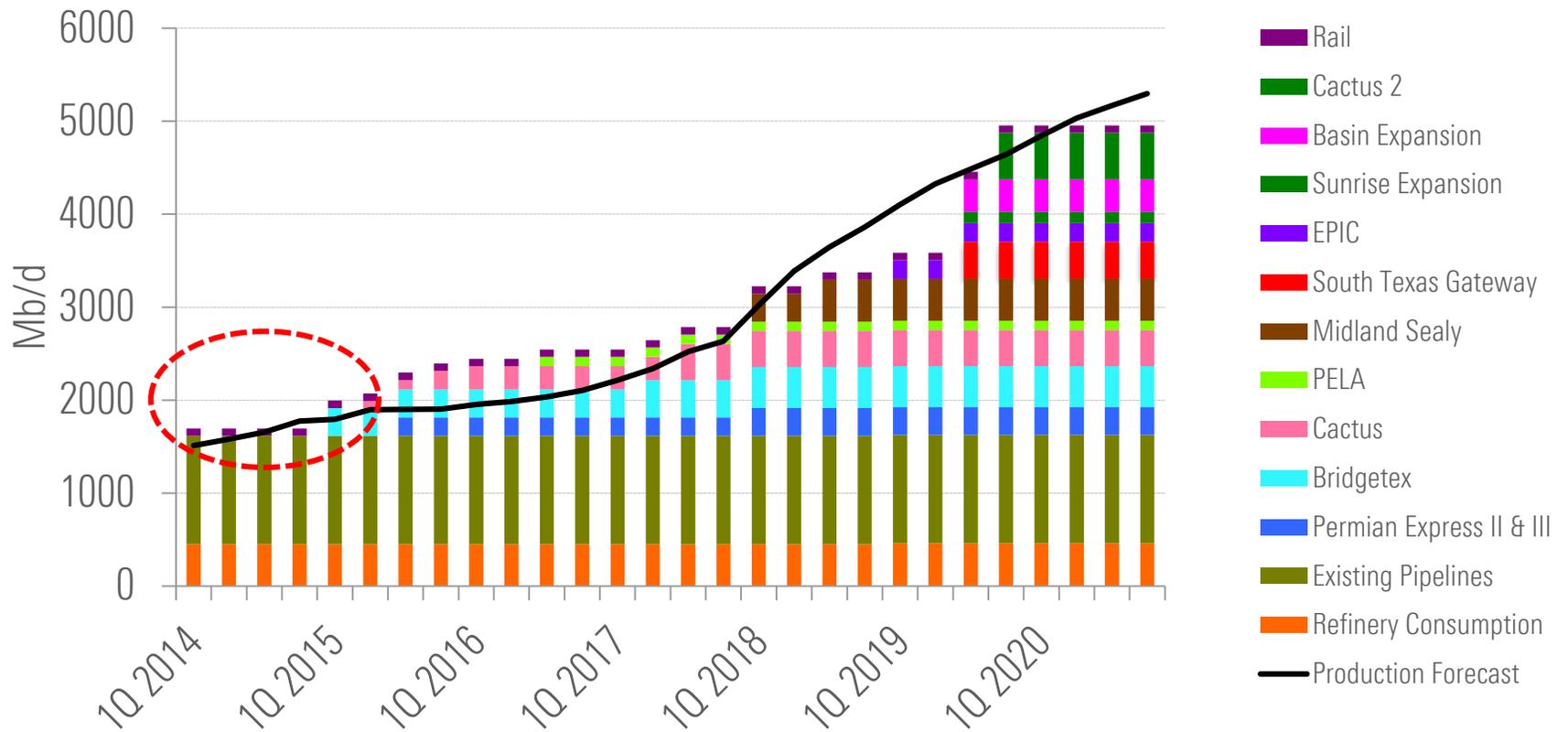
- ▶ Corpus linked to Permian and Eagle Ford – Occidental Ingleside 300 mb/d
- ▶ Vessel size is a constraint
- ▶ LOOP reversal key (Capline Announcement)

| Terminal Region | # of Marine Terminals | Terminal Addition Projects | Largest Vessel | Estimated Export Capacity Today (mmb/d) |
|--|------------------------------|-----------------------------------|-----------------------|--|
| Brownsville | | | Rail/Pipe | N/A |
| Corpus Christi | 11 | 2 | Suezmax /VLCC | 0.96 |
| Houston, Freeport, Texas City, Galveston, Seabrook | 16 | 3 | Suezmax | 1.7 |
| Beaumont Port Arthur | 6 | 1 | Aframax | 0.5 |
| St. James | 6 | | Aframax | N/A |
| LOOP | 1 | | ULCC | |
| Total | 40 | 6 | | ~3.5 |

Source: Company Reports, Morningstar

Permian Takeaway Balance – Constraints and Pricing

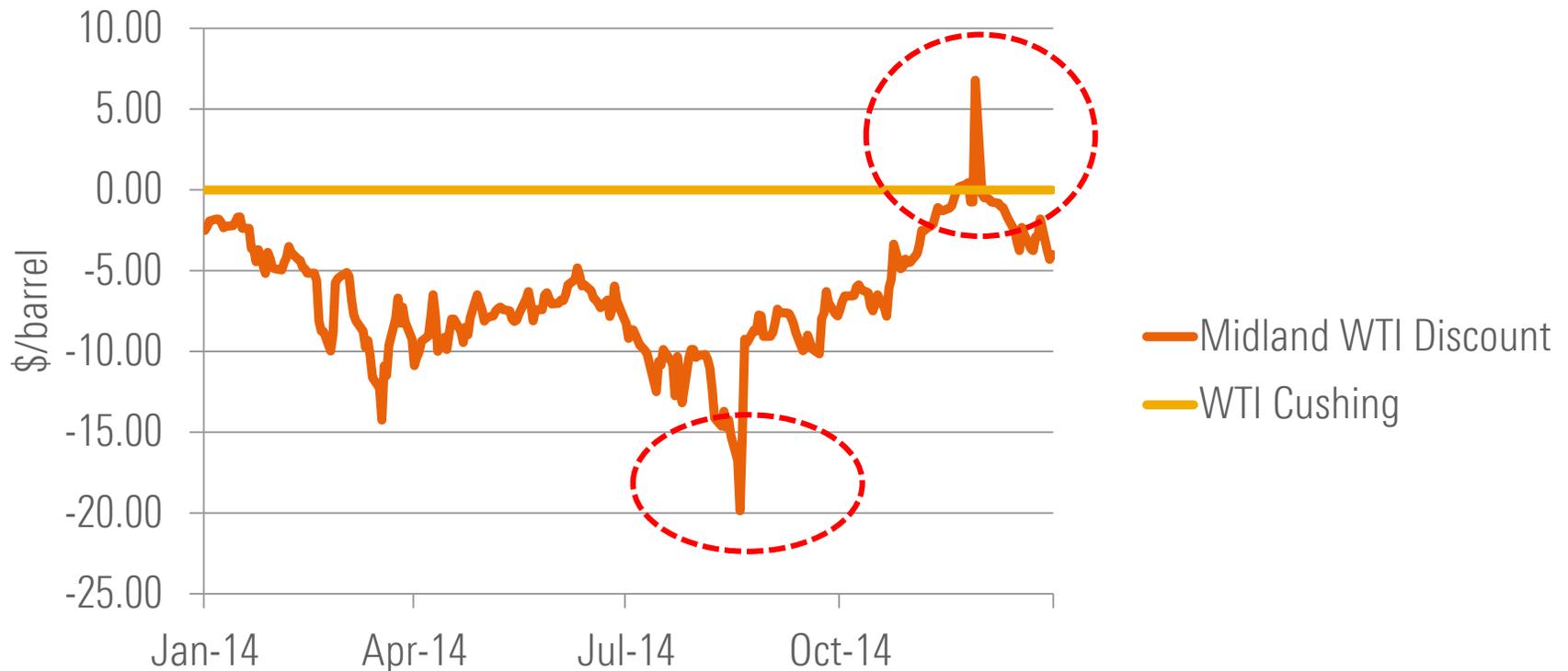
▶ Earlier Constraint in 2014 – production exceeds takeaway in Q3 2014



Source: Company Filings, Morningstar

Midland Takeaway Constraint

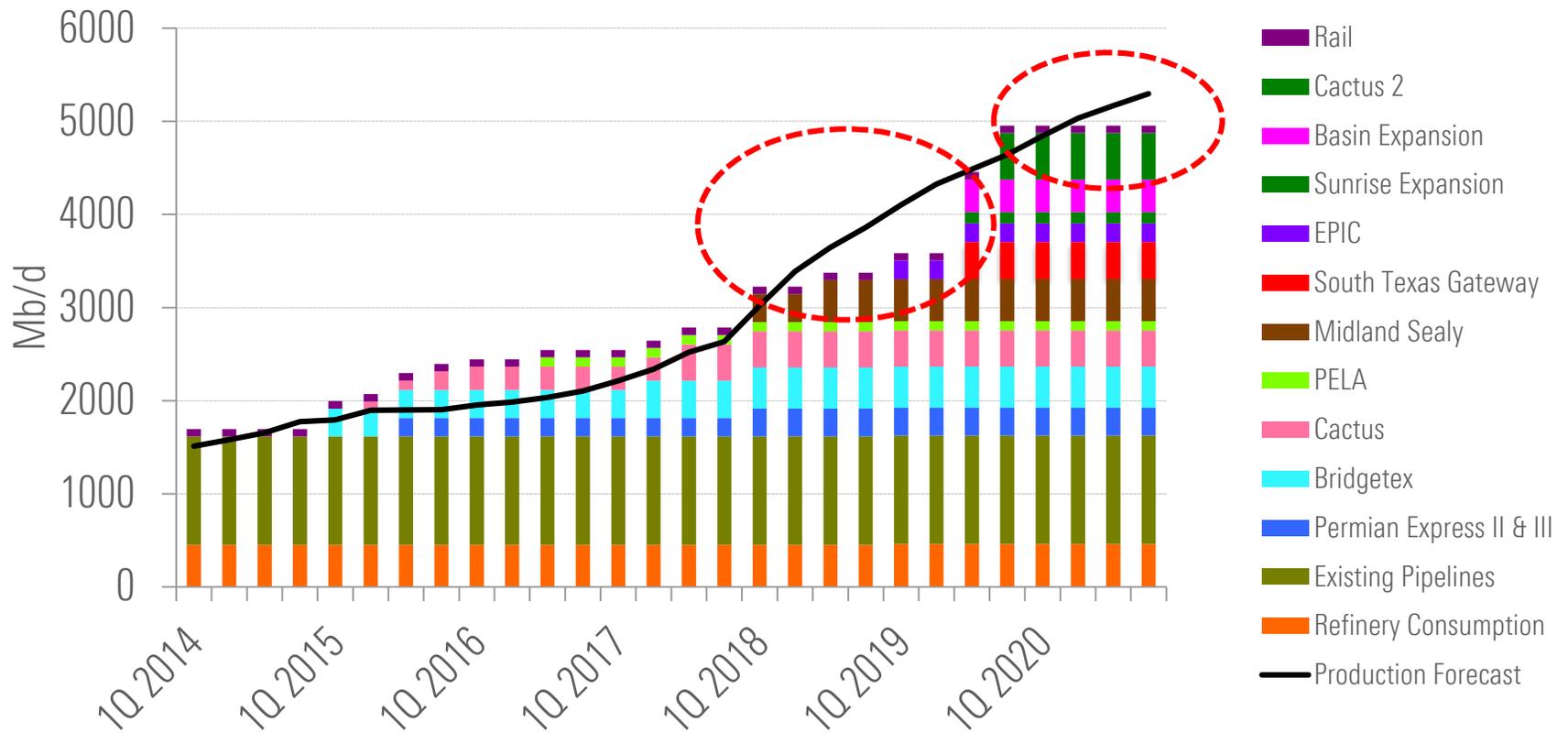
- ▶ “Normal” Midland discount = \$0.80/barrel – pipeline tariff to Cushing
- ▶ In August 2014 Midland price drops \$20/barrel below Cushing as producers discount to find pipeline space
- ▶ By November the constraint is over due to new pipe capacity -shippers bid \$5/barrel premiums



Source: CME Group, Morningstar

Permian Takeaway Balance – Constraints and Pricing

- ▶ Similar constraints lie ahead as production exceeds capacity next year (2018)
- ▶ Further constraint in 2020
- ▶ Production/drilling could slow if prices drop too low



Source: Company Filings, Morningstar

How the Permian Spigot Works

- ▶ Breakeven is the low price
- ▶ Increased demand in international market will drive Brent premium and exports
- ▶ A wide premium and price above \$50/barrel encourages Permian growth
- ▶ WTI Houston is the clearing price for exports
- ▶ Dock infrastructure constraints will limit exports
- ▶ Takeaway constraints limit production
- ▶ Could see consistent 2 mmb/d exports and term contracts
- ▶ If prices and production decline then low sporadic exports
- ▶ U.S. Gulf Coast has become the swing market for crude exports and Permian is the spigot

Questions?

Morningstar Crude and Refined Products Commodities Research



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Can Gulf of Mexico Crude Exports Keep Growing?

Ready Asian market for medium sour grades.

Morningstar Commodities Research
1 November 2017

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Data Sources for This Publication:
CME Group
U.S. Energy Information Administration
To discover more about the data sources used, [click here](#).

Response to OPEC Cuts
U.S. crude export volumes continue to surge because of the wide premium between international Brent crude and domestic benchmark West Texas Intermediate. The Energy Information Administration estimated that a record 2.1 million barrels/day, or mmb/d, of U.S. crude was exported during the week ending Oct. 27, 2017, and the year-to-date weekly average is now running at 0.9 mmb/d. Most crude exports since federal restrictions were lifted in December 2015 have been light sweet grades, but this year has seen the first flows of medium sour offshore Gulf of Mexico grades headed to Asia. Arguably, the attraction of Gulf of Mexico crude exports has been artificially created by OPEC production cuts leading to a shortage of similar grades. This note looks at the longer-term potential for Gulf crude exports.

- ▶ Research Focus: North America
 - ▶ U.S. and Canadian crude production, takeaway infrastructure and pricing
 - ▶ Refining and processing
 - ▶ Trading, storage, blending, arbitrage
 - ▶ Export markets and opportunities
 - ▶ Downstream petrochemical impacts

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