

LPG: A Market in Transition "Developments, Challenges & Outlook"

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Upstream



Midstream



Marine



Infrastructure



Downstream



Agenda

- 1. Introduction**
- 2. Market Review 2015**
- 3. Global S/D Outlook & Challenges**
- 4. Price Outlook – Entering a “New Normal”**
- 5. The Role of Shipping**
- 6. Closing Thoughts**



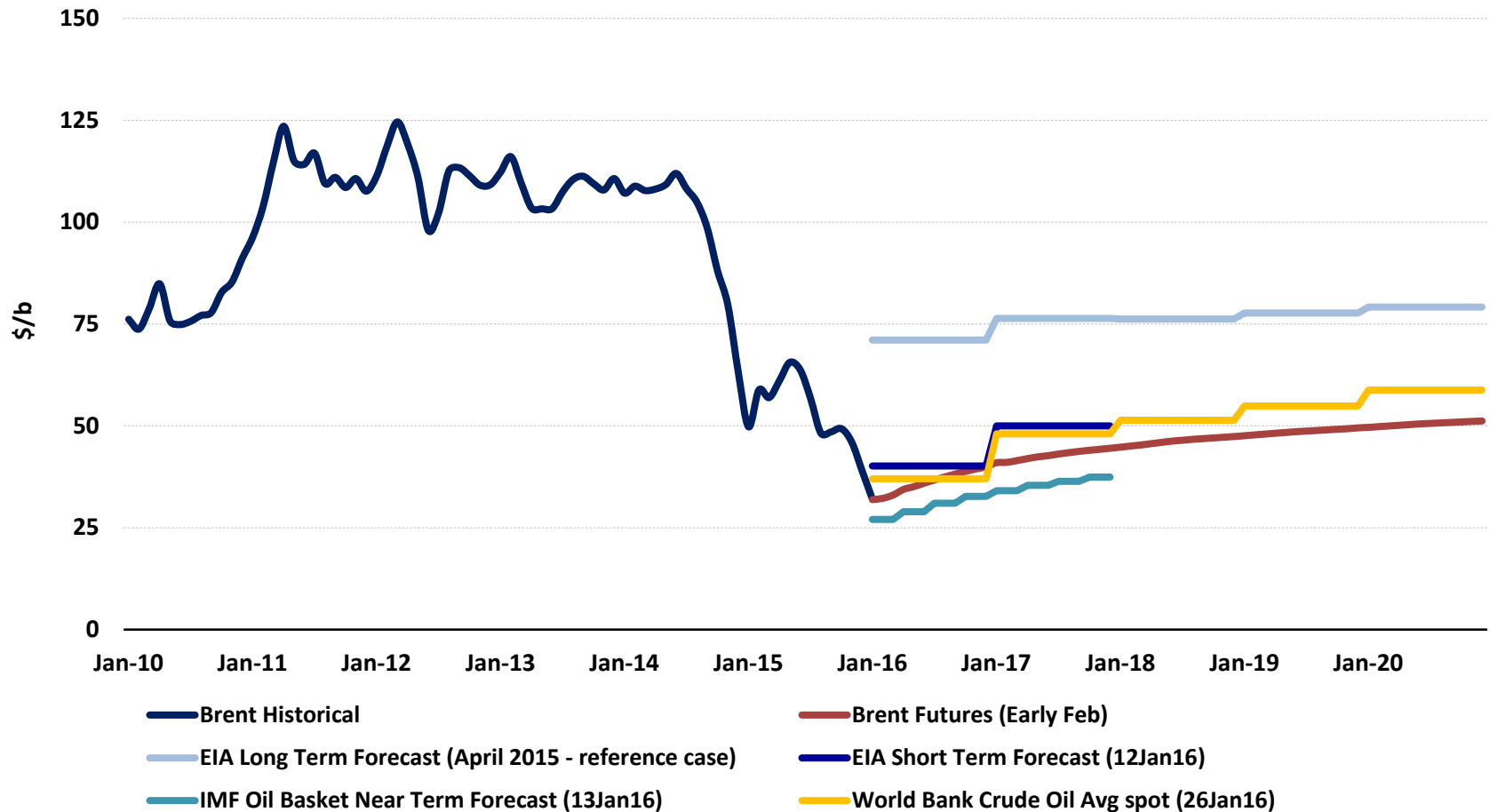
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1 – Introduction

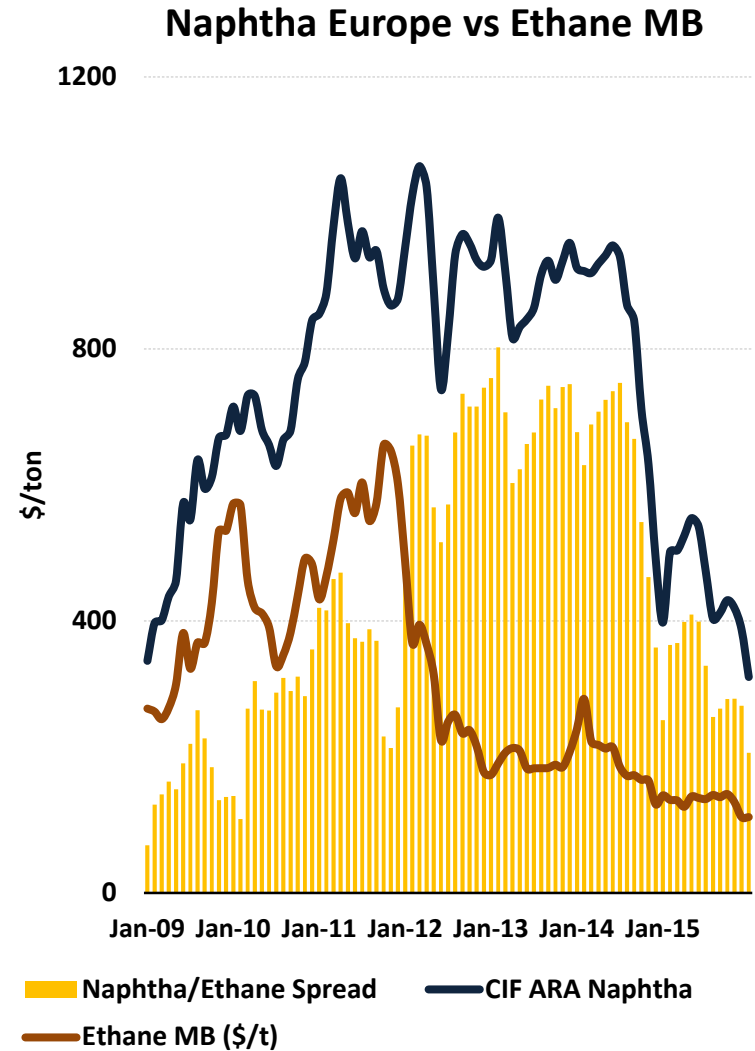
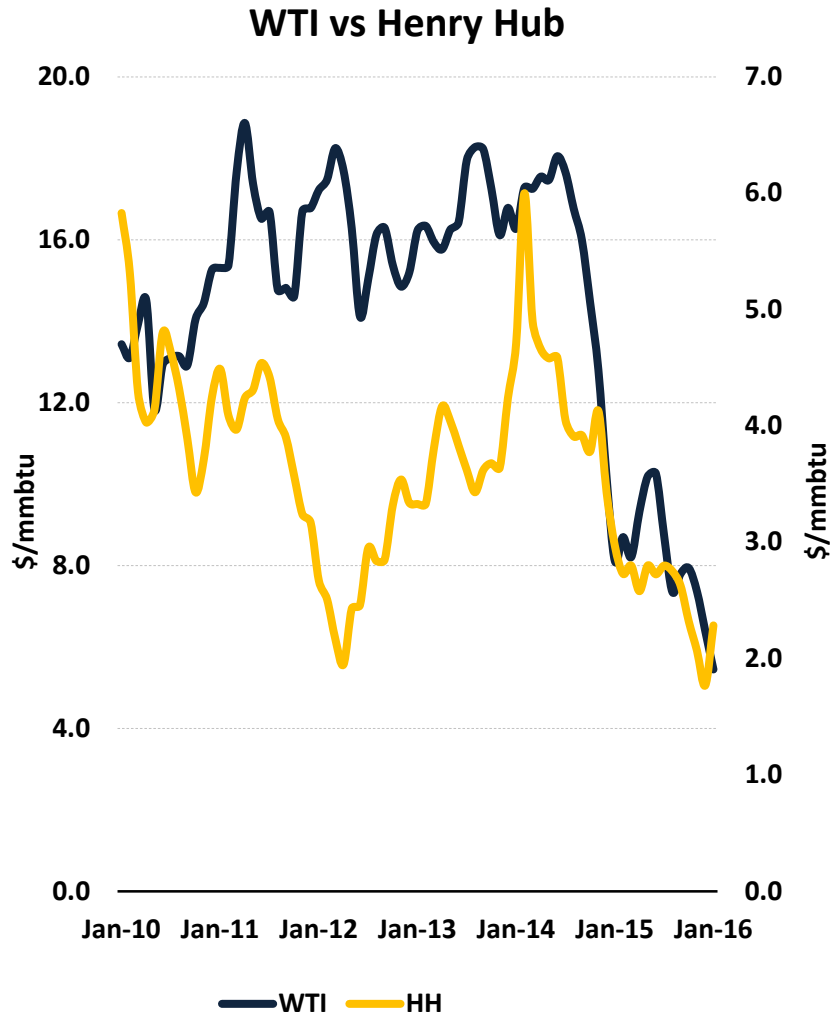


Crude oil price drop changes market perception

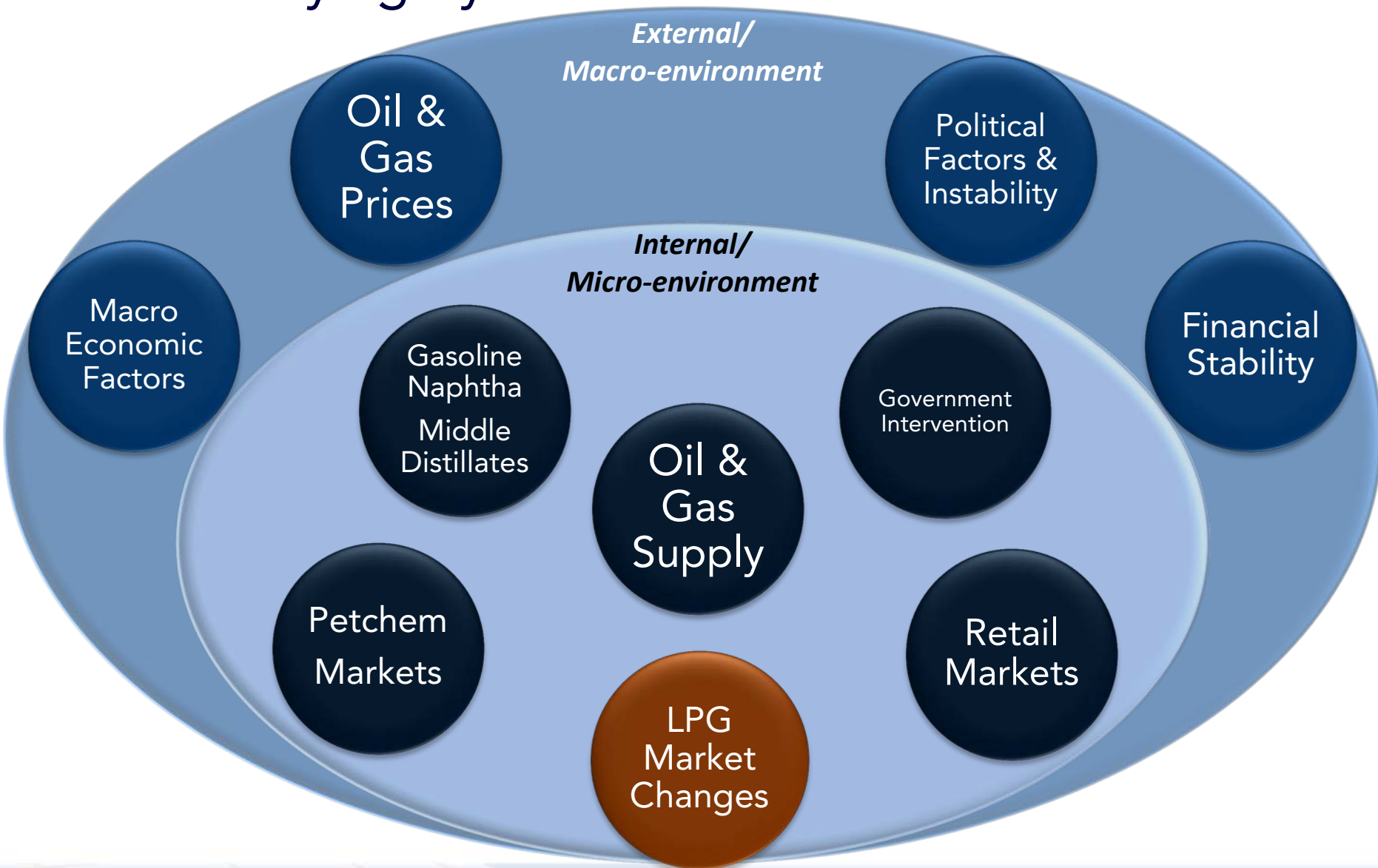
Brent Crude Historical and Public Available Estimations



US gas follows oil; feedstock spreads shift



The underlying dynamics of the LPG market



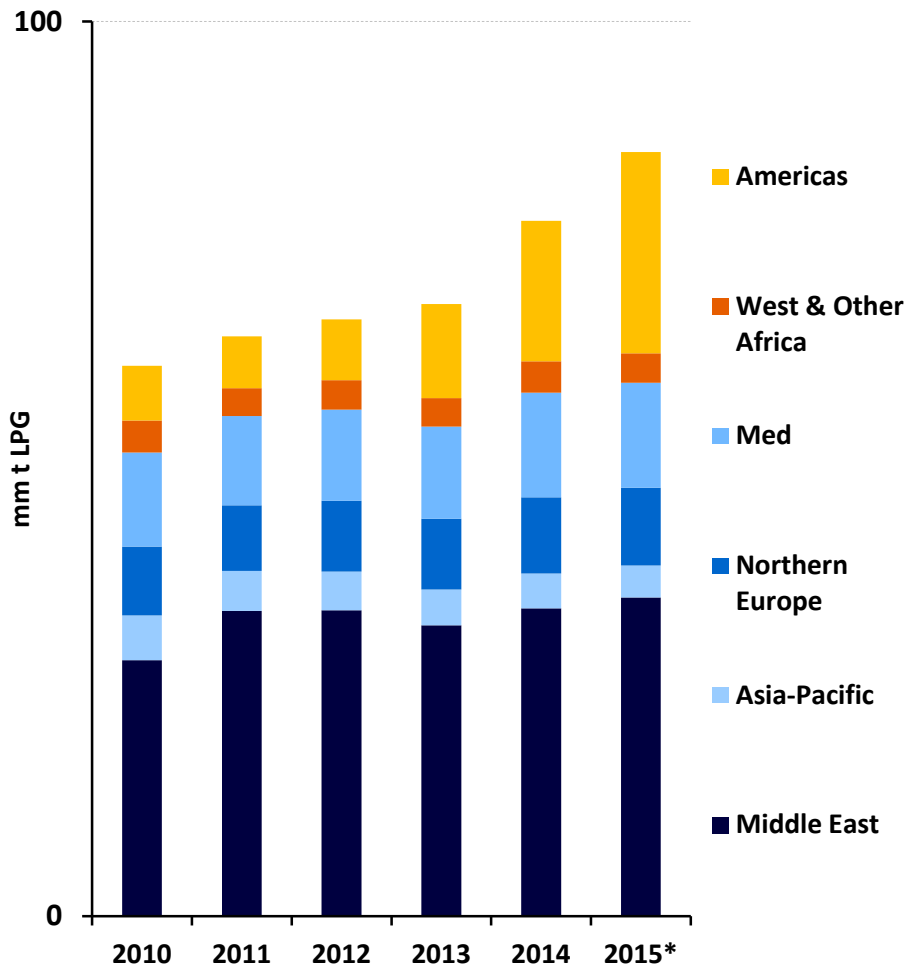


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2 - Market Review 2015

US exports dominate LPG supply growth in 2015...

Global LPG Seaborne Supply



US LPG exports estimated to have increased about 50% yoy in 2015

Middle East exports grew moderately

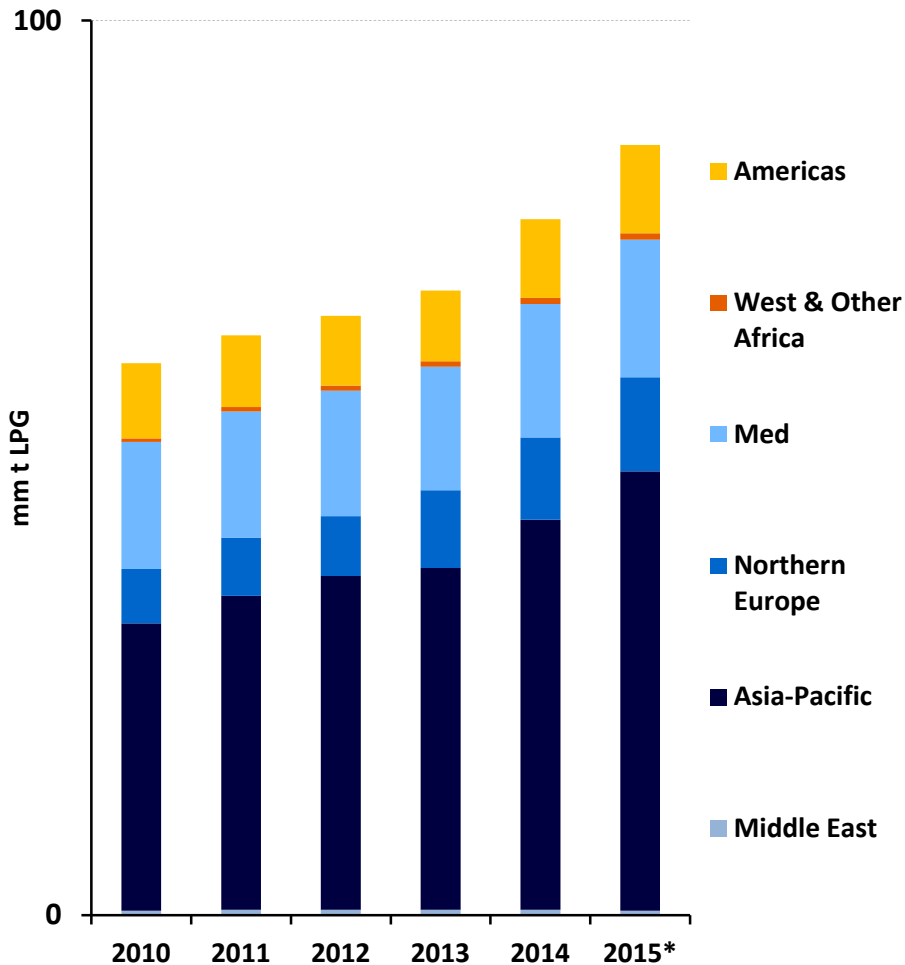
Exports from other regions have remained relatively flat during the course of 2015

— Source, Poten & Partners

*Preliminary Data

...with Asia pivotal in absorbing the new supplies

Global LPG Seaborne Demand



Europe and L. America imports have increased in 2015...

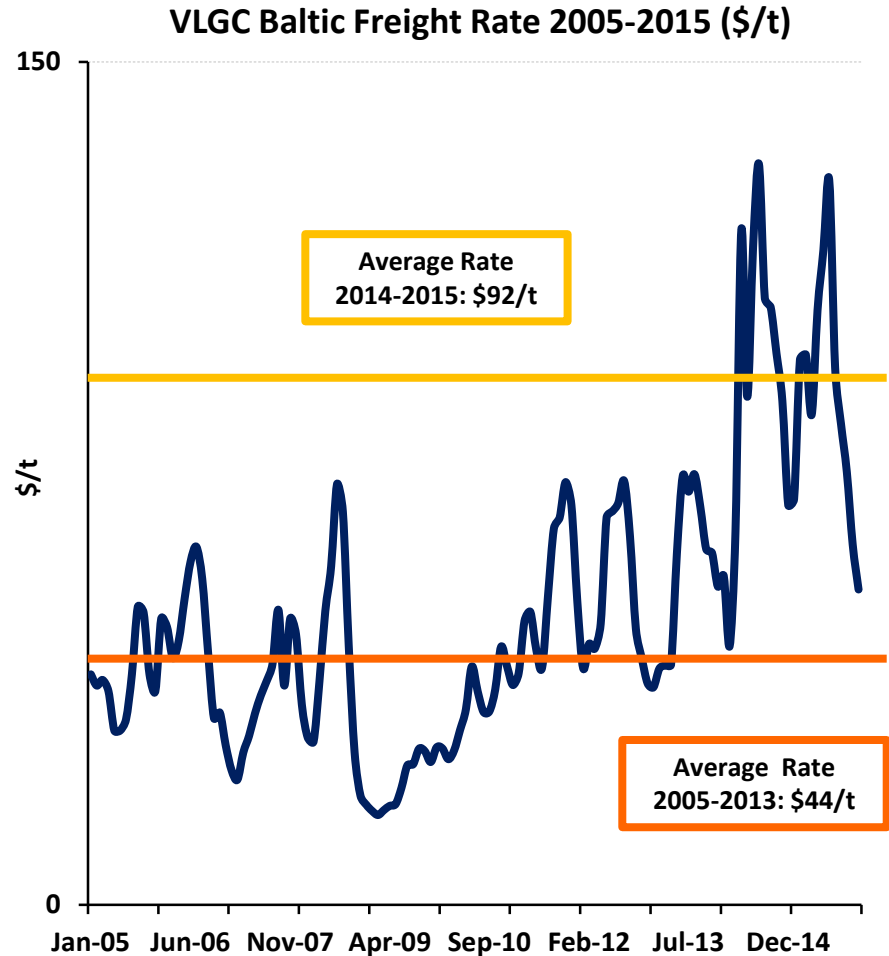
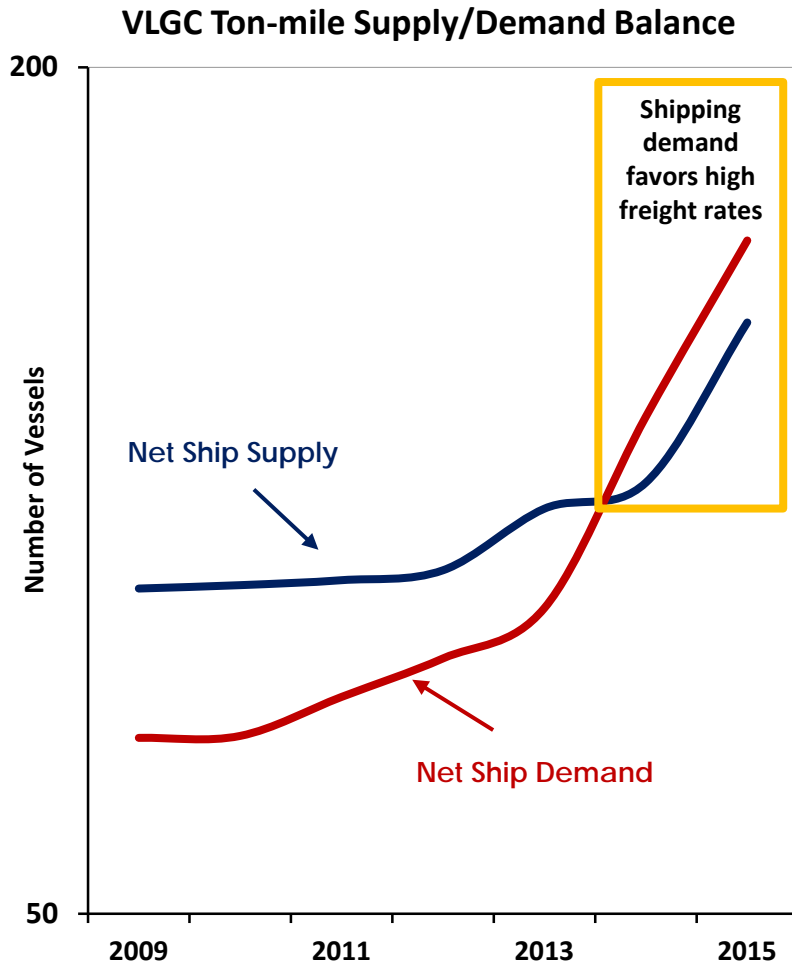
...but Asia has been the main factor balancing the global trade

China and India combined imported about 6 mm t more LPG than in 2014

— Source, Poten & Partners

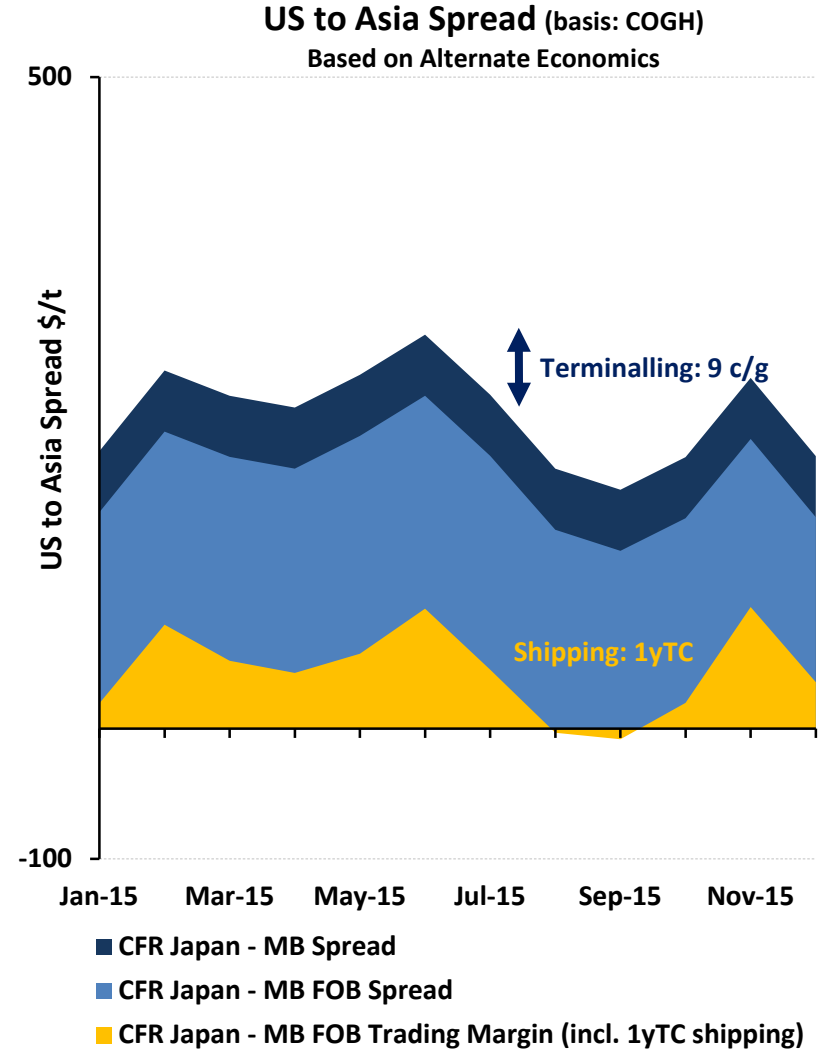
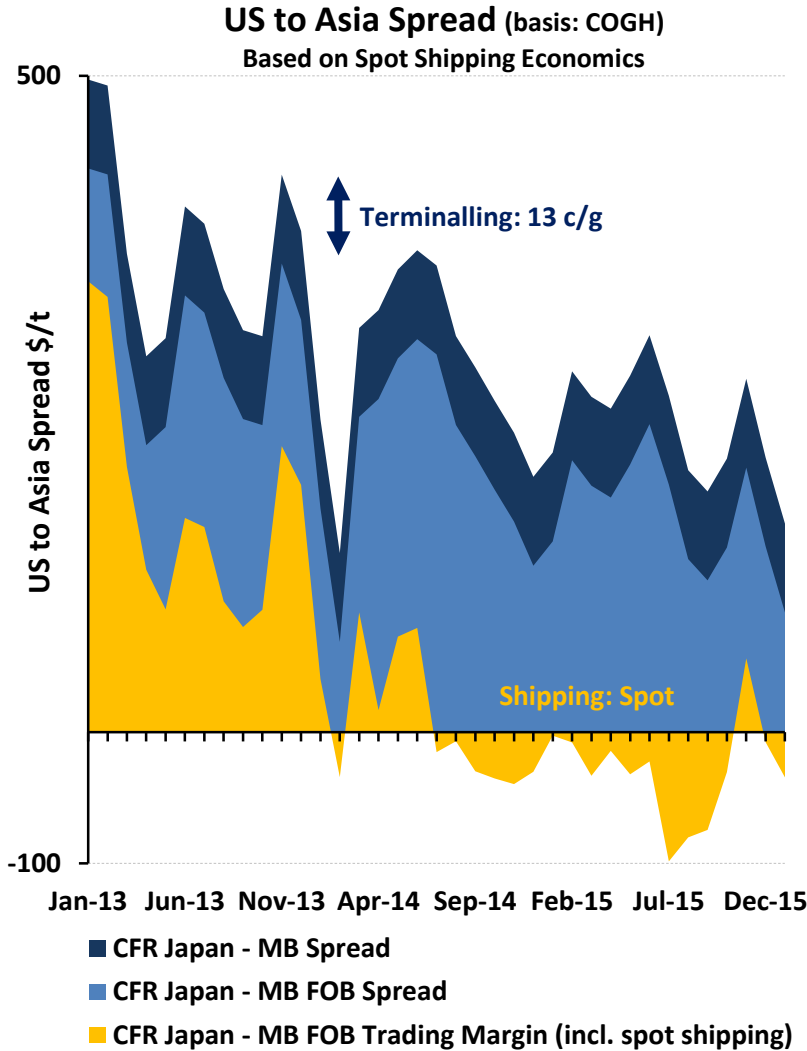
*Preliminary Data

Shipping s/d dynamics keep freight in high levels...



— Source, Poten & Partners

High US exports to Asia supported/offset by alternative economics



— Source, Poten & Partners

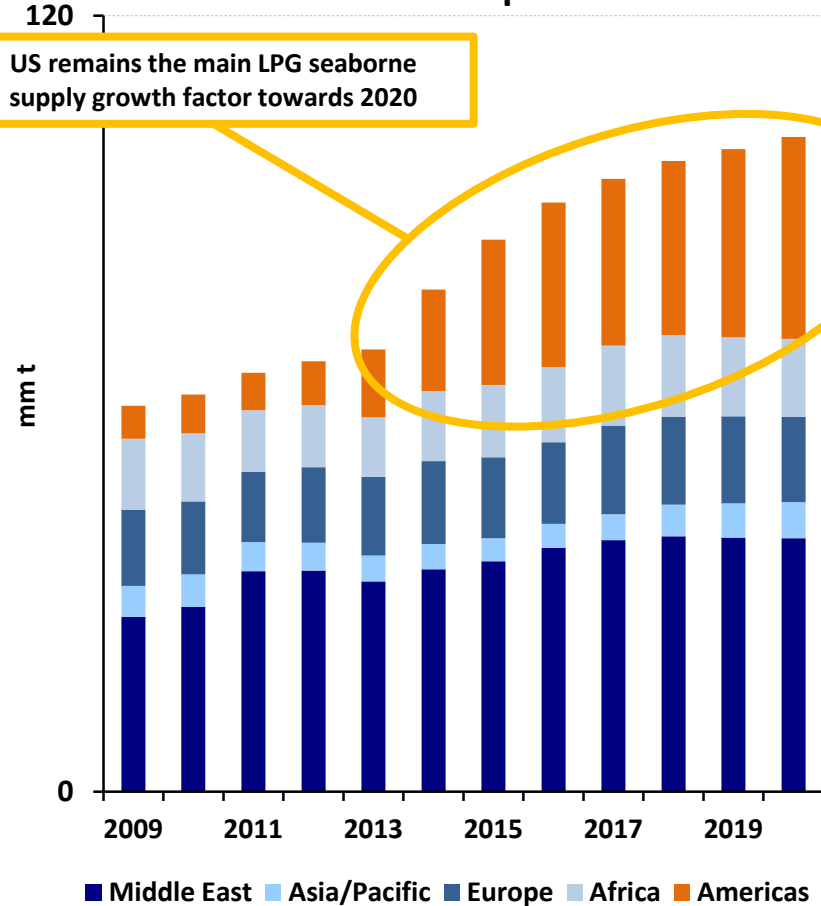


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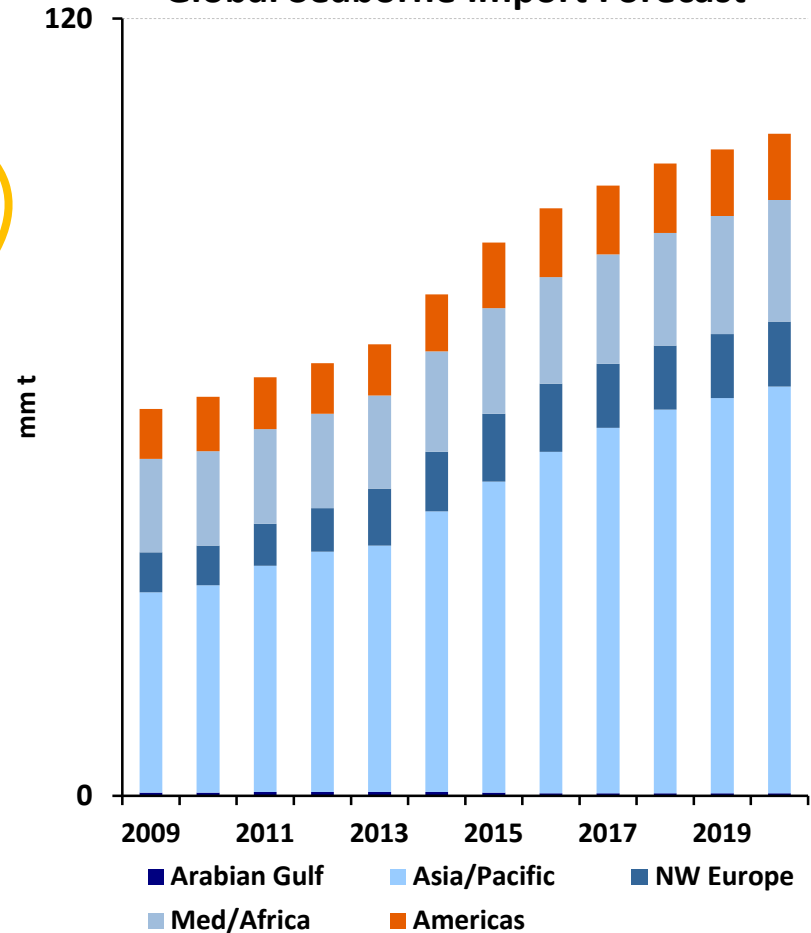
3 - Global Supply/Demand Outlook

Global LPG trade volumes continue to grow

Global Seaborne Export Forecast



Global Seaborne Import Forecast

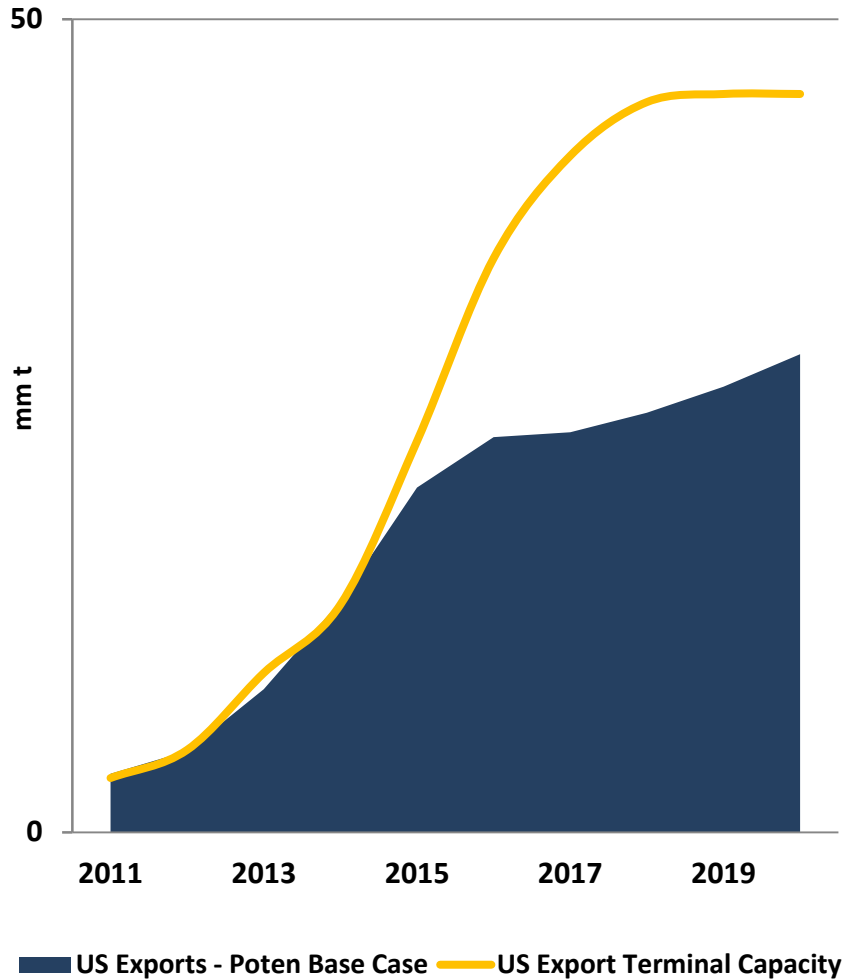


— Source, Poten & Partners

*Base case scenario

US exports will define global supply growth to 2020...

US LPG Terminal Capacity vs Estimated Export Volumes

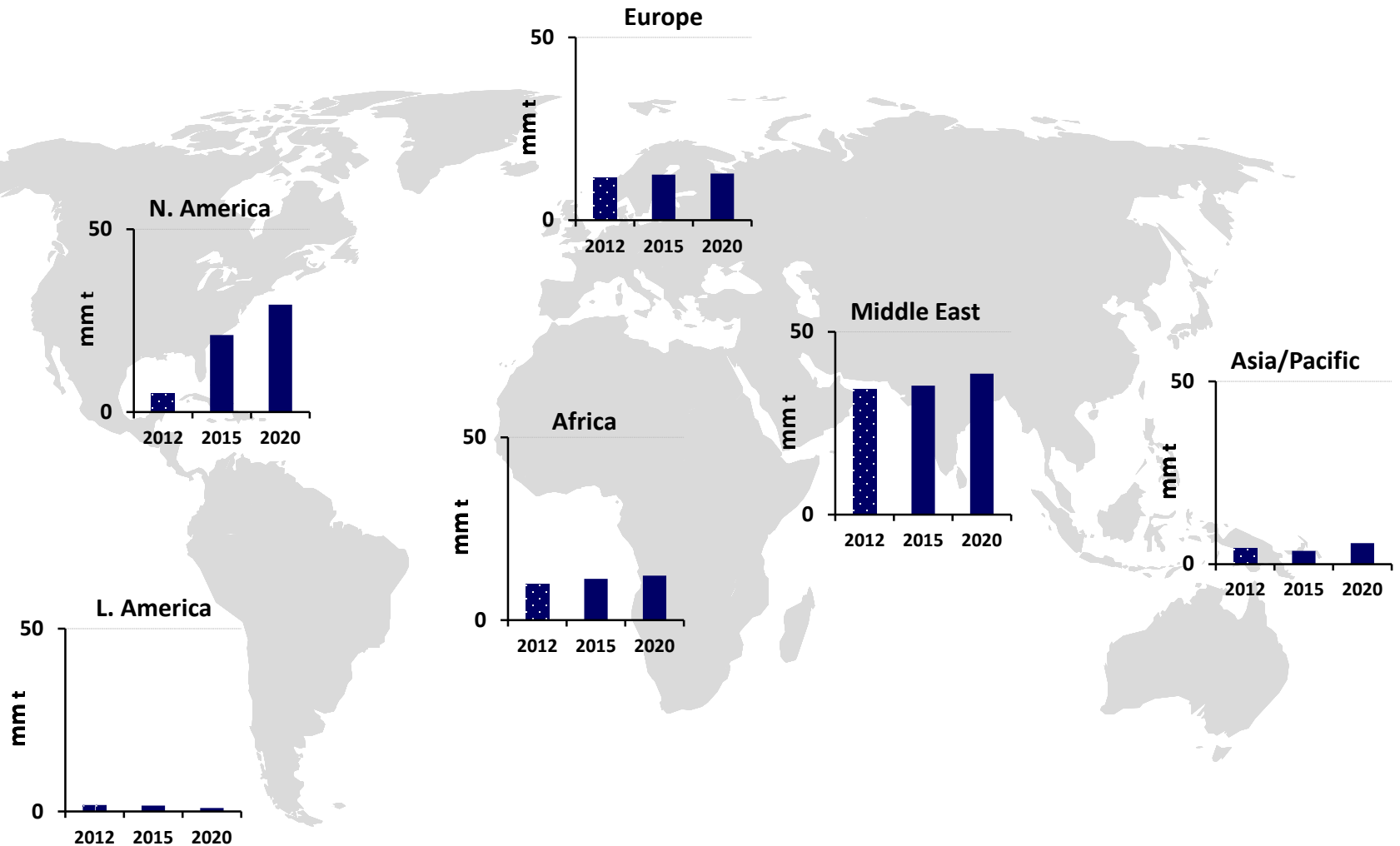


- Additional LPG terminal capacity in 2016 (EPD Expansion, Marcus Hook Expansion, Oxy and P66 start-up)
- Domestic LPG production trajectory challenging due to unfavorable shale economics
- New PDH facilities, steam cracking demand, ethane supply/demand and retail market will play important role
- Will there be a shift to greater percentage of butane in export volumes?

— Source, Poten & Partners

*Base case scenario

...while most other regions will grow moderately

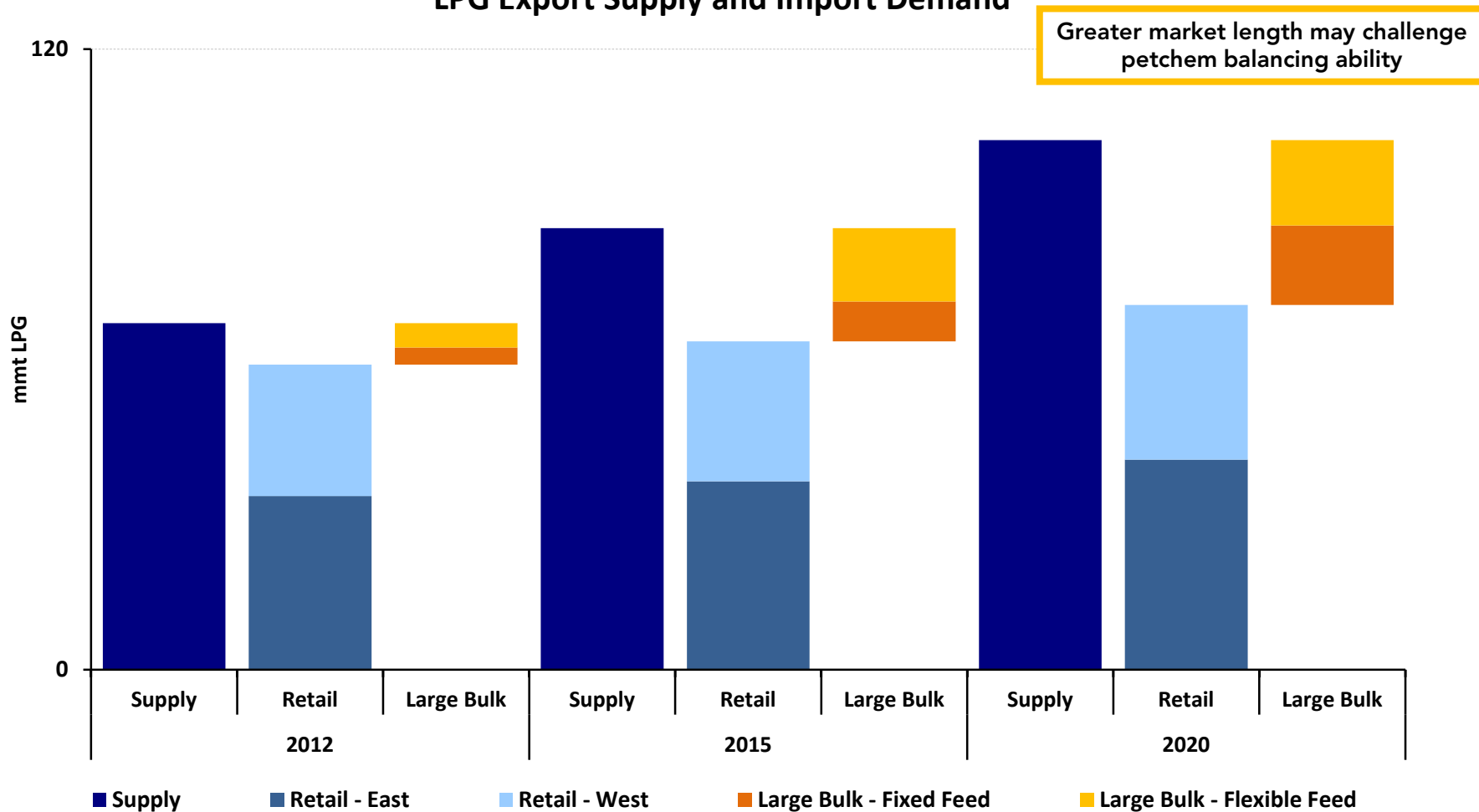


— Source, Poten & Partners

*Base case scenario

Balancing global LPG trade could prove challenging...

LPG Export Supply and Import Demand

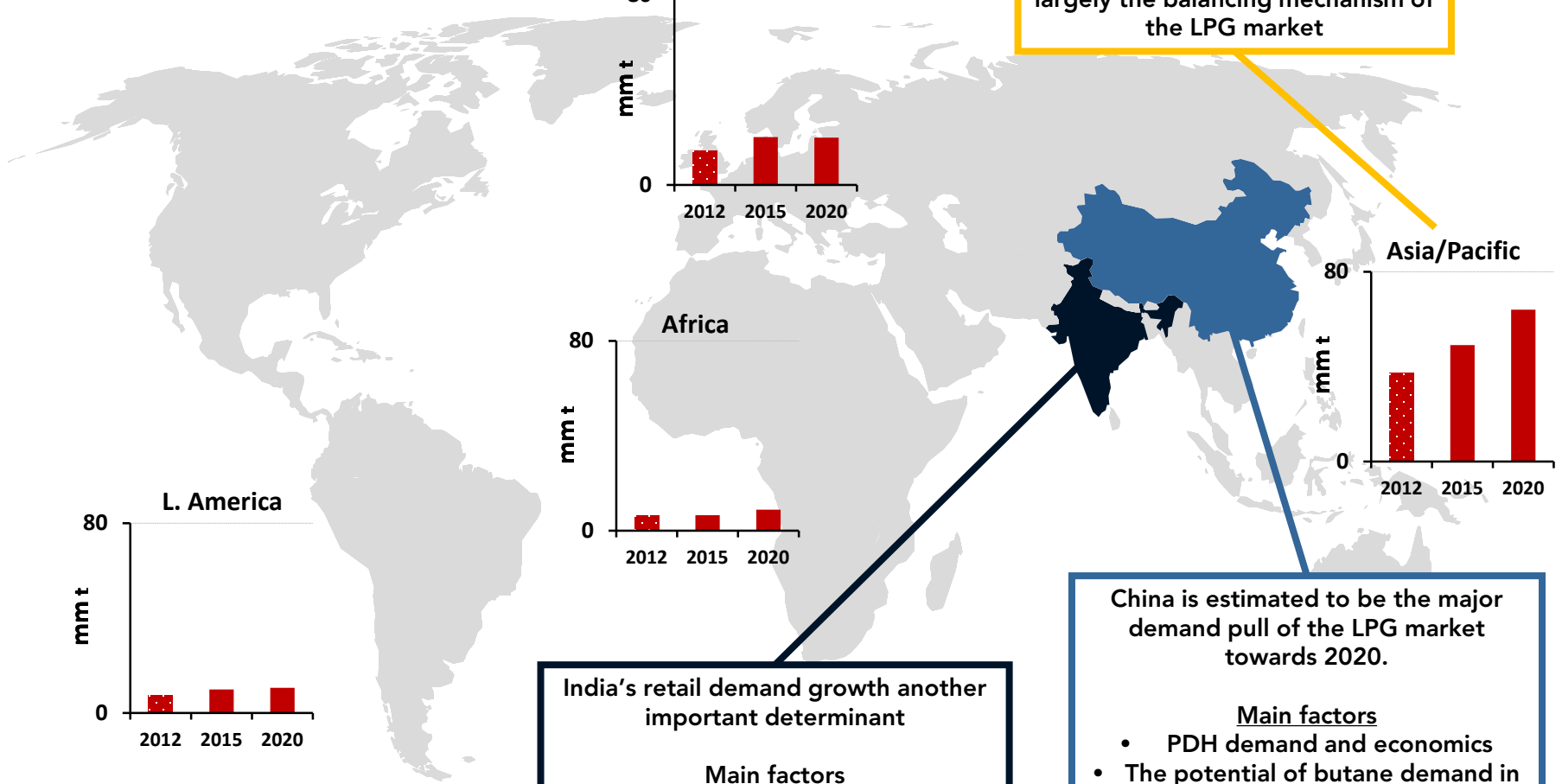


Greater market length may challenge petchem balancing ability

*Base case scenario

...with Asia destined to be the "marginal" LPG consumer

Petchem demand and economics in Asia and Europe is expected to be largely the balancing mechanism of the LPG market



India's retail demand growth another important determinant

Main factors

- Further retail demand growth
 - The impact of subsidies
- Import infrastructure constraints

China is estimated to be the major demand pull of the LPG market towards 2020.

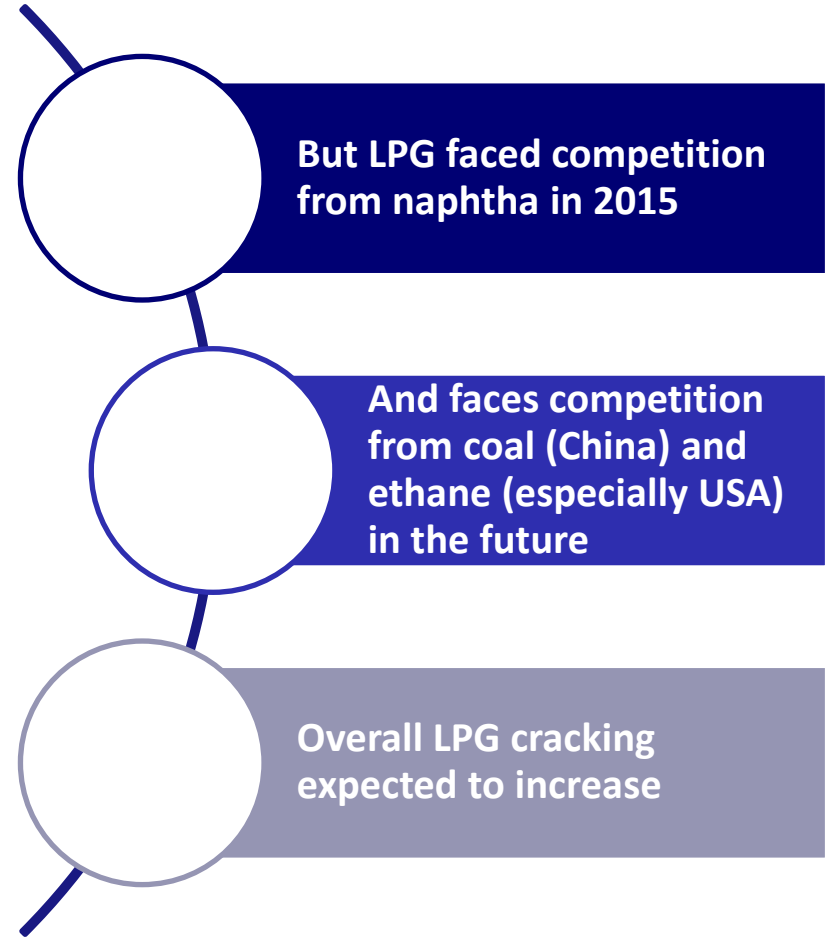
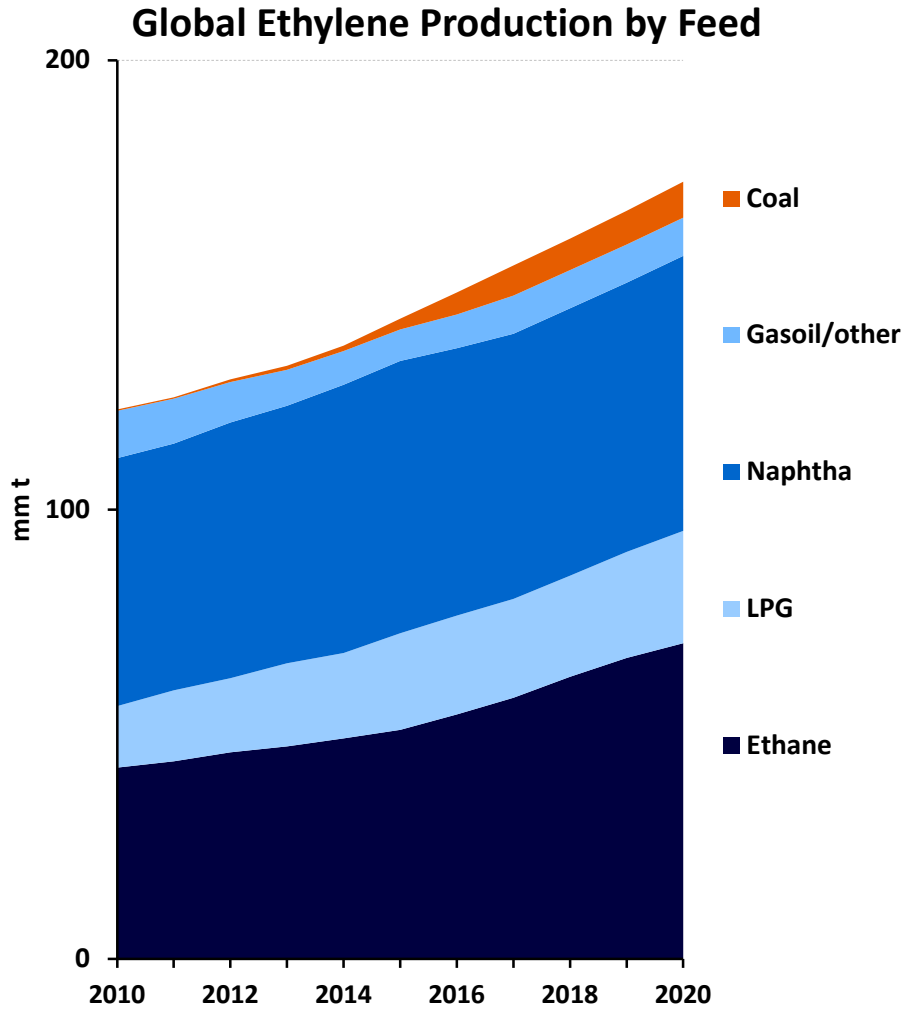
Main factors

- PDH demand and economics
- The potential of butane demand in gasoline components/petchems

— Source, Poten & Partners

*Base case scenario

Challenge No1: LPG prices/plant economics determine use as ethylene feed

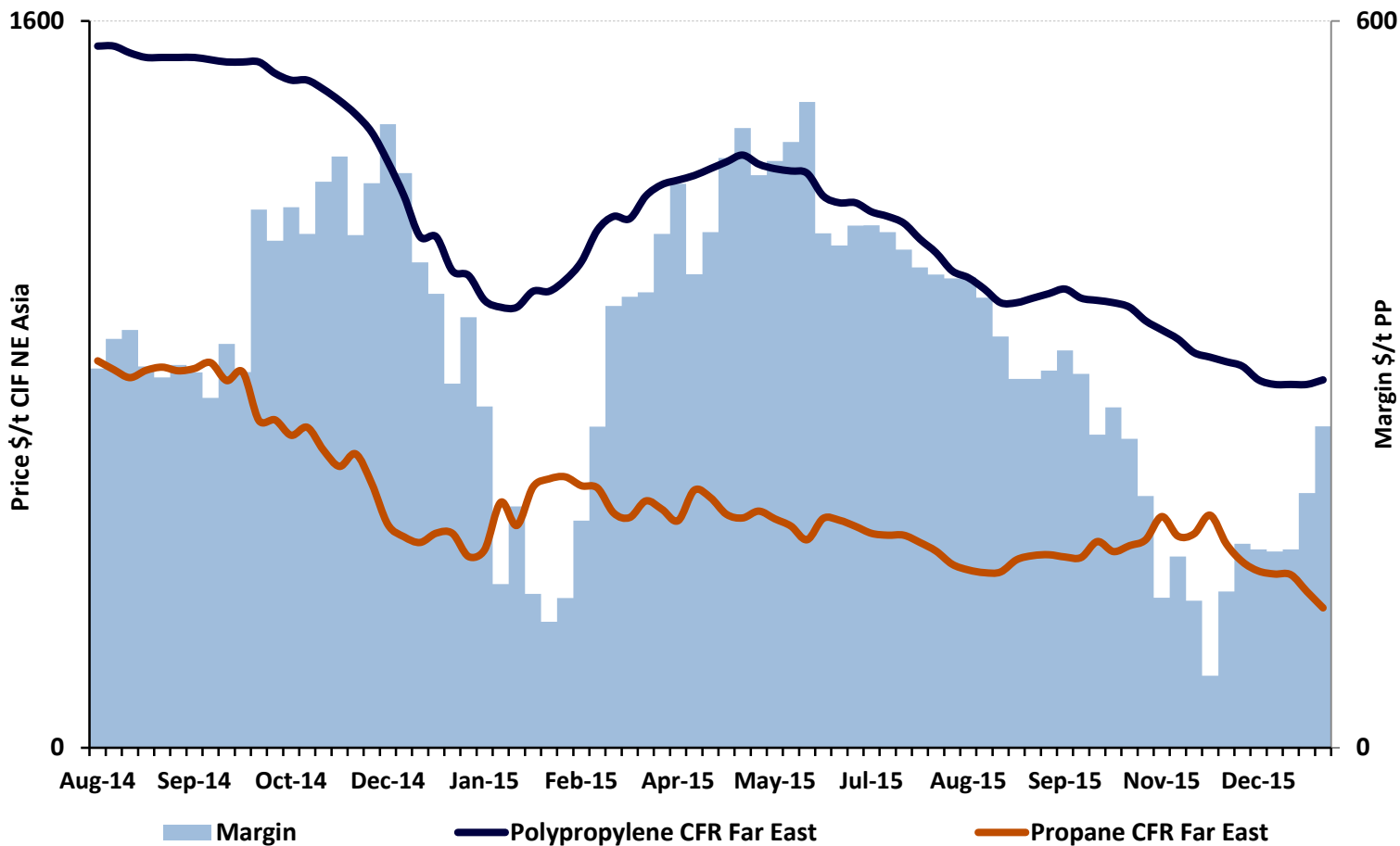


*Base case scenario

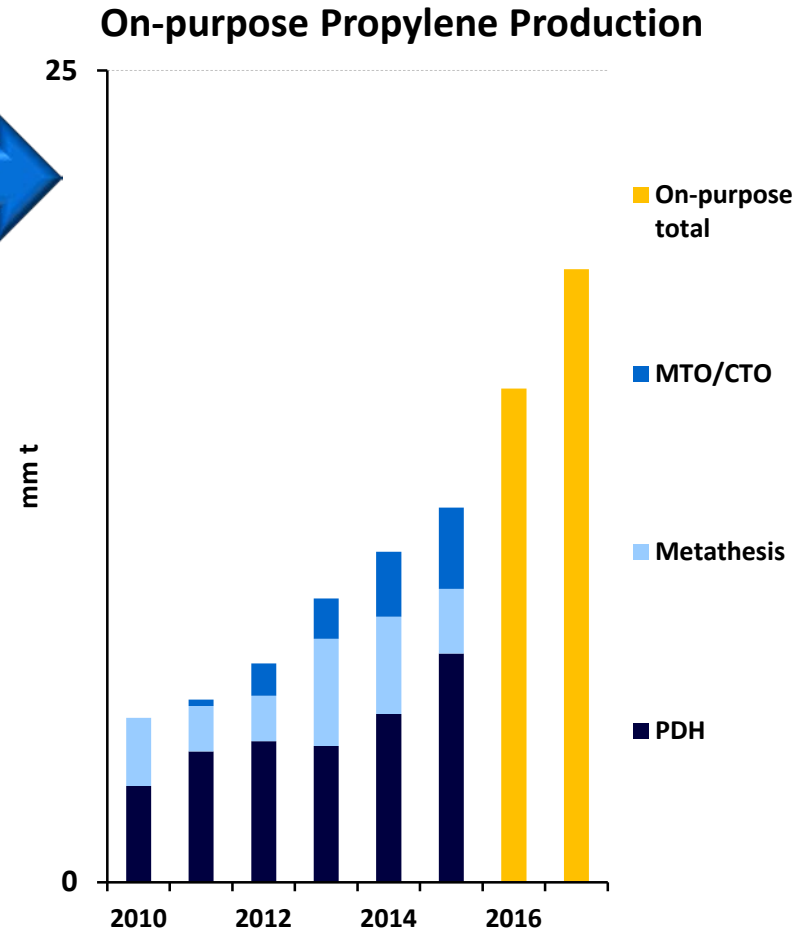
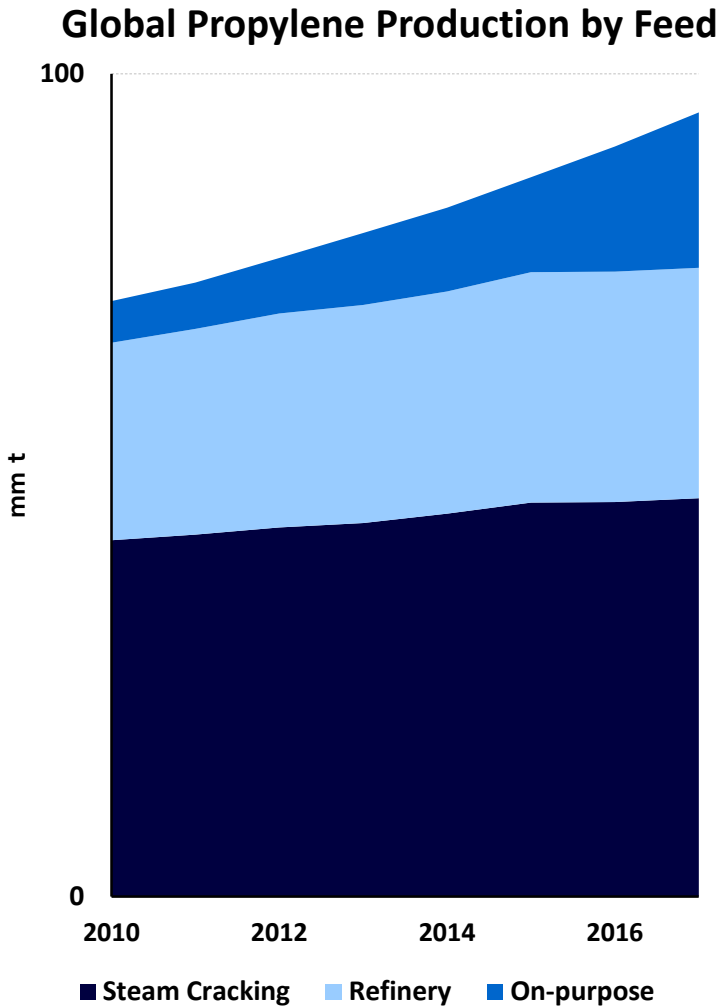
Challenge No2:

Propane & propylene/PP prices determine PDH plant operation

PDH/PP Complex Margins NE Asia



Challenge No3: PDH has to compete with other on-purpose sources



*Base case scenario

Propane and butane markets led by different drivers

Propane

Majority of the US export tons – large annual increments

Retail: main Northern hemisphere retail fuel – demand flat to declining.

Large bulk: preferred cracker feed in Europe but close to current technical limits

Limited cracker flexibility in Asia

Main growth outlet east: PDH

Butane

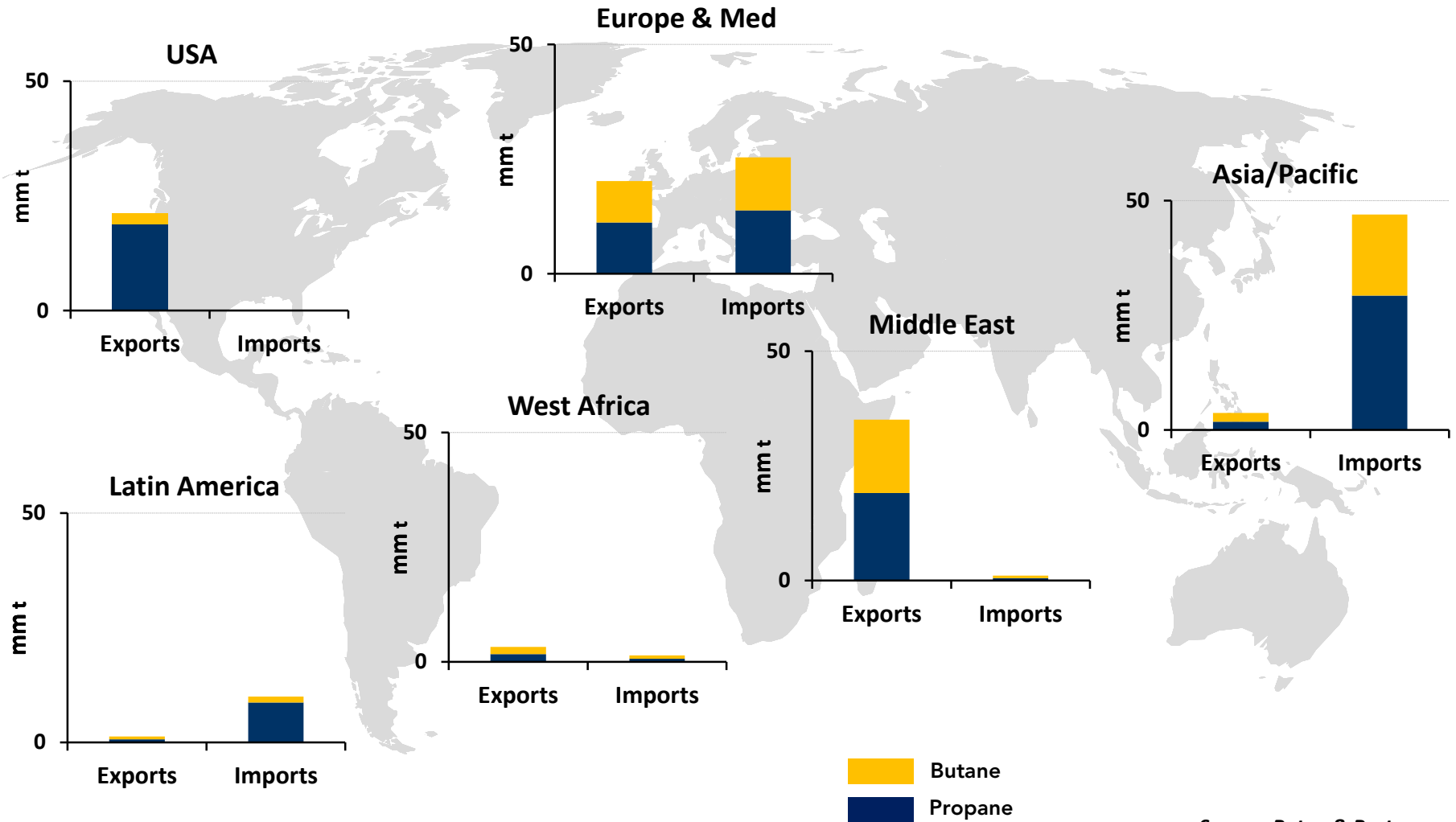
Minority of the US export tons – small annual increments

Retail: good market growth in India and Indonesia

Large bulk: main growth market is gasoline components – both west and east

Large cracker flexibility in Asia but won't be used if butane prices are too high

Propane/butane trade dynamics in 2015...

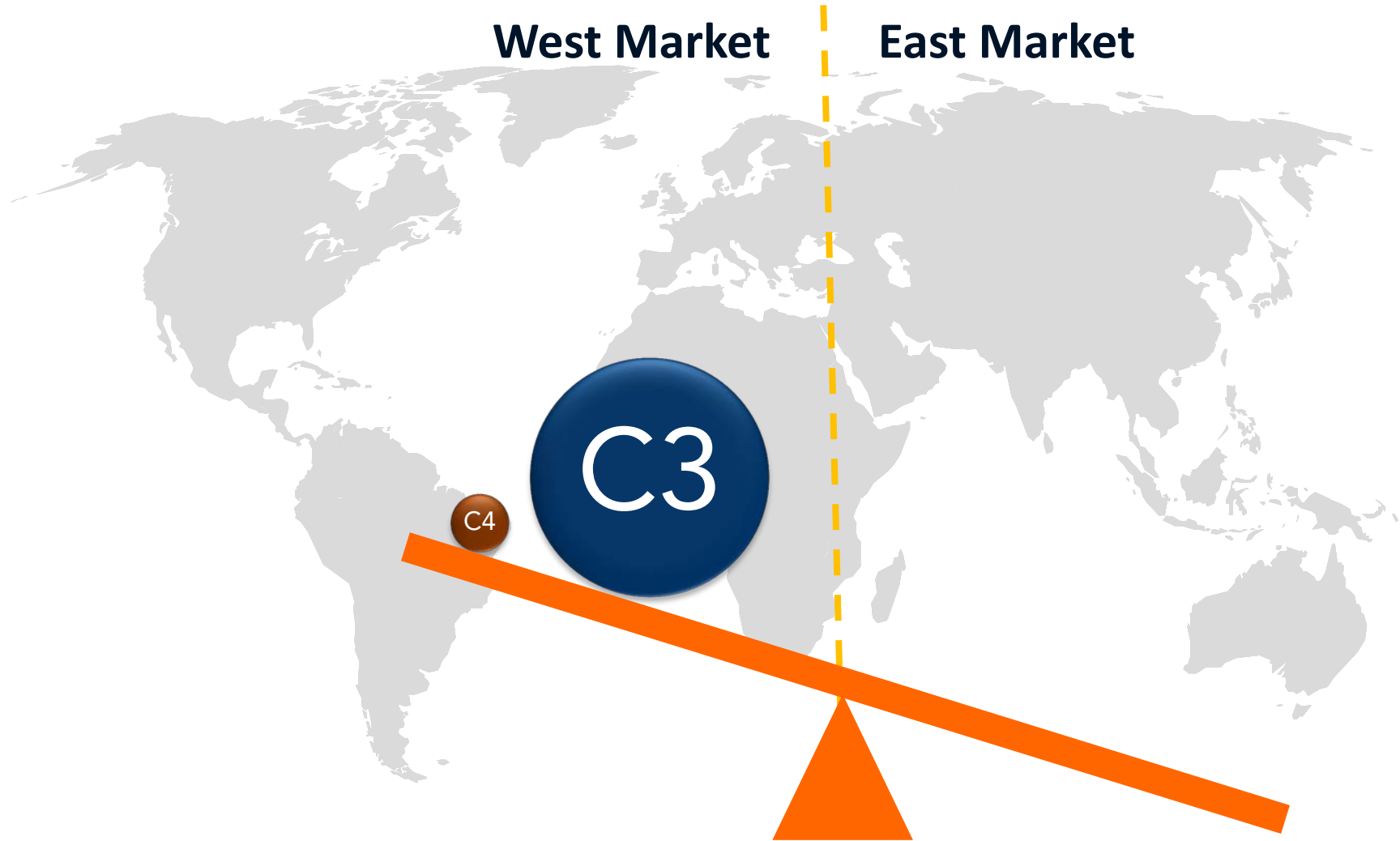


— Source, Poten & Partners

West to East trade flow dominated by propane

West Market

East Market



— Source, Poten & Partners



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4 - Price Outlook – Entering a “New Normal”

LPG pricing enters into a “new normal”...

USA

Europe

Asia

Major US Pricing Considerations

- Ethane supply/demand and pricing
- Crude oil and nat gas prices
- US Production levels
- Domestic market conditions (PDH facilities, Inventory, gasoline blending requirements, warm/severe winter, etc)
- Steam-cracking economics
- Unconstrained (ample terminal capacity) connection to global markets
- Terminalling fees
- Netback economics
- Shipping freight rate levels

Major Northern Europe Pricing Considerations

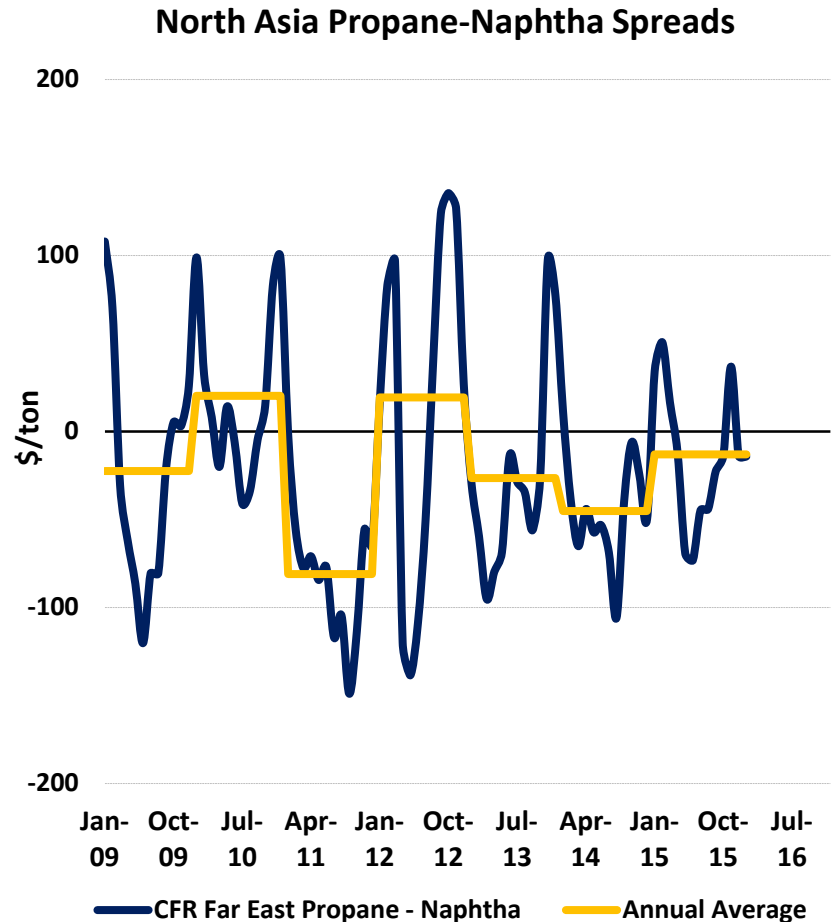
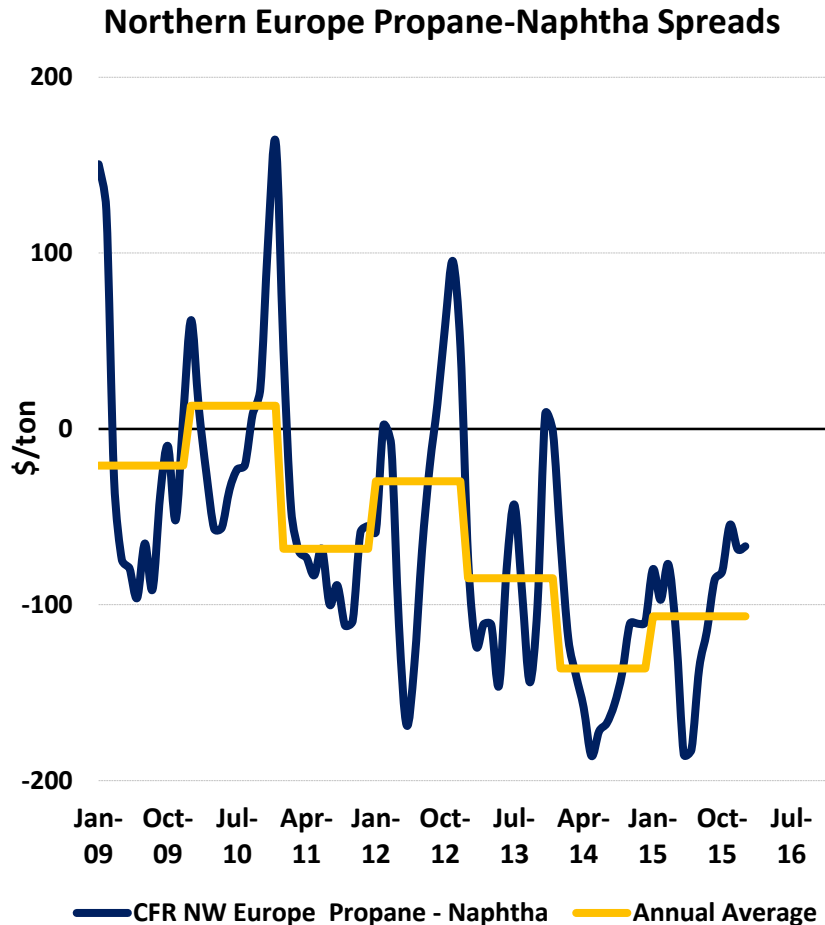
- Crude oil (Brent) price
- Steam-cracking economics
- Retail market developments

Major Asian Pricing Considerations

- PDH economics
- Steam-cracking economics
- Large bulk economics (industrial, gasoline blending requirements, “deep processing” etc)
- Chinese industrial/GDP growth
- Retail market developments
- Government intervention

— Source, Poten & Partners

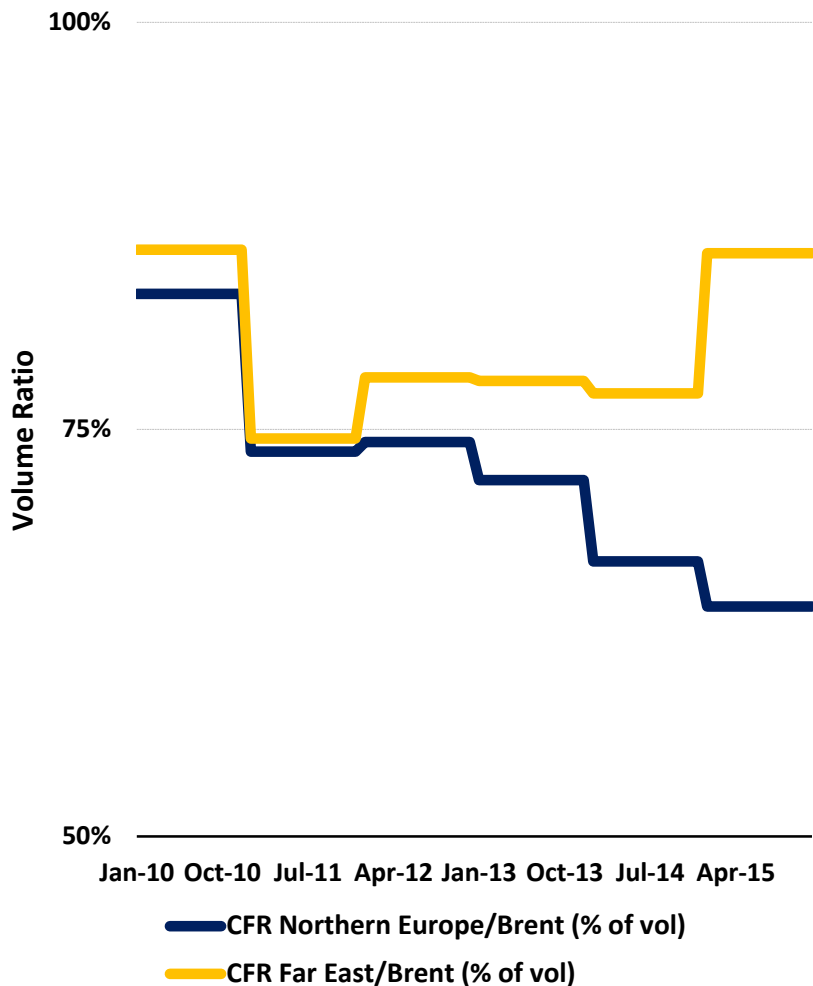
Propane West enters new regime; East less change



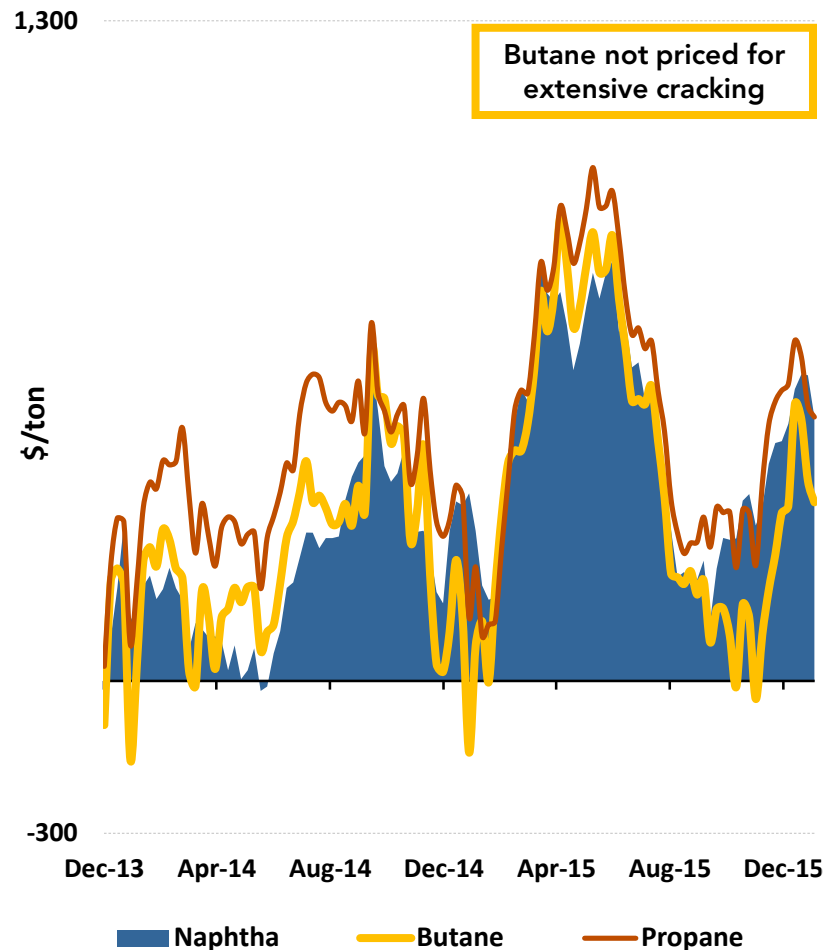
— Source, Poten & Partners

Butane West – new era; butane East – no decline

Butane Crude Relationship - Far East/NWE



N.E. Asia Cracker Incremental Margins



— Source, Poten & Partners

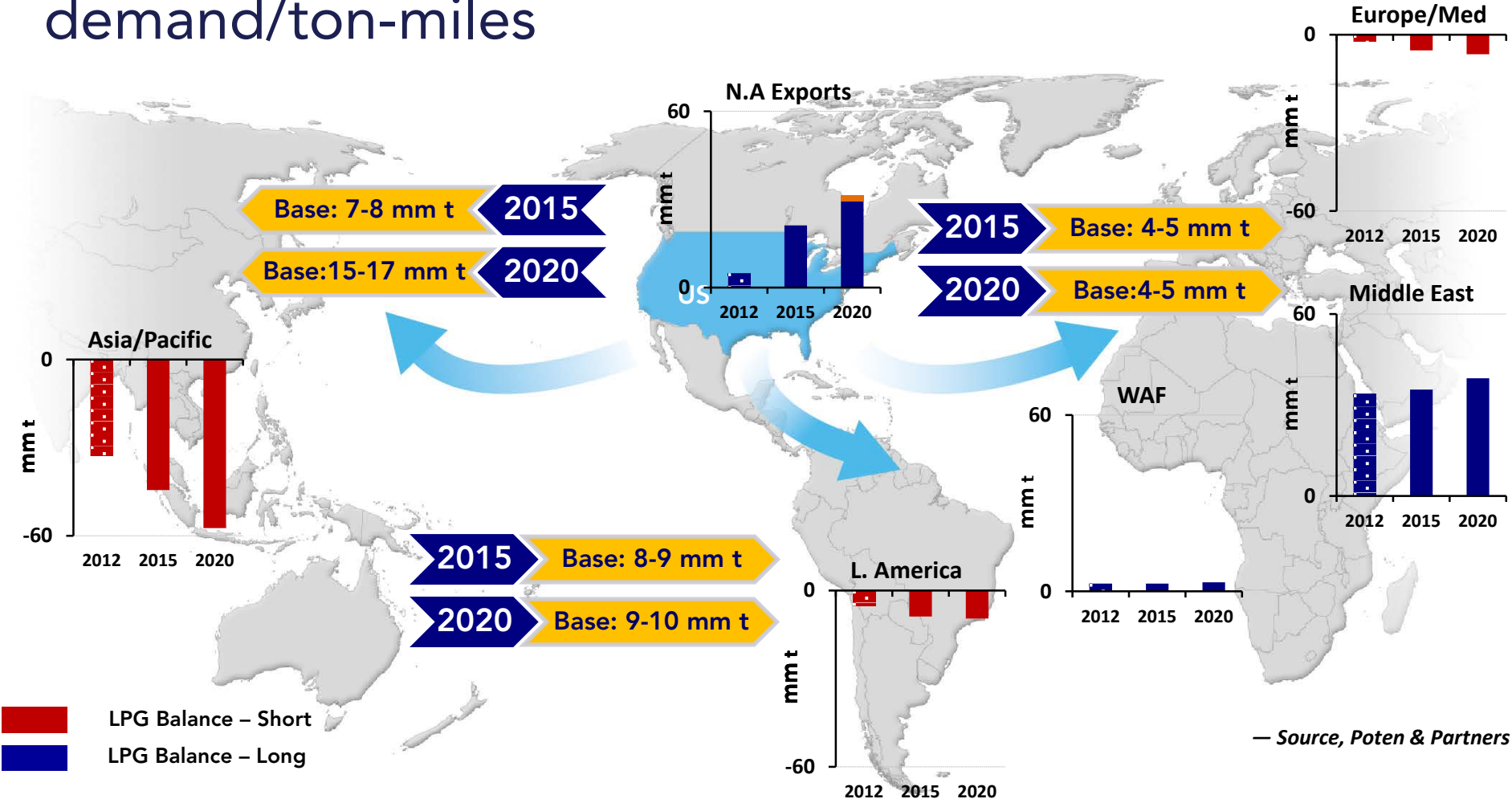


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5 - The Role of Shipping



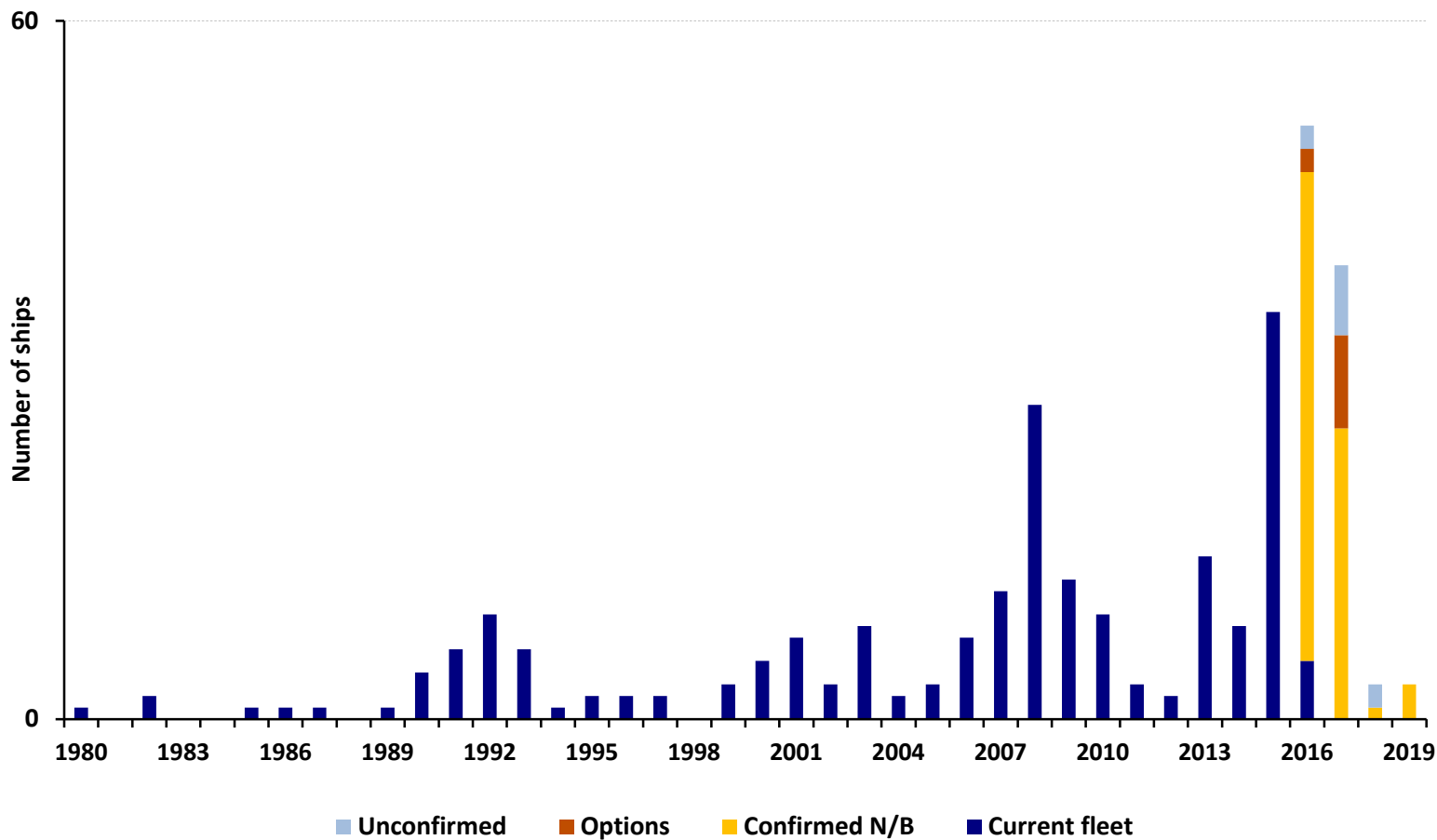
US LPG volume destinations will define shipping demand/ton-miles



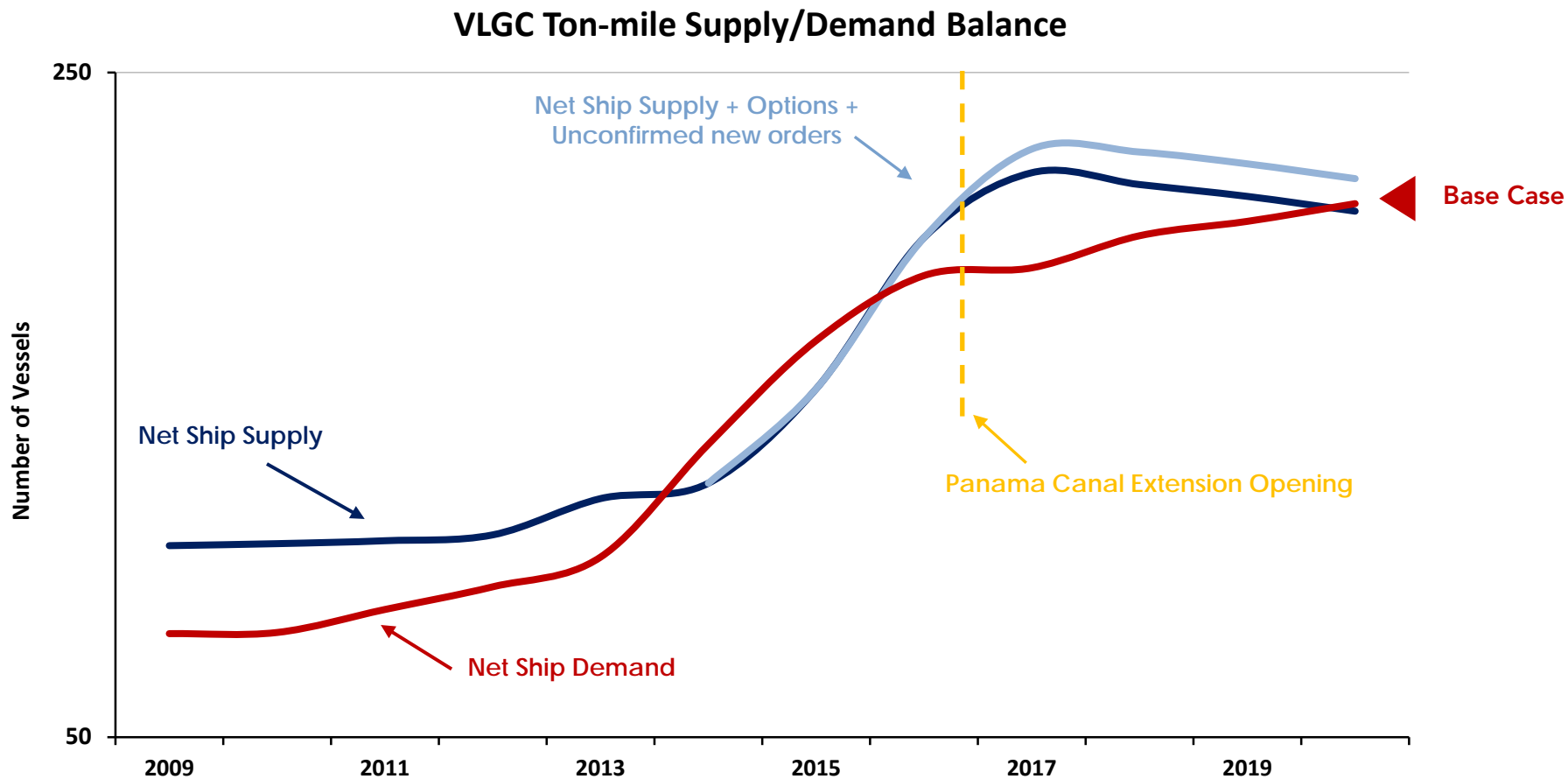
*Base: Represents our base case scenario of volumes exported from US to other regions

Heavy VLGC N/B delivery schedule expected...

The VLGC Fleet - Feb 2016



... which will put downward pressure to freight levels



— Source, Poten & Partners



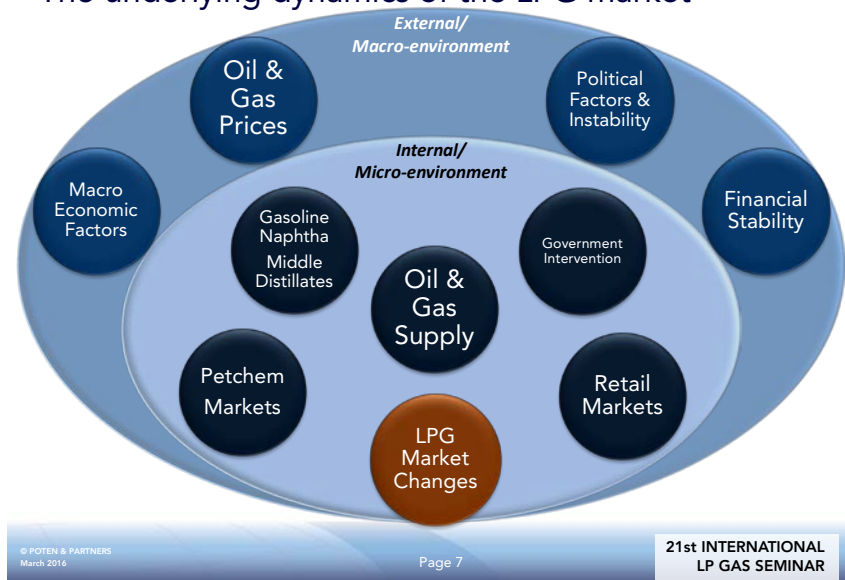
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6 - Closing Thoughts



LPG market has more variables than ever

The underlying dynamics of the LPG market



Expect Uncertainty

Expect Volatility

Identify key short-term/long-term drivers

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