

Oil's big drop and its clear impact on petrochemical markets in North America

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AGENDA

Oil's big drop and its impact on petrochemicals

Crude, gas price movements at a glance
Naphtha's comeback as competitive feed

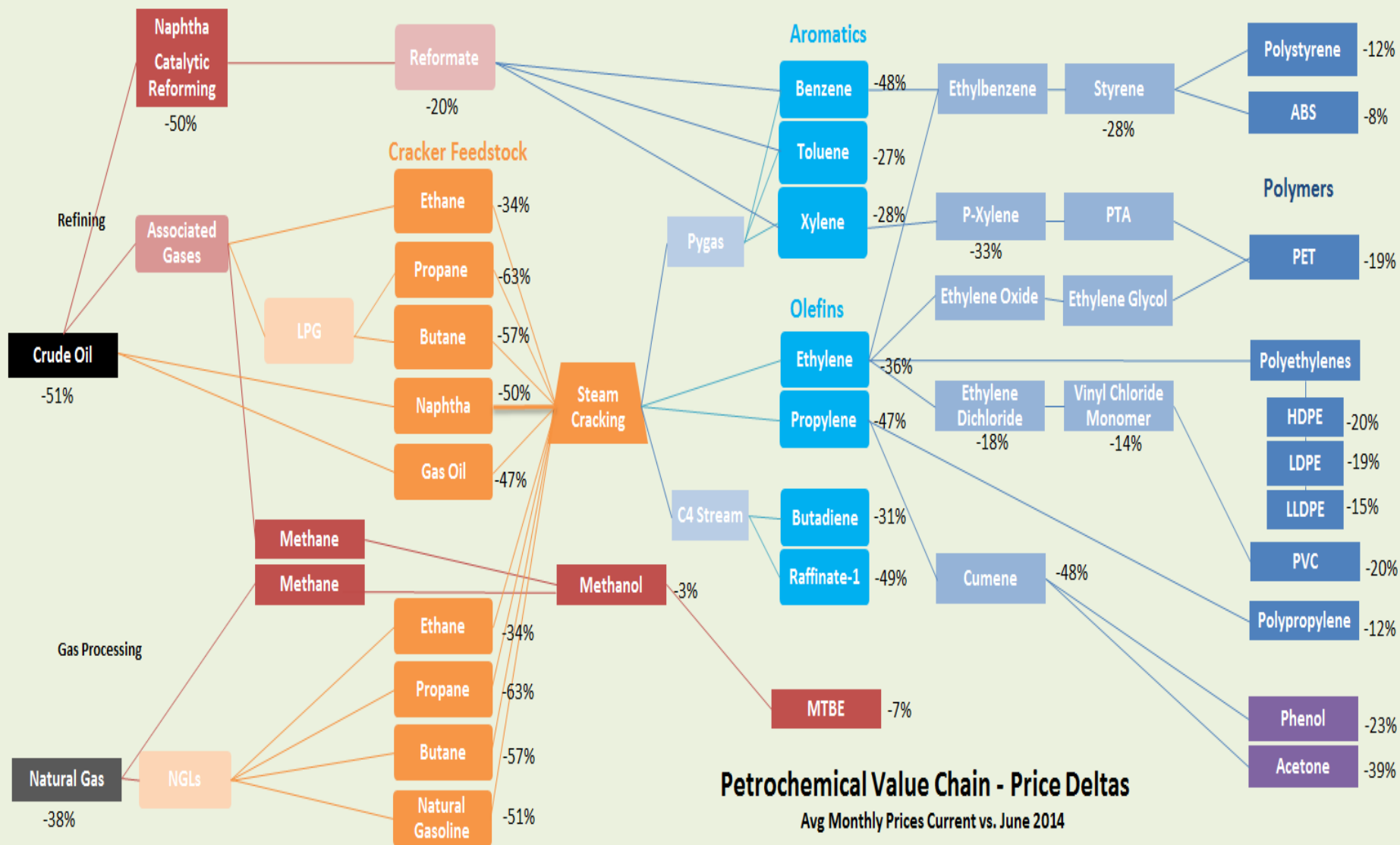
Advantage erosion through overbuild?

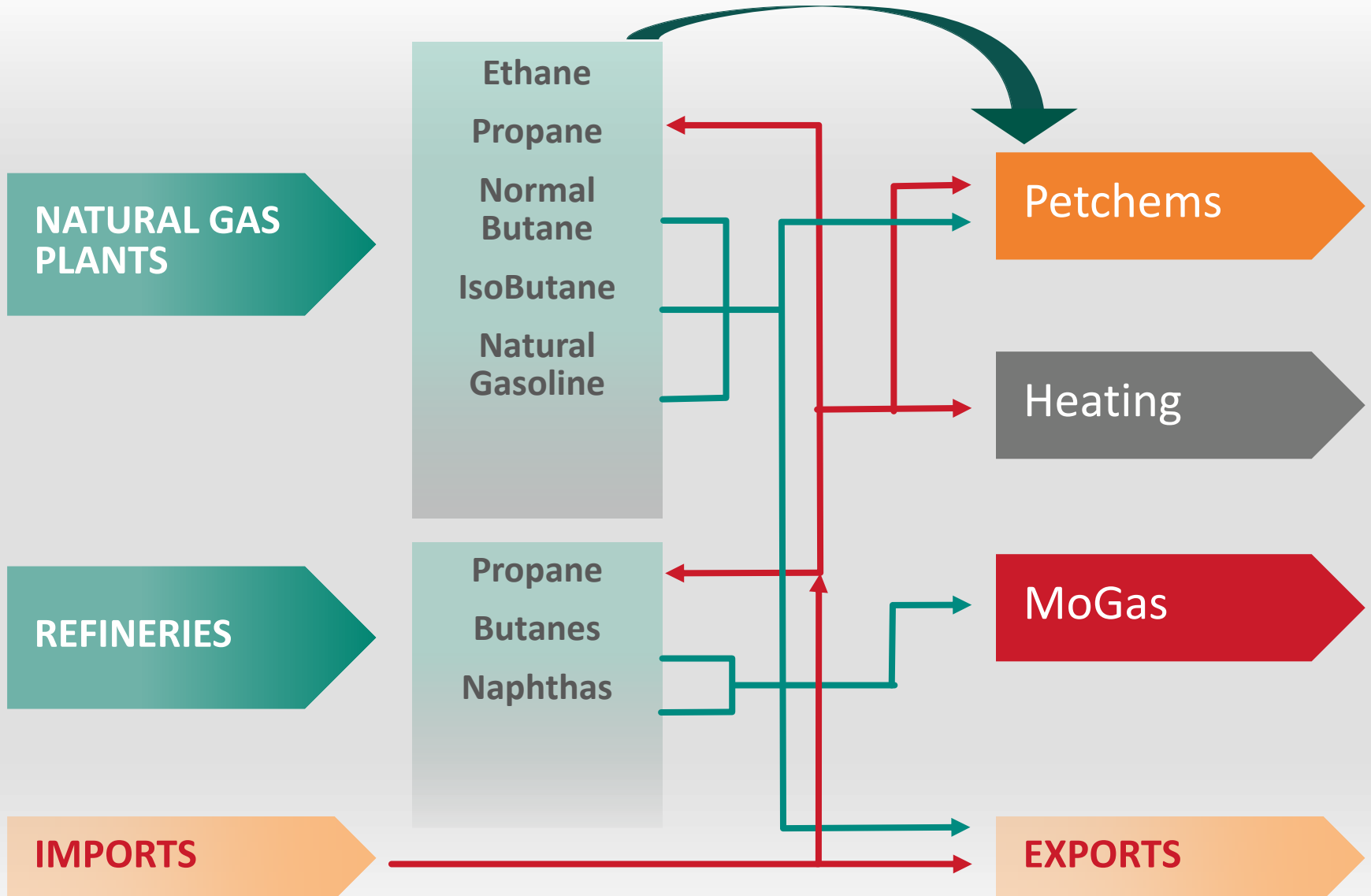
Behind the feedstock advantage
Scope of ethylene/PE projects in North America

Advantage erosion through \$50 oil

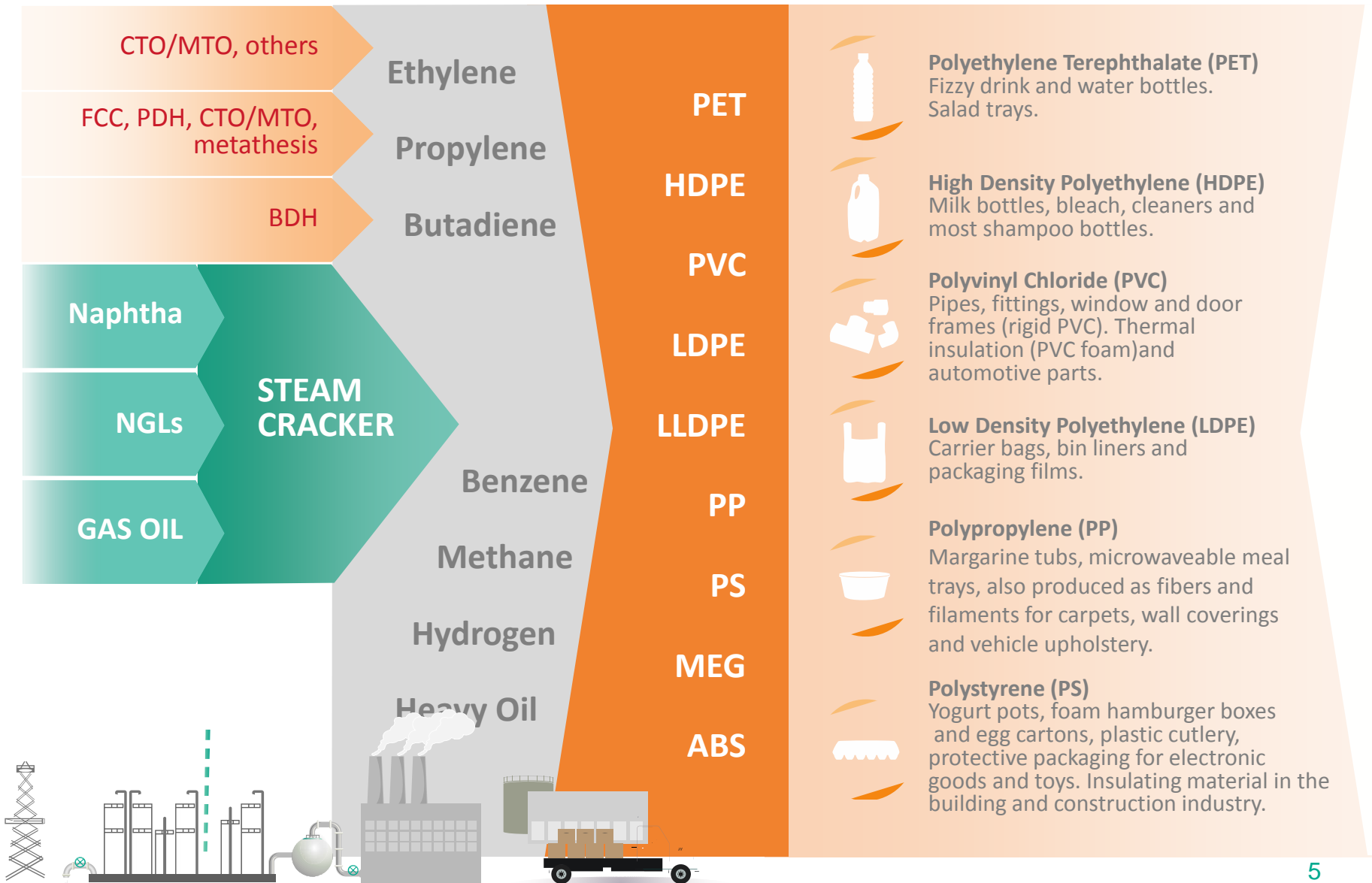
Impact of pricing on steam cracker margins
Short-term expectations: Volatility & implications

Value chain – Making sense of it all

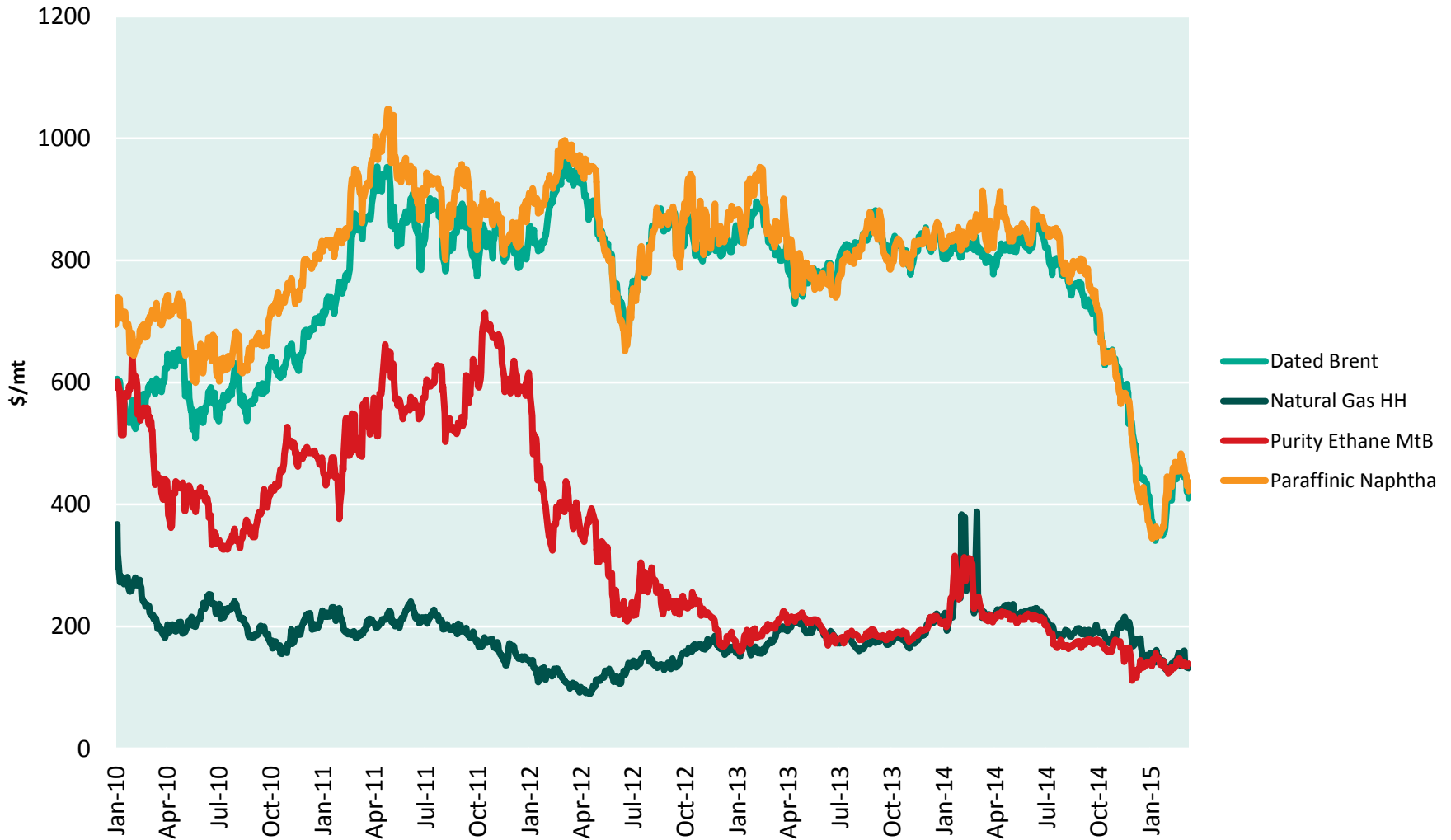




Petrochemical links – a closer look

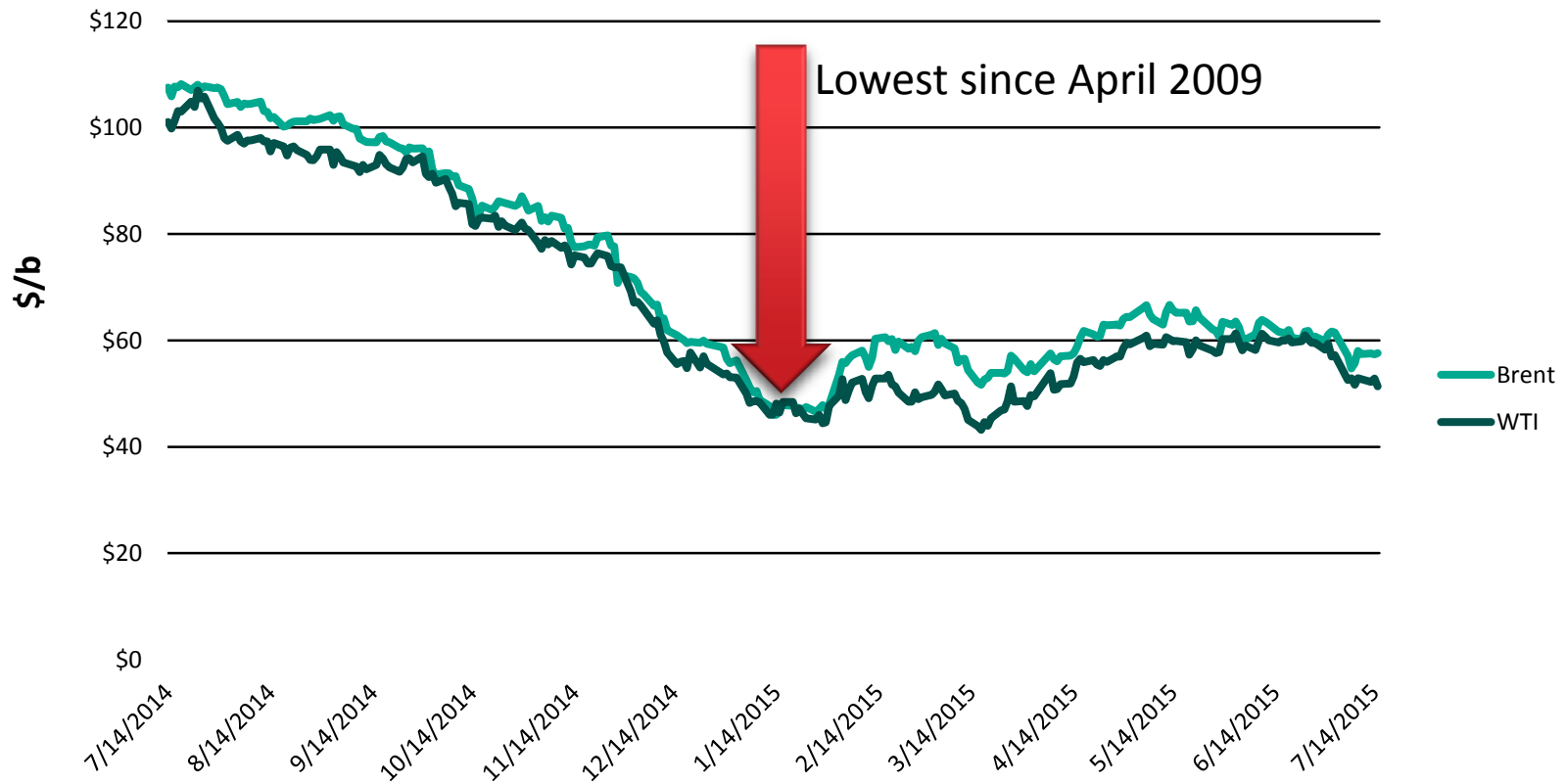


Correlations have become clear...



Source: Platts

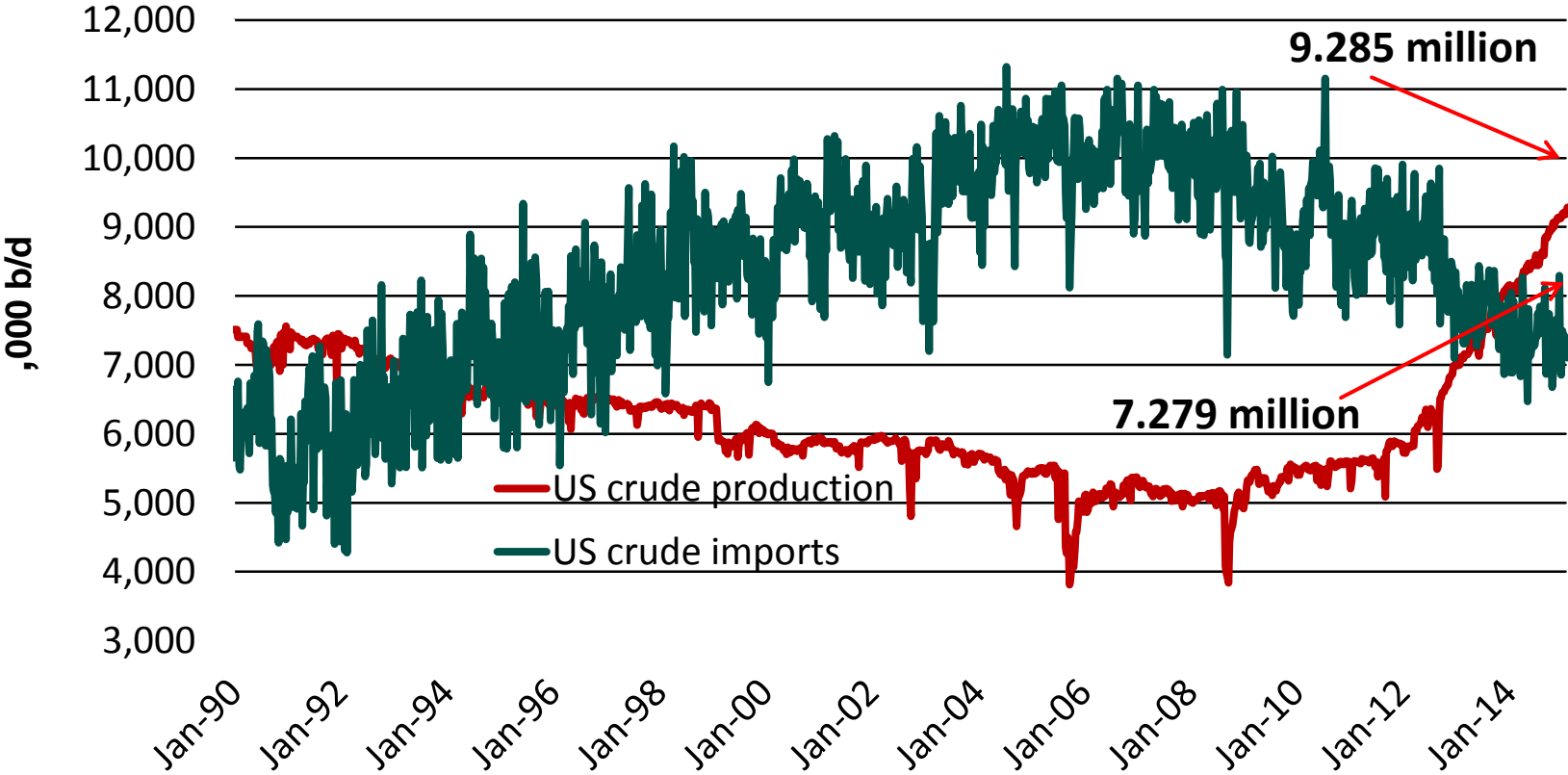
Brent, WTI since March 2014



Source: Platts

Rising oil production is key driver

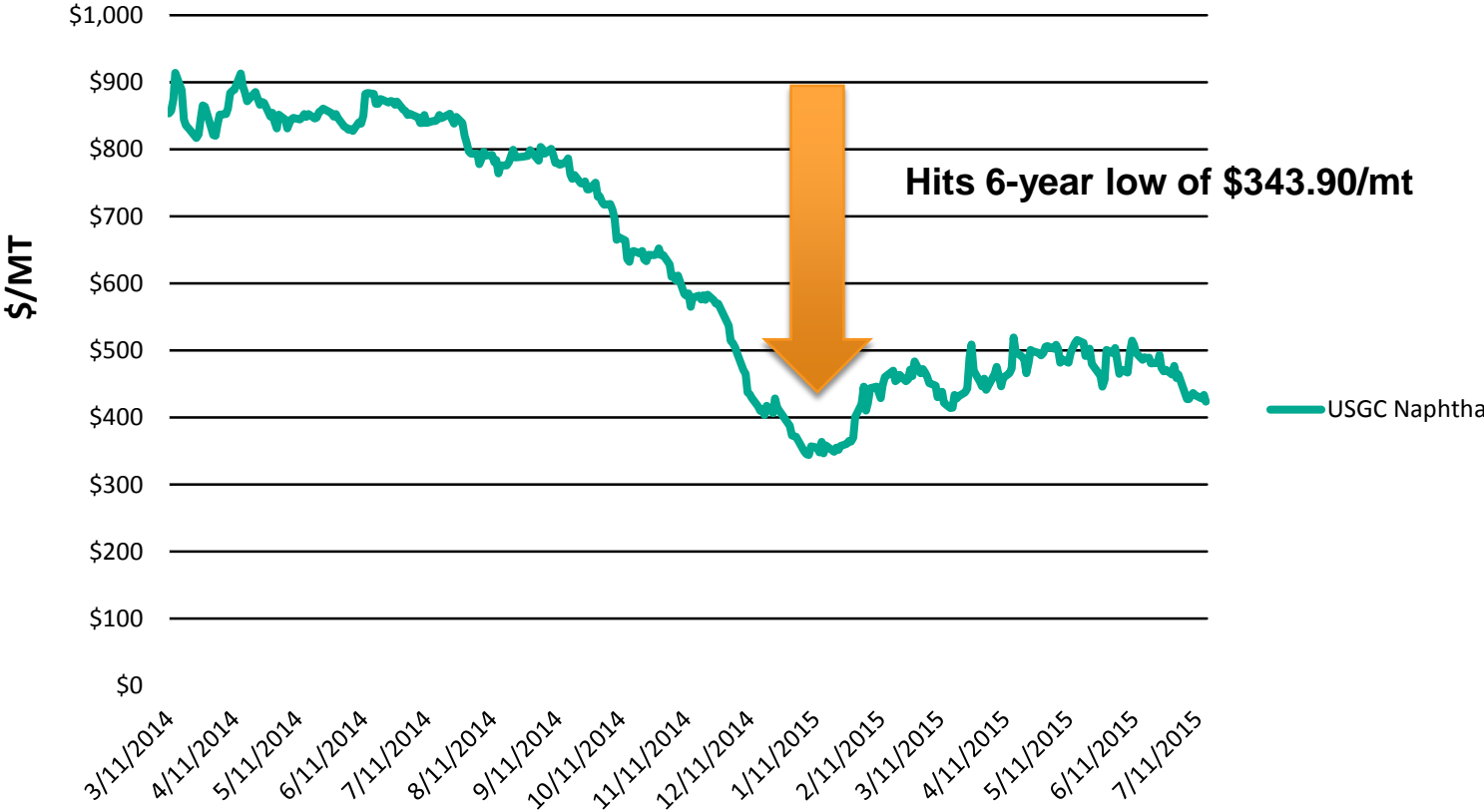
US production vs. Imports



Source: Platts

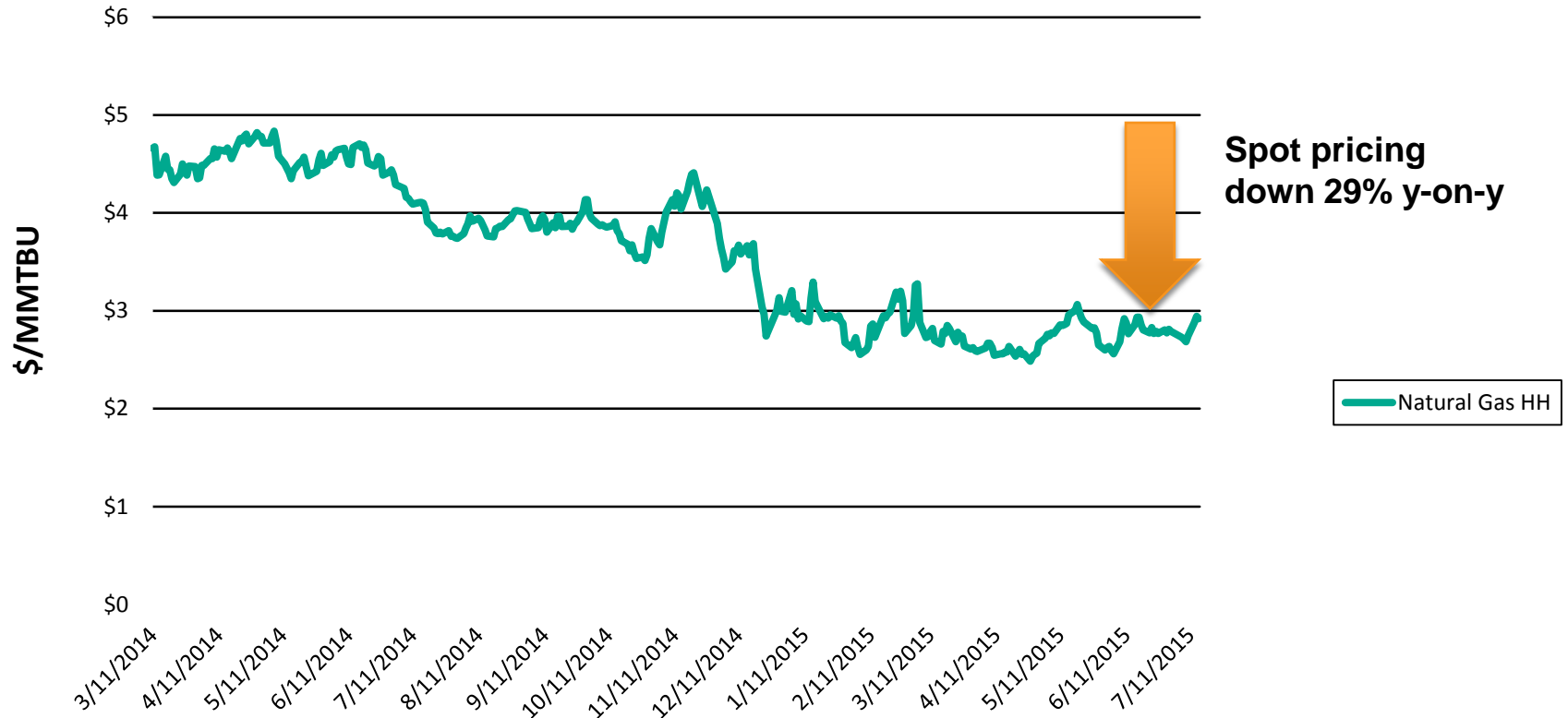
Naphtha dips more than 40%

US Gulf Coast Naphtha



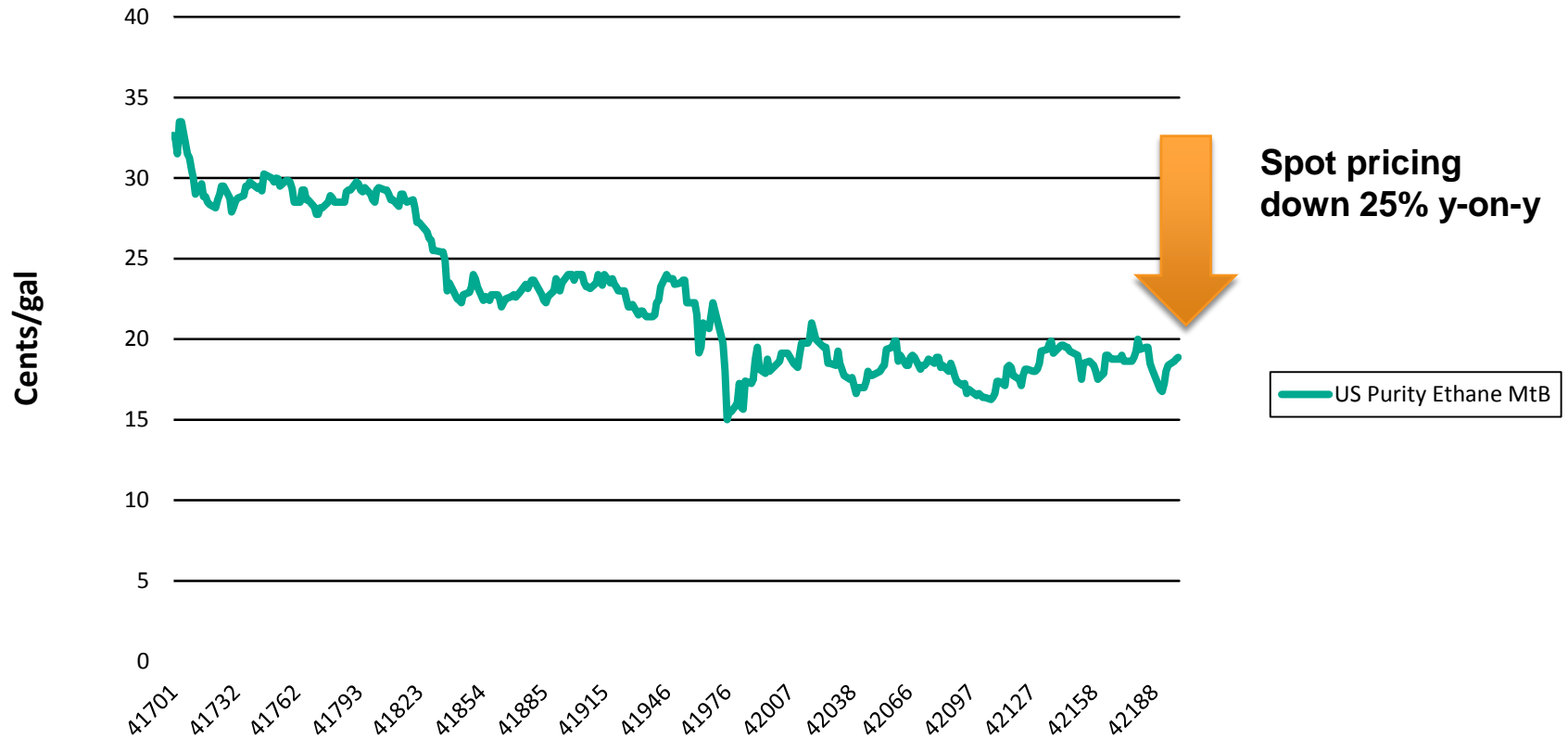
Source: Platts

US Natural Gas



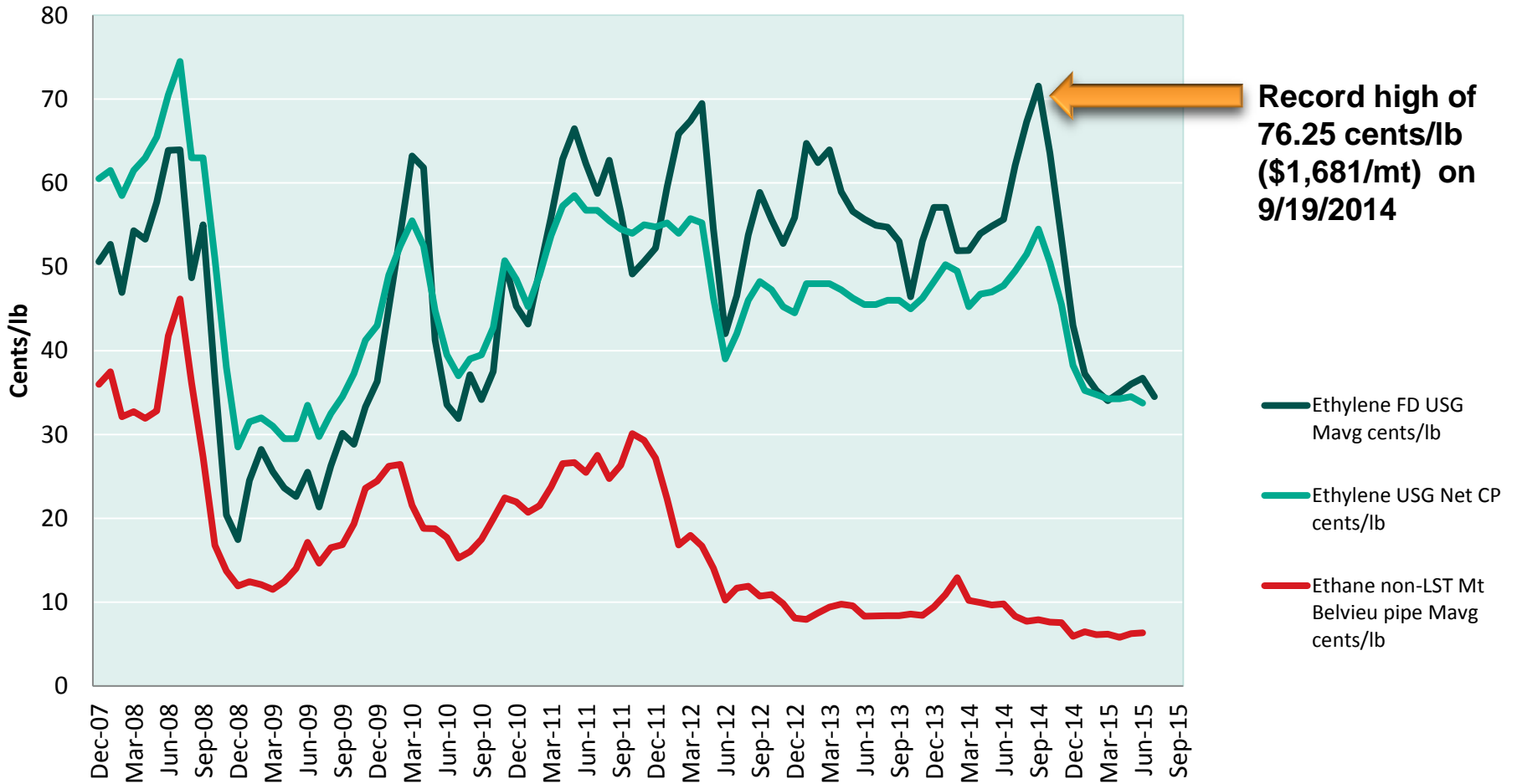
Source: Platts

Mont Belvieu Purity Ethane



Source: Platts

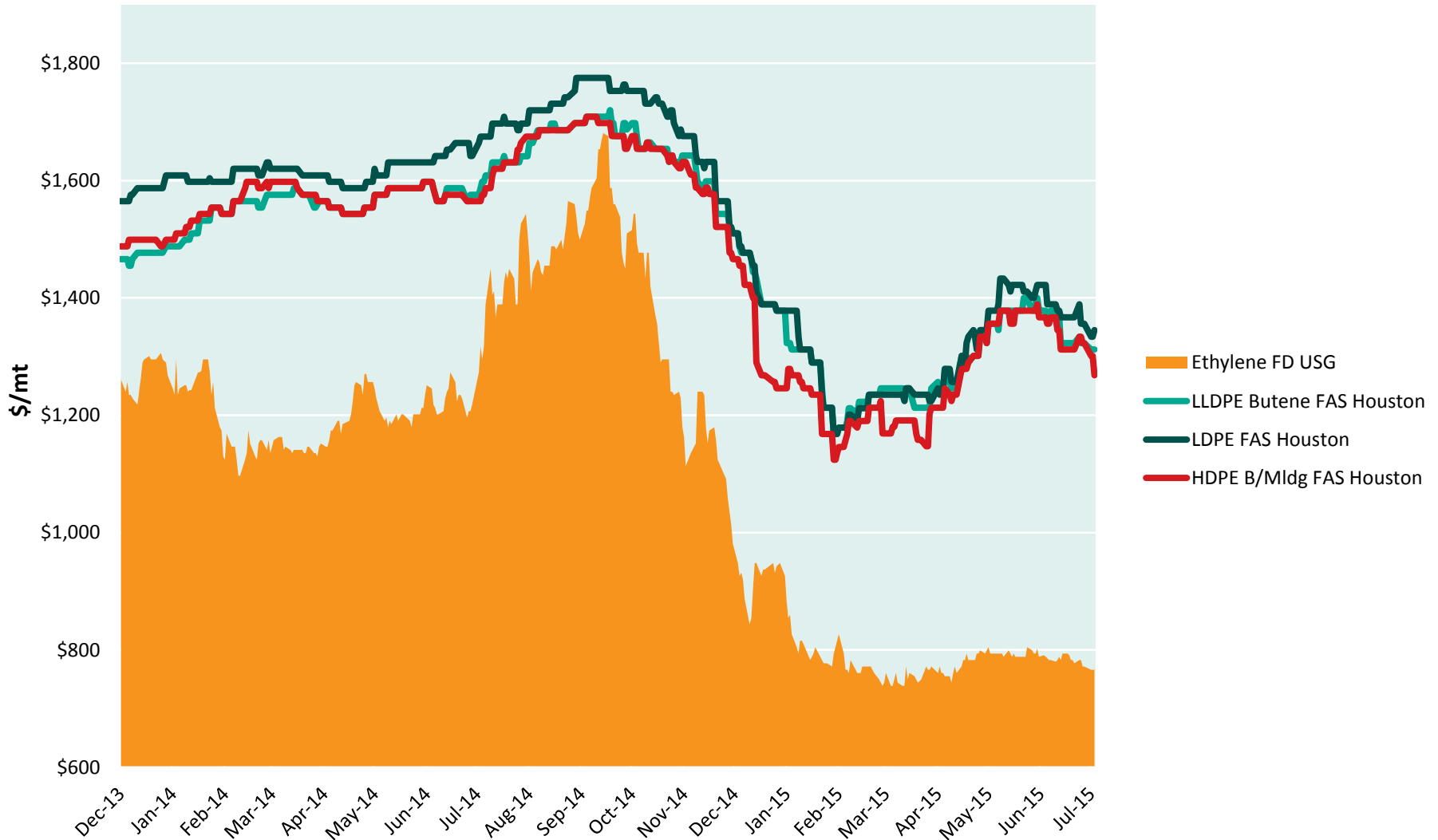
Ethylene Contract vs. Spot price vs. Ethane



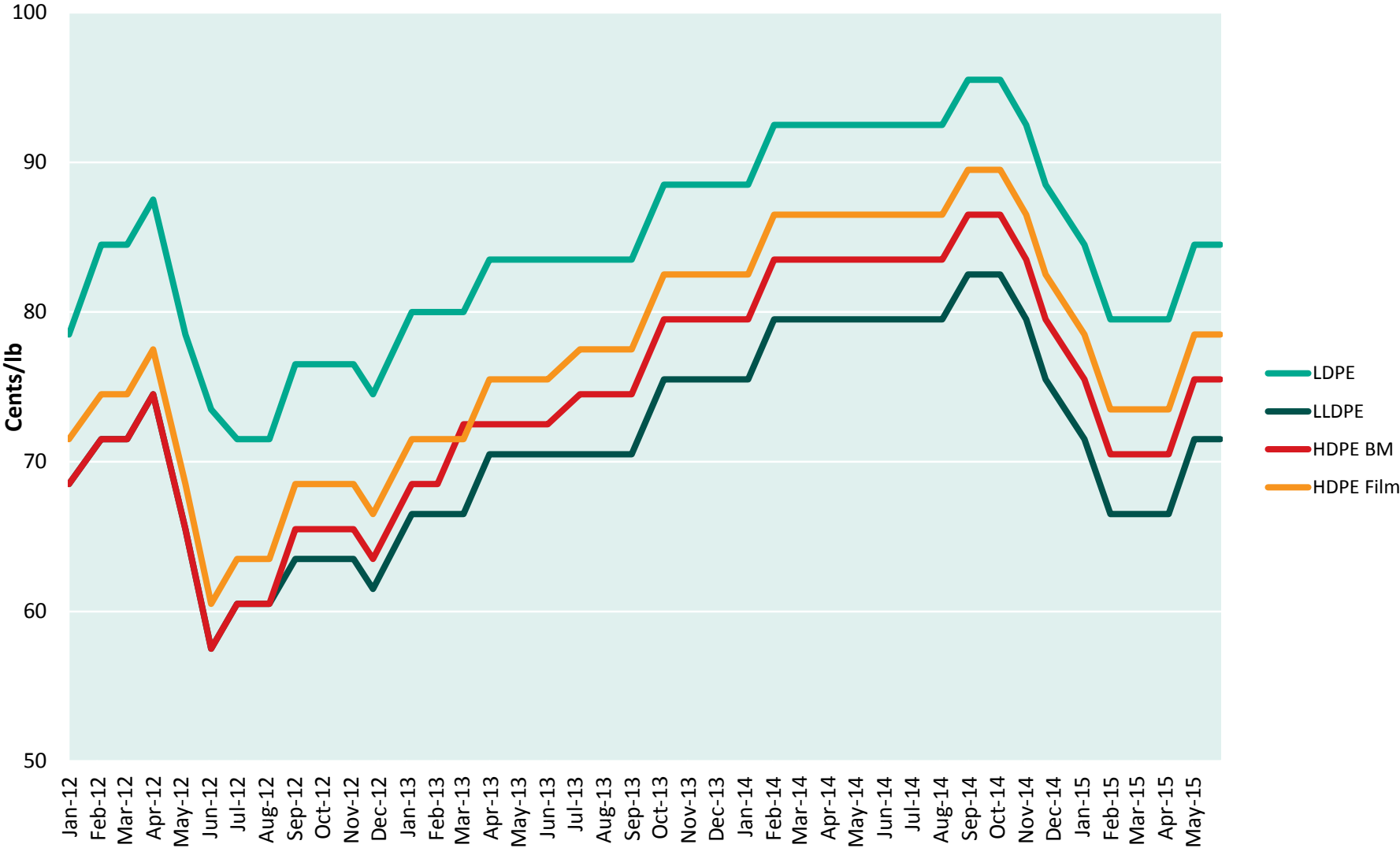
Source: Platts

- Drops in crude, naphtha pricing at the global level have pressured North American ethylene – to a degree
- Logistical constraints – Evangeline pipeline – have contributed greatly to depressed pricing in the US
- Current pricing at levels not seen in 5-6 years
- Short-term market expectations
- Hurricane season and upcoming startup of expansions

US spot ethylene & PE



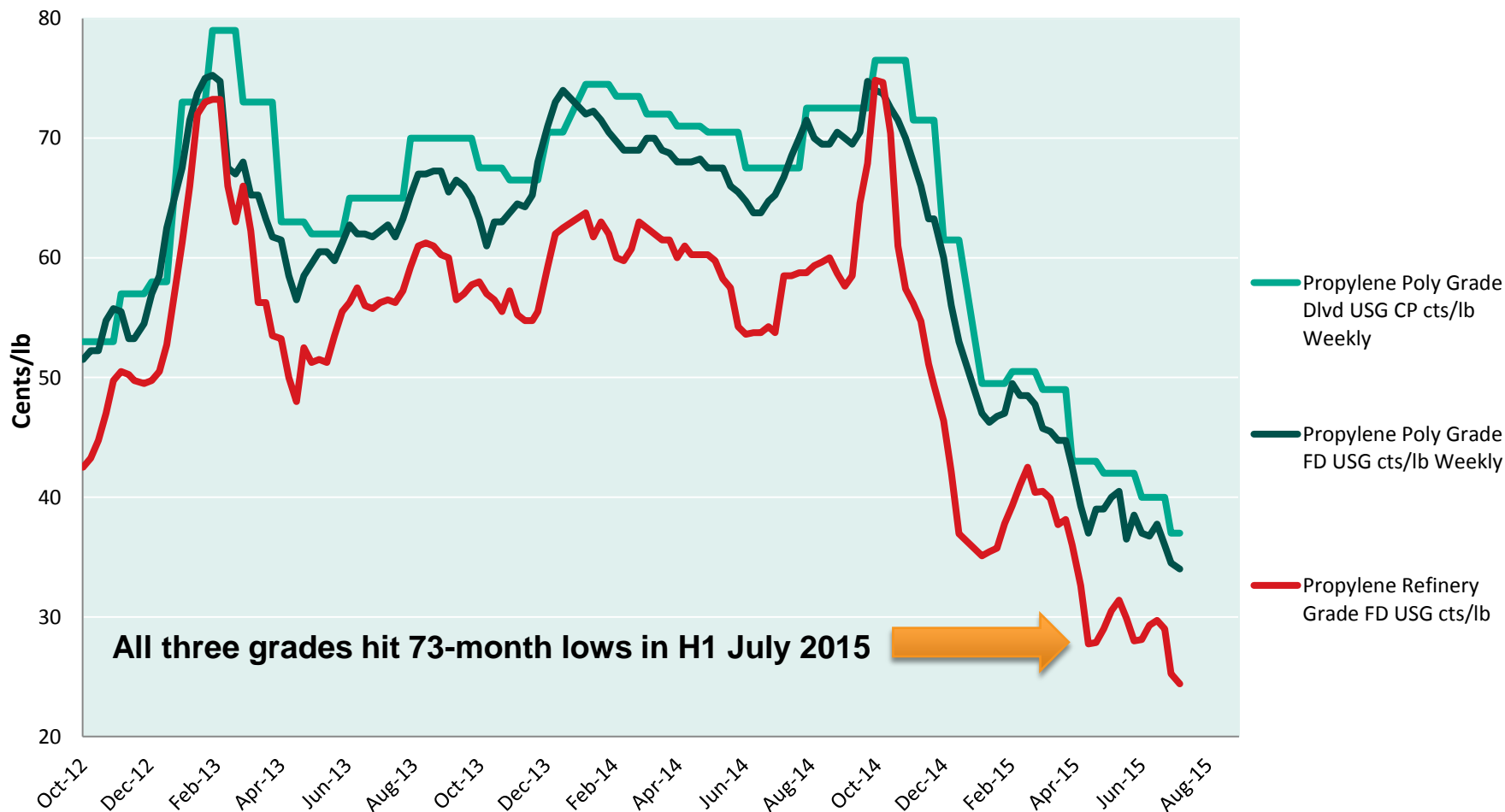
US PE: Contracts track global movement



Source: Platts

Propylene: Oversupply yields drop in prices

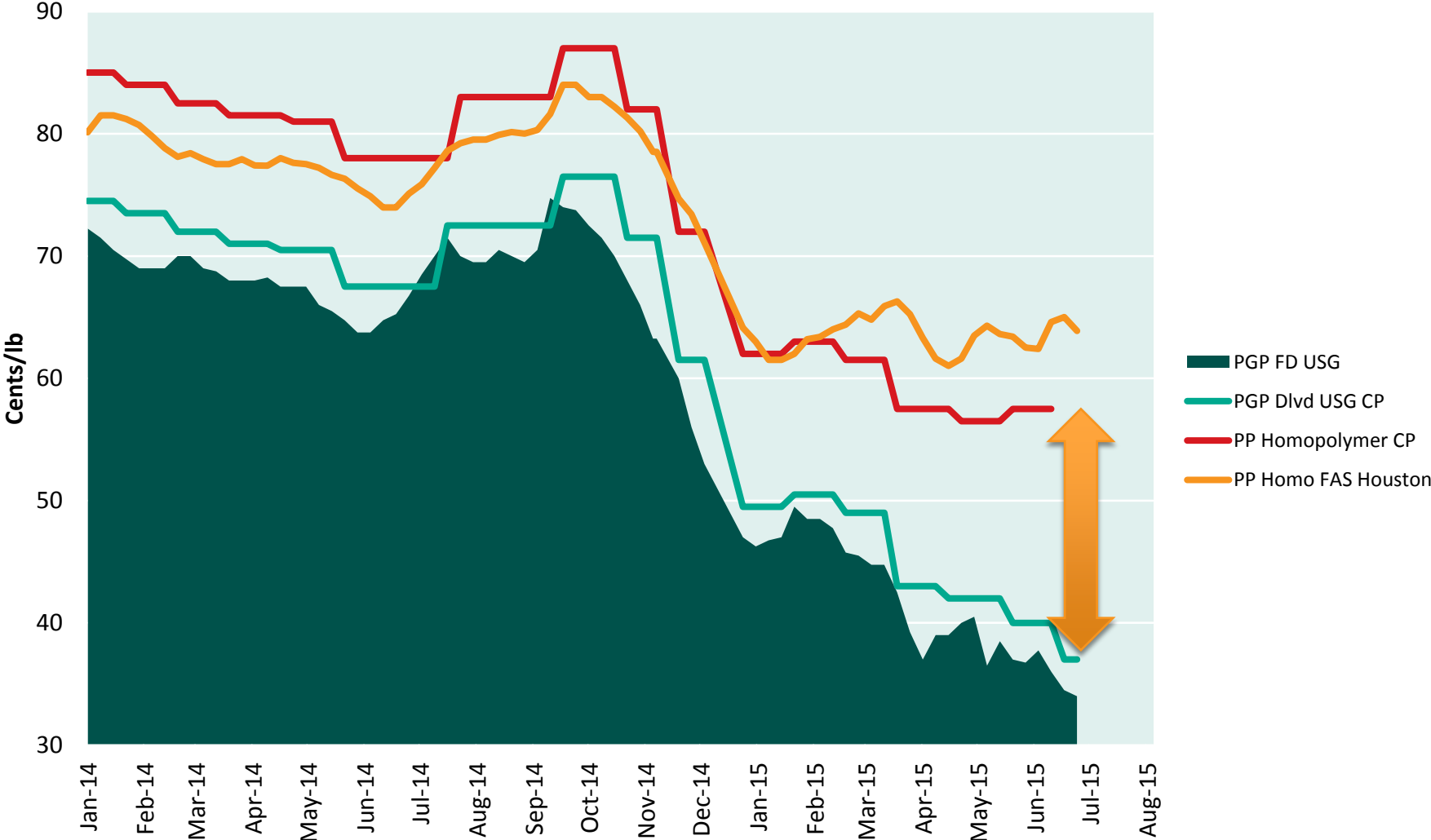
Spot PGP vs. PGP CP vs. spot RGP



All three grades hit 73-month lows in H1 July 2015

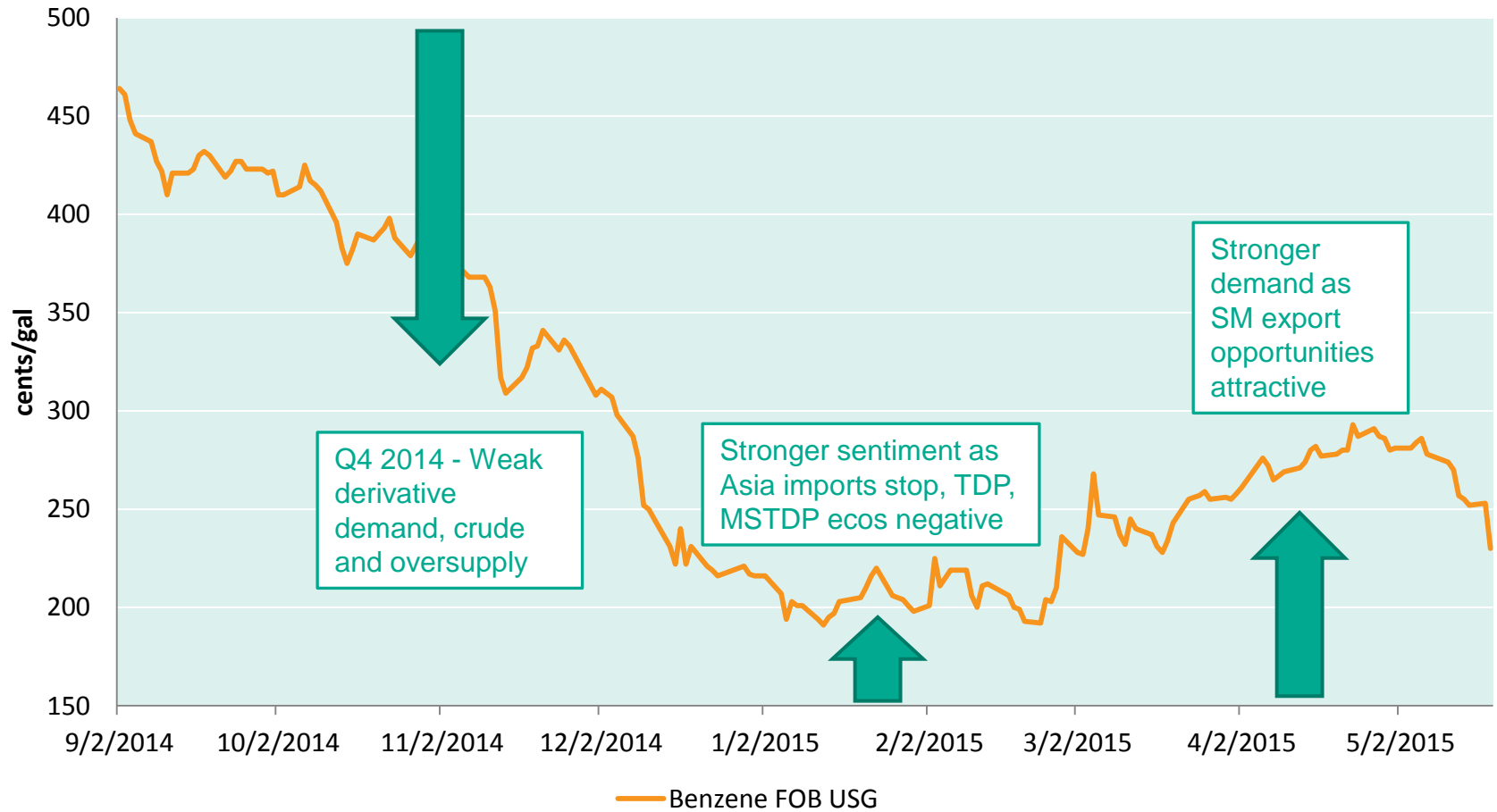


PP Homopolymer vs. PGP CP/spot



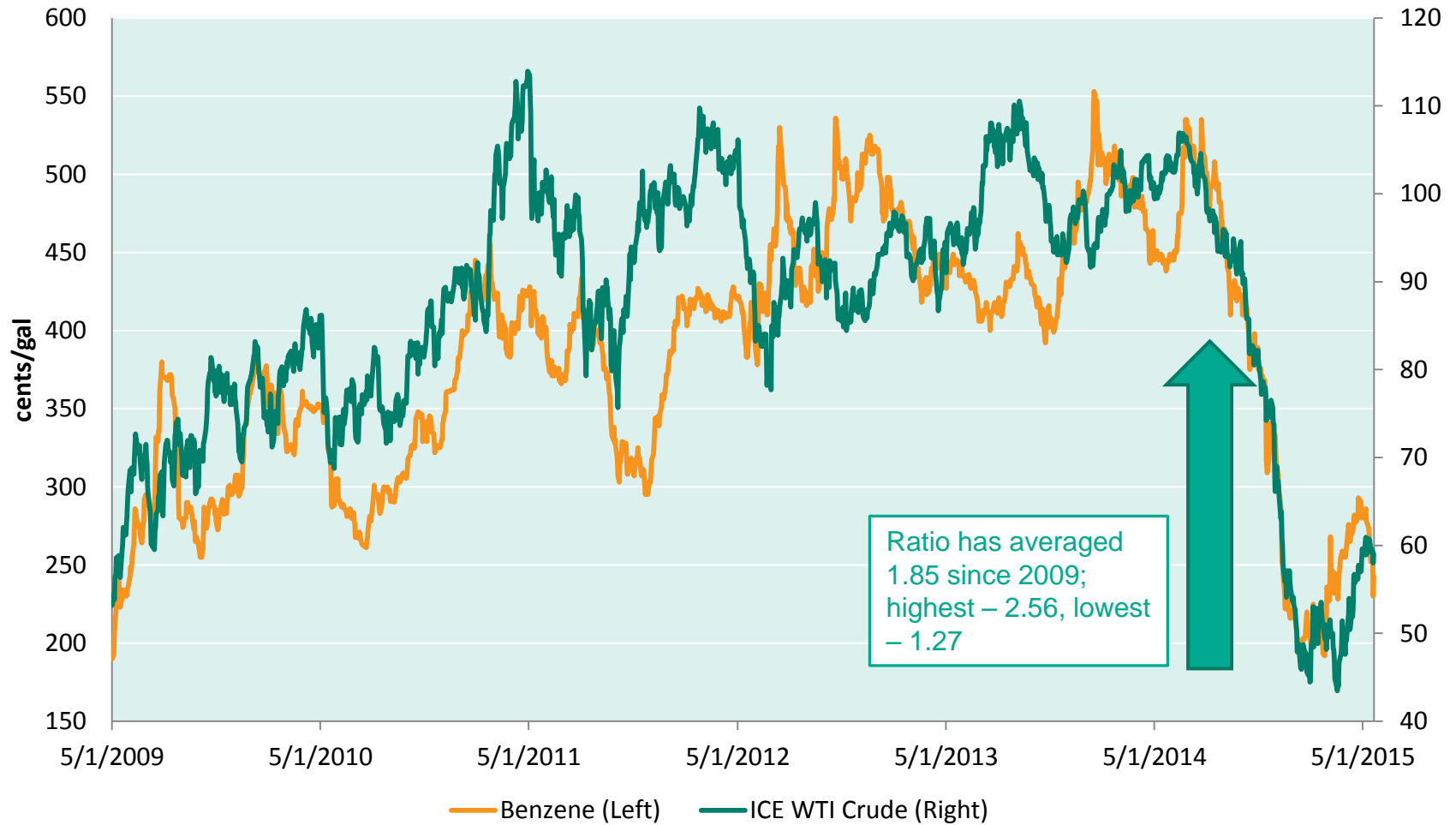
- As with ethylene, drops in crude, naphtha pricing at the global level have pressured North American propylene
- Because more than half of production originates at refinery, the effect of lower crude is amplified, compared to ethylene
- US market currently long; export opportunities available
- Spot, contract prices at six-year lows
- Short-term expectations; Dow PDH capacity around the corner

Benzene: Volatility in net-short market

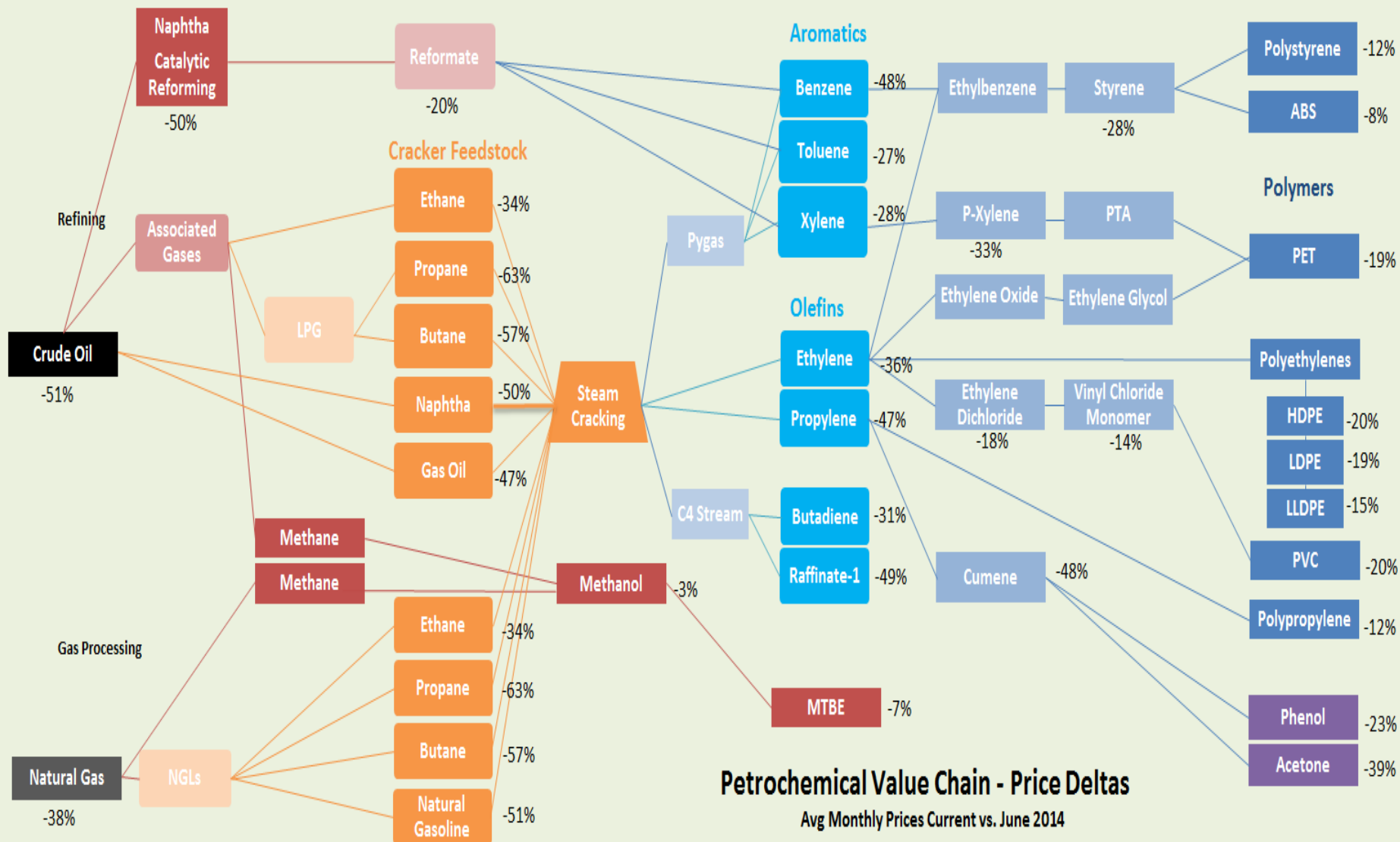


Source: Platts

Benzene, crude tie strong



Value chain – Making sense of it all



Advantage erosion through overbuilding?

The North American petrochemical industry could find itself in a jam if it pursues all announced expansions and fails to balance its exports of natural gas, NGLs

- For the past 3-4 years, the North American industry has felt bullish about its future thanks to the shale gas boom
- Olefins, in particular, are undergoing a renaissance – and dreaming big – less than 10 years after being left for dead

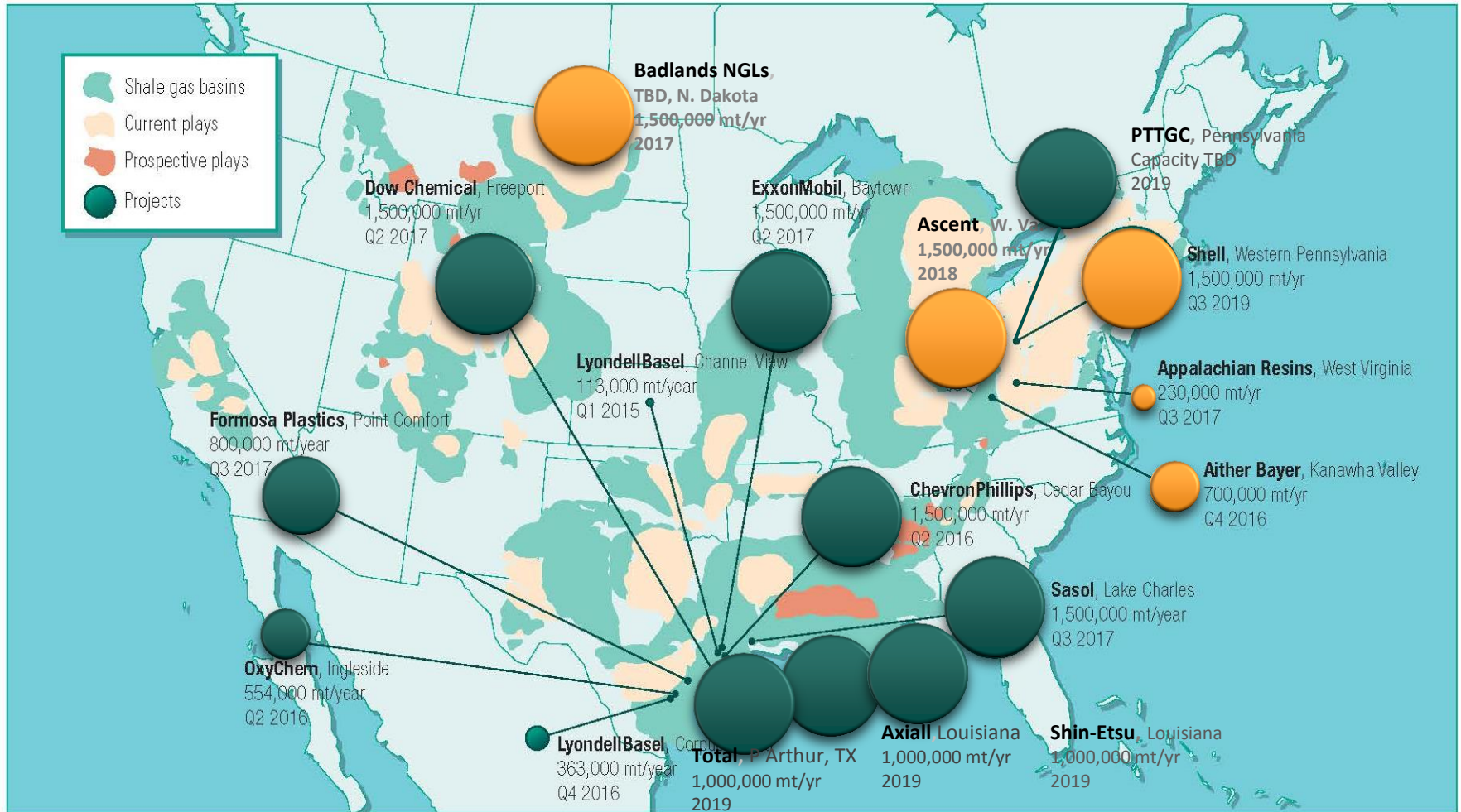
Ethylene – More than 15 million mt/year in announced greenfield expansions

– Some 2.5 million mt/year in brownfield

Propylene – More than 4 million mt/year in greenfield

- Methanol production in North America is staging an impressive comeback after years of exile – more than 20 million mt/year in announced capacity expansions

Big bet is on ethylene, PE exports



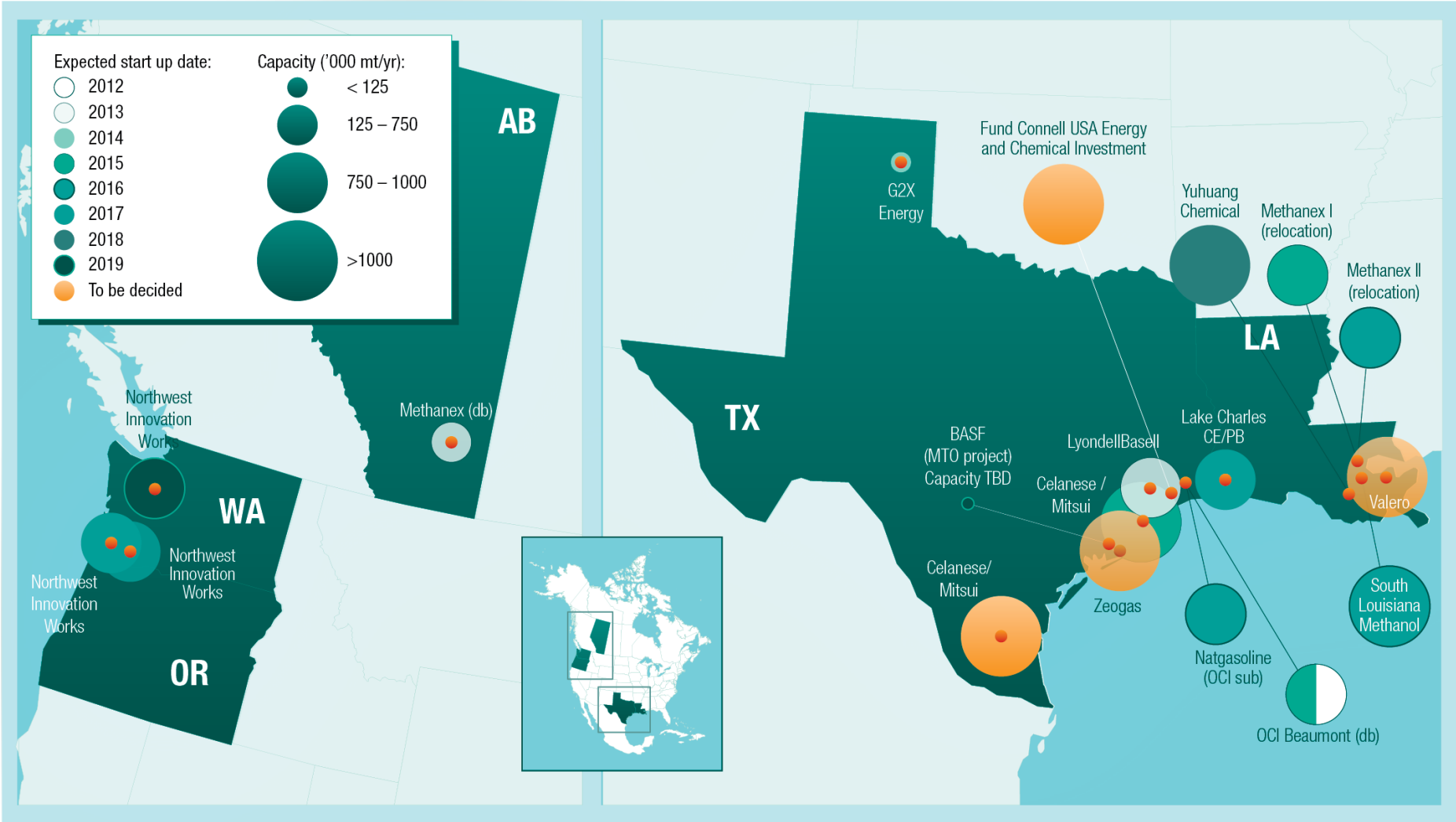
Source: EIA, Platts

North American PE expansions

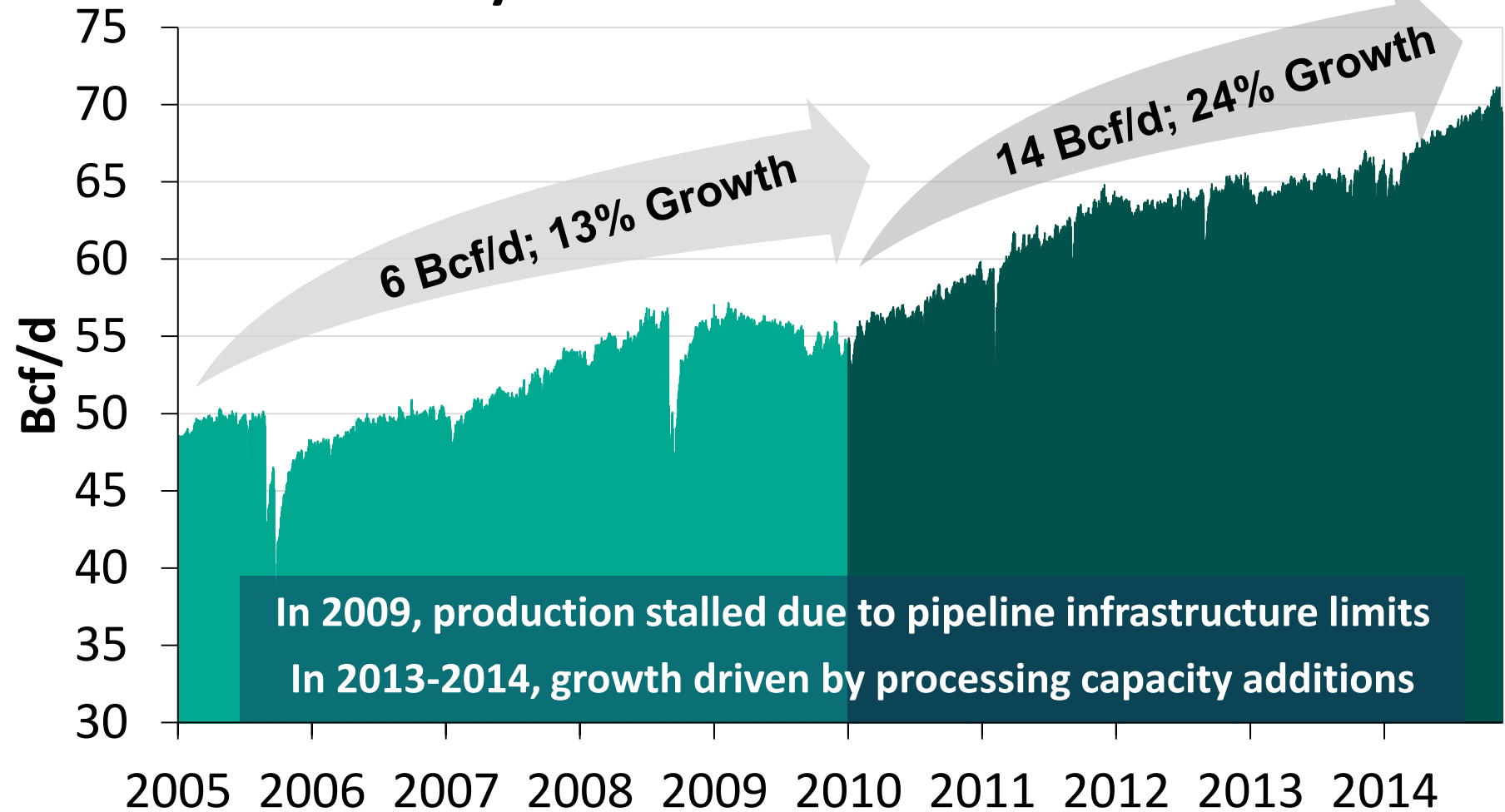
Company	Location	,000 t/yr	Grade(s)	Startup
Braskem-Idesa Etileno XXI	Veracruz, MEX	1,000	HD, LD	2015
Nova Chemicals	Joffre, CAN	450	LLD	2015
LyondellBasell	Texas	450	LD, LLD	2016
Ineos/Sasol	Louisiana	470	HD	2016
Dow Chemical	Texas	TBD	LD, EPDM	2017
ChevronPhillips	Texas	1,000	HD, LLD	2017
ExxonMobil Chemical	Texas	1,300	HD, LLD	2017
Bandlands NGLs	N. Dakota	1,500	TBD	2017
Formosa Plastics CUSA	Texas	300	LD	2018
Sasol	Louisiana	450	LLD	2018
Sasol	Louisiana	420	LD	2018
Nova Chemicals	Sarnia, CAN	500	TBD	2018+
Shell Chemical	Pennsylvania	1,000	TBD	2019
Odebrecht (Braskem)	W. Virginia	TBD	TBD	2019

Source: Company announcements, Platts

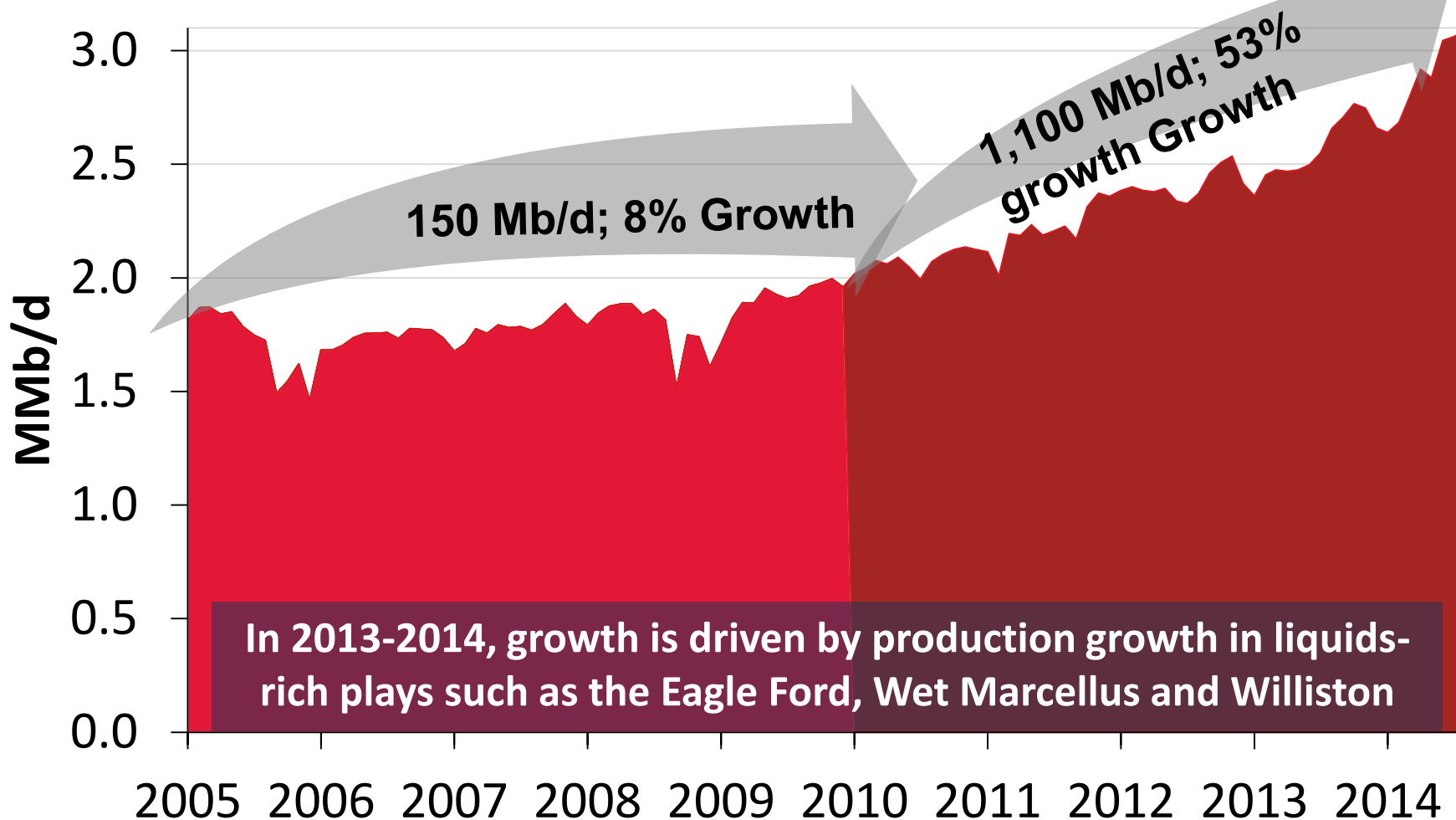
North American methanol projects



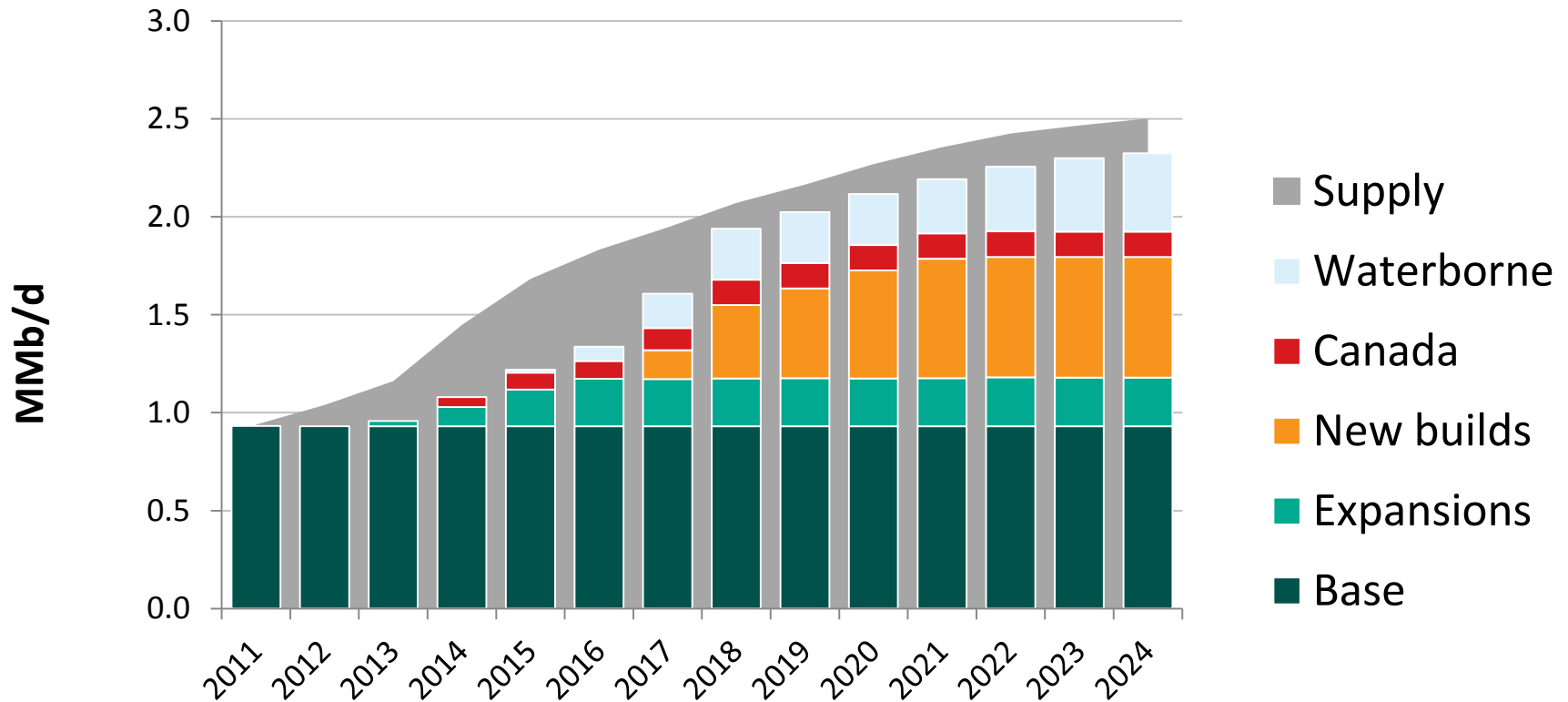
US Dry Gas Production – Lower 48



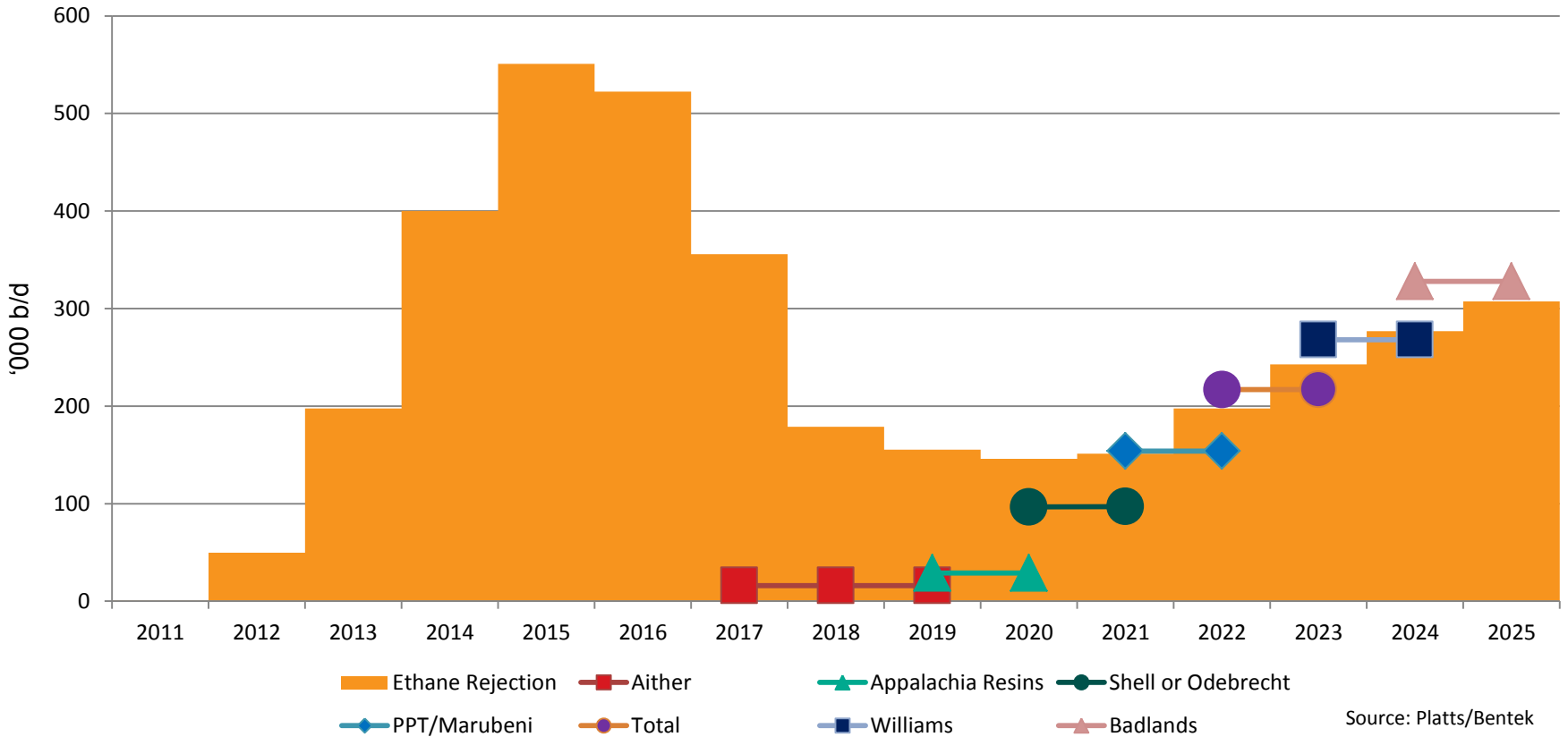
NGL Production from Gas Plants



Domestic demand growth

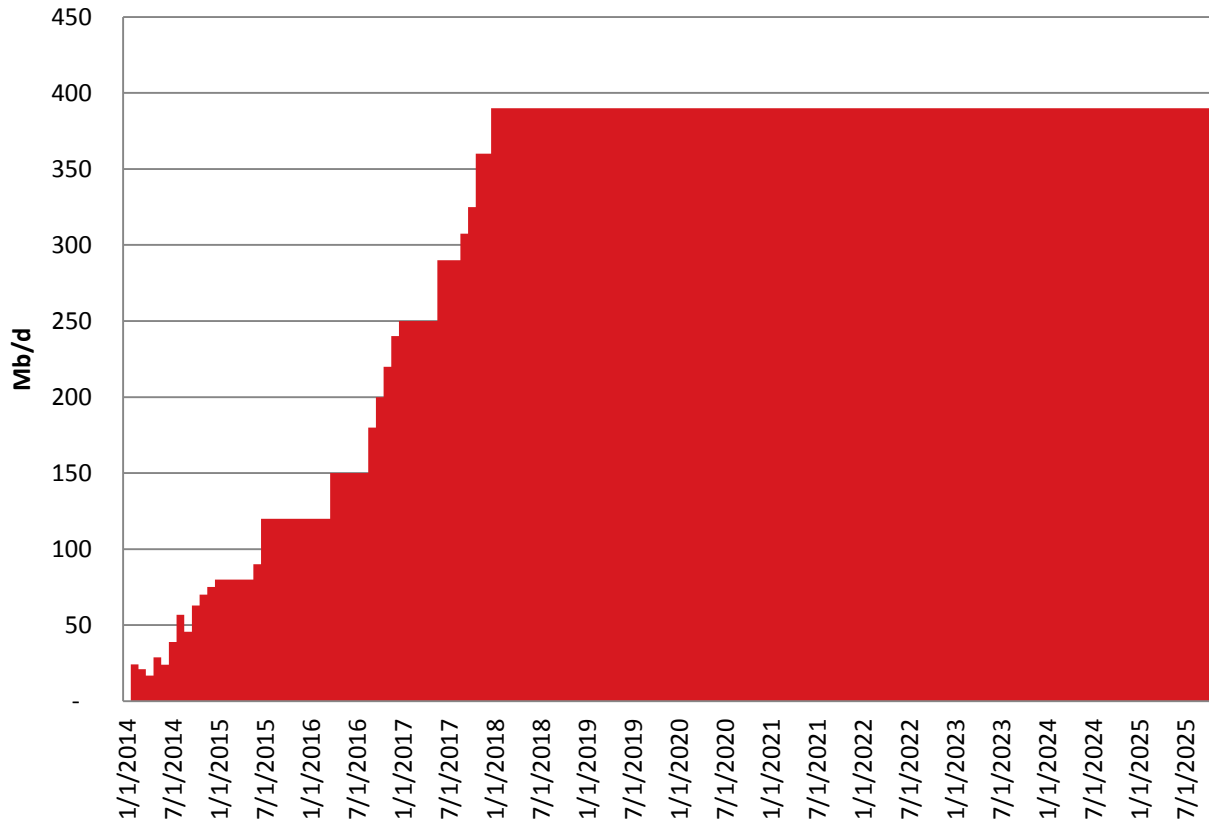


Source: Bentek Market Call: North American NGLs, 4Q2014



- Crackers above are not accounted for in rejection forecast. If added, we can see how quickly the ethane surplus dries up

US Ethane Exports



- Global demand for ethane growing
- By 2018, all announced export terminals will be operational
- New announcements could tighten US ethane supplies

- The US petrochemical industry could overbuild olefins production, causing ethane surpluses to dry up

“If the petrochemical industry knows anything, it is how to overbuild”

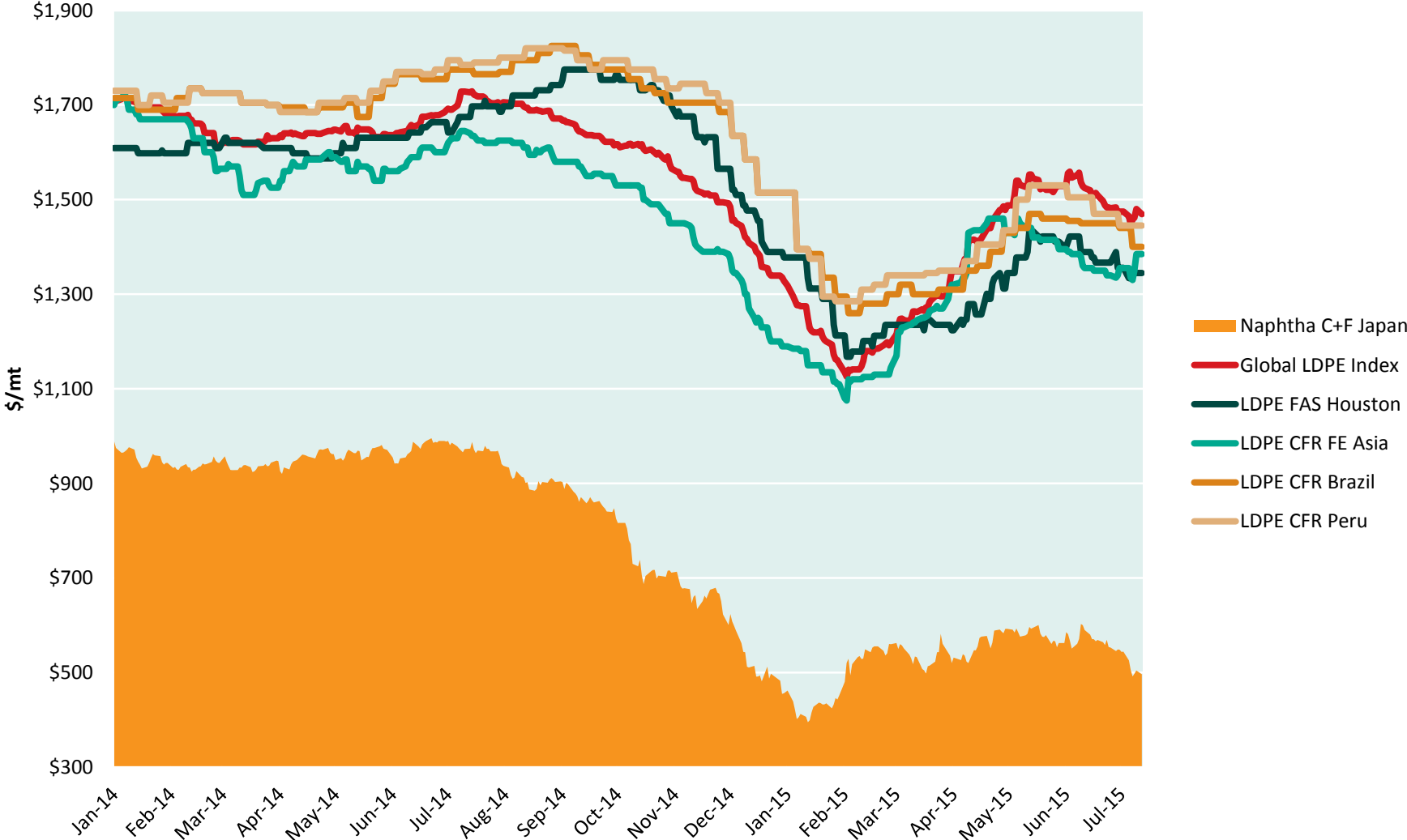
-- Sr. VP of major engineering firm

- The US could export massive amounts of ethane, also eroding its feedstock advantage
- Ethane availability alone is not enough to support projected plastic demand growth globally
- Recent drop in oil prices shows how naphtha could remain competitive in the future

Margin erosion through \$50/b oil

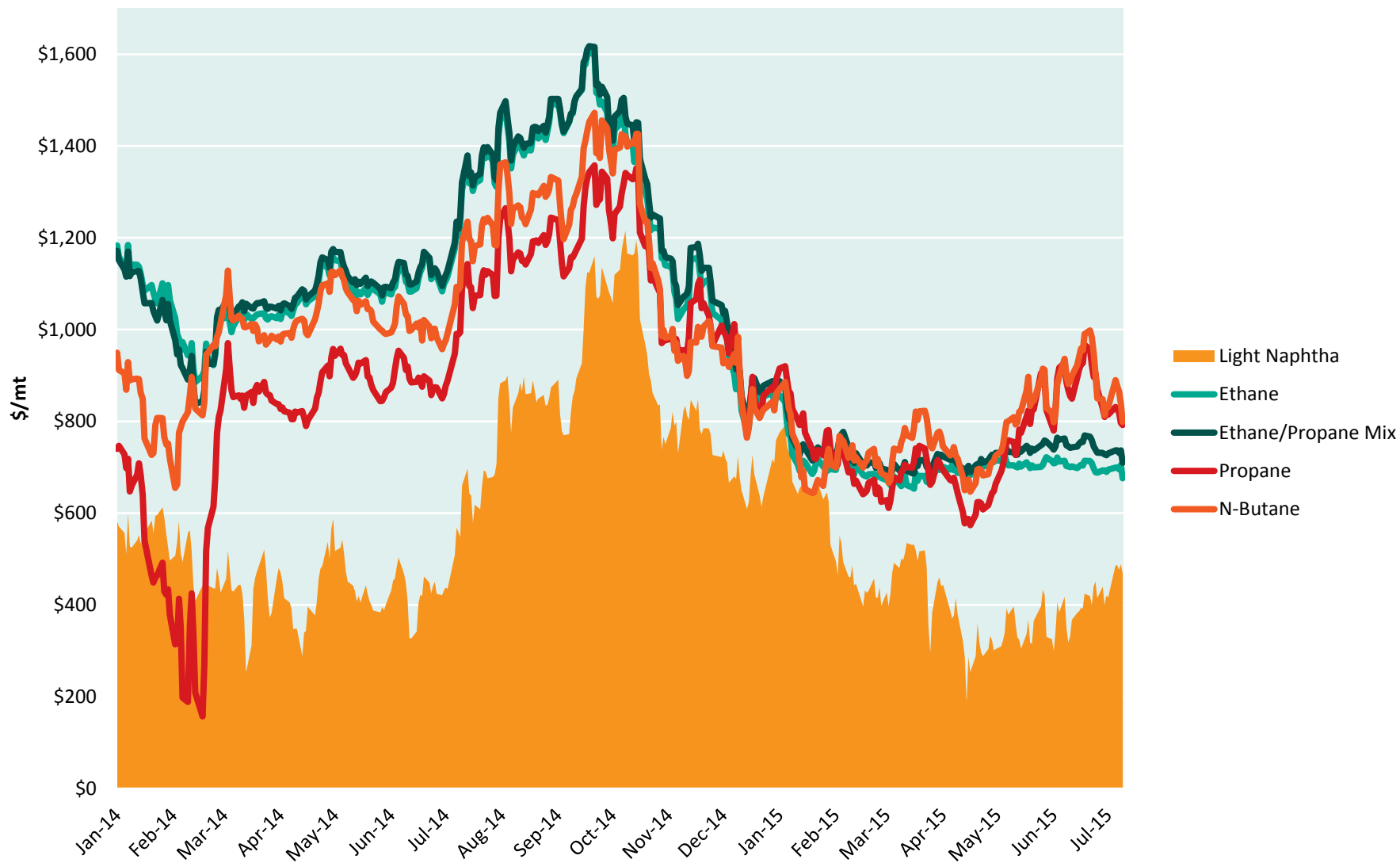
Lower feedstock prices have been met with corresponding drops in olefins, polymers. Though ethane margins remain healthy, naphtha has made up ground

Naphtha sets the PE global price

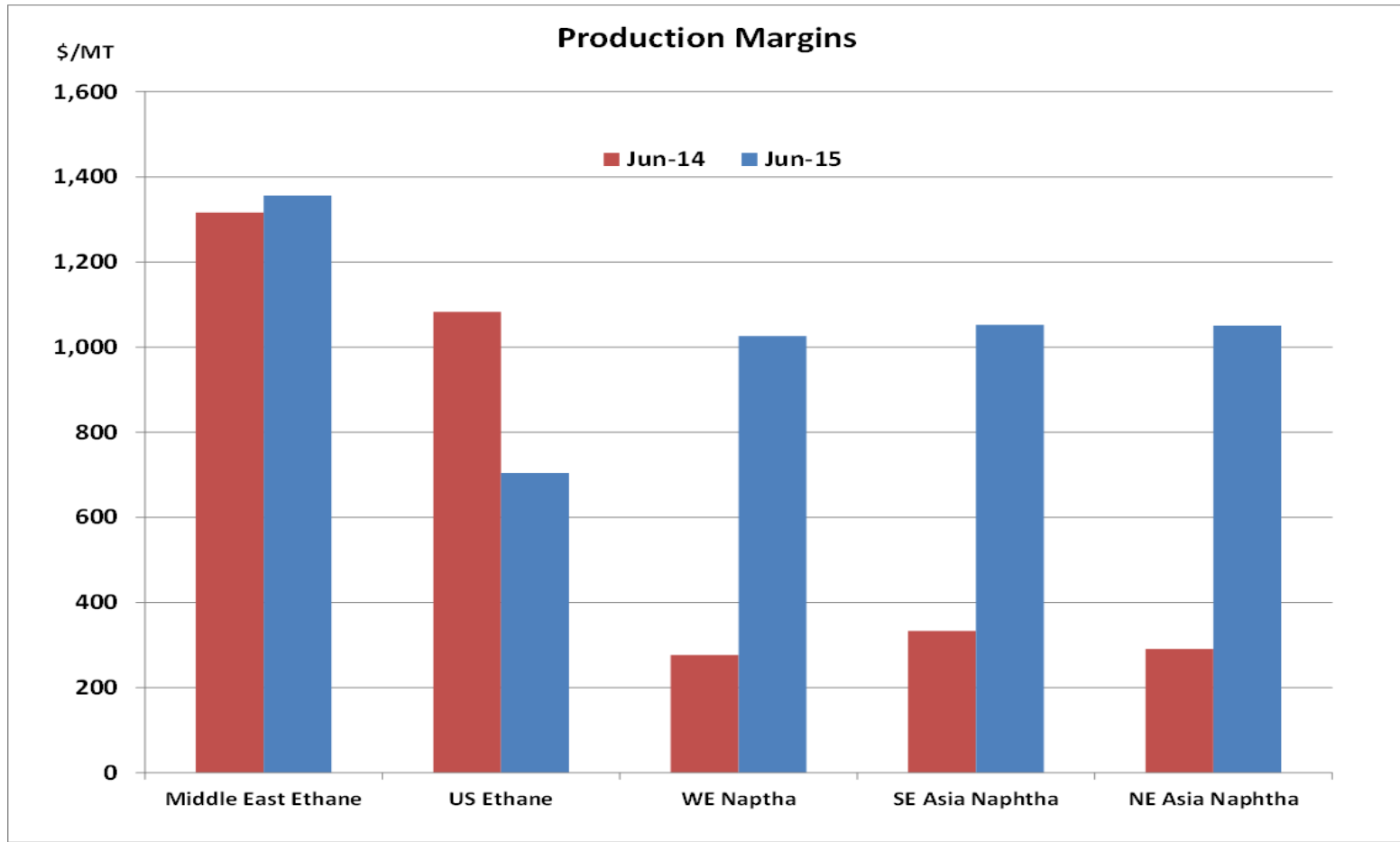


Source: Platts

Naphtha, LPGs margins improved

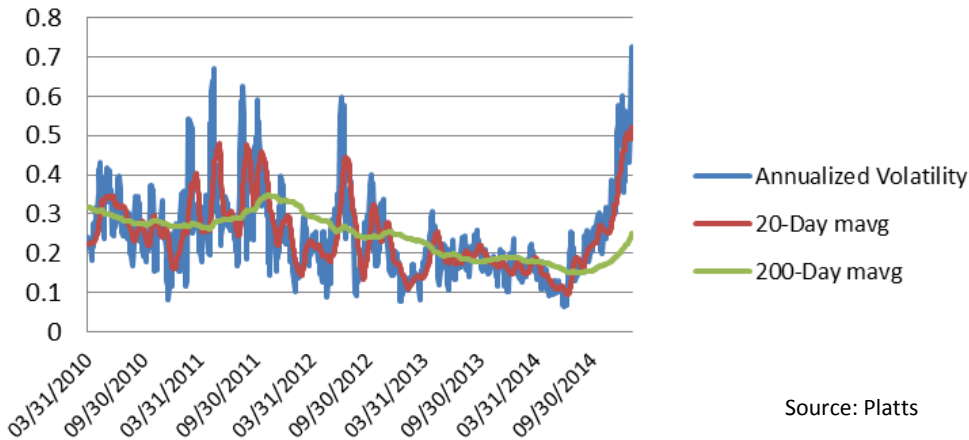


Tight markets boost naphtha margins

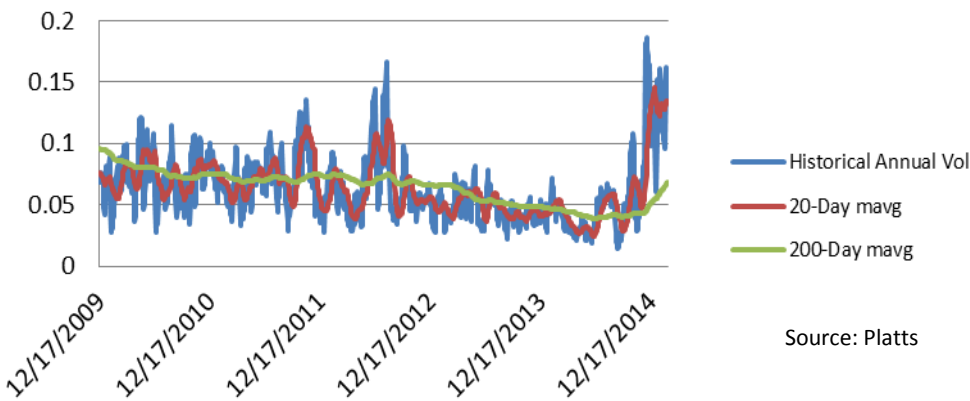


Why overbuilding may not happen

WTI Historical Annualized Volatility



Platts Global Petchem Index Hist. Volatility



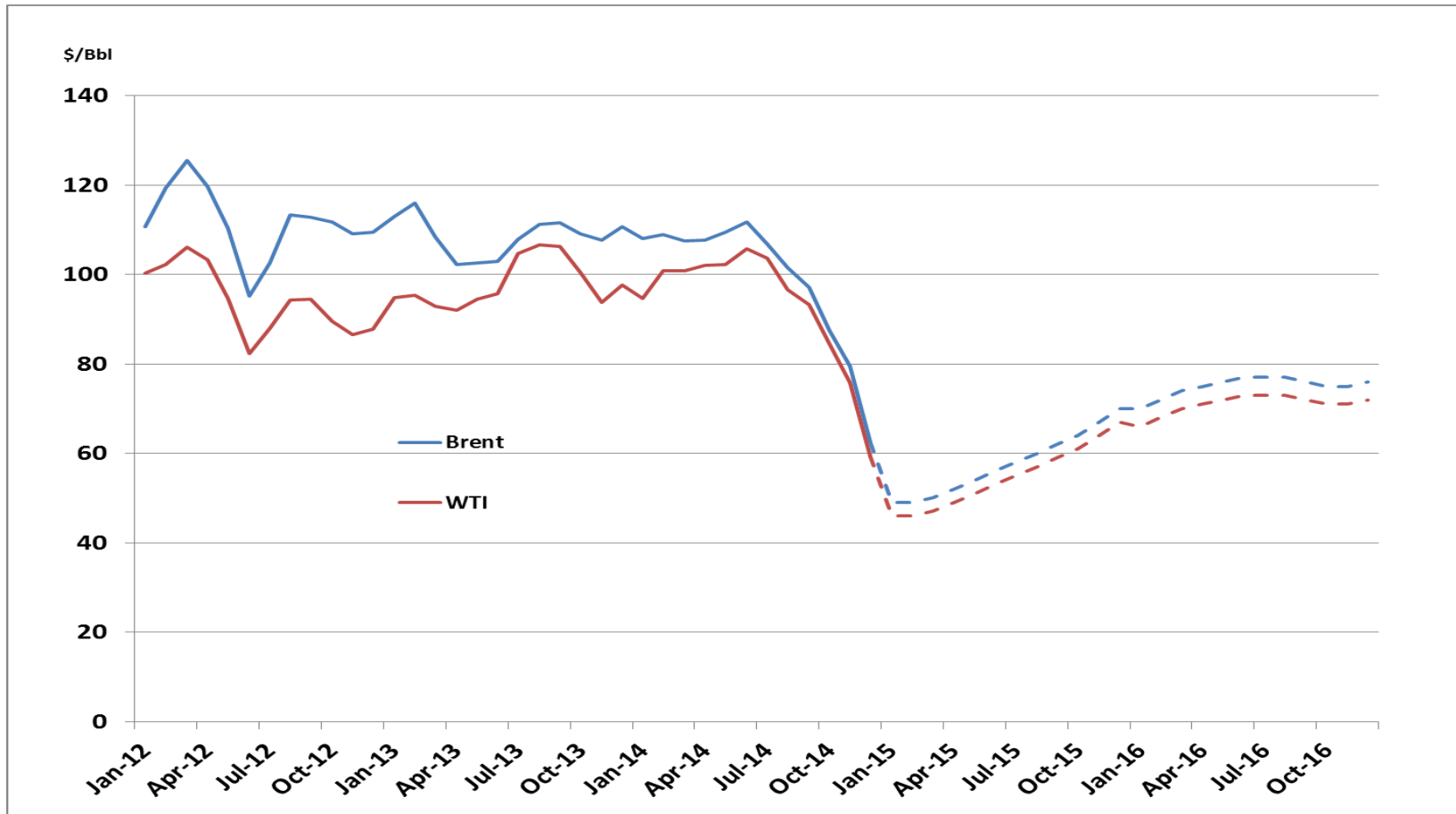
- WTI volatility hit levels not seen in the past four years
- The volatility in crude also reflected in Platts Global Petrochemical Index
- Volatility makes guaranteeing future profits challenging, and could result in project delays or cancellations
- See recent Odebrecht announcement

Greenfields: Some decisions postponed

Company	Location	,000 t/yr	Startup
Dow Chemical	Texas	1,500	H2 2017
ExxonMobil Chemical	Texas	1,500	H2 2017
Chevron Phillips Chemical	Texas	1,500	H2 2017
Formosa Plastics CUSA	Texas	800	2018
Sasol	Louisiana	1,500	2018
Occidental/Mexichem	Texas	550	2018
Appalachian Resin	W. Virginia	250	2018
Aither Chemical/RMG	W. Virginia	200-300	2018
Badlands NGLs	N. Dakota	1,500	2018
Total Petrochemicals	Texas	1,000	2019
PTTGC	Pennsylvania	N/A	2019
Axiall	Louisiana	1,000	2019
Shin-Etsu (Shintech)	Louisiana	1,000	2019
Shell Chemical	Pennsylvania	1,000-1,500	2019
Ascent (Odebrecht-Braskem)	W. Virginia	1,000-1,500	2019

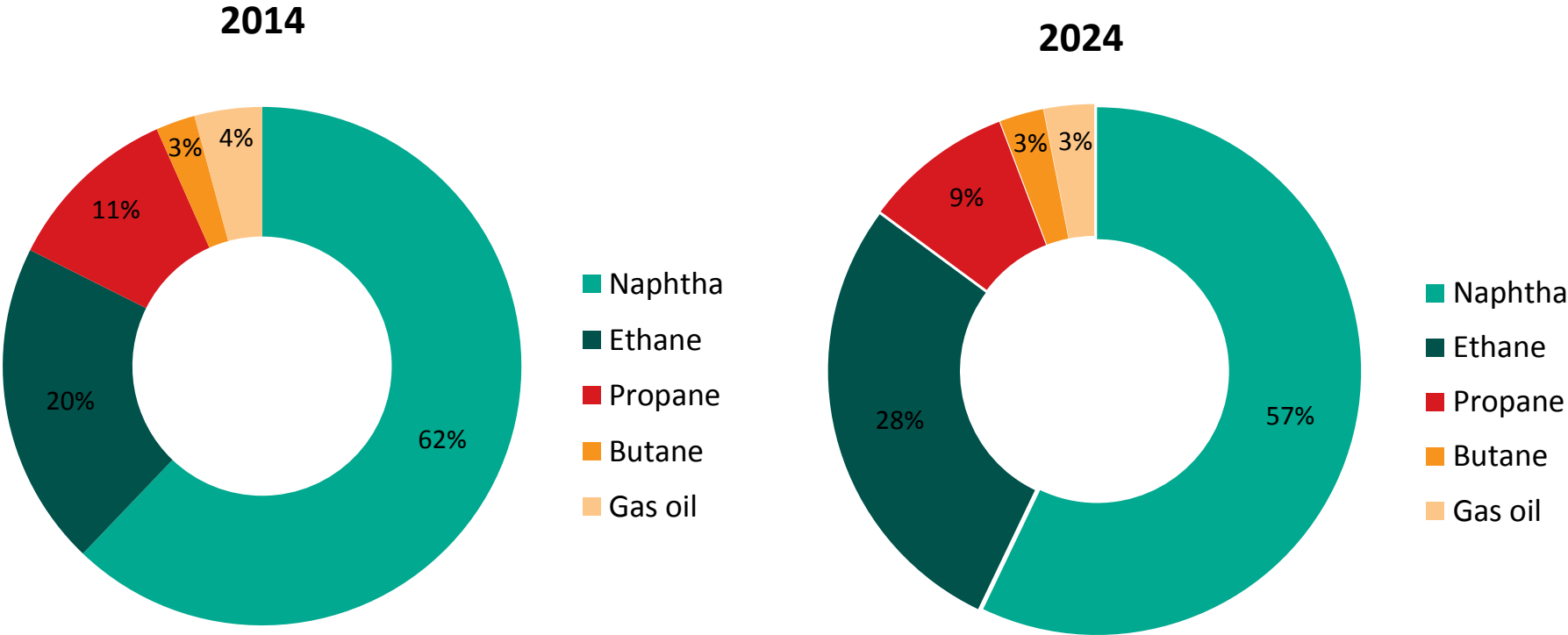
Source: Company announcements, Platts

Crude prices make or break naphtha



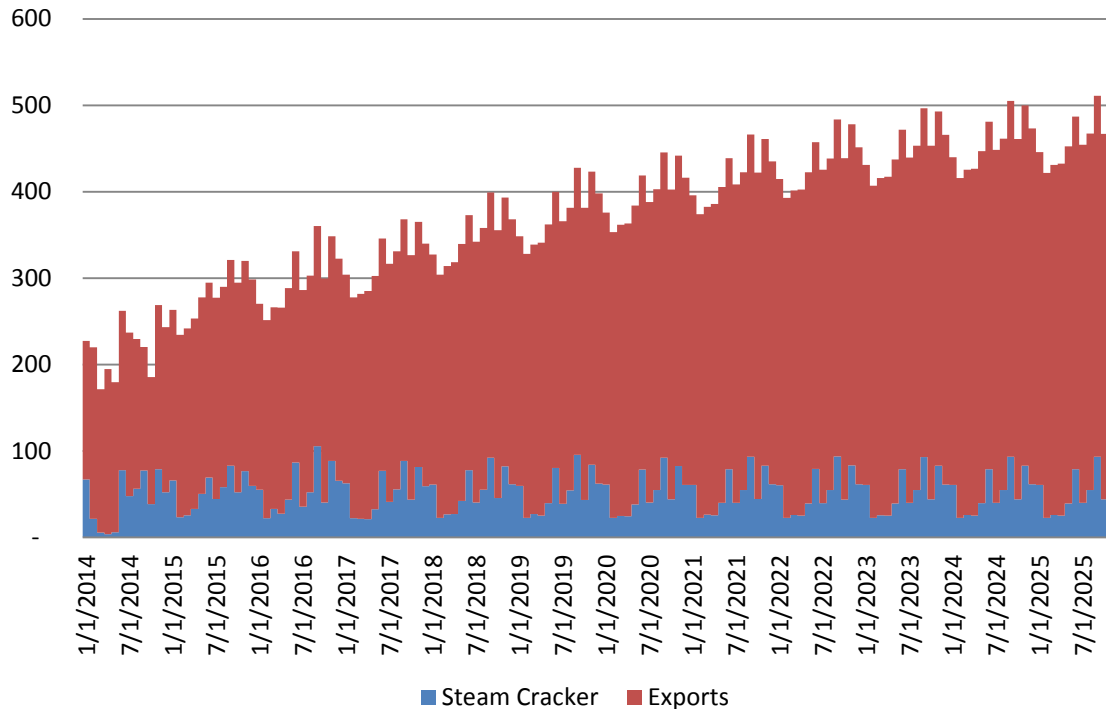
Source: US Energy Information Administration

- Despite the shifting to lights in the US, naphtha continues to dominate conventional global feedslates



Source: Platts

US Natural Gasoline, Mb/d



- Natural gasoline is a C5/C6 stream, very similar to naphtha, that comes from natural gas processing plants. It can be processed by some crackers just like naphtha
- It is being exported to Canada as diluent for tar sands, returns to US Gulf in the oil

- Plunge in oil prices has had palpable effect on petrochemicals
- At the heart of the drop is increased production, particularly in North America, without corresponding demand growth
- It has boosted naphtha's competitiveness as feedstock; ethane remains advantaged, but feeling pressure from LPGs
- Prices have fallen – some by as much as 50% – which has affected steam cracker margins, particularly for light-fed units

Volatility in crude pricing is at a 4-year high and introduces more risk; decisions on key projects already delayed

Thank you!

Let's stay in touch regarding the markets

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