

Shifting trade patterns and North American methanol expansions

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AGENDA

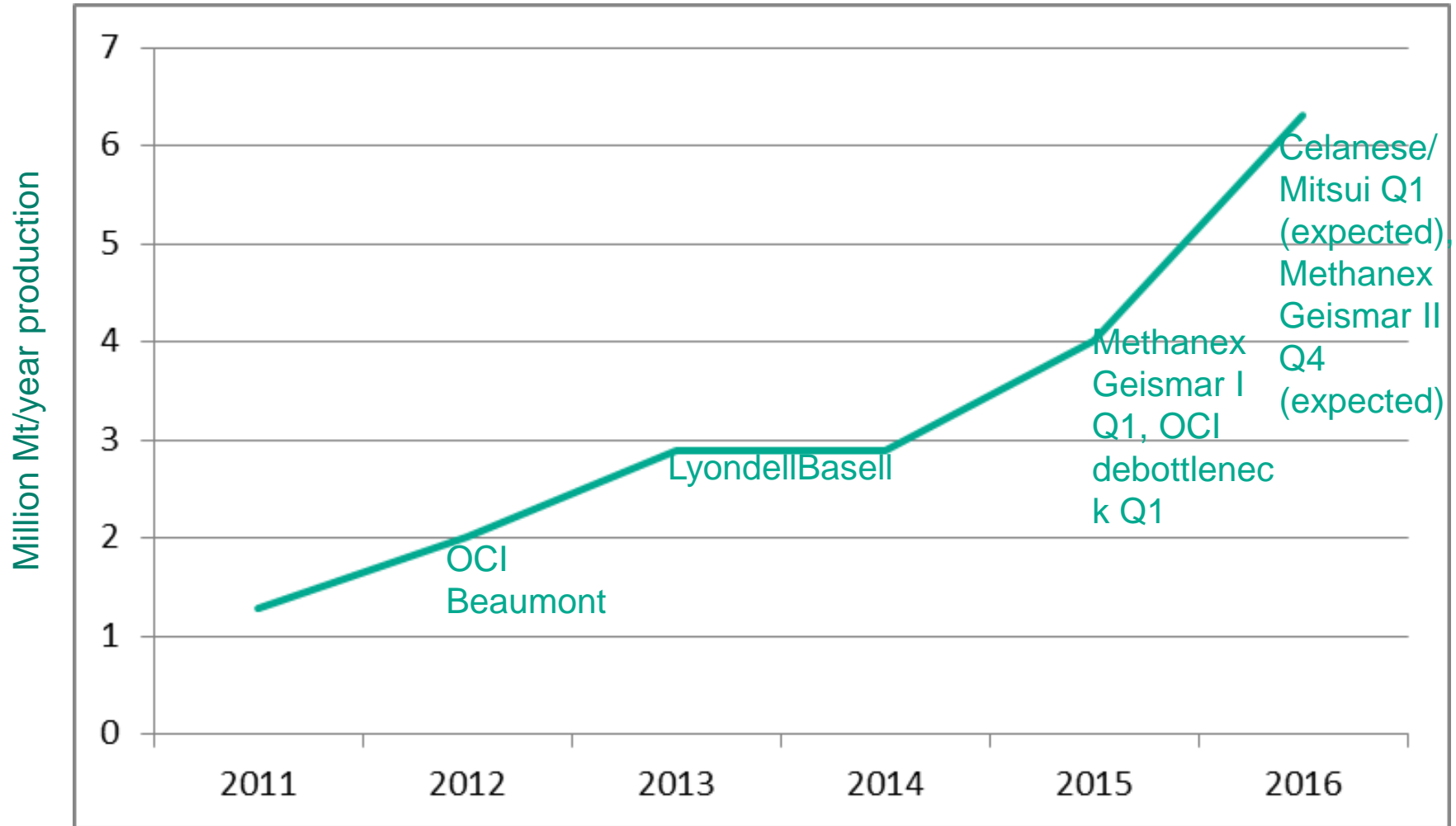
Snapshot on US spot market
Shale gas and methanol production
Shifting trade patterns in N. American market

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

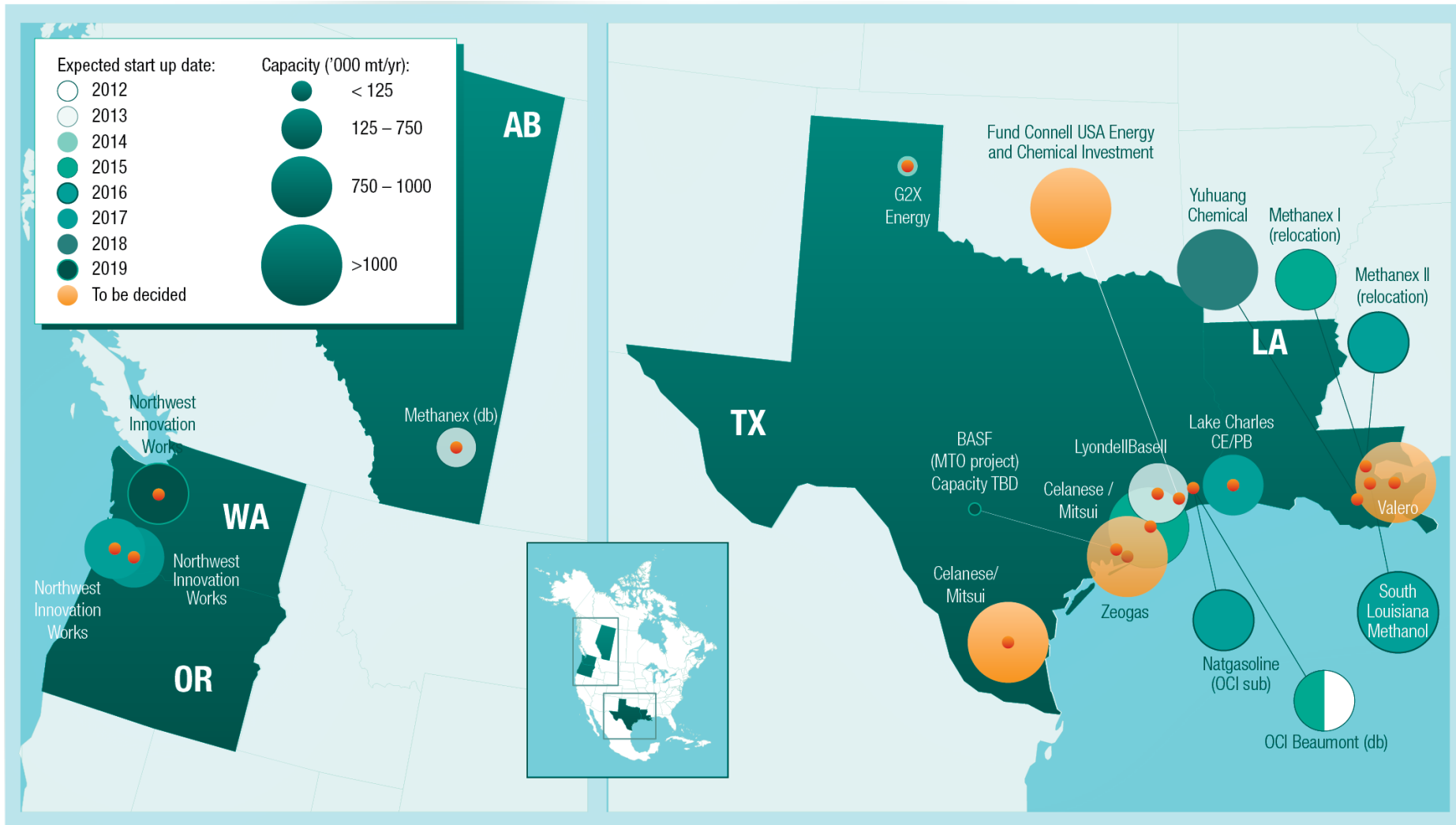
Spot methanol FOB USG



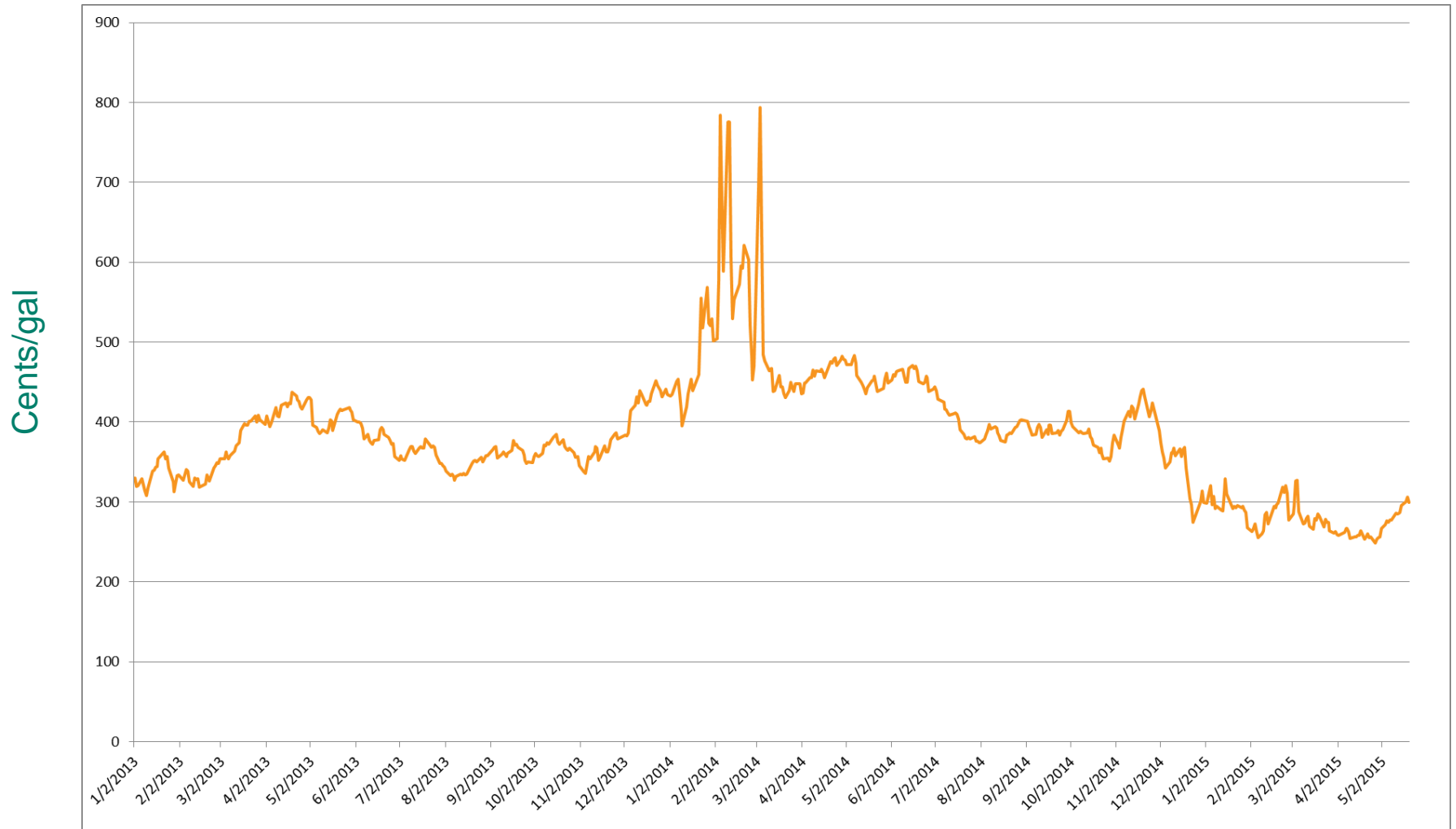
How much new production?



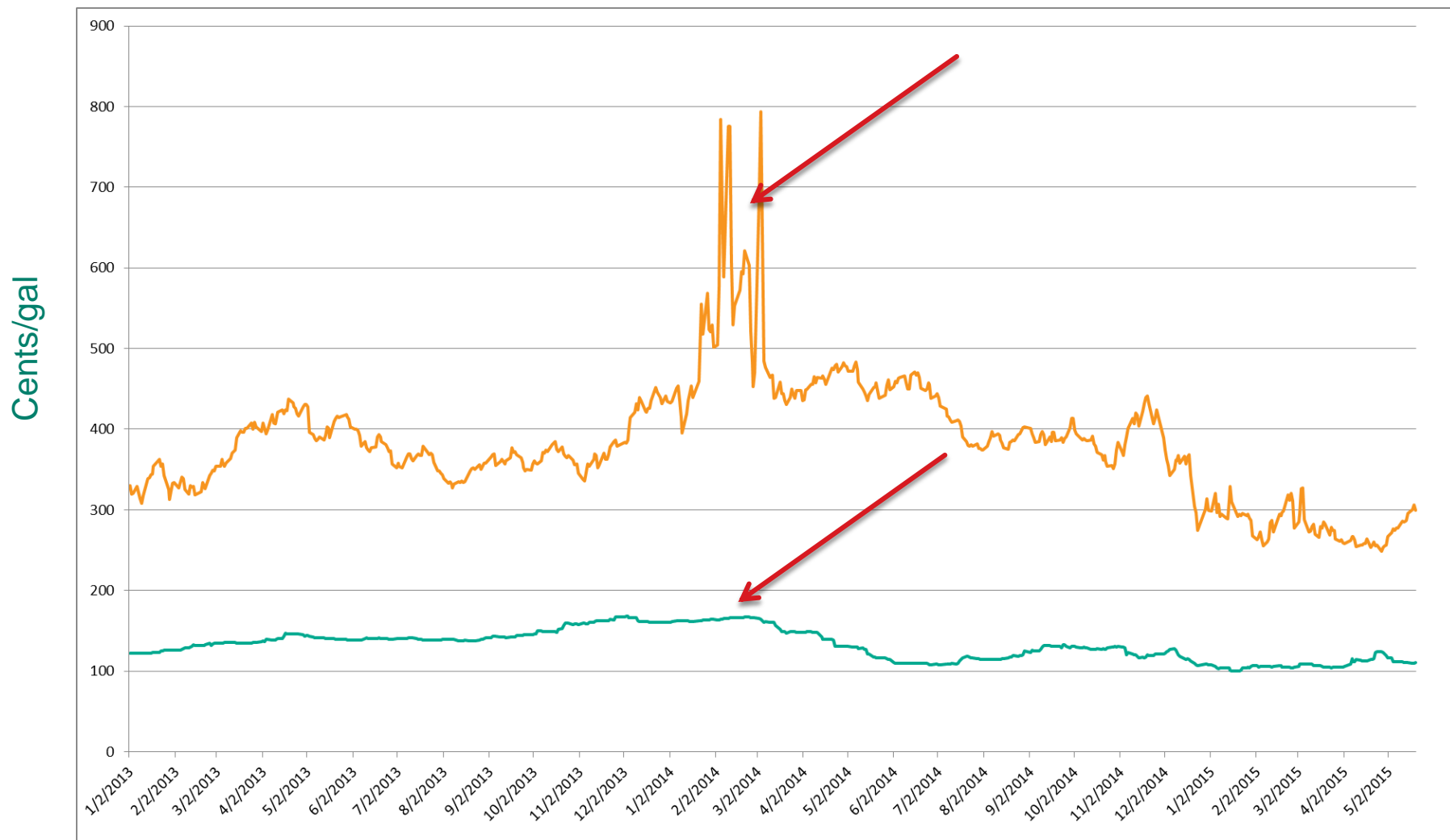
North American methanol projects



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?

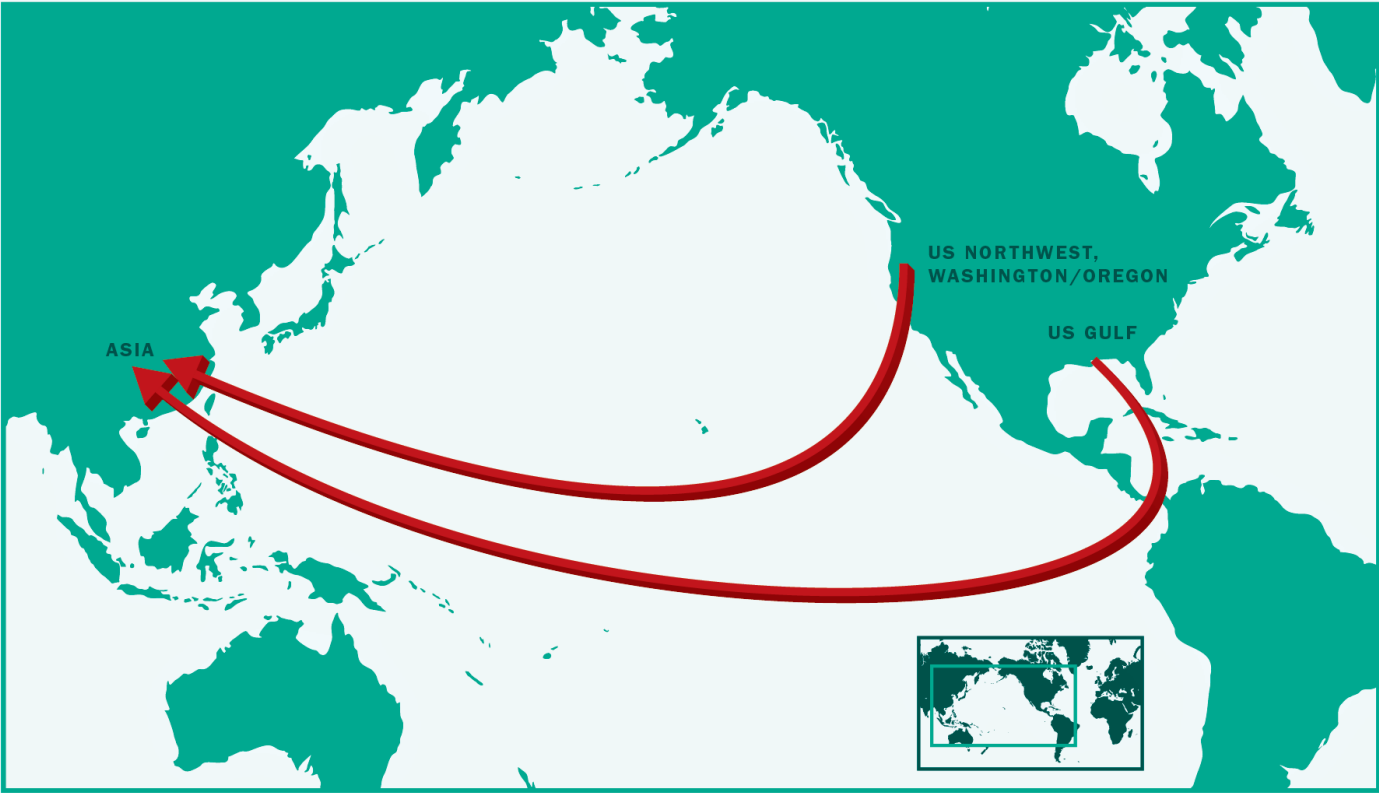
Increased European demand



Increased South American demand



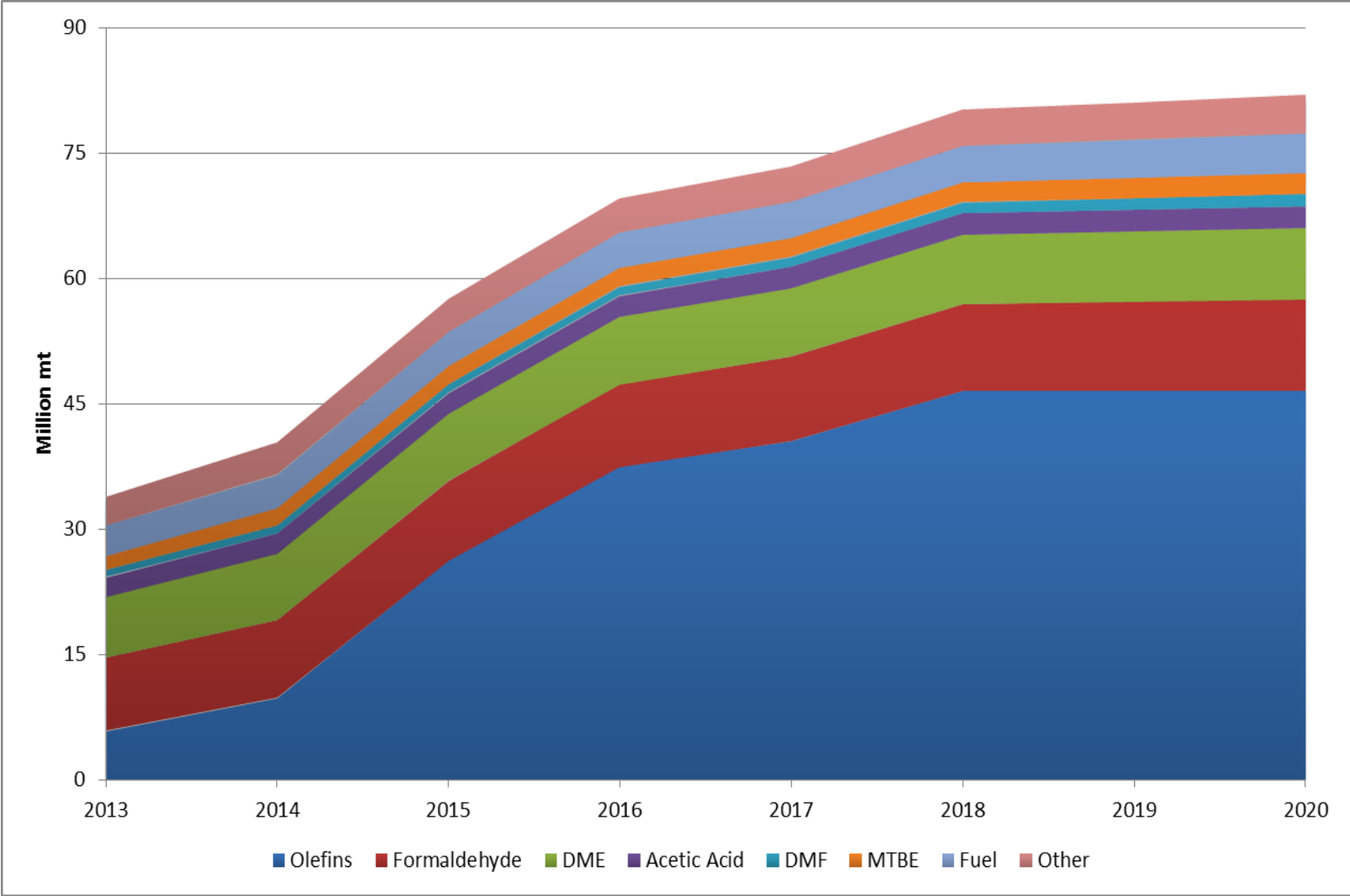
Asia MTO/CTO demand

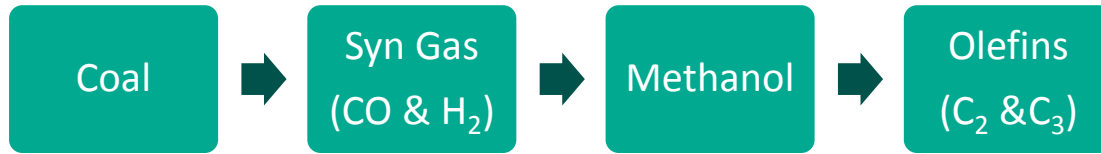


How China's MTO push impacts Global Methanol Trade

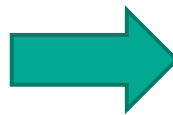
MTO and CTO basics

Methanol Consumption in China



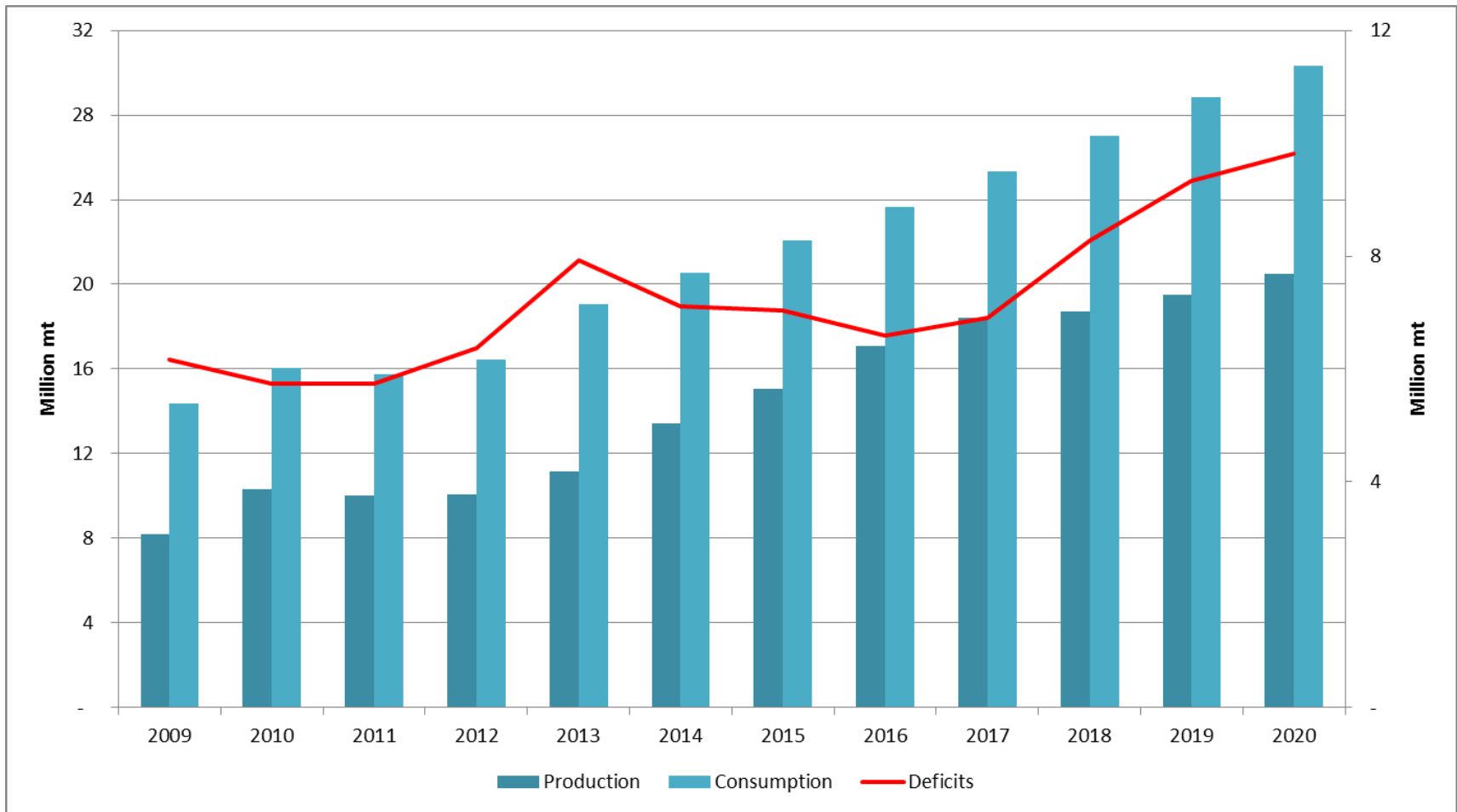


- Coal gasification, syngas cleaning, methanol synthesis, olefins polymerization
- Coal is synthesized in a gasifier to produce the synthetic gas
- Syngas is then converted into methanol
- Transformation into olefins



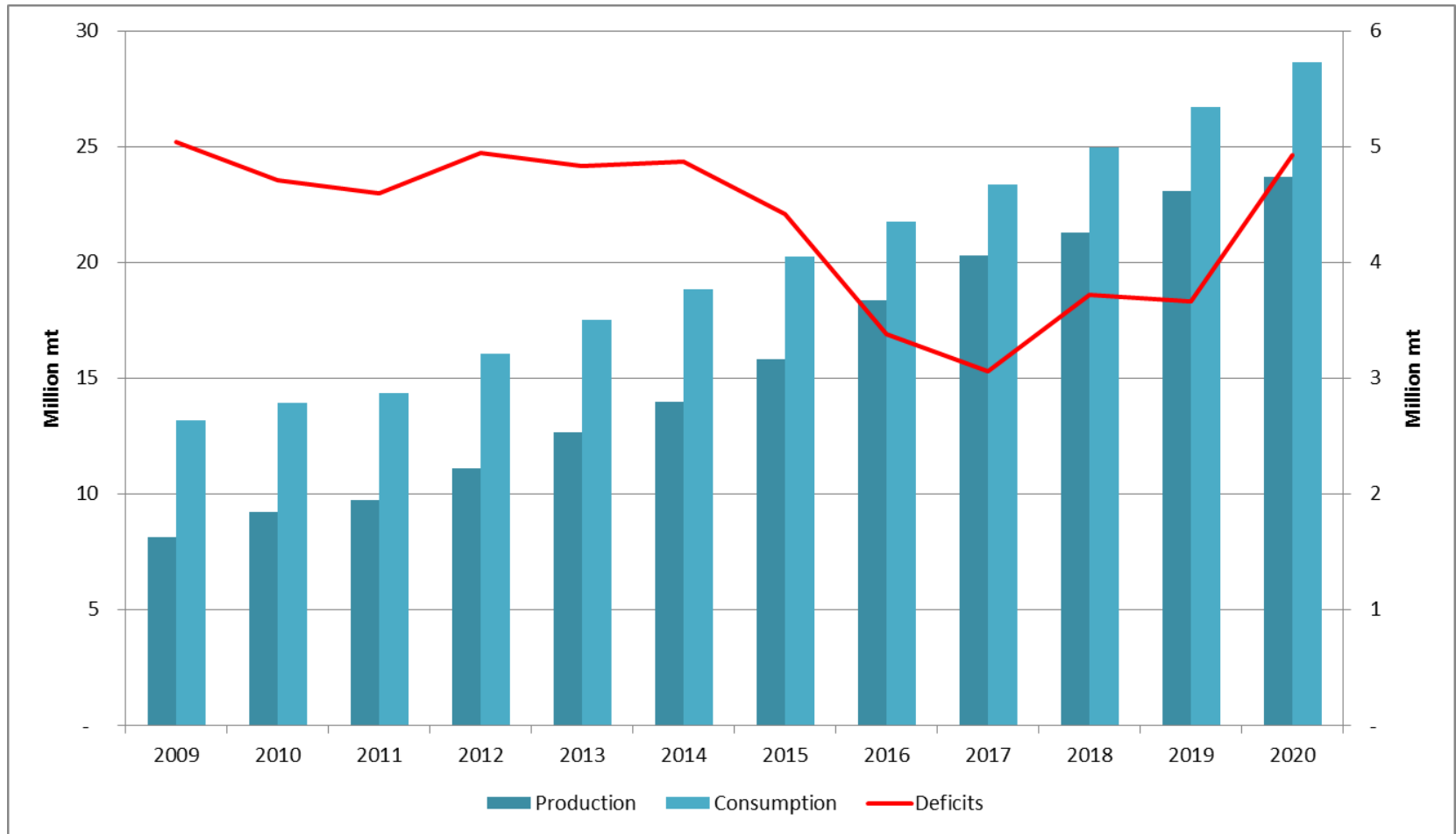
- Movement away from oil feedstock in petrochemicals
 - Oil imports account for about 60% of China's demand
- Coal mining diversification as traditional downstream coal demand levels off
 - More than 70 per cent of China's miners are losing money (China Coal Industry Association)
- Power generators looking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

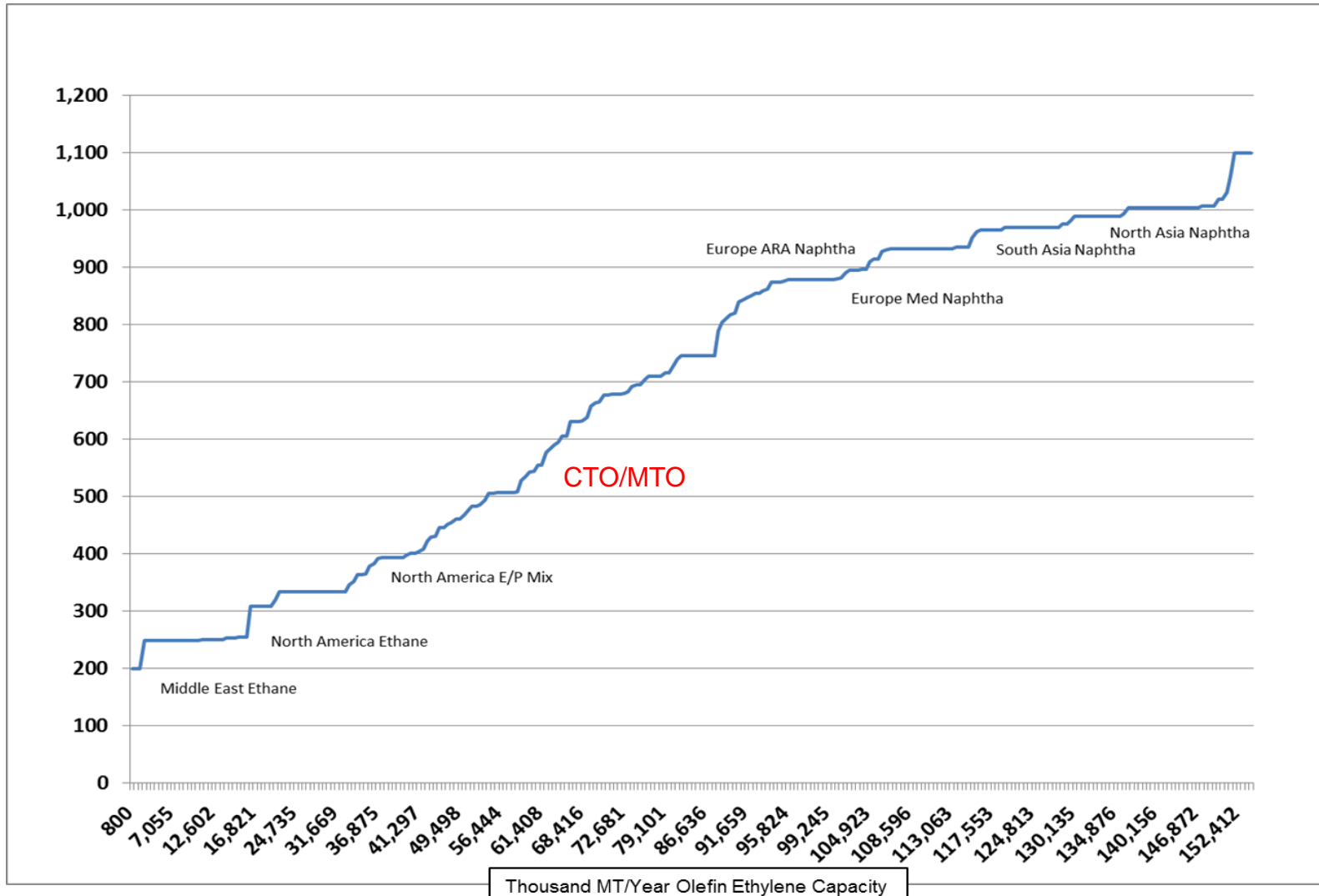
Challenges

- 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

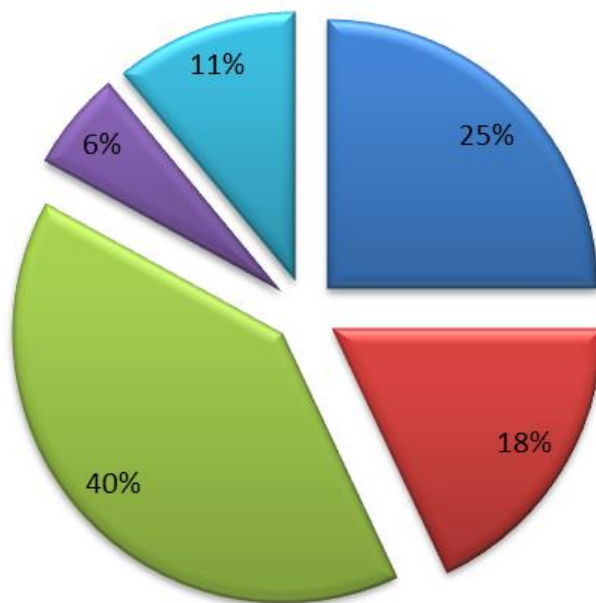
Benefits

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

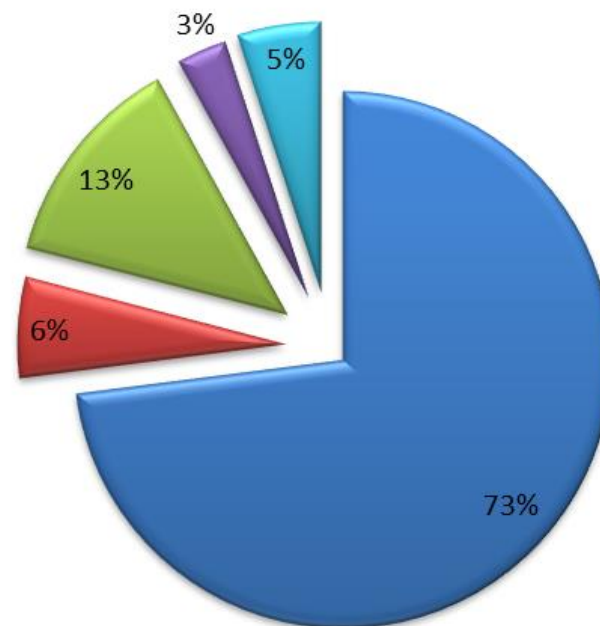
Global Ethylene Production Cost Curve



Typical CTO Cost Structure



Typical MTO Cost Structure



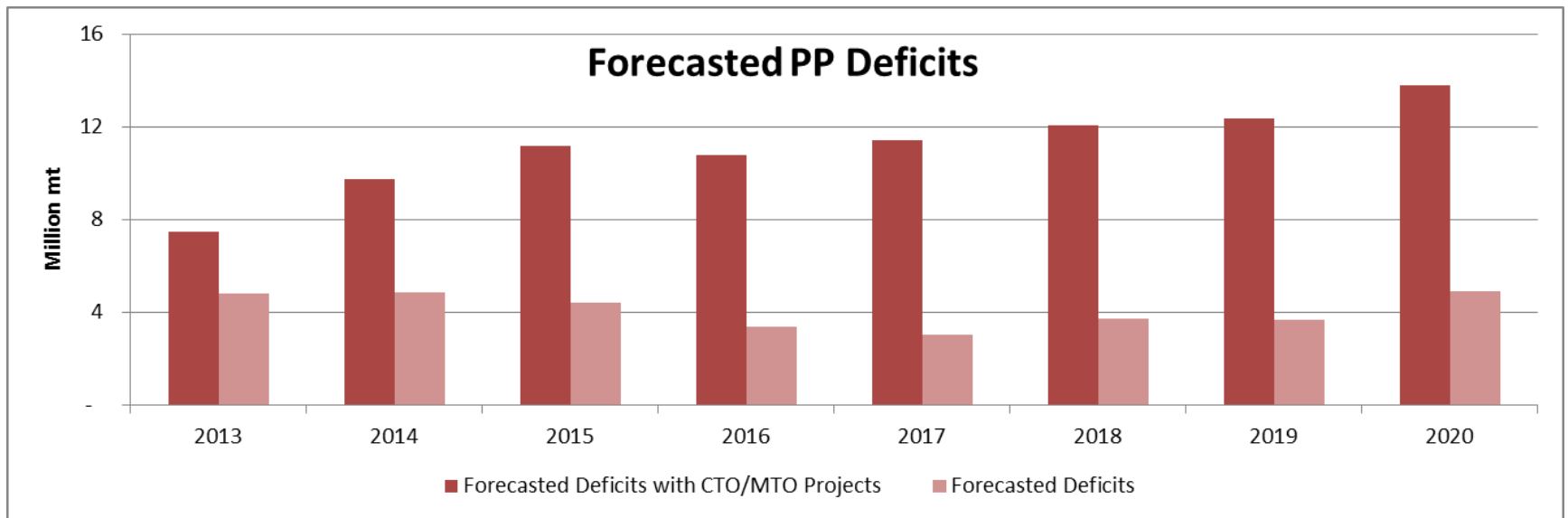
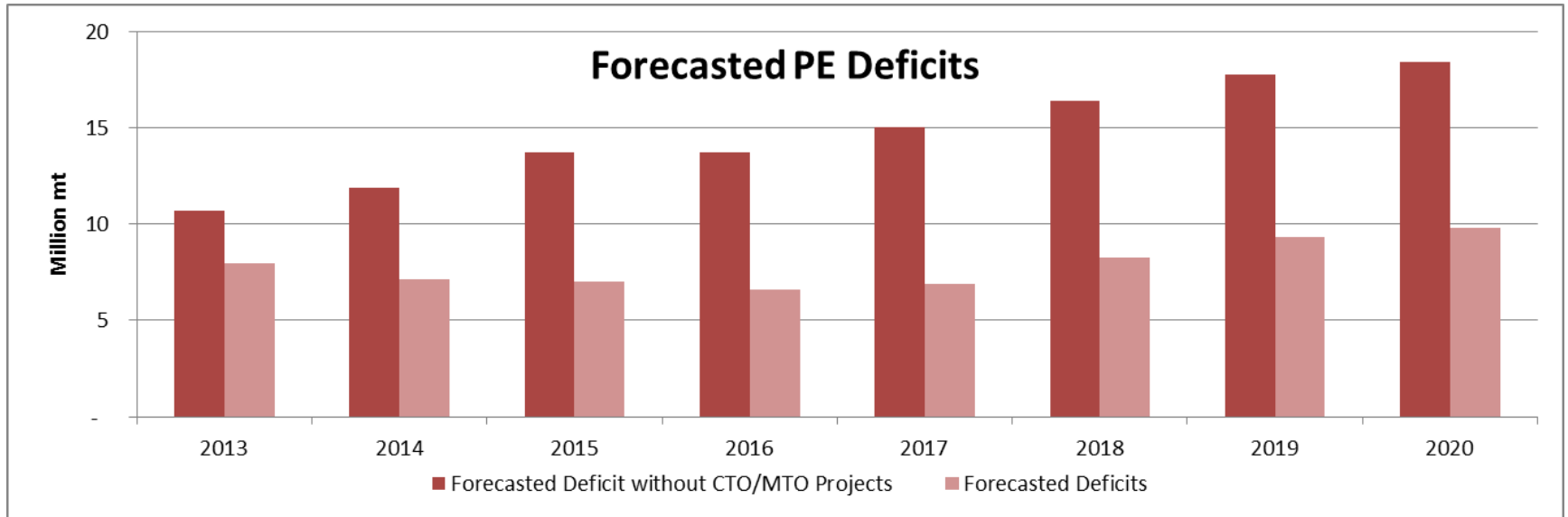
■ Feedstock ■ Power ■ Financing and Depreciation Costs ■ Catalyst ■ Other

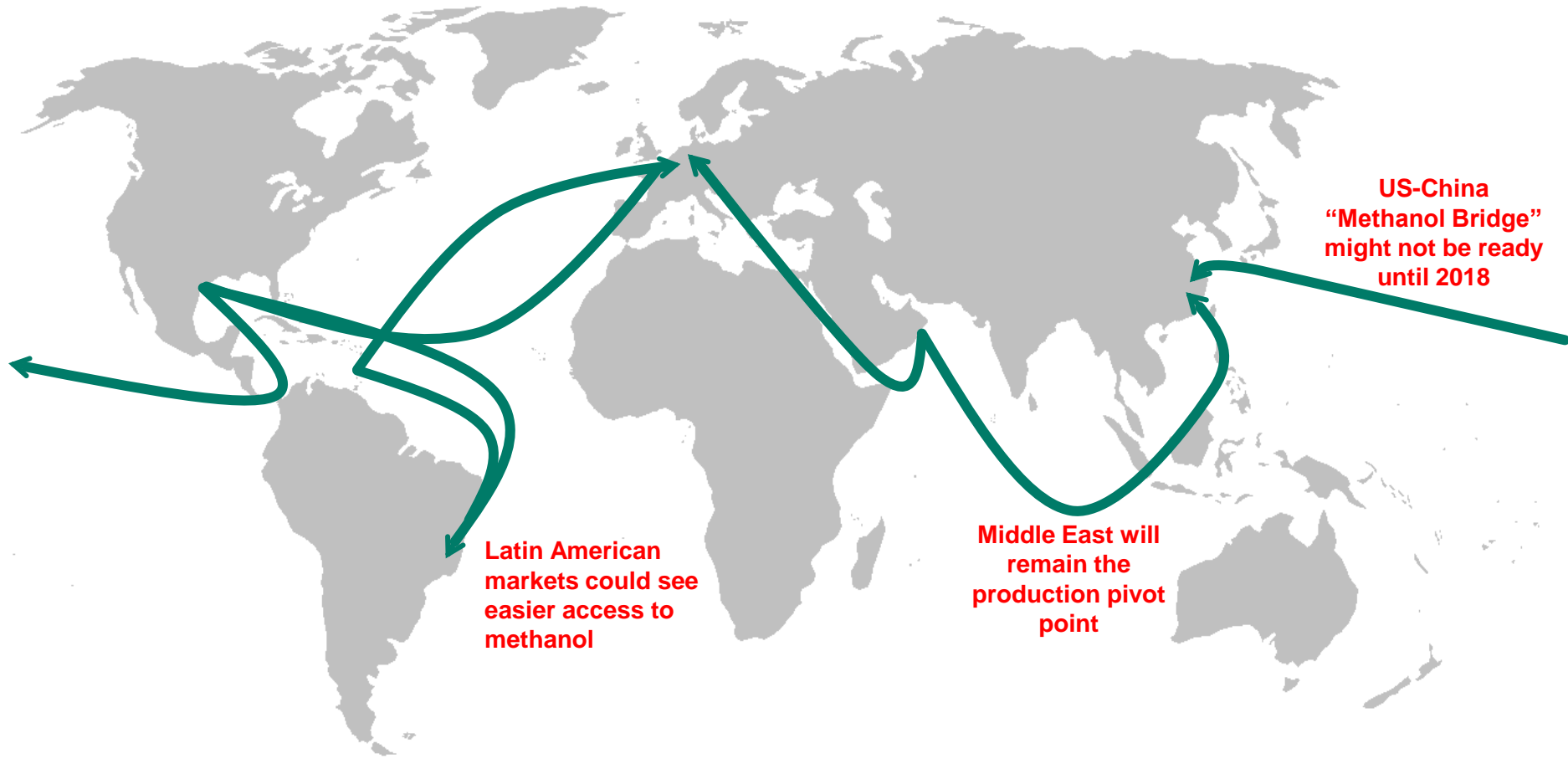
CHINESE CTO/MTO/MTP PROJECTS



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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