

Americas Olefins at a glance

Bernardo Fallas, Managing Editor – Americas Petrochemicals (Olefins & Polymers)
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AGENDA

All eyes on ethylene

North American expansion projects at a glance
How lower crude is affecting decisions
Logistical squeezes & their impact on pricing

Propylene: The PDH bet

Will on-purpose processes save the day?
Polypropylene's wait-and-see attitude
Pricing: New normal or temporary reprieve

- 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 8 years after being left for dead

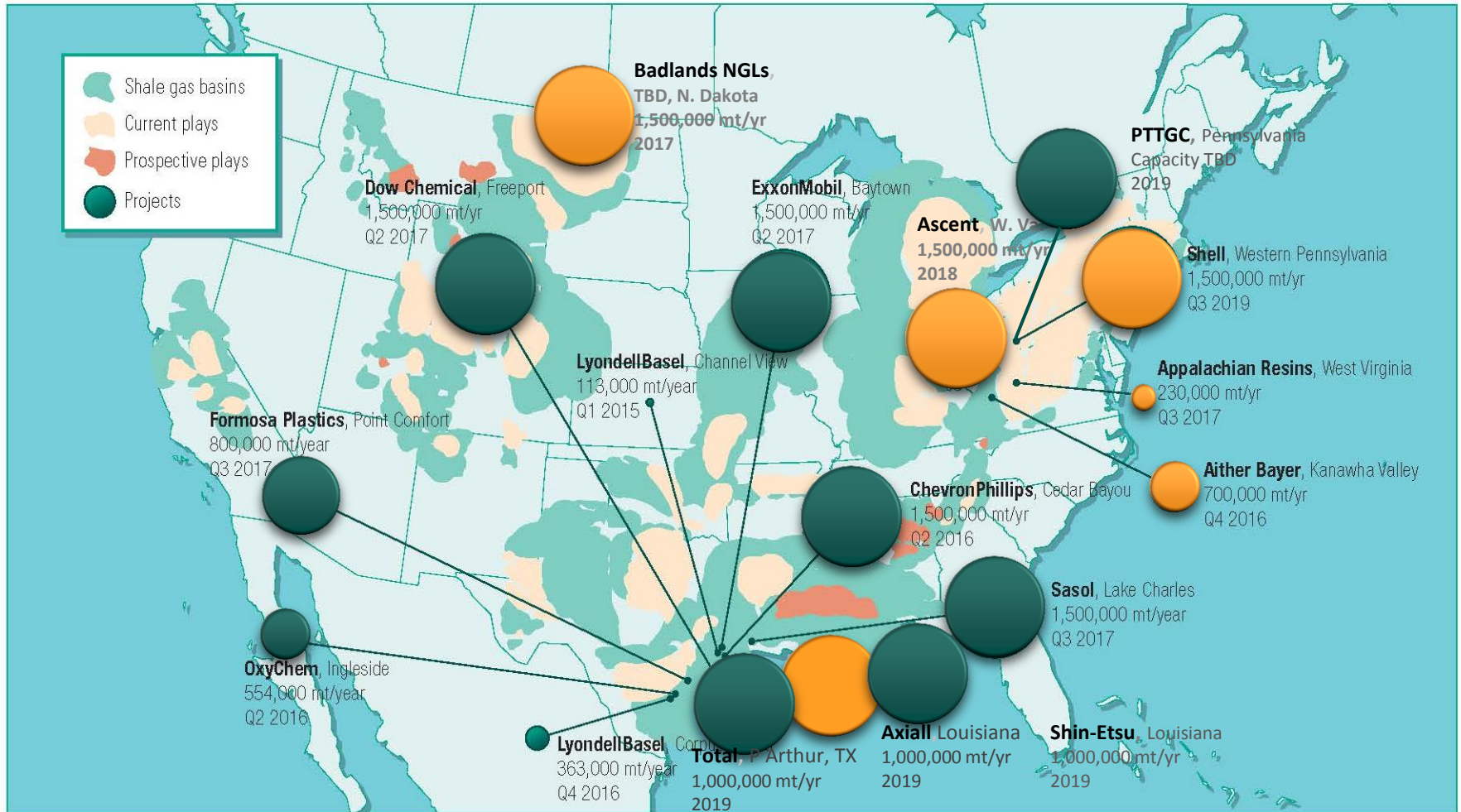
Ethylene – More than 15 million mt/year in announced greenfield expansions

– Some 2.5 million mt/year in brownfield

Propylene – More than 4 million mt/year in greenfield

- Polyethylene expansions expected to reach 7-8 million mt/year, with feedstock advantage realized through exports

Big bet is on ethylene, PE exports



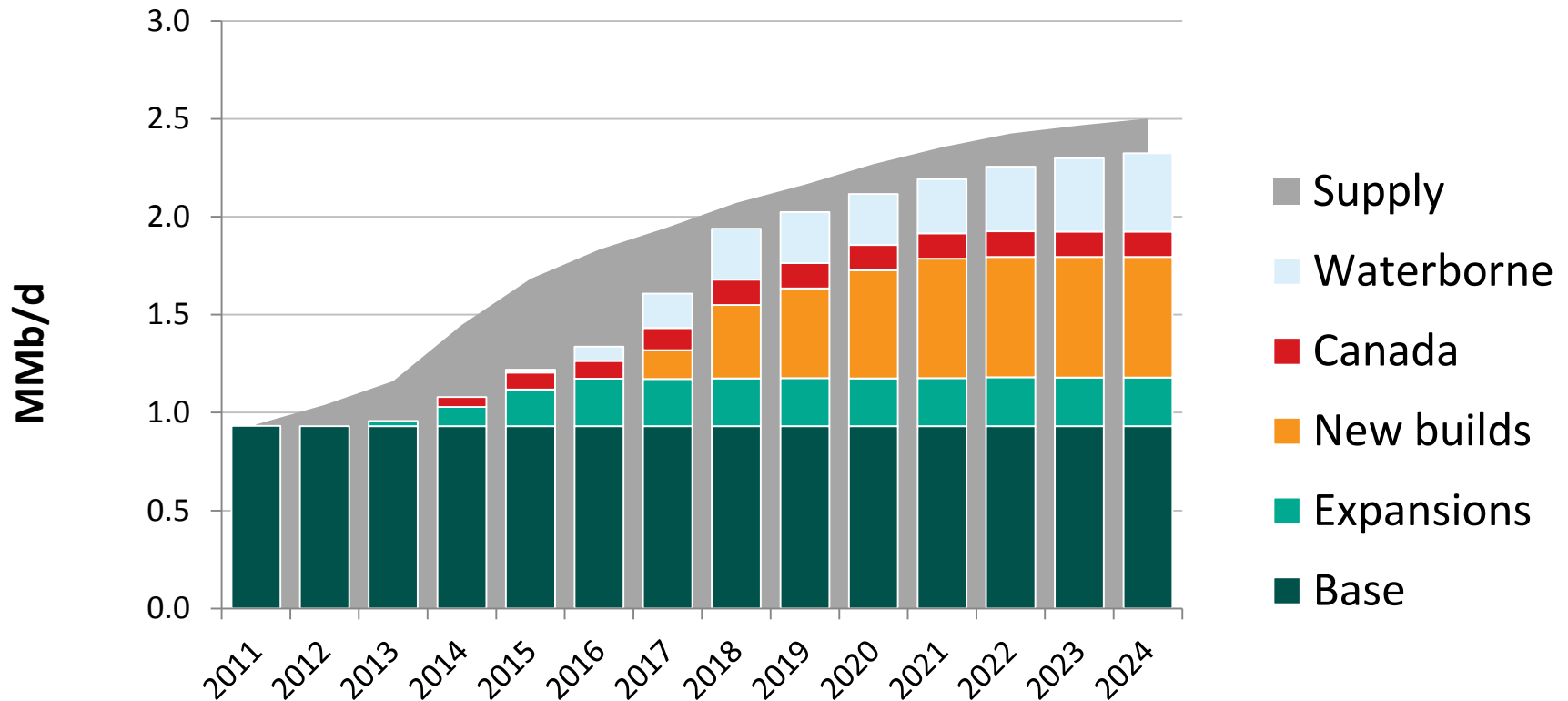
Source: EIA, Platts

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

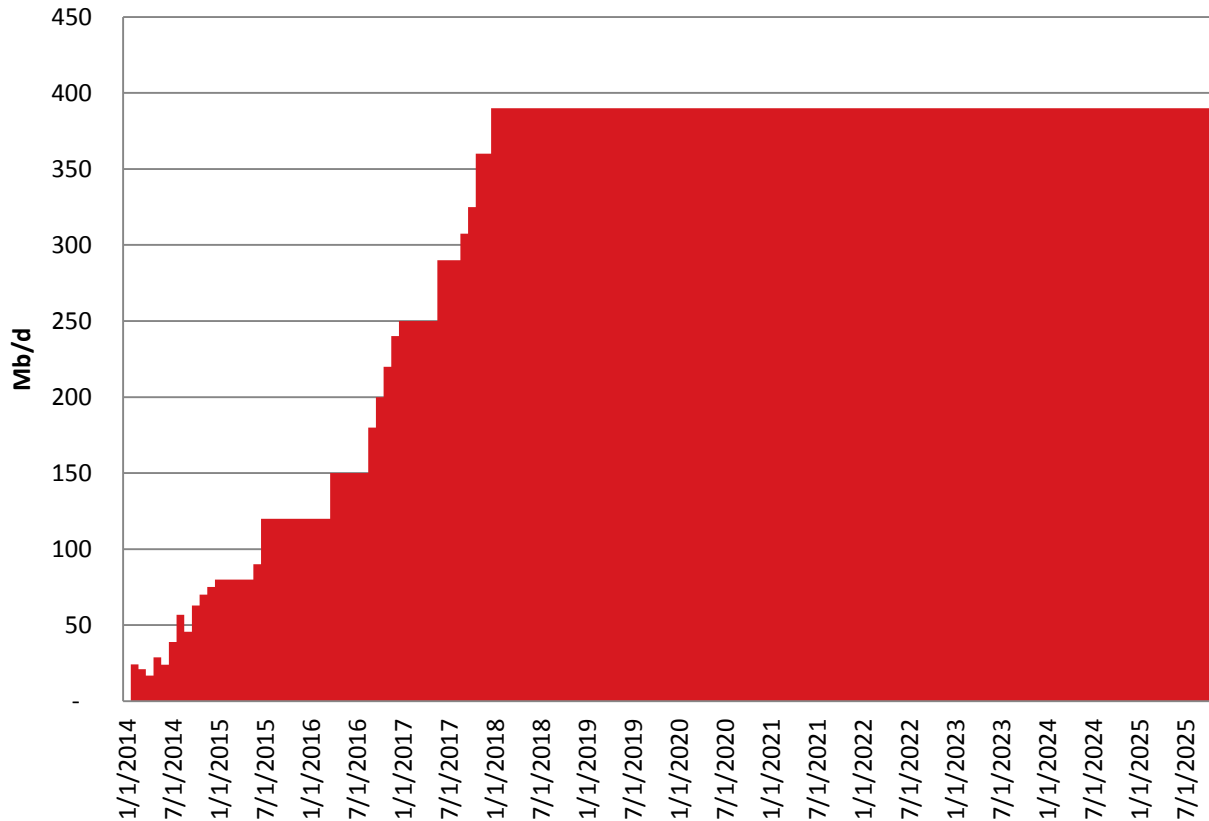
Source: Company announcements, Platts

Domestic demand growth



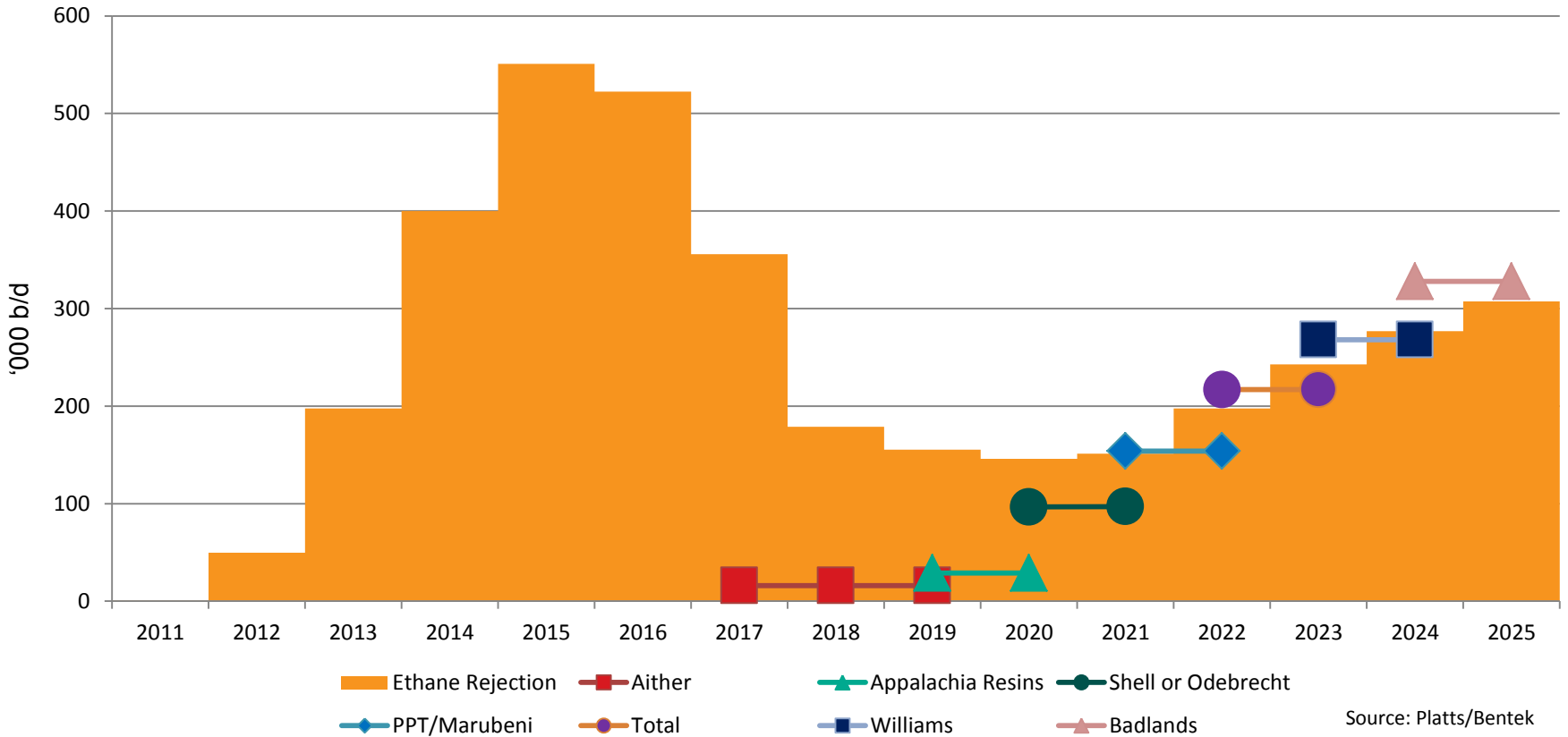
Source: Bentek Market Call: North American NGLs, 4Q2014

US Ethane Exports



Source: Bentek, Platts Analytics

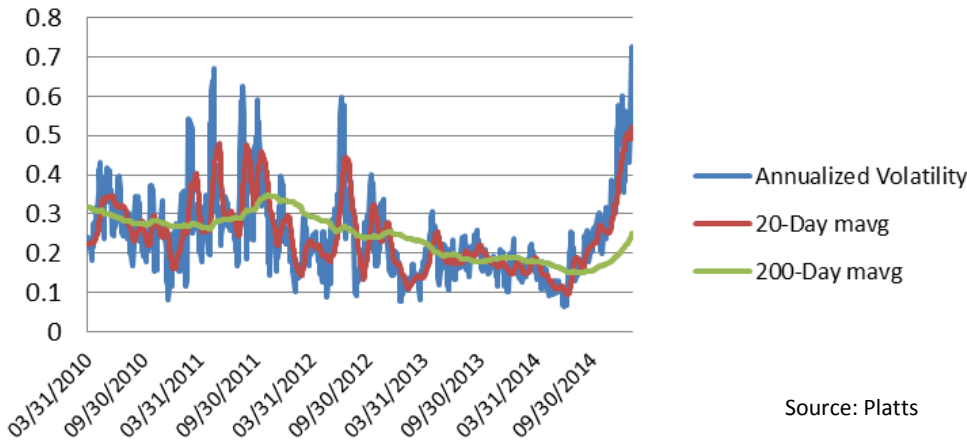
- Global demand for ethane growing
- By 2018, all announced export terminals will be operational
- New announcements could tighten US ethane supplies.



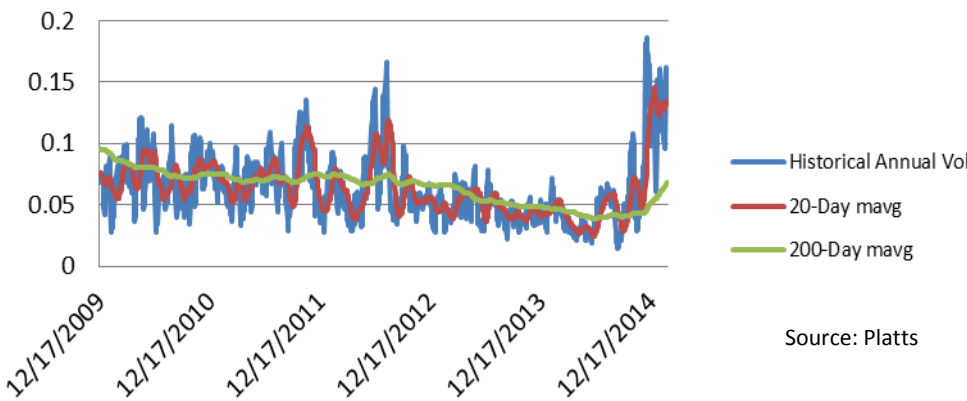
- Crackers above are not accounted for in rejection forecast. If added, we can see how quickly the ethane surplus dries up

Why overbuilding may not happen

WTI Historical Annualized Volatility

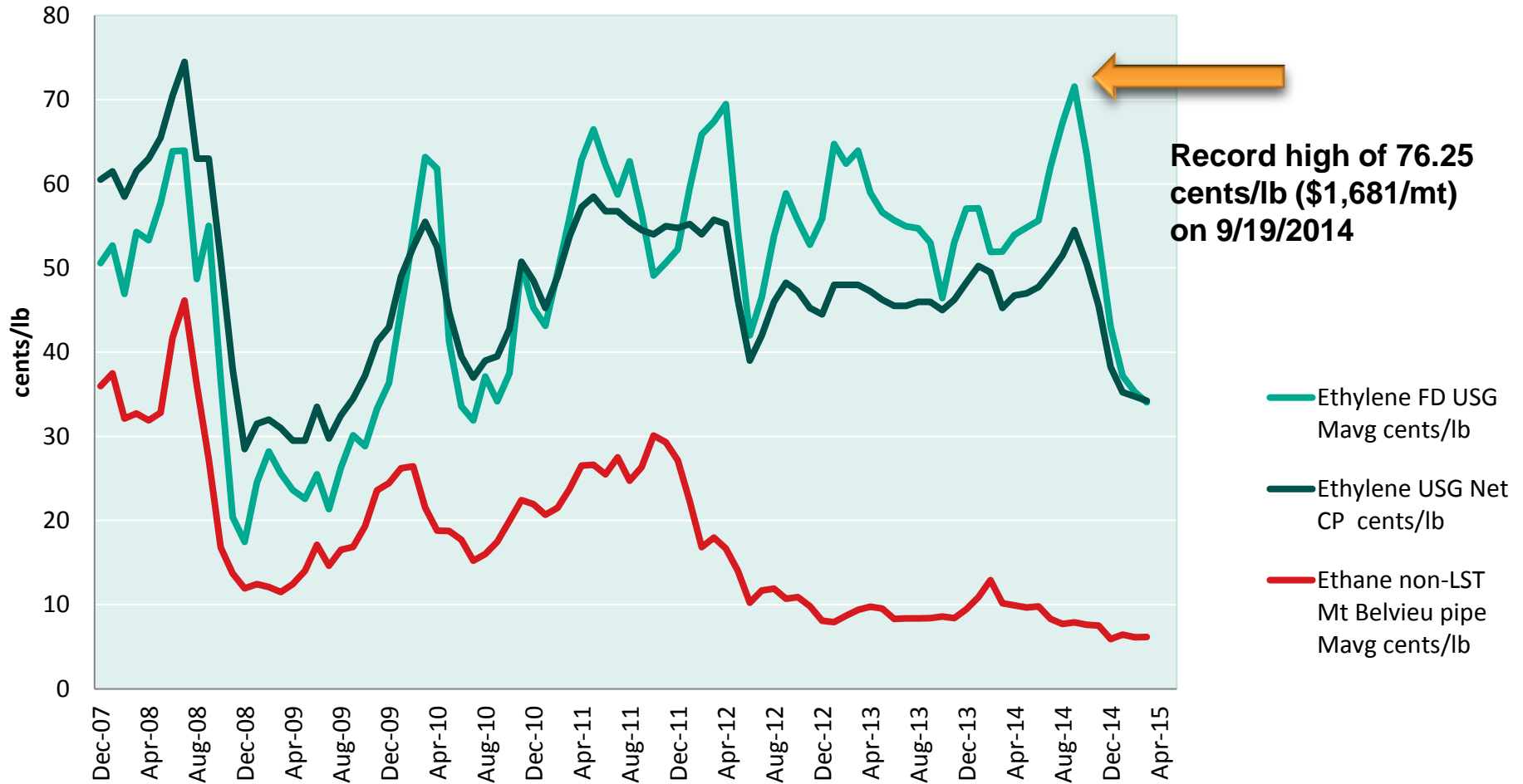


Platts Global Petrochem Index Hist. Volatility



- WTI volatility at a level 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

Ethylene Contract vs. Spot price vs. Ethane



Record high of 76.25 cents/lb (\$1,681/mt) on 9/19/2014

- 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

Propylene: Is propane the answer?

Company	Location	,000 t/yr	Startup
Dow Chemical (PDH)	Freeport, TX	750	2015
Enterprise Products (PDH)	Mt. Belvieu, TX	750	2016
C3 Petrochemicals (PDH)	Alvin, TX	1,200	2016
Formosa Plastics CUSA (PDH)	Point Comfort, TX	600	2016
Williams (PDH)	Alberta, Canada	500	2016
REXTac (PDH)	Odessa, TX	300	2016
Dow Chemical (PDH II) *	TBD/USG	TBD	2018
Enterprise Products (PDH II) *	TBD/USG	TBD	TBD
Williams (PDH II) *	Alberta, Canada	TBD	TBD
BASF (MTO) *	TBD/USG	TBD	TBD
Flint Hills Resources (PDH)	Houston, TX	Expansion	Shelved
LyondellBasell (metathesis)	Texas	Expansion	Shelved

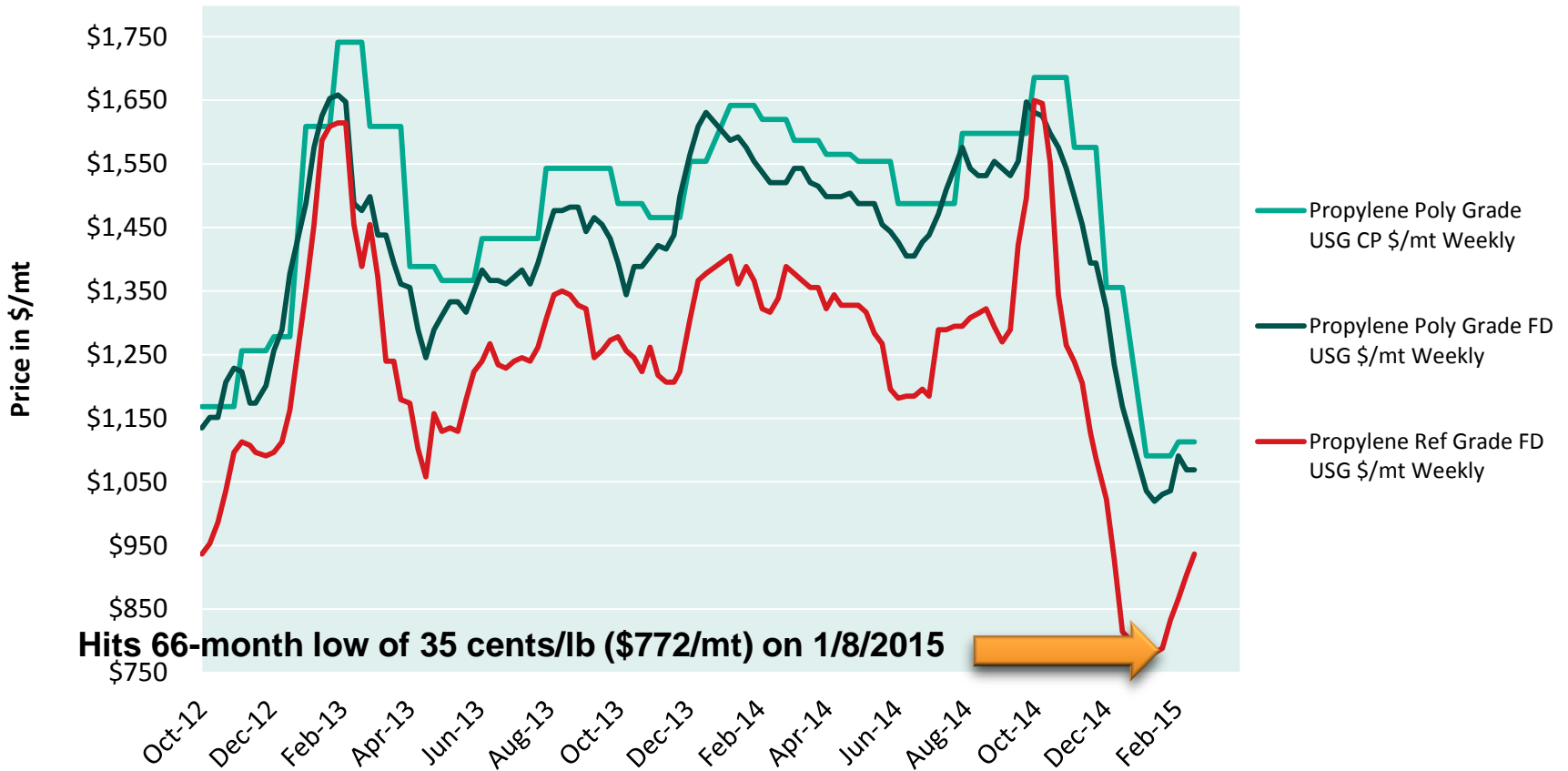
Source: Company announcements, Platts

Company	Location	,000 mt/yr	ETA
RexTac	Odessa, TX	270	H2 2016

Source: Company announcements, Platts

- Despite several on-purpose propylene projects, only one PP expansion has been announced
- For the past few years, the business has looked unattractive, with the likes of Dow and Sunoco exiting it all together
- In 2012, Chevron Phillips and Sumika ended a JV in Pasadena, Texas, taking 320,000 mt/year out of the market

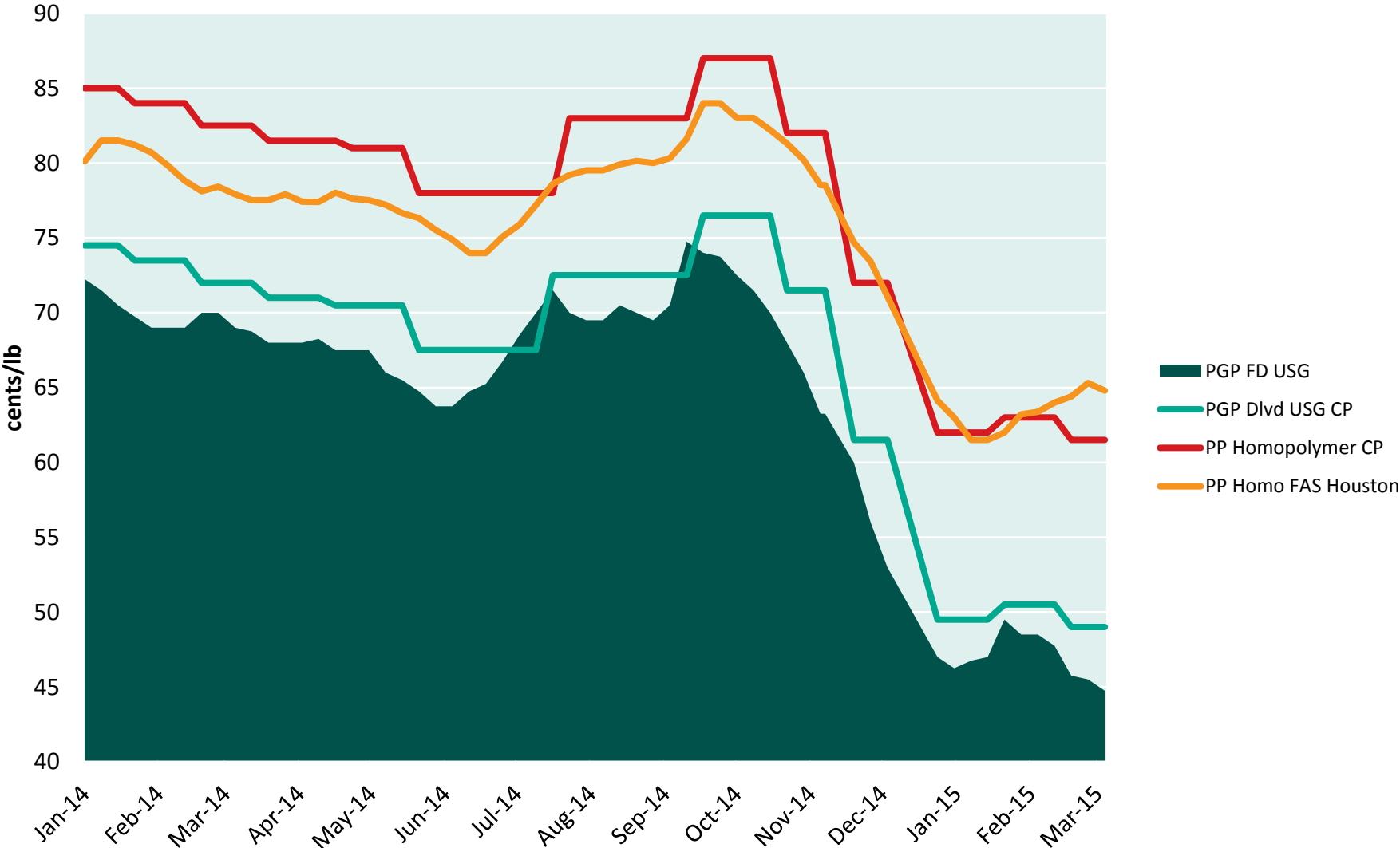
Spot PGP vs. PGP CP vs. spot RGP



Hits 66-month low of 35 cents/lb (\$772/mt) on 1/8/2015

Source: Platts

PP Homopolymer vs. PGP CP/spot



Source: Platts

- 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 is long; export opportunities available
- Spot, contract prices at six-year lows
- Short-term expectations; Dow PDH capacity around the corner

Thank you! Gracias!

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Polymers: Here Comes the Polyethylene Boom

Chris Ferrell, Editor – Americas Petrochemicals (Polymers)

May 29, 2015

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Polymers: Here Comes the Polyethylene Boom

Latin America as a prime destination for US Exports

How naphtha could upend expansion strategy

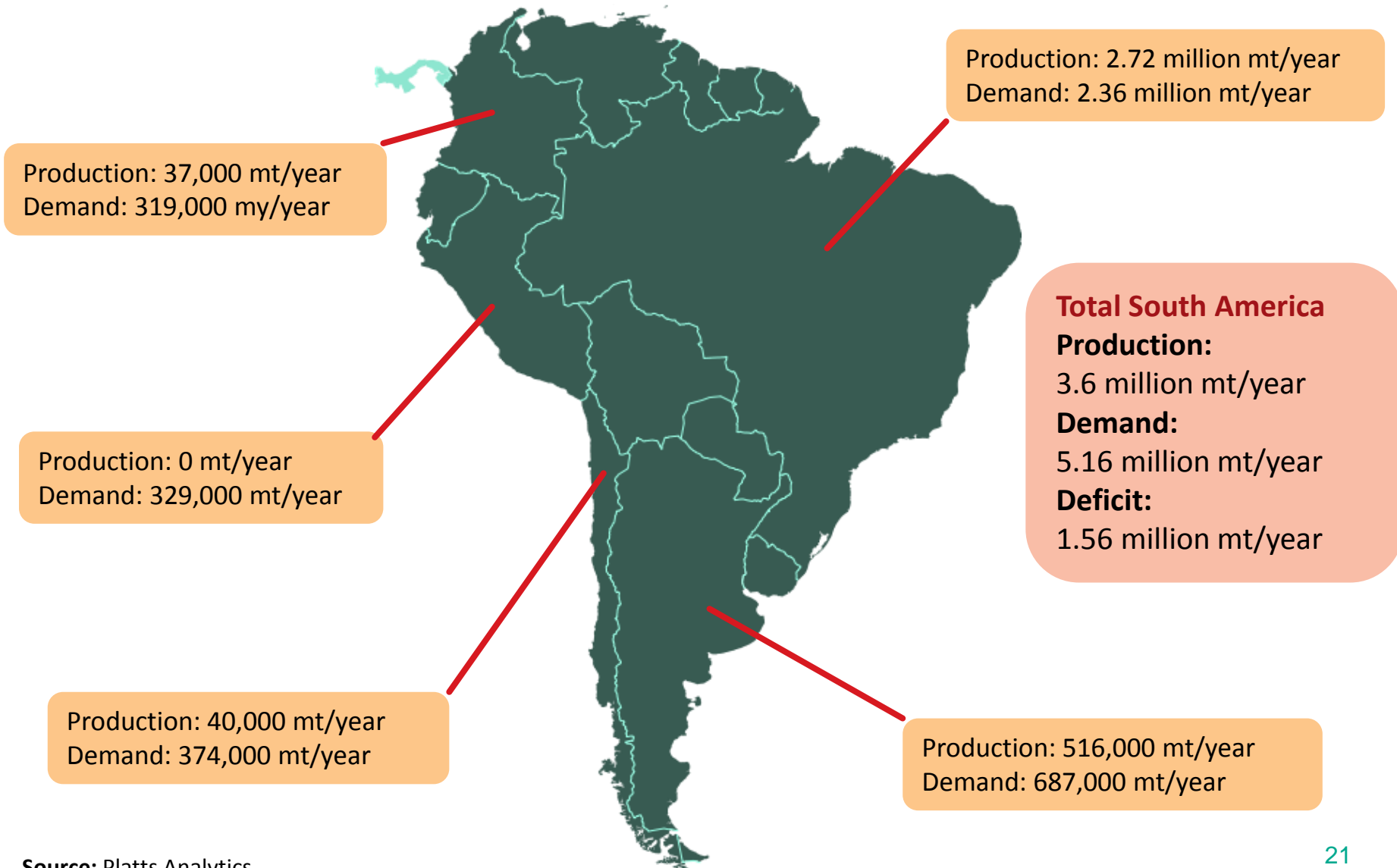
PP: Behind producers' push for margin expansions

Polymer pricing overview

Latin America a prime destination for US exports

Increased North American capacity over the next decade will make US a bigger player in the global polyethylene market.

South American PE markets

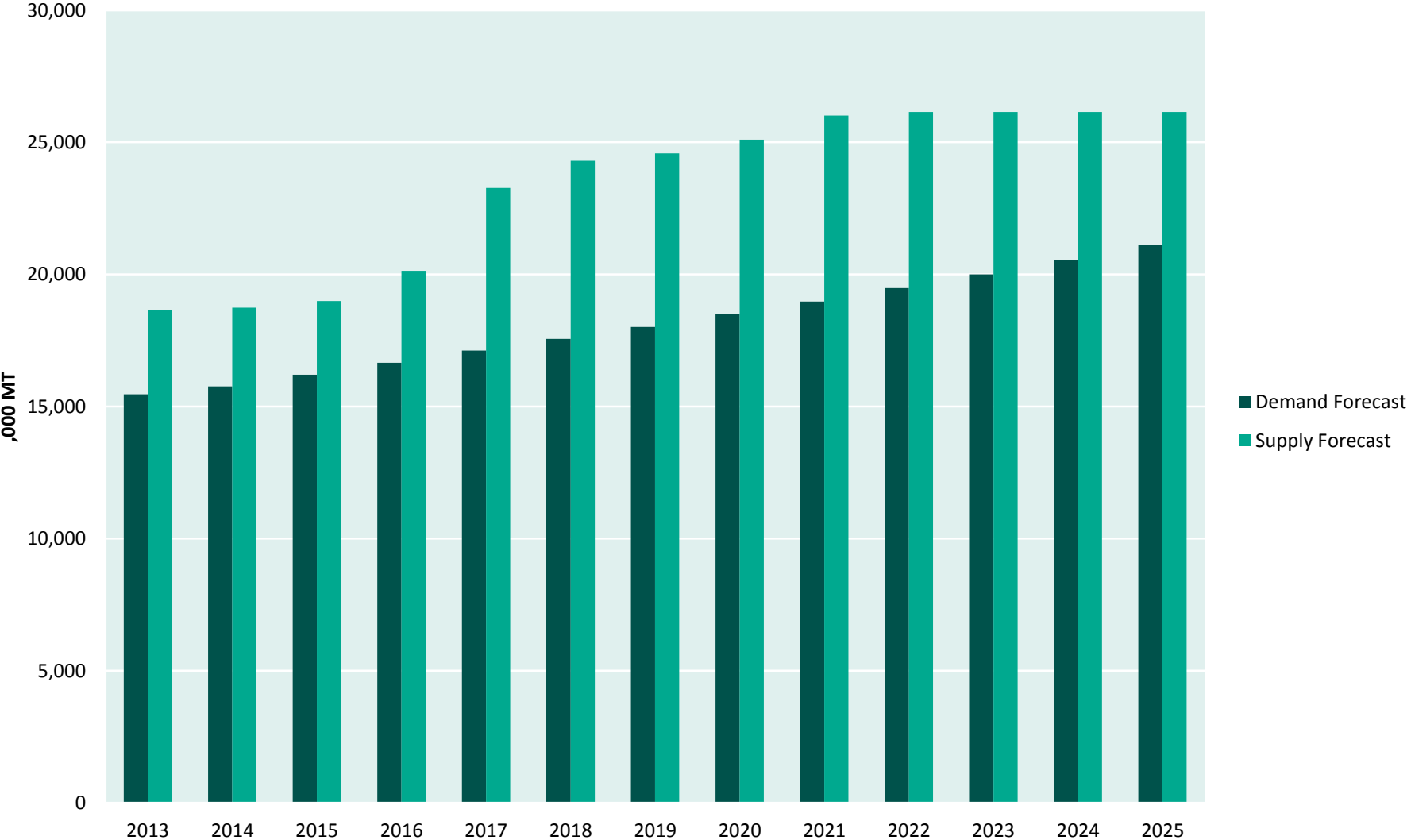


North America PE expansions



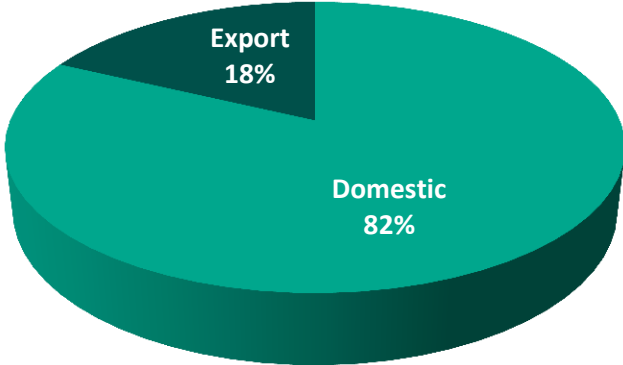
Source: Platts Analytics

North America supply/demand forecast

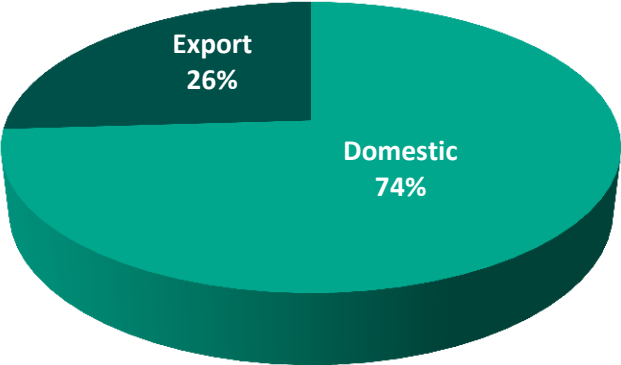


Source: Platts Analytics

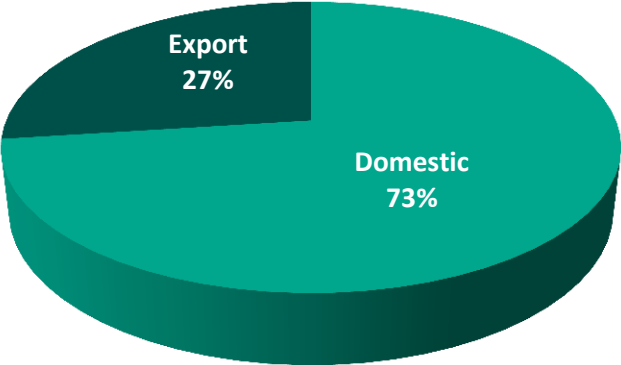
All US PE (2014)



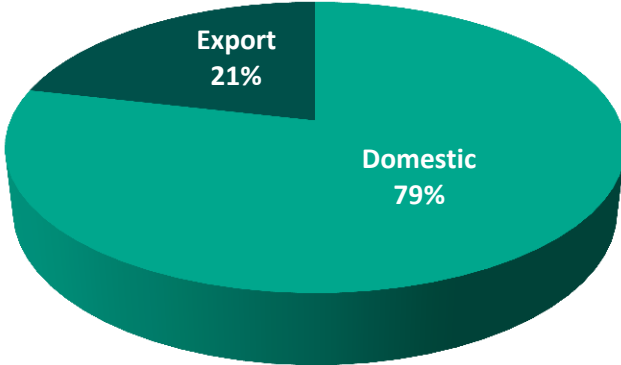
All US PE Projected (2018)



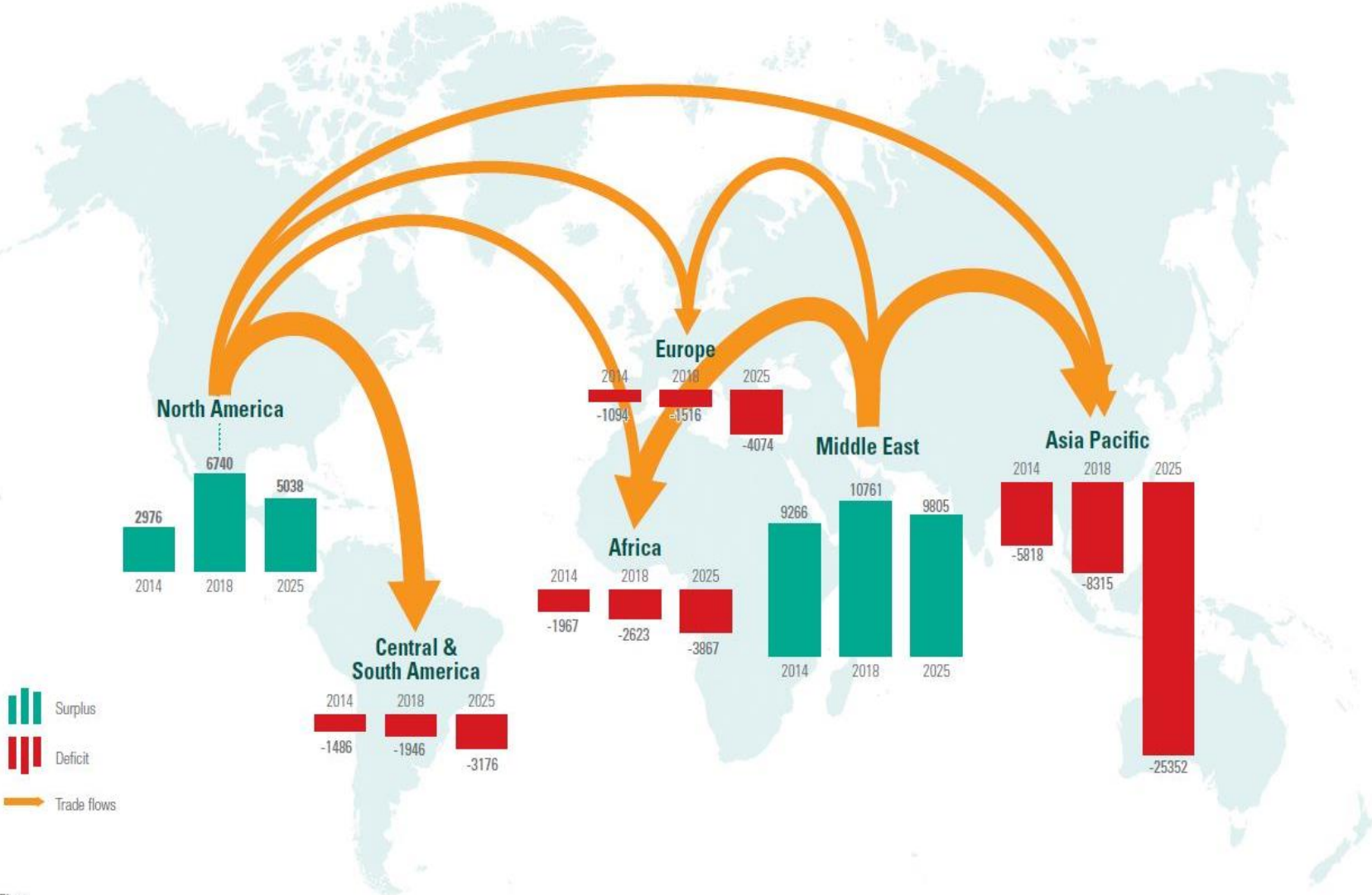
All US PE Projected (2021)



All US PE Projected (2024)



PE trade flows 2014, 2018, 2025

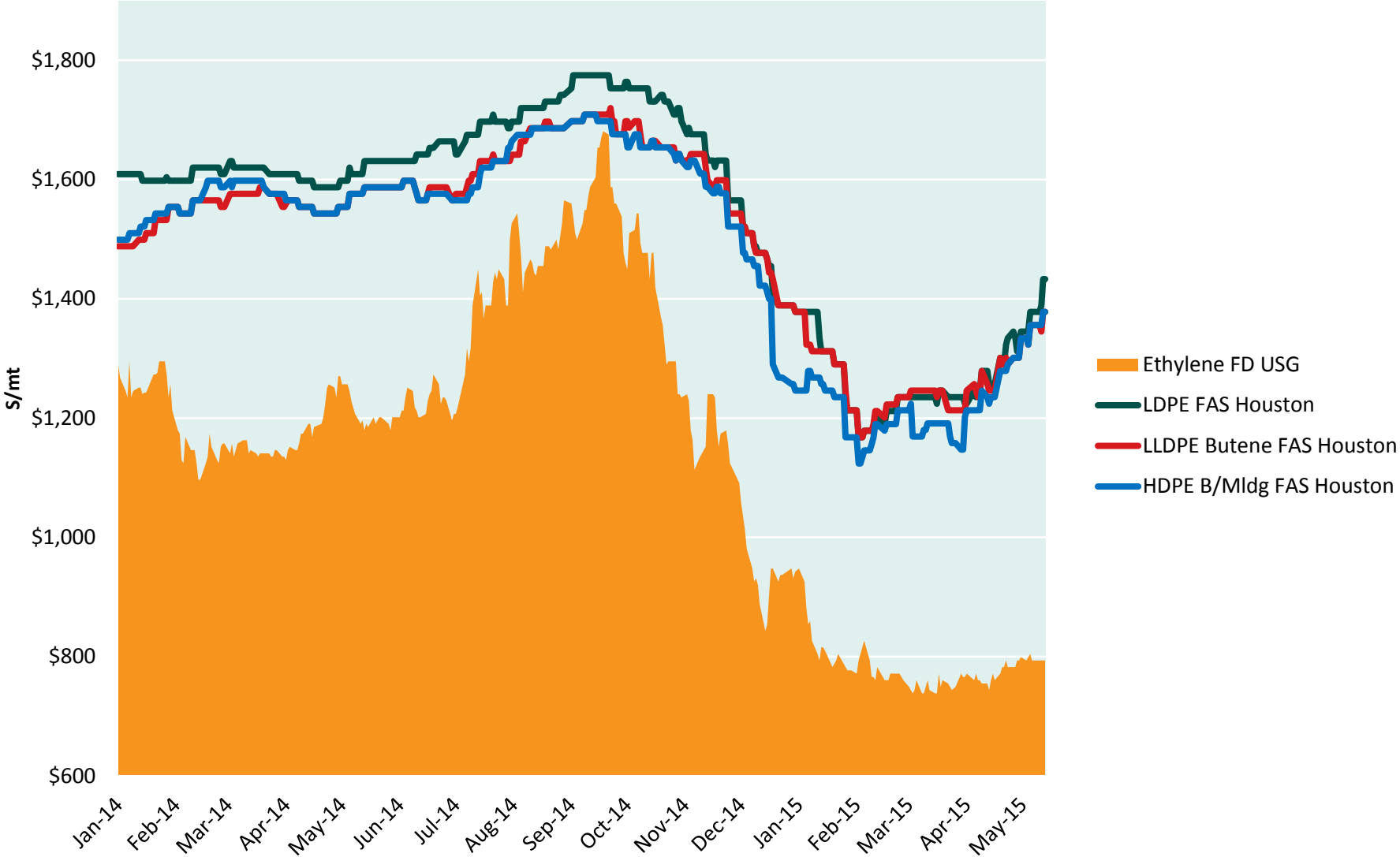


Source: EIA, Platts

How cheaper naphtha could upend the strategy

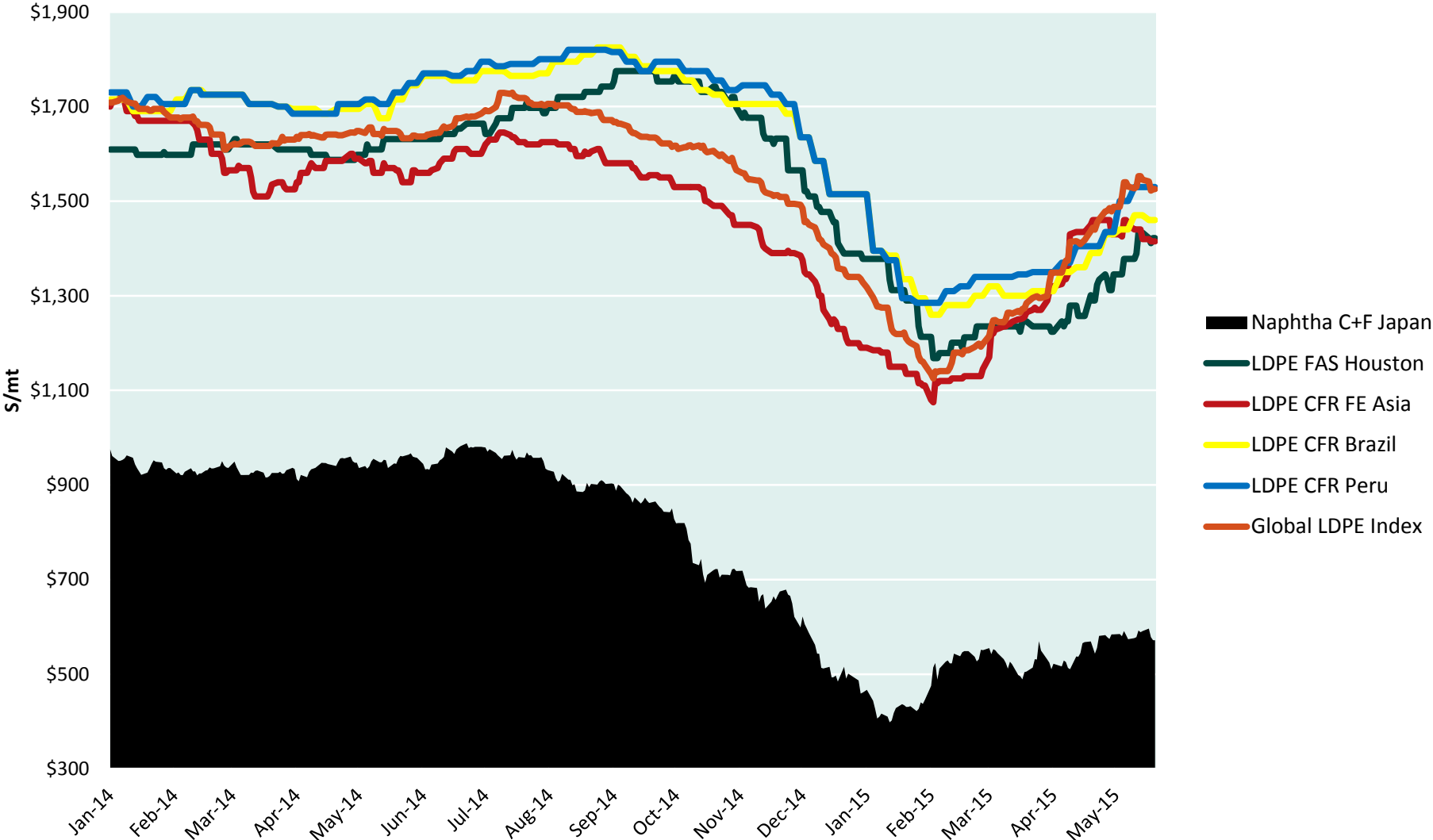
While ethane-based margins are still cost-advantaged, lower oil prices have some producers taking a closer look at potential investments.

US spot ethylene & PE



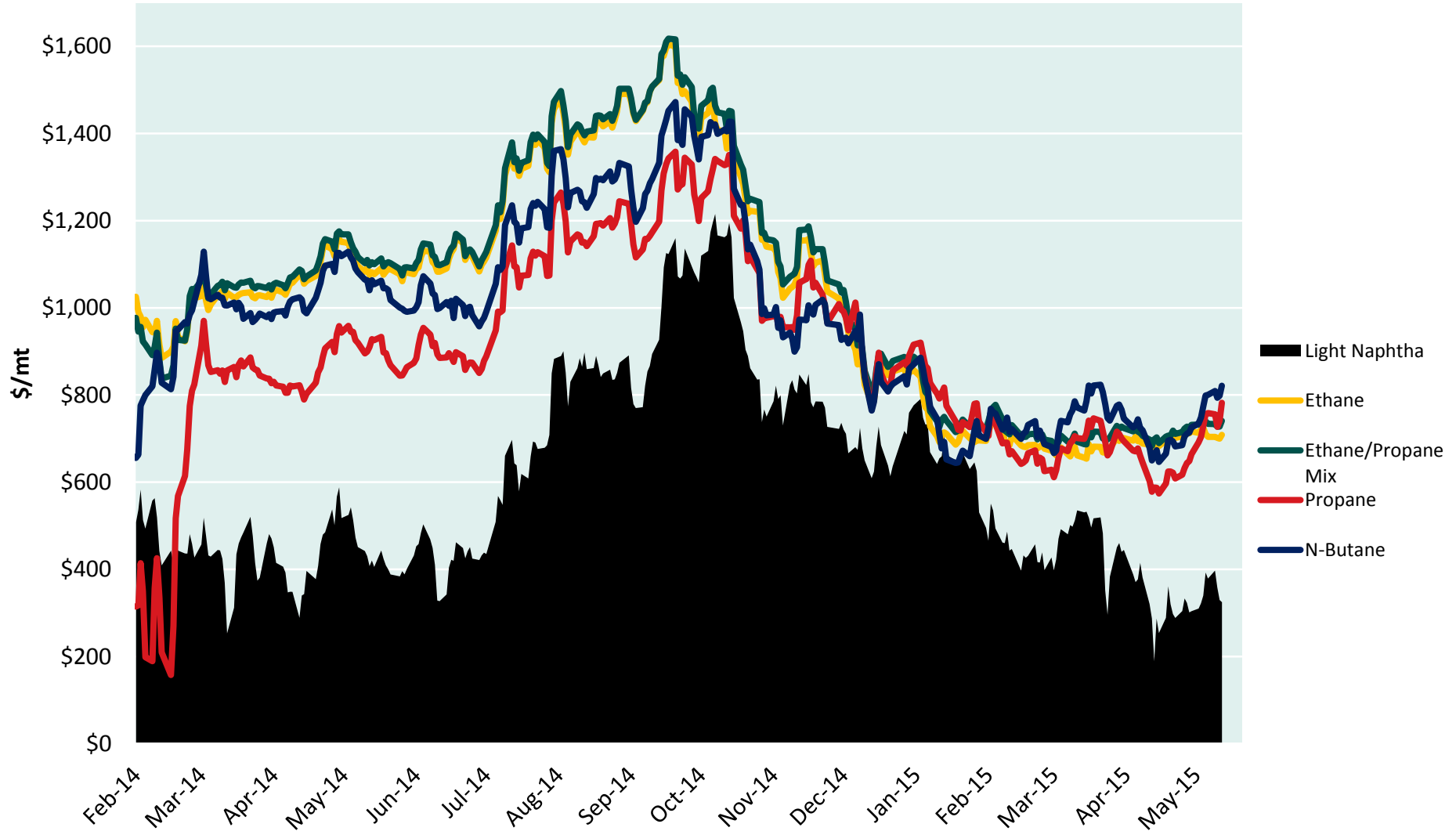
Source: Platts

Naphtha sets the PE global price



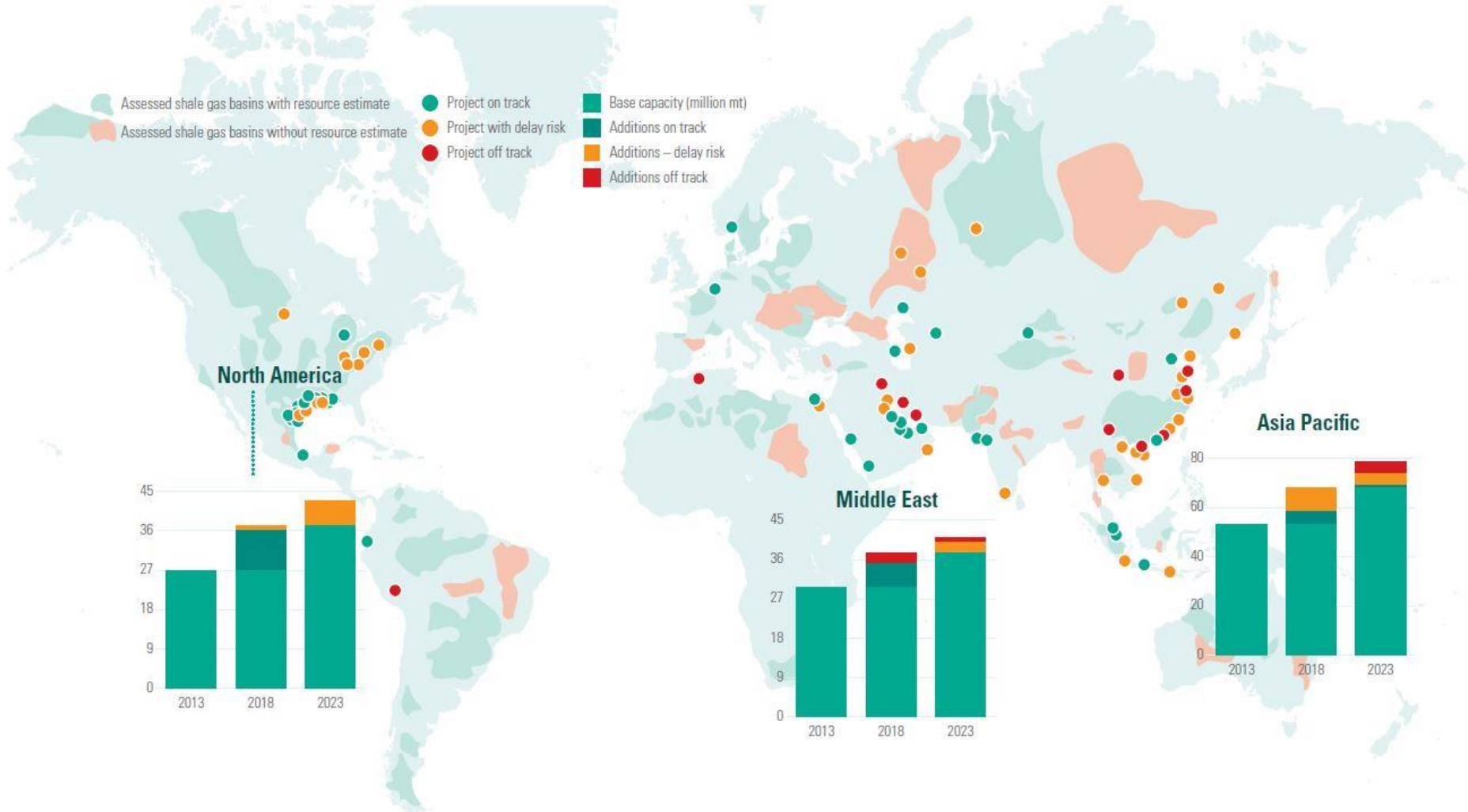
Source: Platts

US steam cracking margins



Global expansions

GLOBAL ETHYLENE CRACKER PROJECTS



Source: EIA, Platts

PP: Behind producers' push for margin expansion

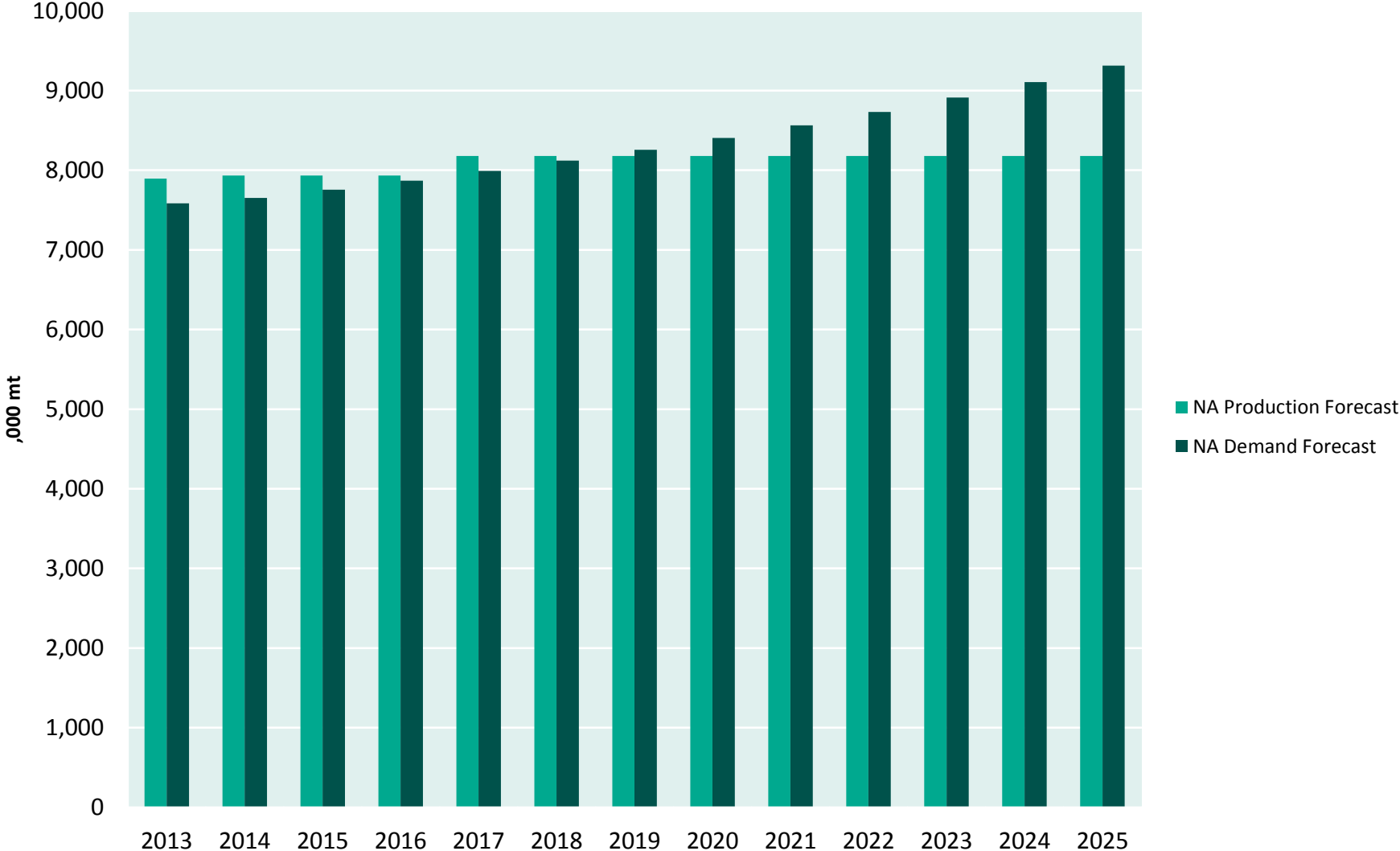
Current cost structures in the US have PP on the outside looking in when it comes to the polymer expansion boom.

US PE and PP: Days of inventory



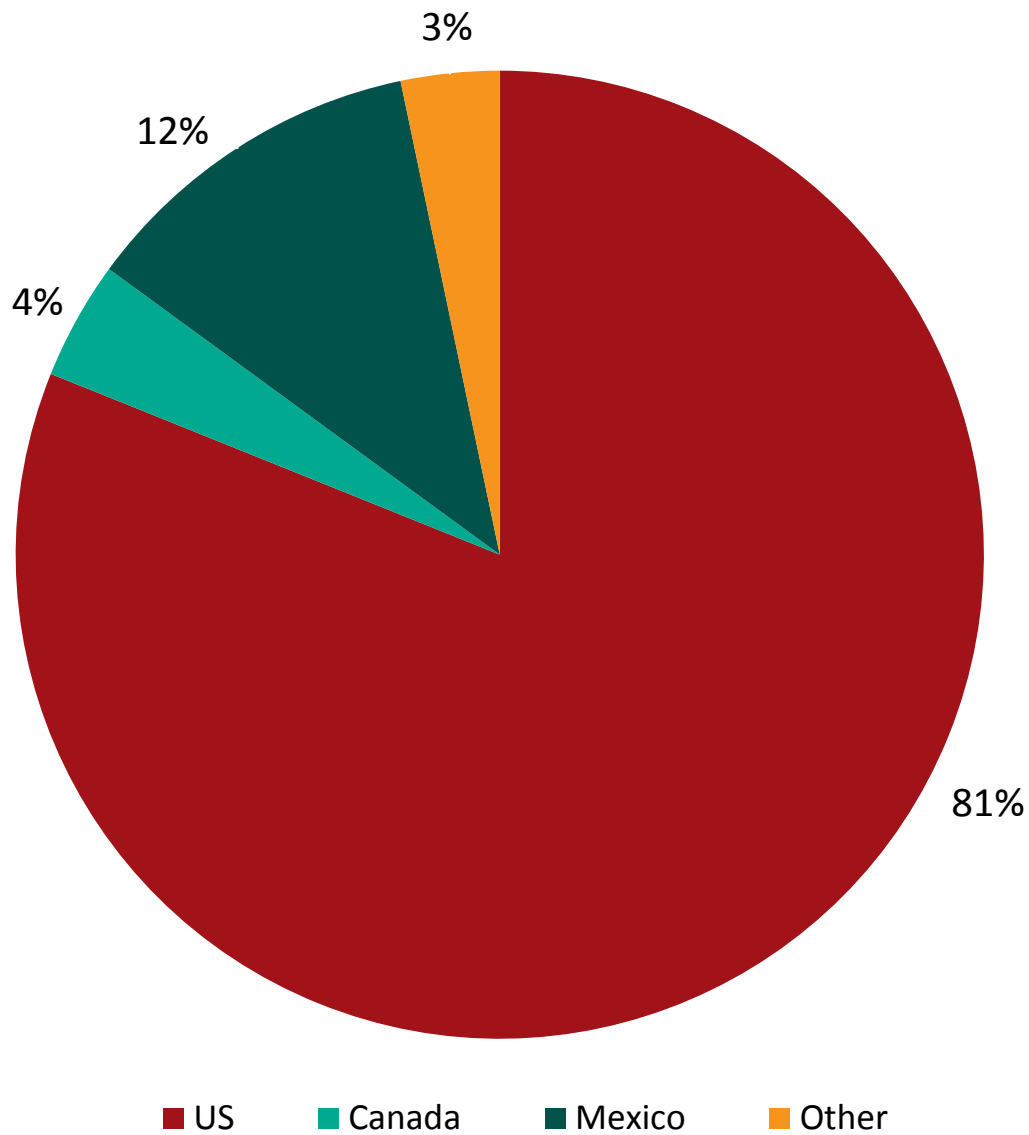
Source: ACC, Platts

North America PP Supply/Demand



Source: Platts Analytics

Where does North American PP go?



2014 NA PP Sales

US:

13.26 billion lb

Mexico:

1.91 billion lb

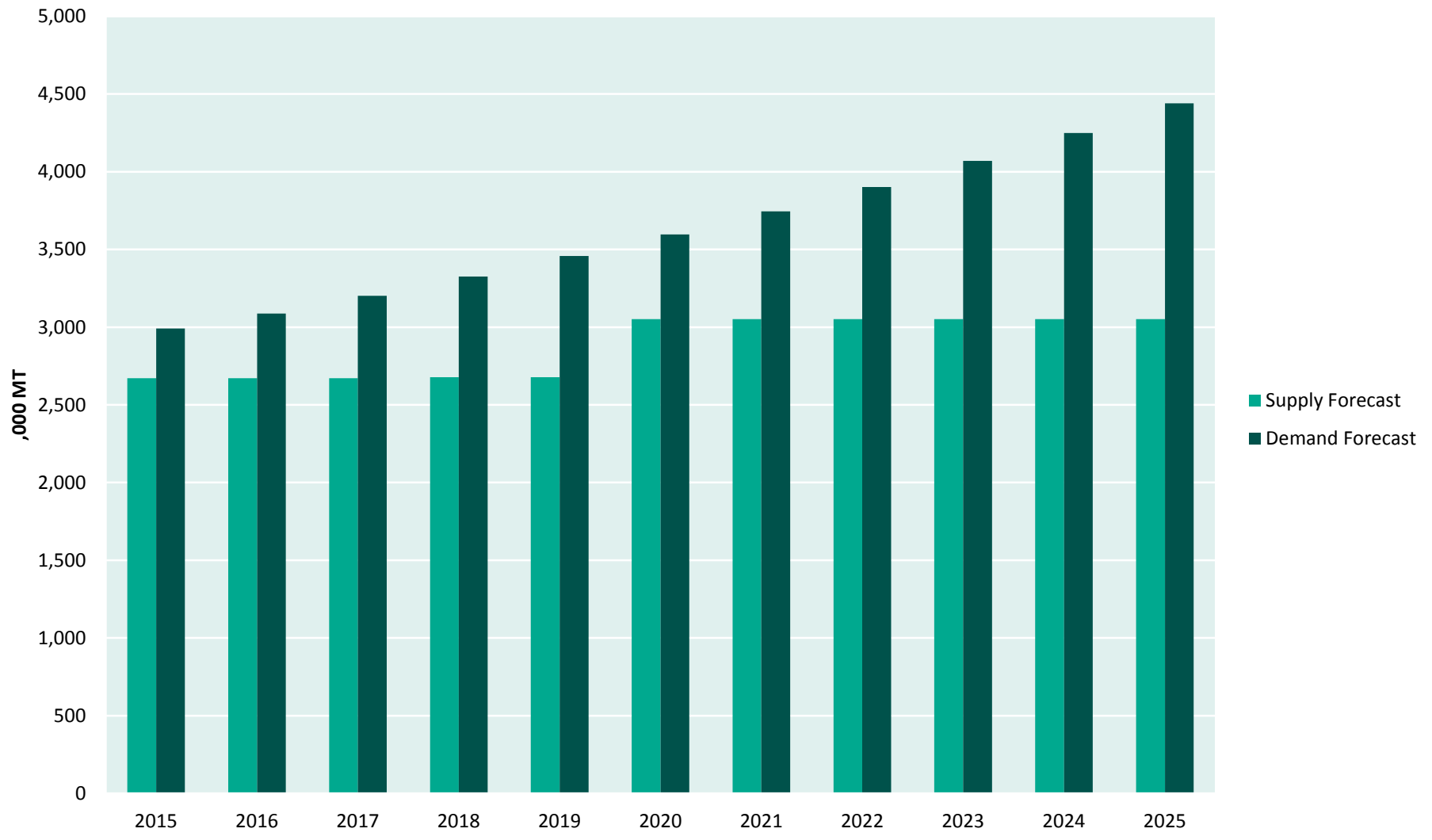
Canada:

646.3 million lb

Other:

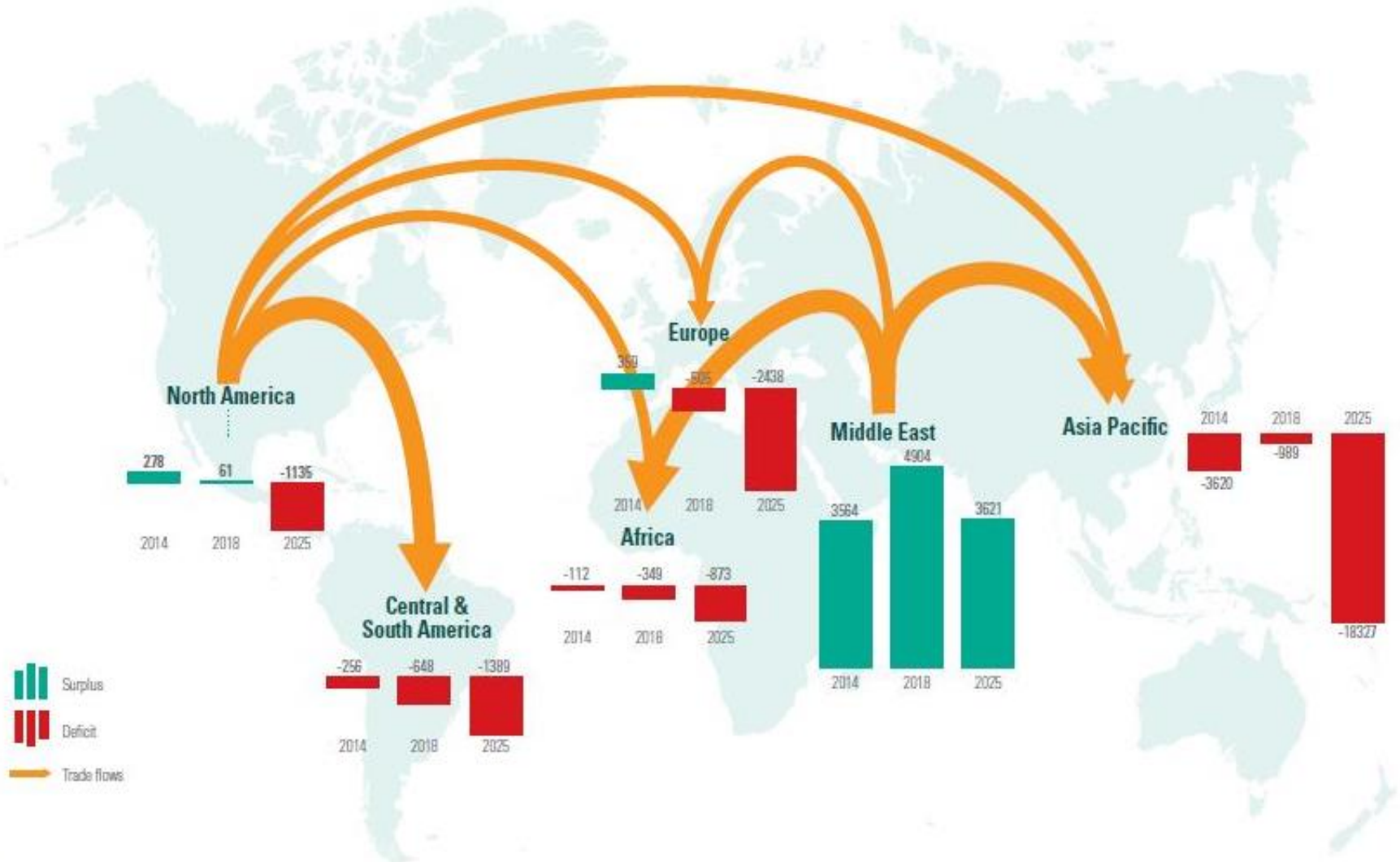
537.8 million lb

South & Central America PP Supply/Demand



Source: Platts Analytics

PP trade flows 2014, 2018, 2025

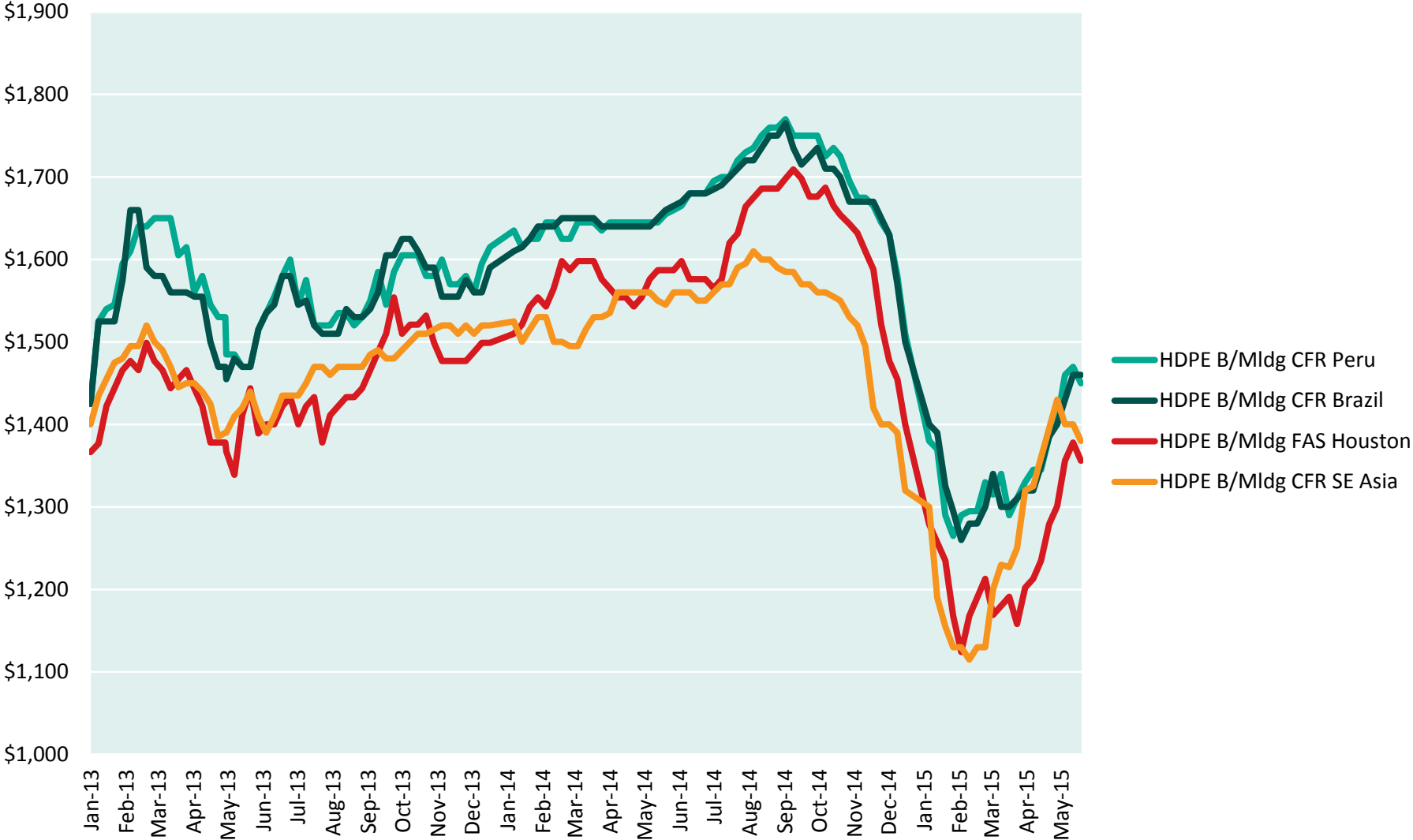


Source: EIA, Platts

Polymers at a glance

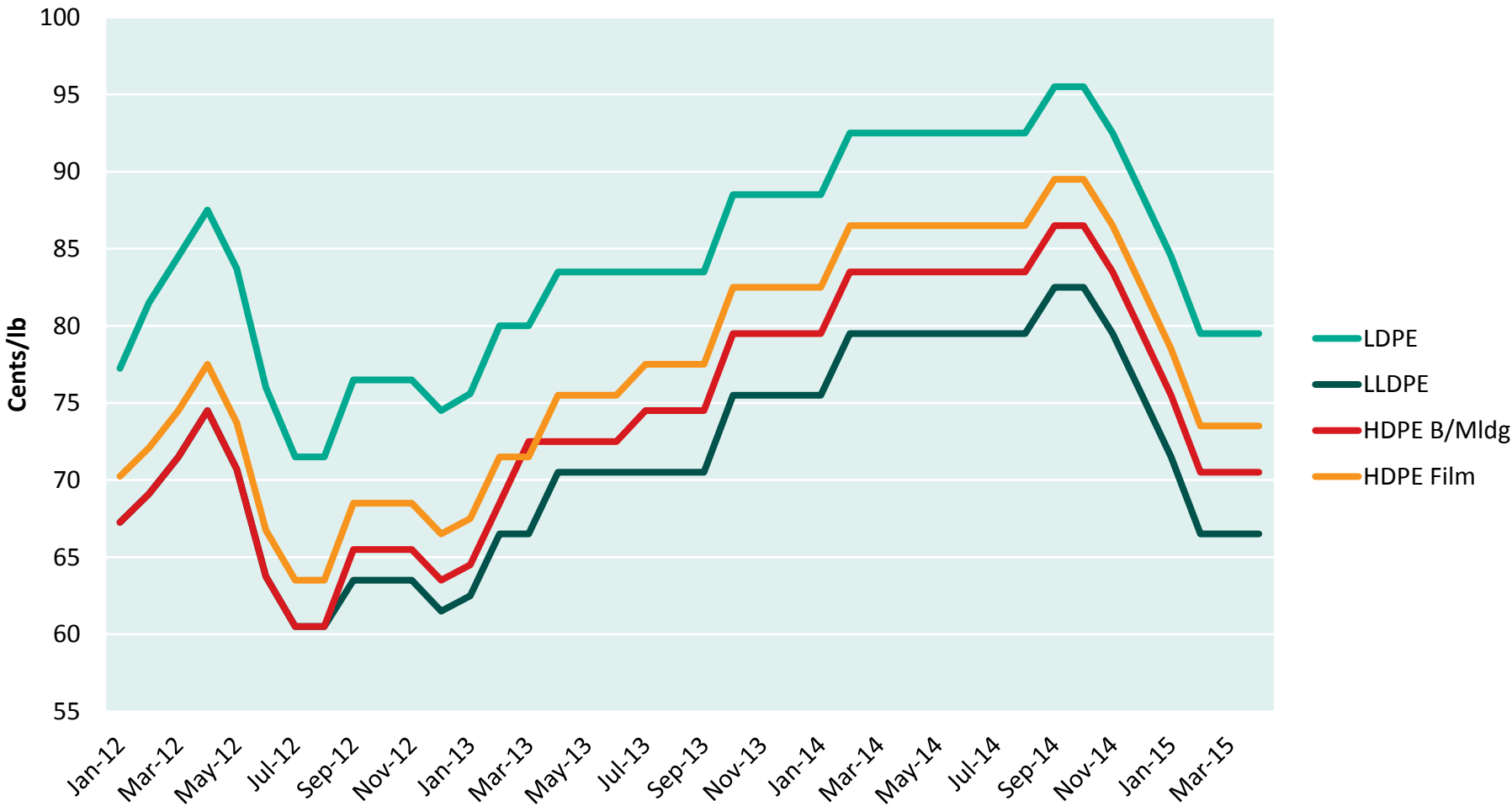
Polyethylene, PVC, polypropylene and polystyrene pricing updates

PE: US pricing competitive globally

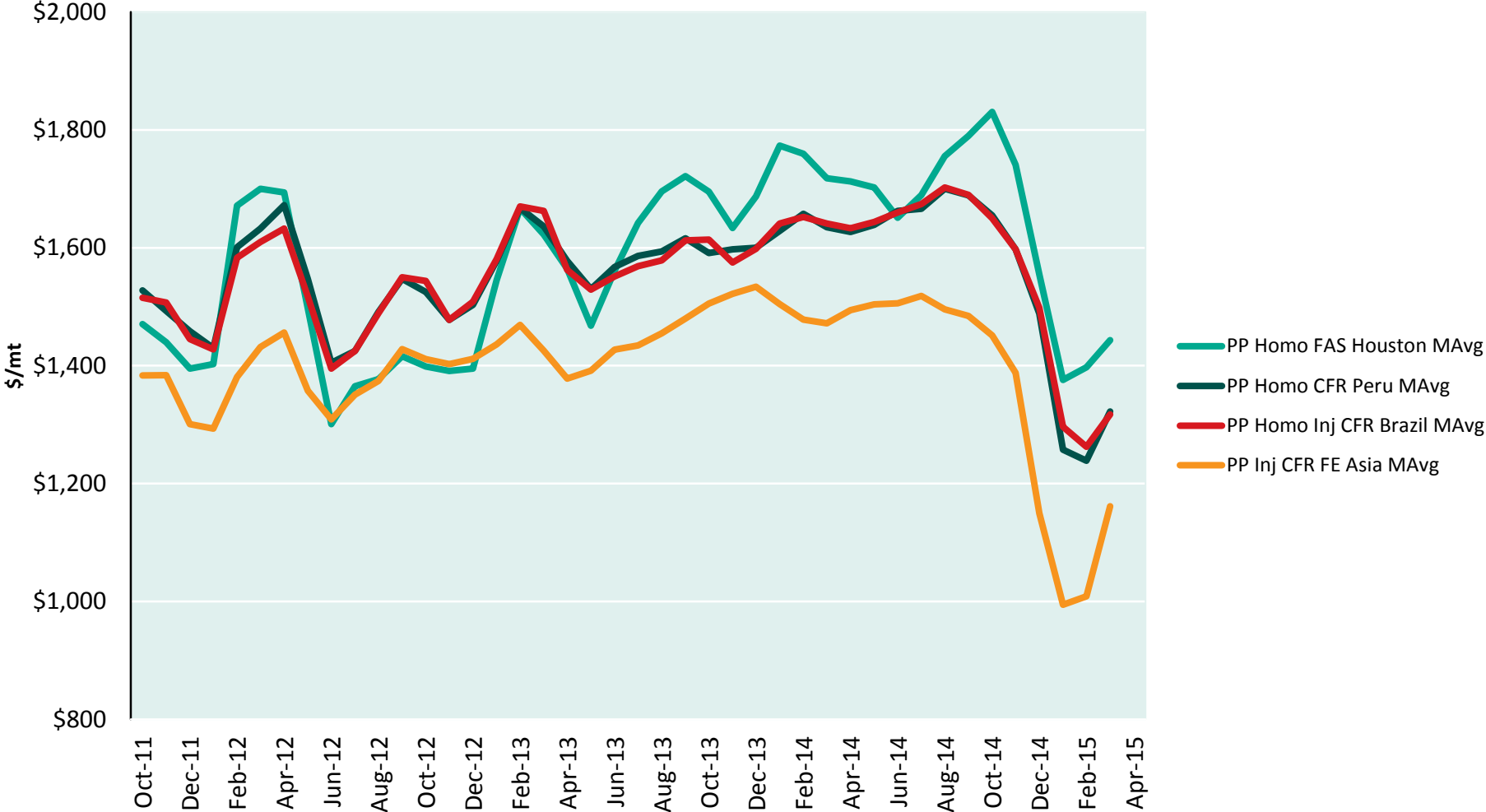


Source: Platts

Domestic Delivered Railcar

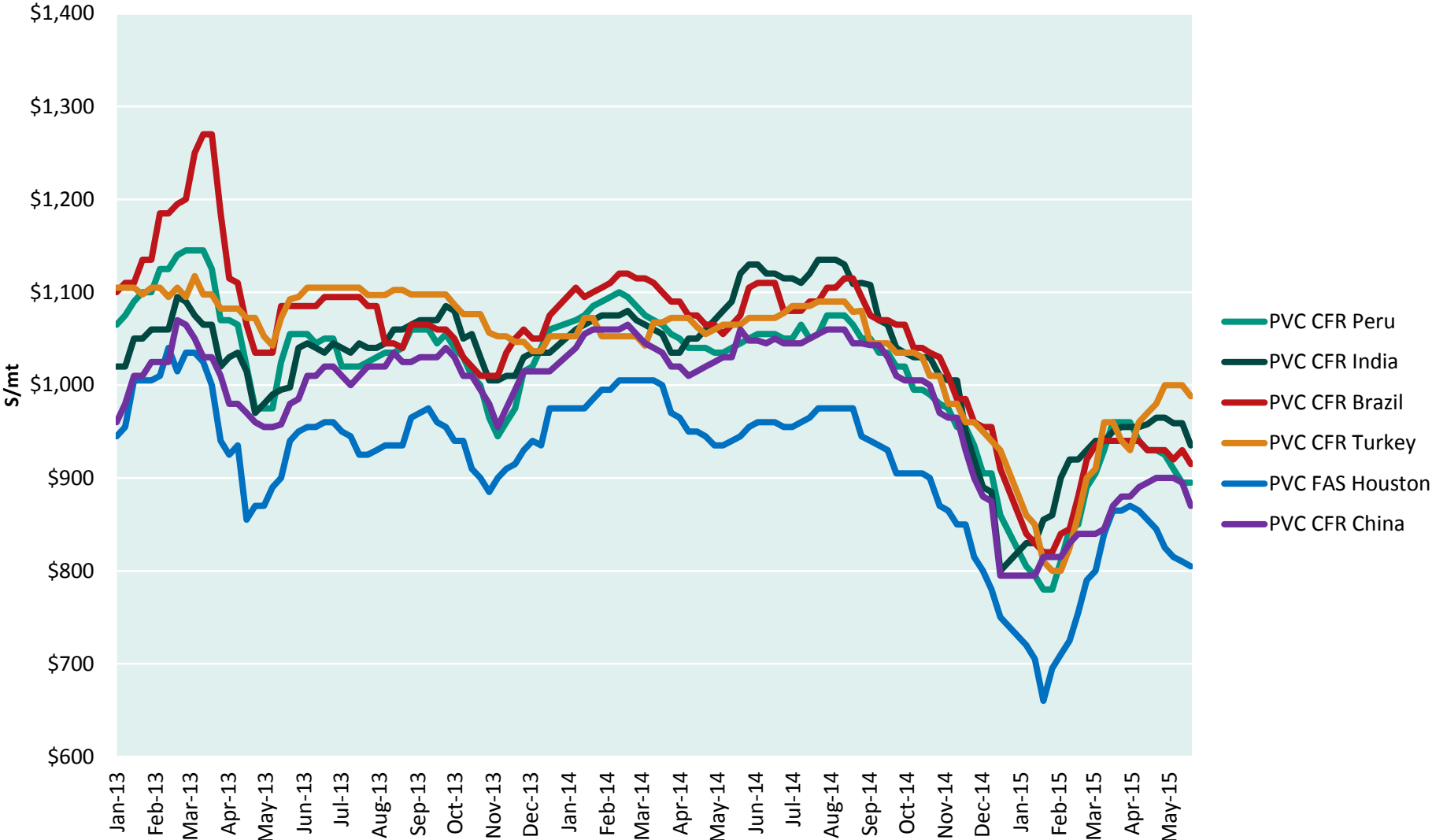


PP: US uncompetitive globally



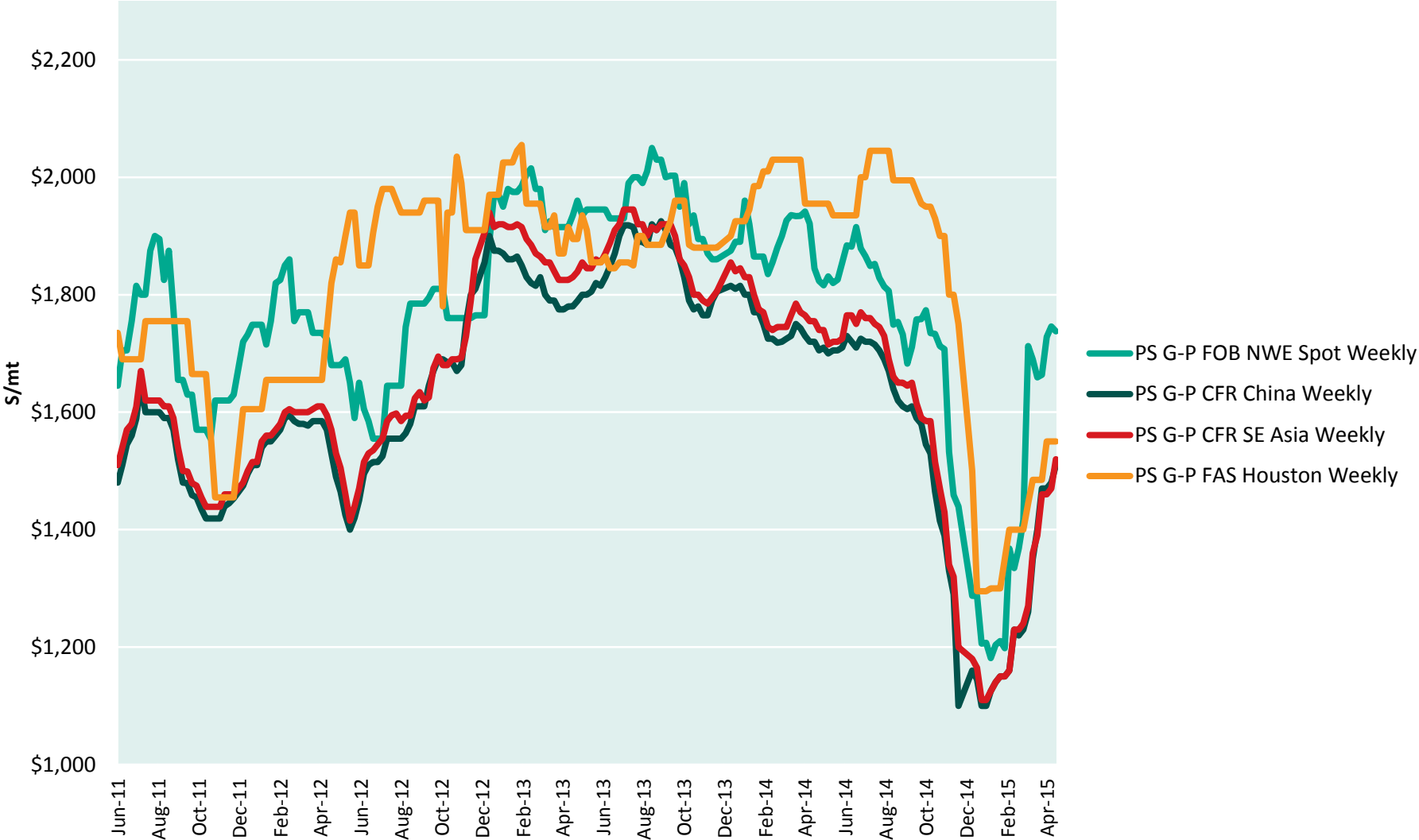
Source: Platts

PVC: US cost advantaged



Source: Platts

Polystyrene: Asia setting market



Source: Platts

- South America is net short polyethylene and expansions in North America will help fill that void over the next decade
- Lower oil prices have made naphtha-based ethylene producers more competitive with shale gas-based producers
- Even with greater North American reliance on ethane, naphtha will remain the global price setter for PE
- US producers are attempting to increase polypropylene margins to help justify new expansions
- Global polymer prices have applied pressure on US export prices, however weaker feedstock costs keep margins little changed.

Gracias! Thank you!

Let's stay in touch regarding the markets

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Shifting trade patterns and North American methanol expansions

Colleen Barry-Goodman, Managing Editor
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AGENDA

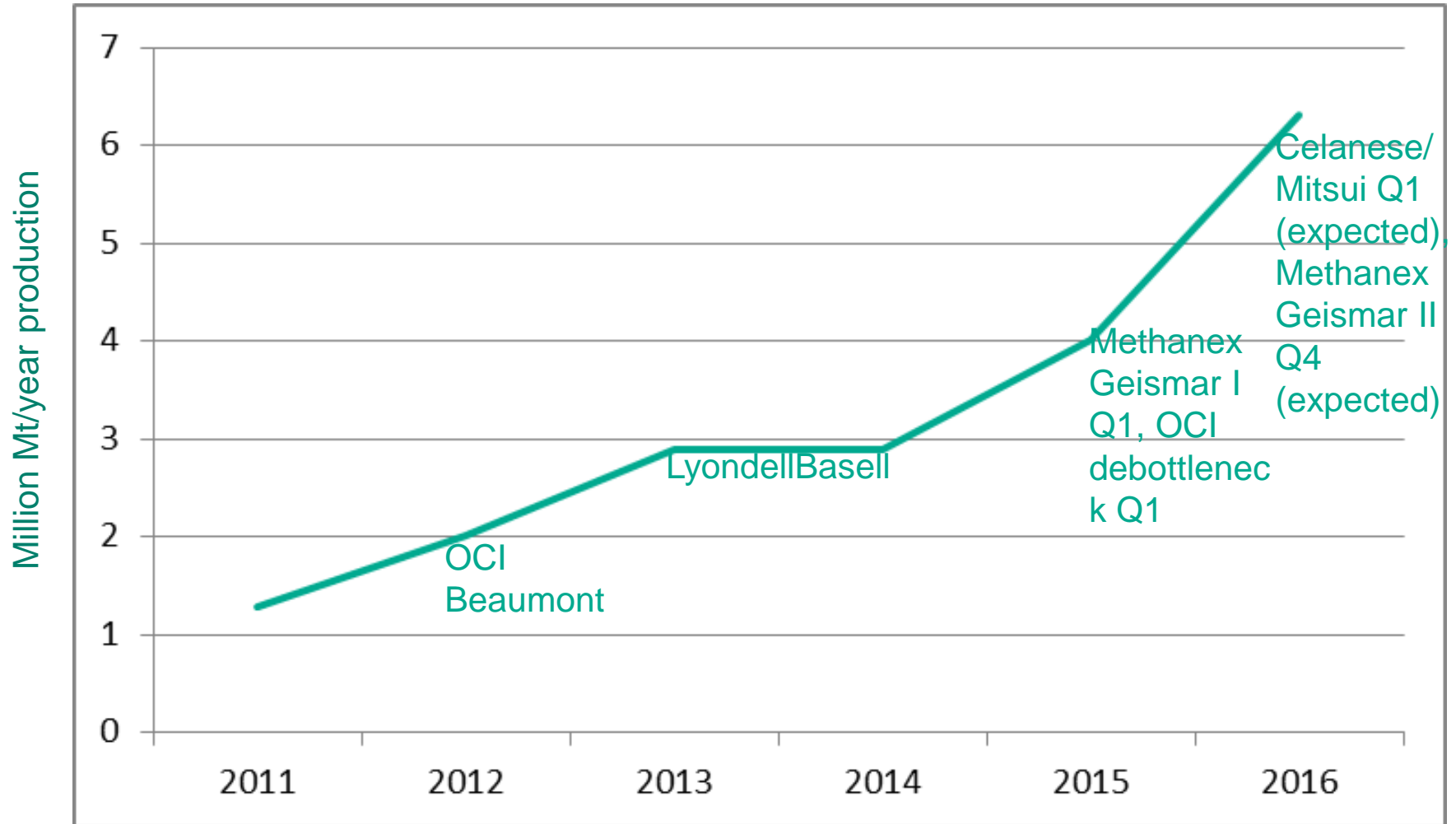
Snapshot on US spot market
Shale gas and methanol production
Shifting trade patterns in N. American market

CTO/MTO process and economics
Methanol as a non-traditional olefin feedstock
Coal: China's feedstock advantage for feedstock production
Q&A

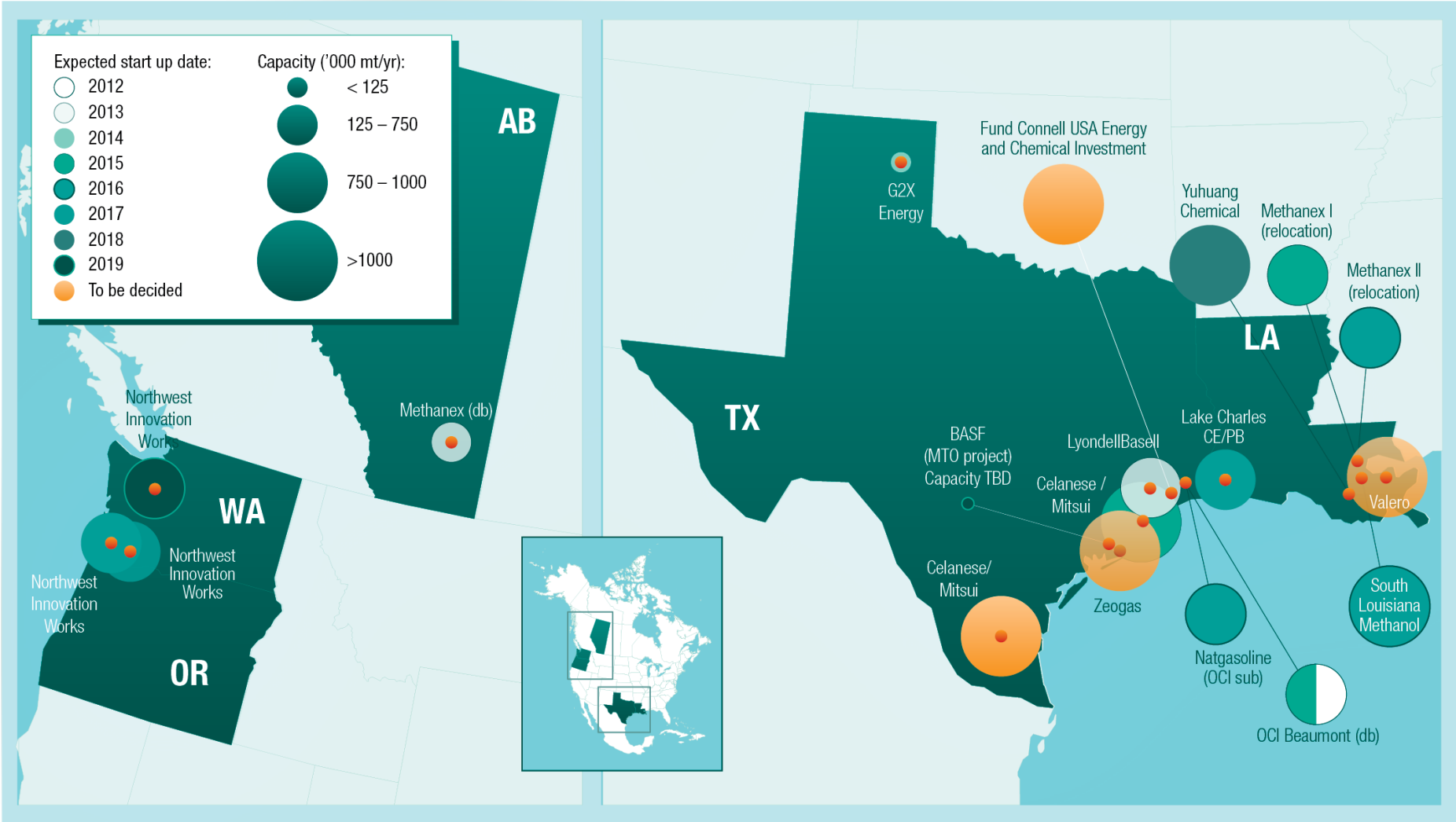
Spot methanol FOB USG



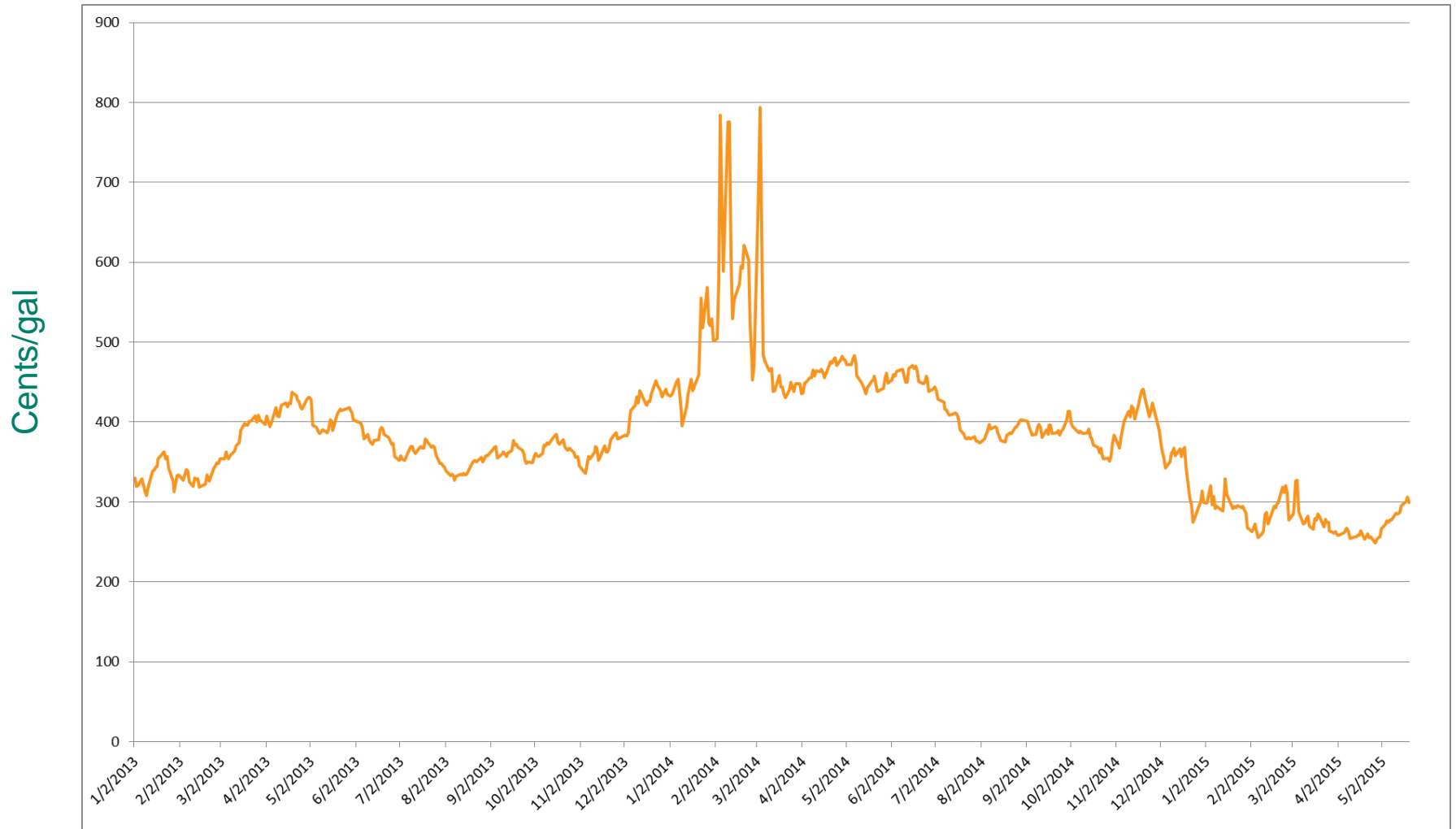
How much new production?



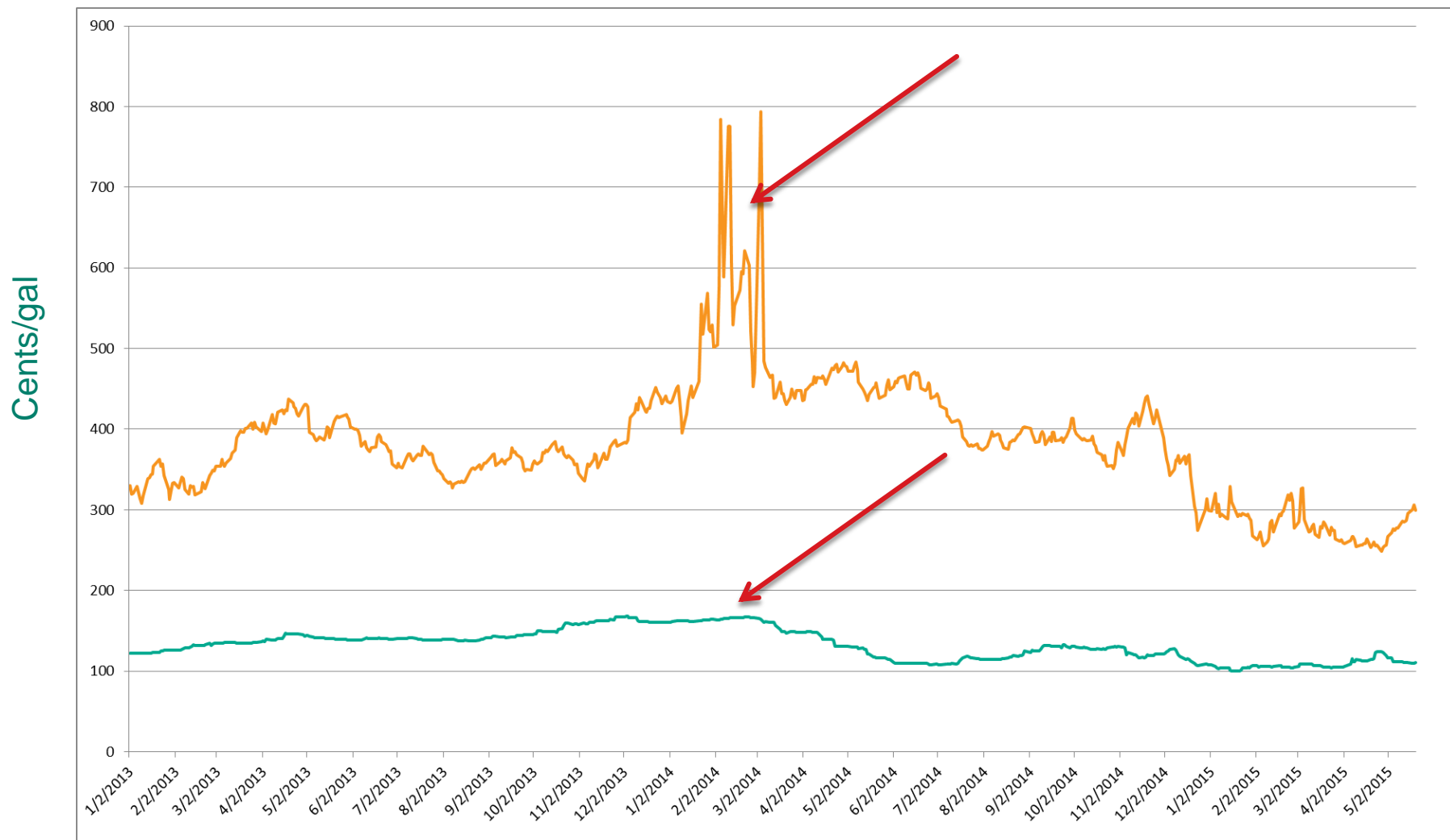
North American methanol projects



Henry Hub

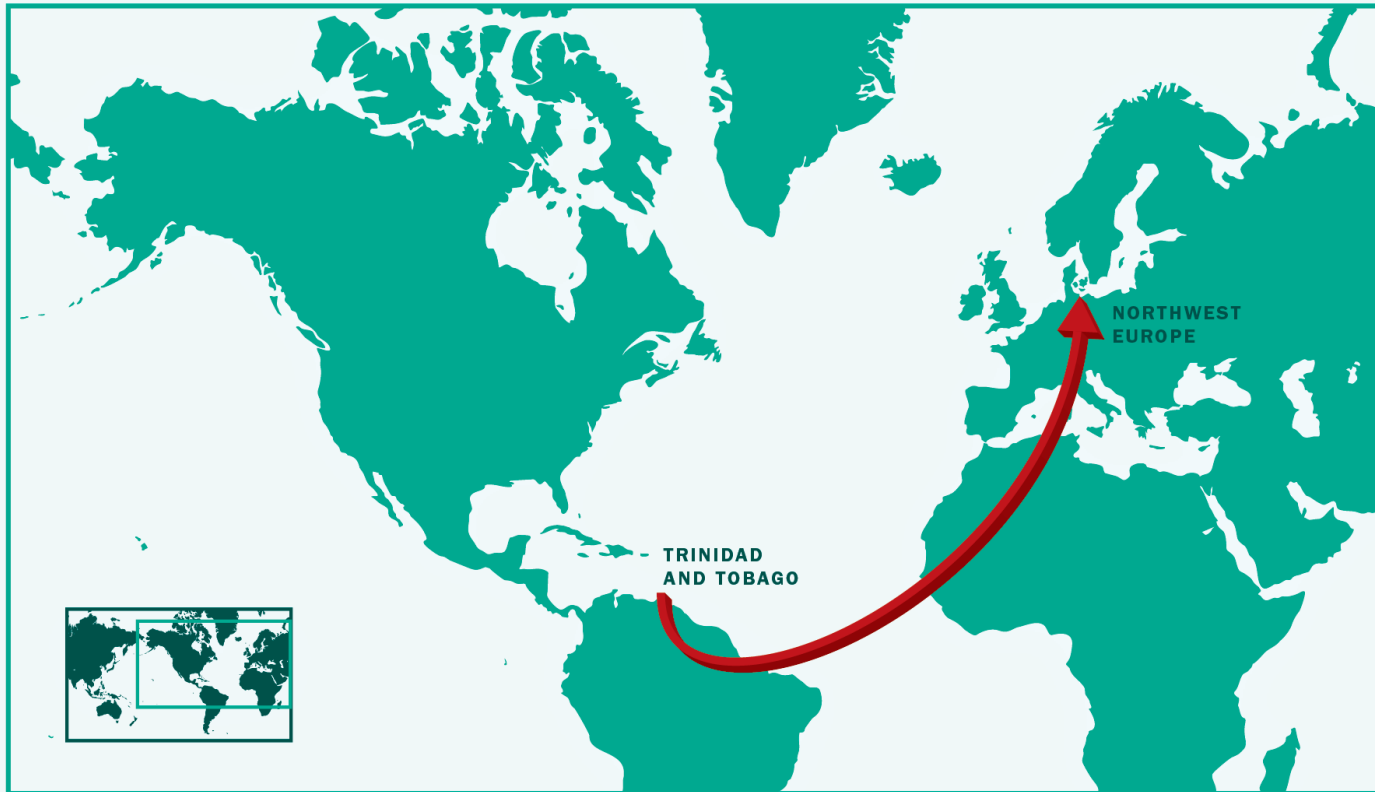


Methanol spot price v Henry Hub



- Once US production outpaces demand, product has to go somewhere, which leads to several questions...
- Where will balance of North American production after 2016 go?
- Where will Trinidad & Tobago material go?
- Will pricing move lower once the new capacity is online?

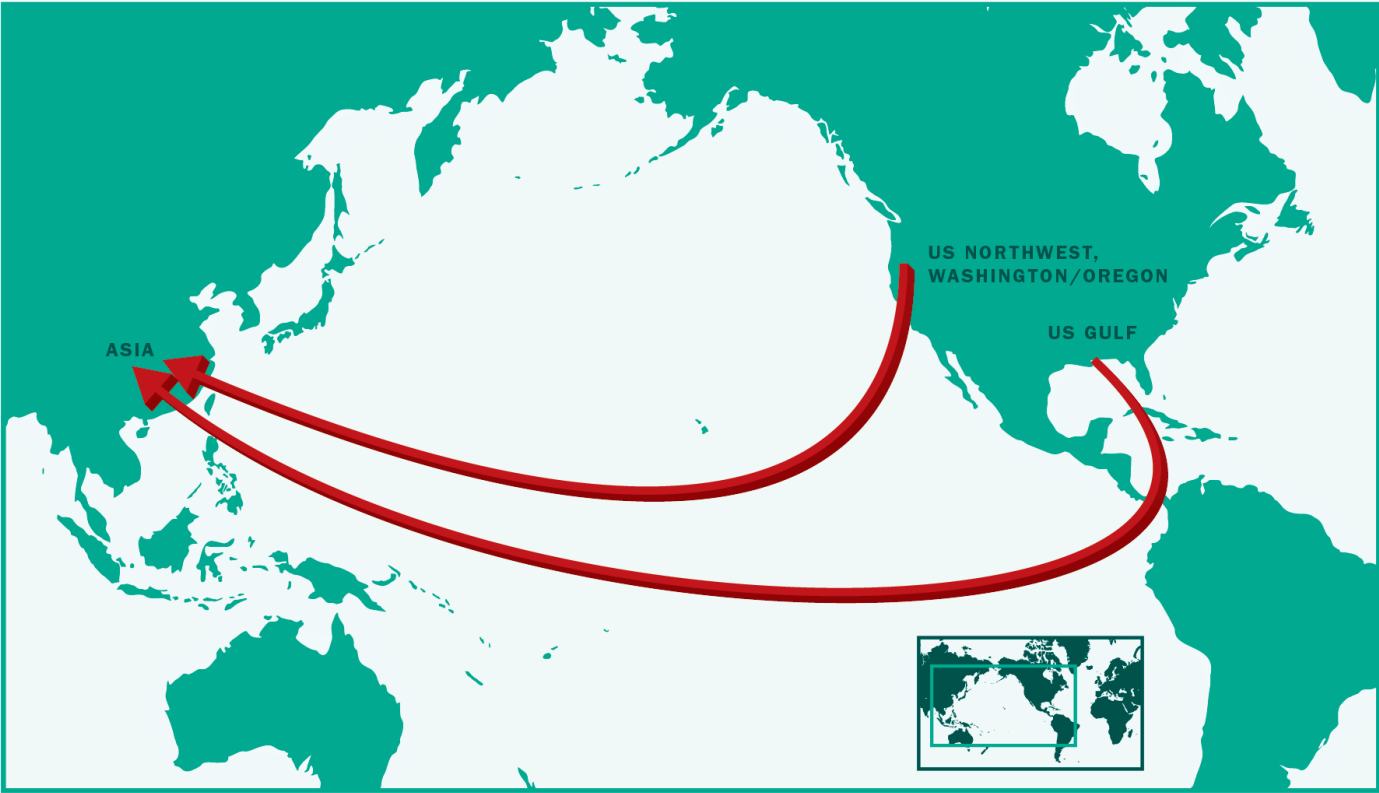
Increased European demand



Increased South American demand



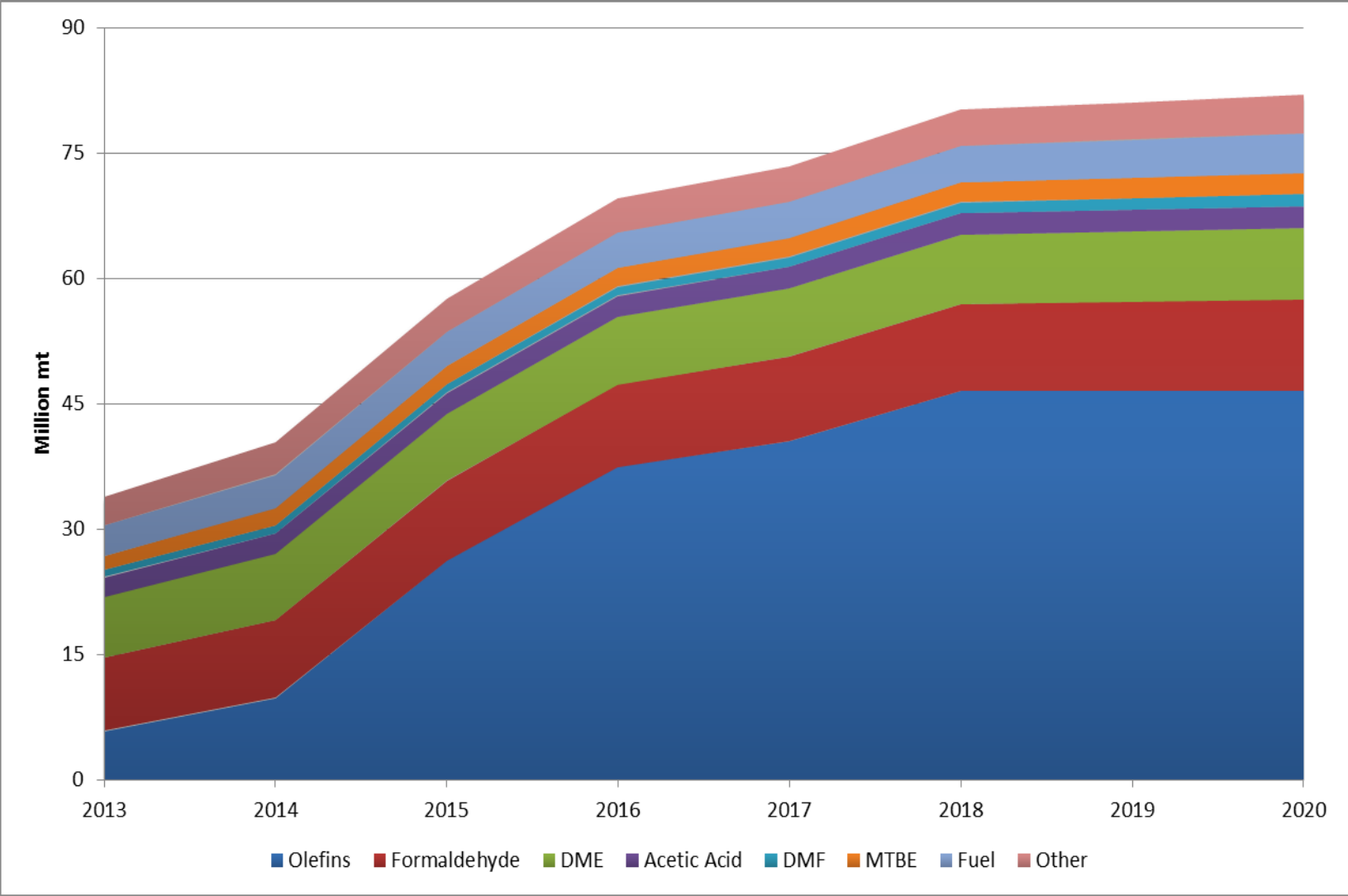
Asia MTO/CTO demand

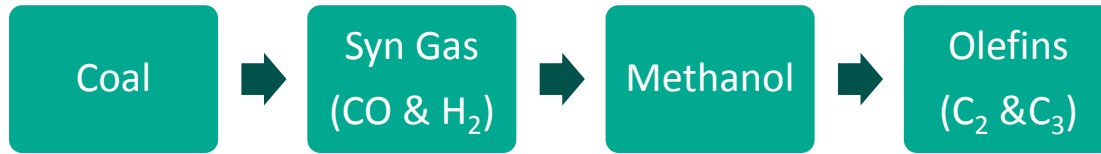


How China's MTO push impacts Global Methanol Trade

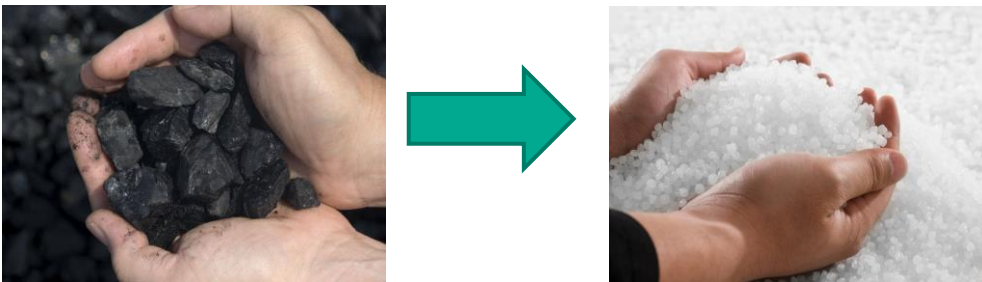
MTO and CTO basics

Methanol Consumption in China



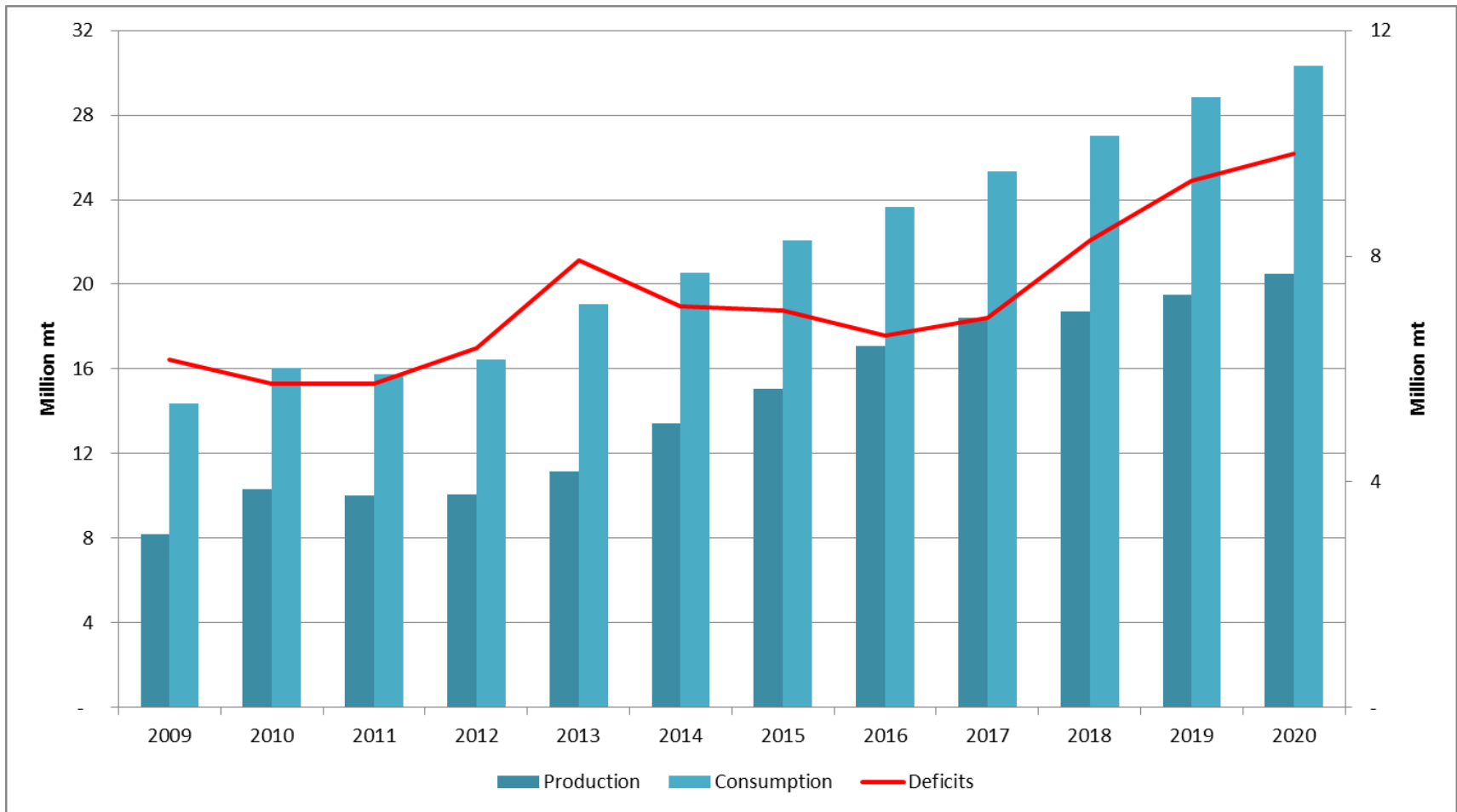


- Coal gasification, syngas cleaning, methanol synthesis, olefins polymerization
- Coal is synthesized in a gasifier to produce the synthetic gas
- Syngas is then converted into methanol
- Transformation into olefins



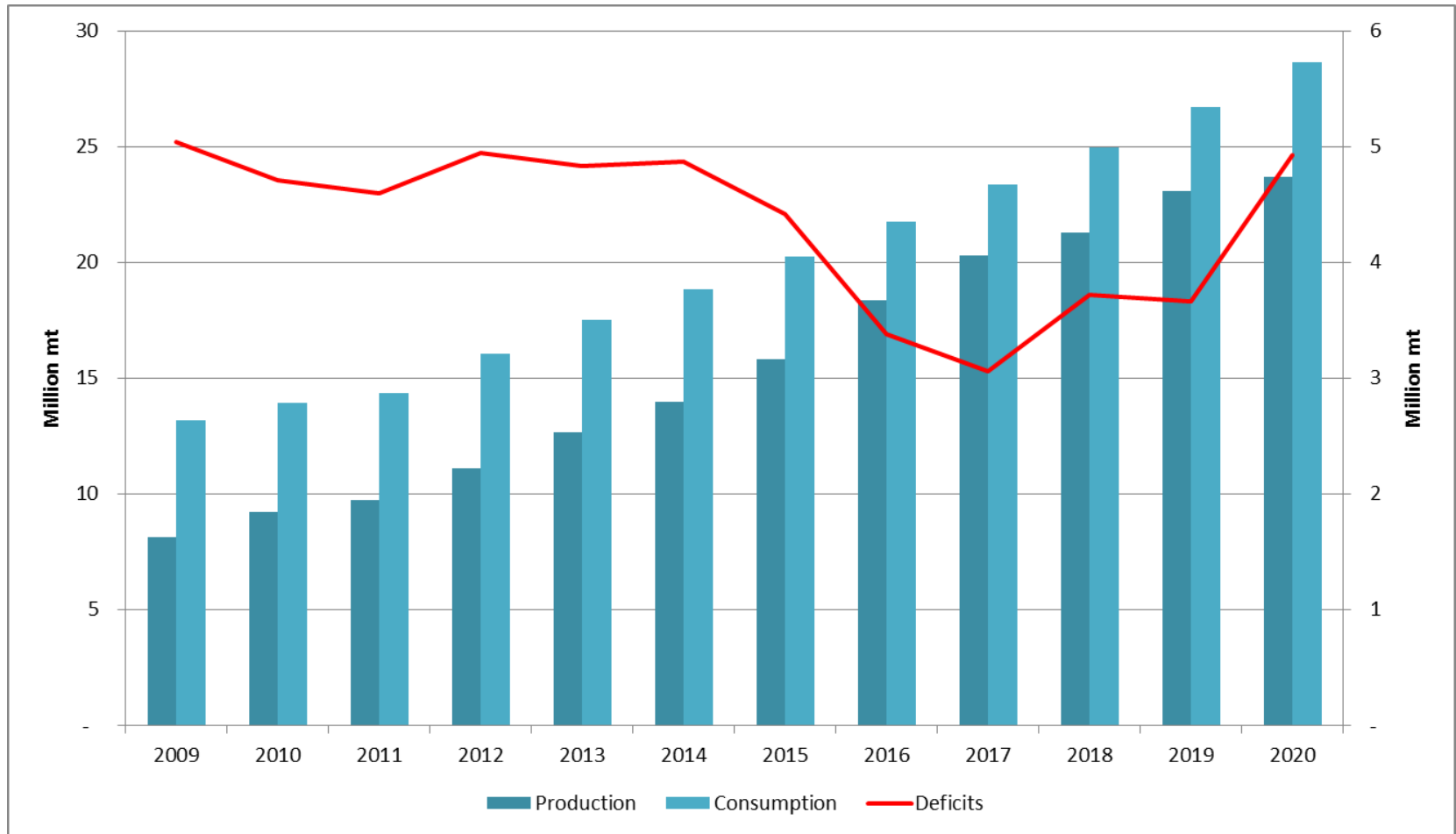
- Movement away from oil feedstock in petrochemicals
 - Oil imports account for about 60% of China's demand
- Coal mining diversification as traditional downstream coal demand levels off
 - More than 70 per cent of China's miners are losing money (China Coal Industry Association)
- Power generators looking for non-regulated investments with higher margins
- Job creation in poor regions

China's PE Deficits



Source: Platts Analytics

China's PP Deficits



Source: Platts Analytics

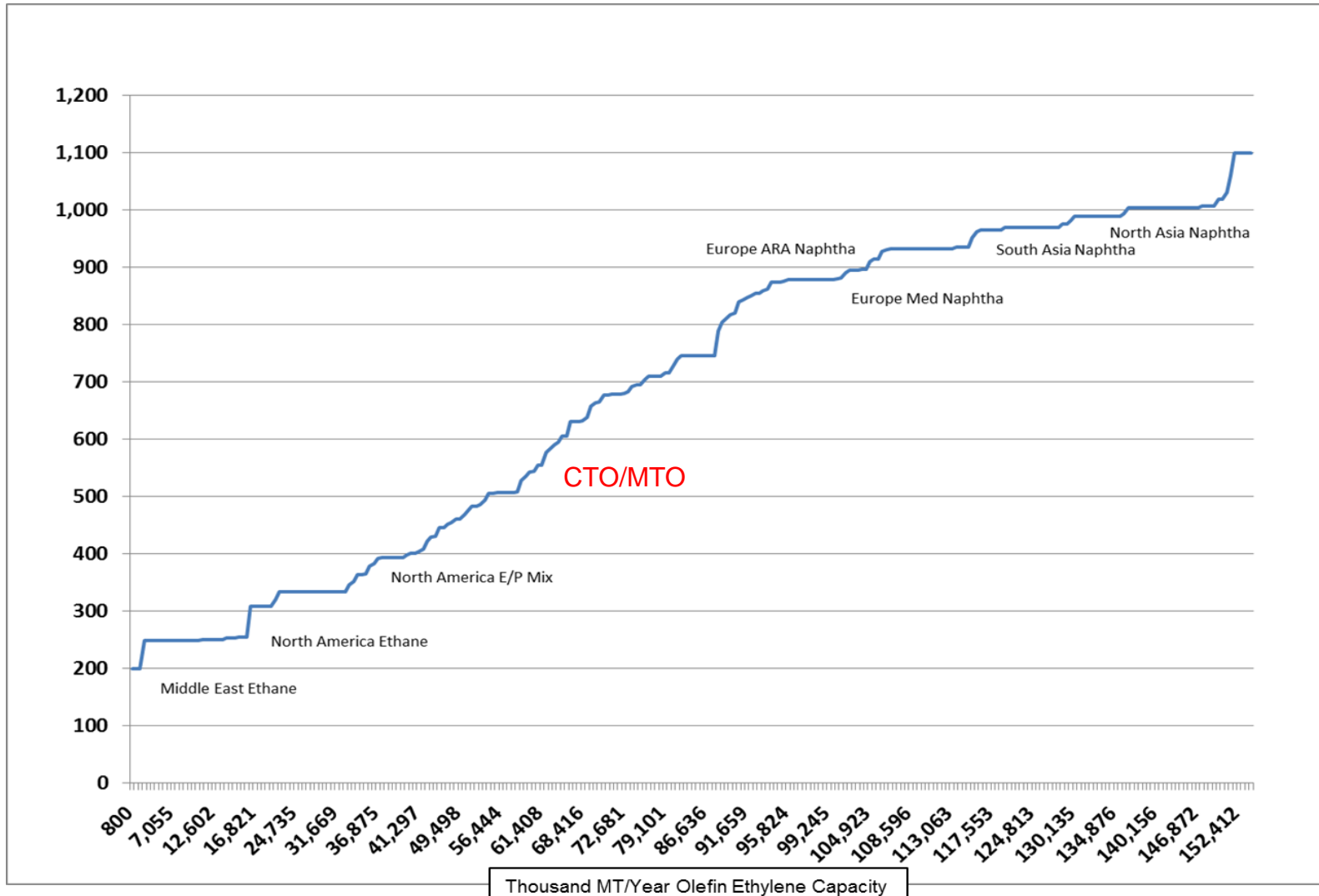
Challenges

- High Capital Costs
- Consumes ~40 mt of fresh water to produce 1 mt of olefins
- Water depleted in production regions
- Near coal mines away from coast
- MTO projects relies on imports

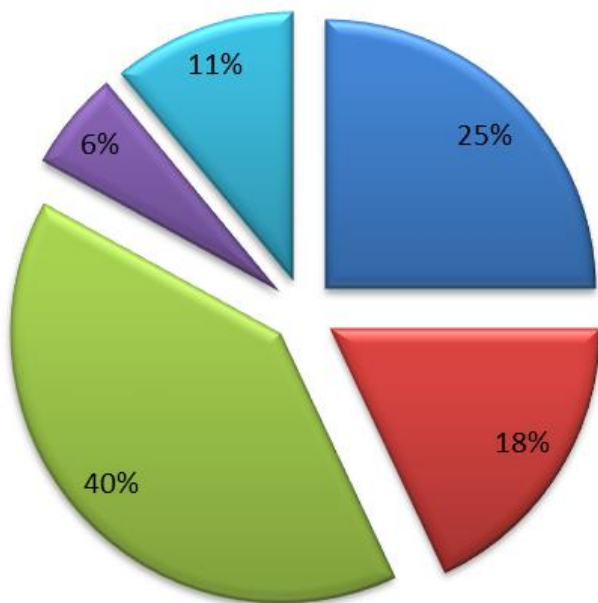
Benefits

- Higher return on investment
- Abundant feedstock for CTO projects
- Lower Feedstock (Coal) Prices
- Lower cash cost for producing 1 mt of ethylene

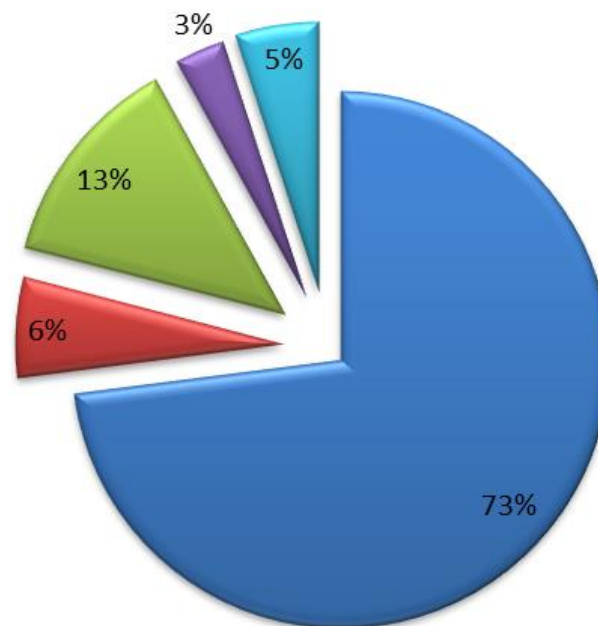
Global Ethylene Production Cost Curve



Typical CTO Cost Structure



Typical MTO Cost Structure



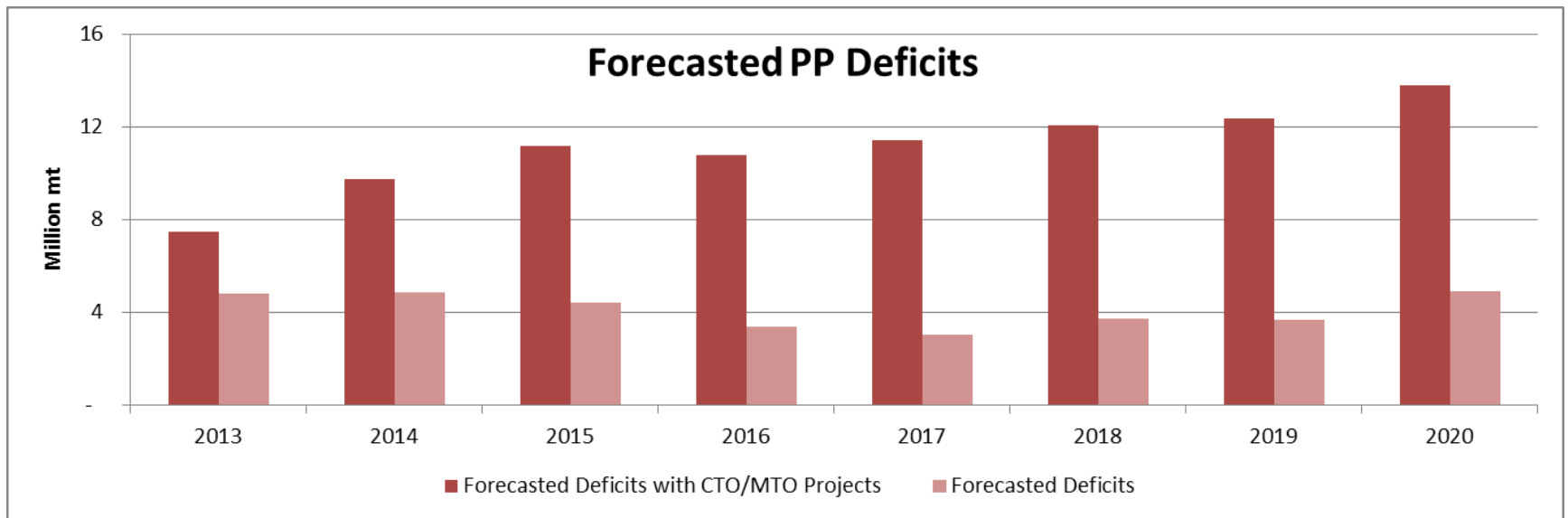
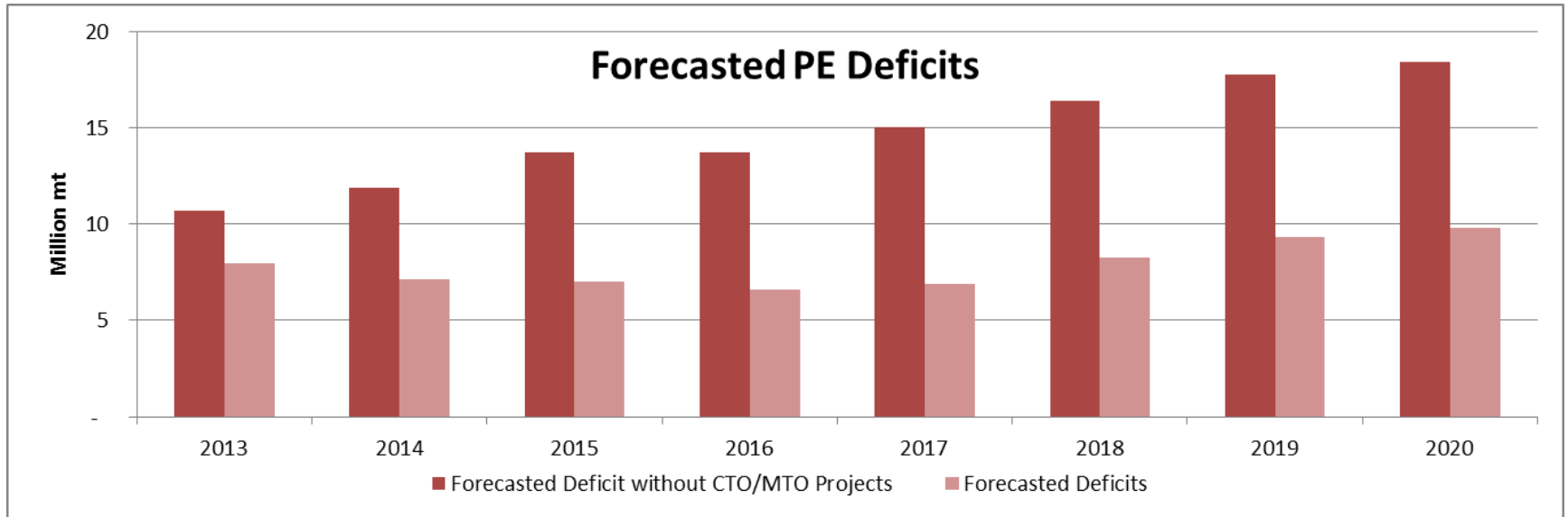
■ Feedstock ■ Power ■ Financing and Depreciation Costs ■ Catalyst ■ Other

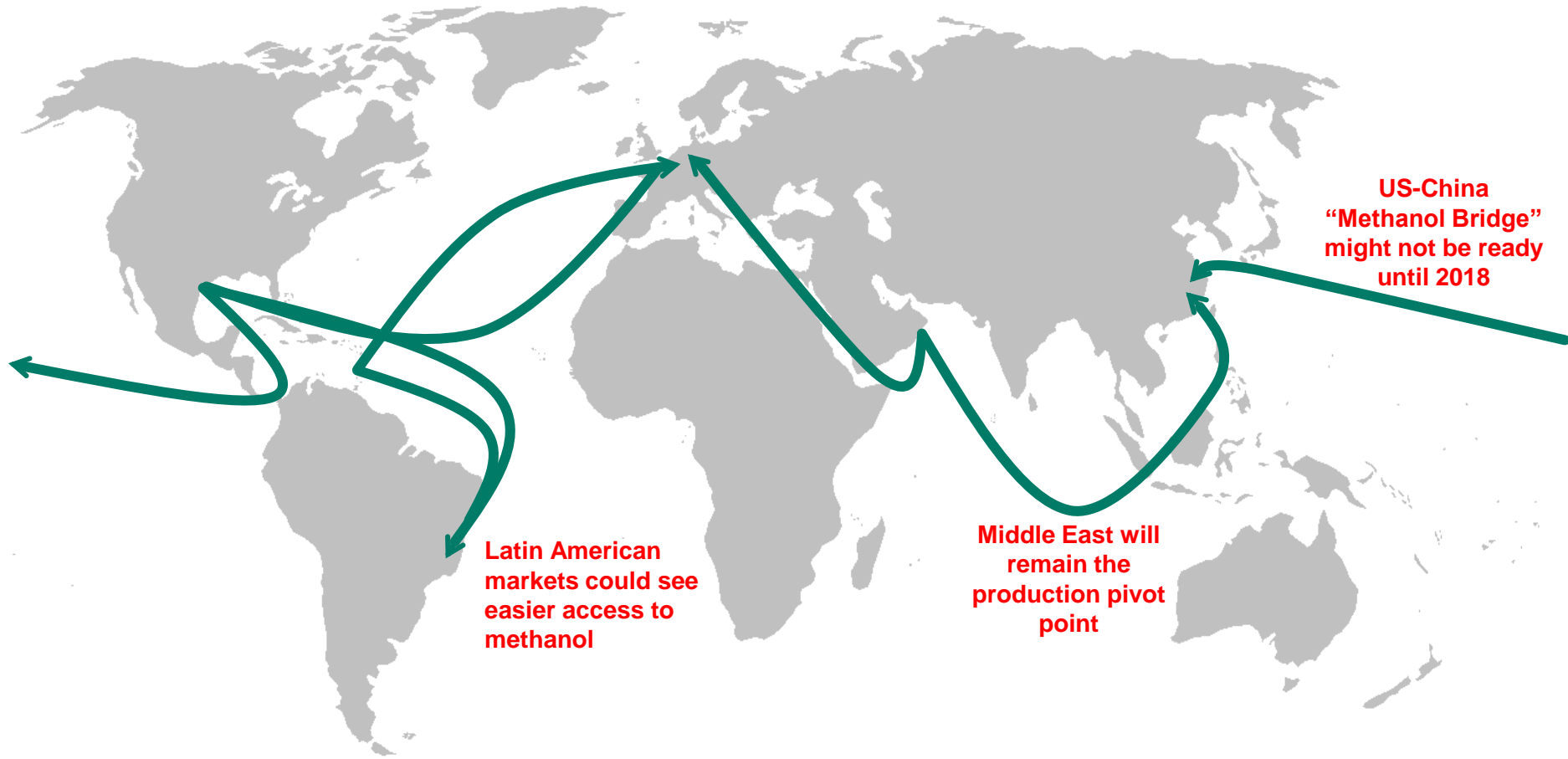
CHINESE CTO/MTO/MTP PROJECTS



Source: USGS, Platts

Domestic Impact of CTO/MTO





- New builds in North America and soaring demand in China setting the stage for shifts in global trade patterns
- Methanol will move from Americas to China
- Latin American markets could see easier access to methanol
- Despite greater availability of methanol, pricing not expected to decline significantly

Thank you! Gracias!

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