

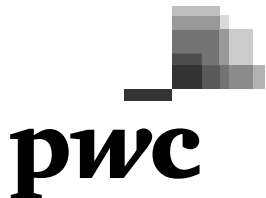
strategy&

Formerly Booz & Company

May 2014

Feedstock Disruptions in Chemicals chains necessitate business model innovation

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Strategy& has based findings on its proprietary feedstock model

Strategy& global feedstock model

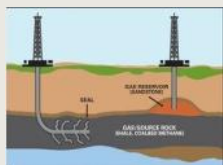


- Feedstock sources
- Cracker by cracker
- Reformers
- On-purpose capacity
- Demand projections
- Price projections

The screenshot displays the "Global Baseline" model interface. It features a complex data table with multiple columns and rows, organized into several sections. The top section is titled "Global Baseline" and includes a sub-header "2022". Below this, there are several tabs or filters, including "Feedstocks", "Crackers", "Reformers", "Demand", and "Price". The main table contains a large number of rows, each representing a different feedstock or product, with columns for various attributes such as "Feedstock", "Cracker", "Reformer", "Demand", and "Price". The table is presented in a clear, structured format, allowing for easy comparison and analysis of the data.

The chemicals industry is facing a number of game changing discontinuities

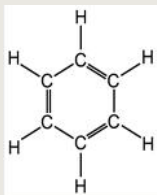
Supply trends



- **Shale Gas in the United States, Associated Gas in Iraq and Russia** leading to increased NGL supply



- **Coal and Shale Gas in China** leading to increased supply of light olefins



- **Tightening aromatics supply**

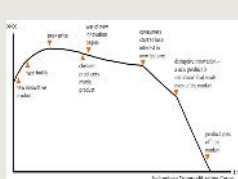
Demand trends



- **Sustained growth in the chemicals industry driven by Asia**

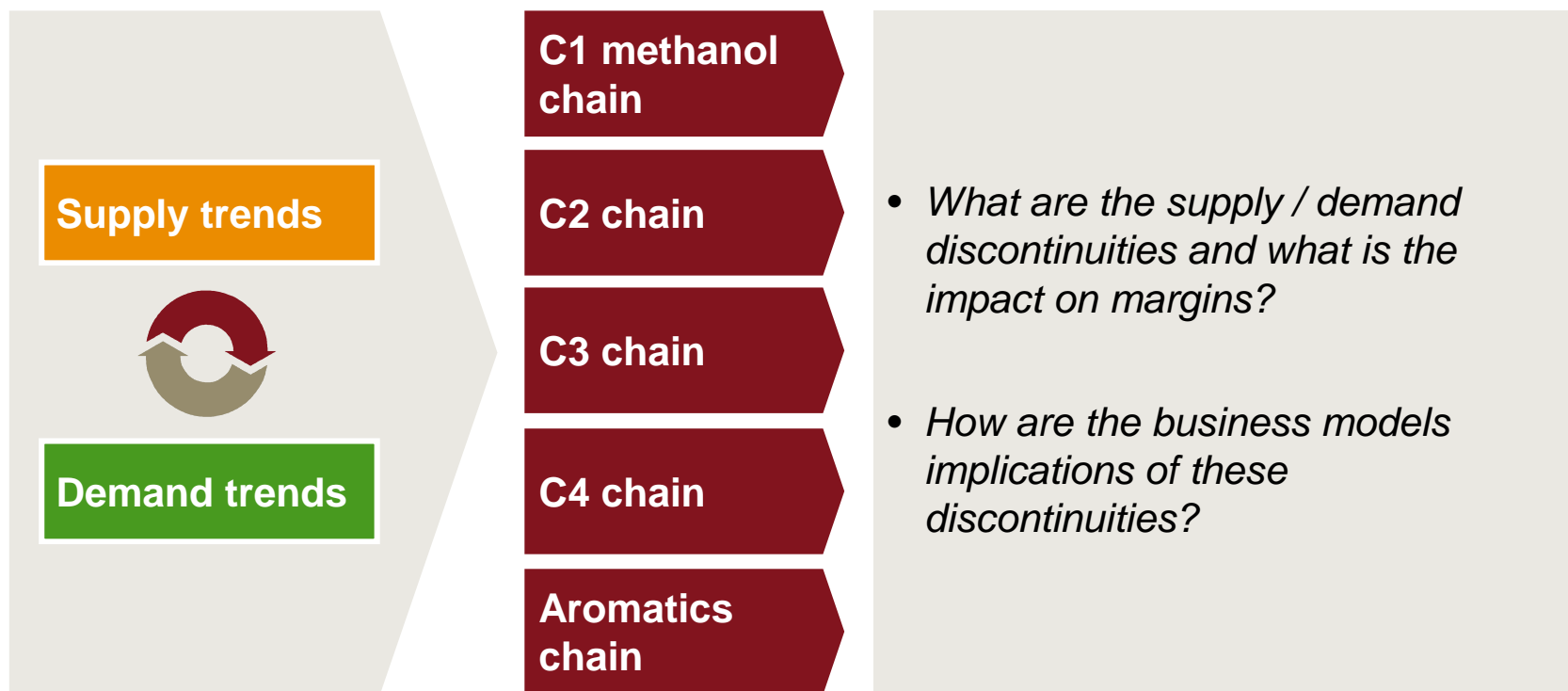


- **Discontinuities in consumer end-market**

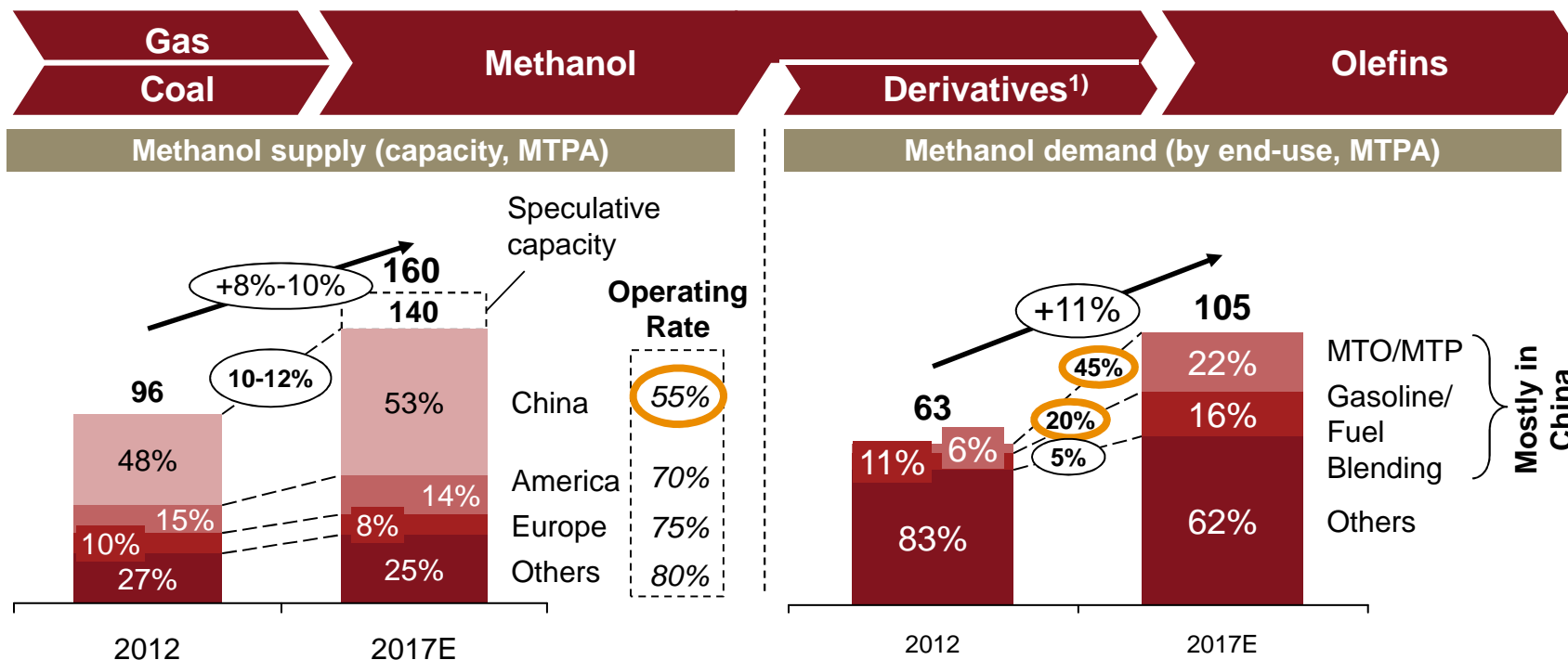


- **Commoditization eroding margins in performance and specialty chemicals**

Going forward, these trends will have implications on supply/ demand of petrochemicals building blocks and business models



Methanol market is driven by China: MTO/P, fuel blending and capacity additions are the key market drivers



Impact on methanol price

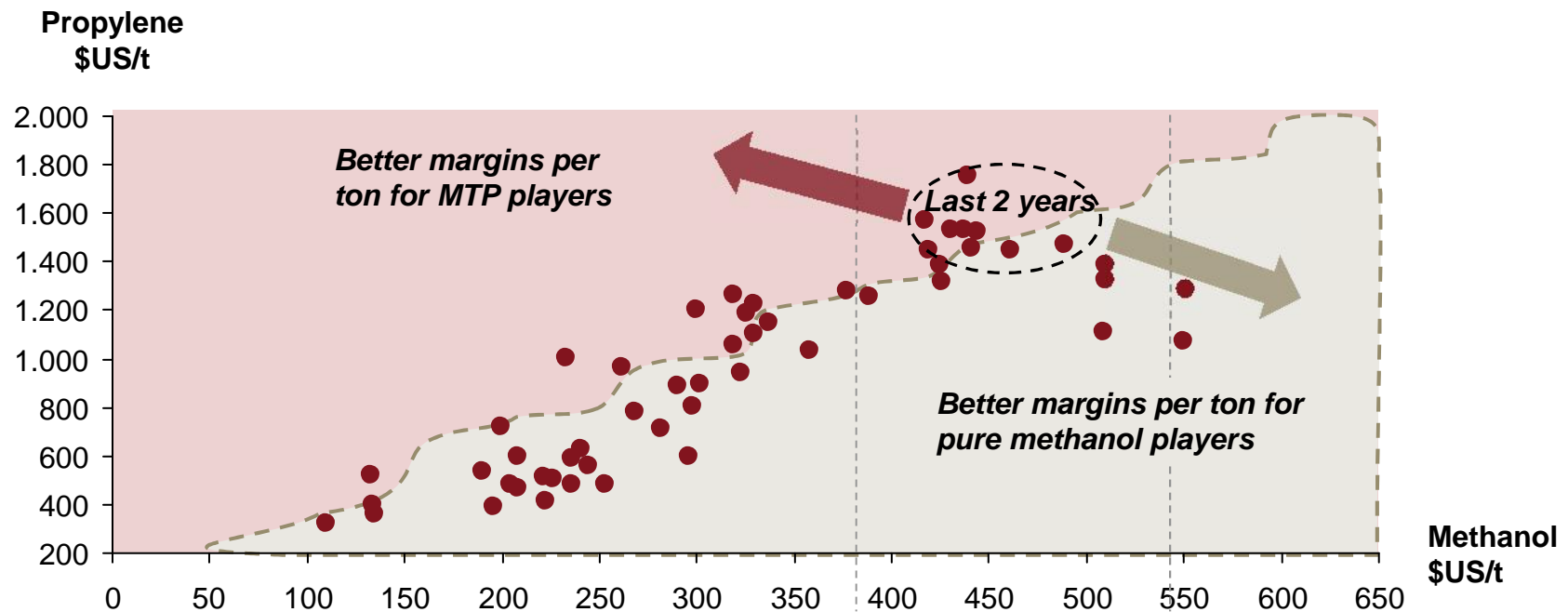


Likely to be capped in Base Case – risk of downward pressure in case of significant operating rate increase in China

1) MTBE, Formaldehyde, Acetic Acid, Chloromethanes, others
Source: Strategy& analysis

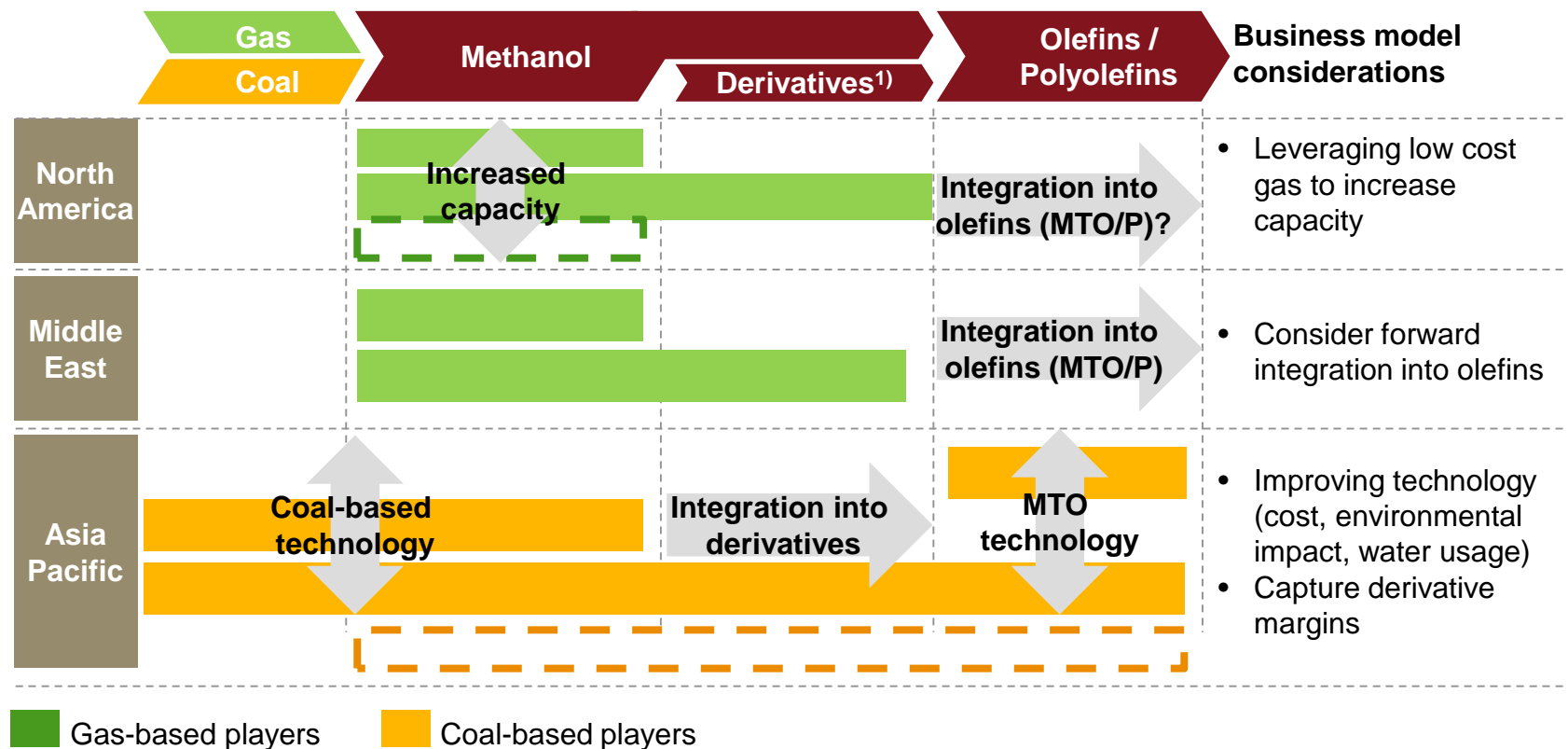
For pure methanol players, moving into MTP can be attractive in case of major increase in methanol supply or C3 prices

Propylene vs. methanol prices and margins \$US/t – 2000 - 2012



Source: Strategy& analysis

In such market conditions, methanol players along the value chain should consider new strategic options

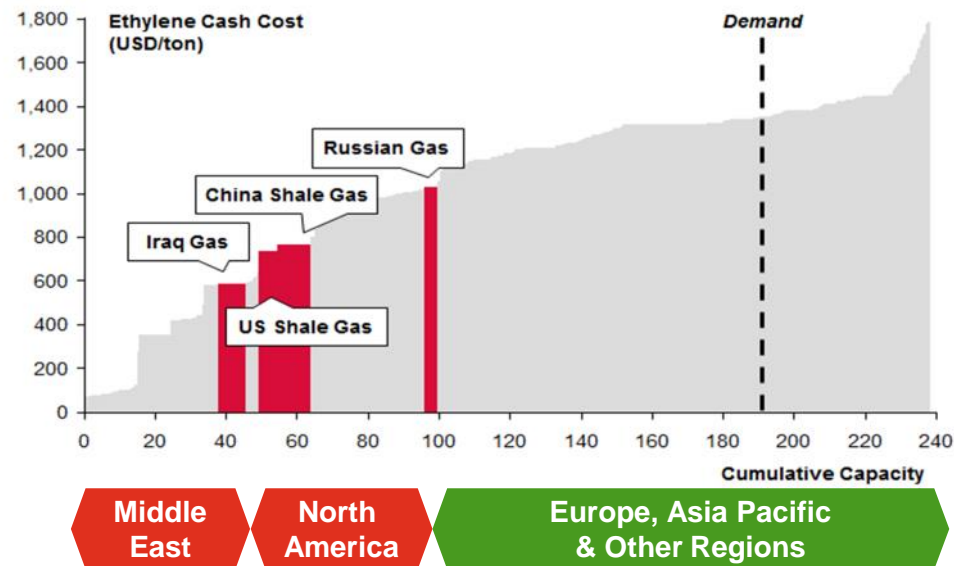


1) MTBE, Formaldehyde, Acetic Acid
Source: Strategy& analysis

Ethylene is expected to be in oversupply as a result of growing light feedstock availability



Global Ethylene Industry Cost Curve Oil Price at USD 90 / bbl, 2025



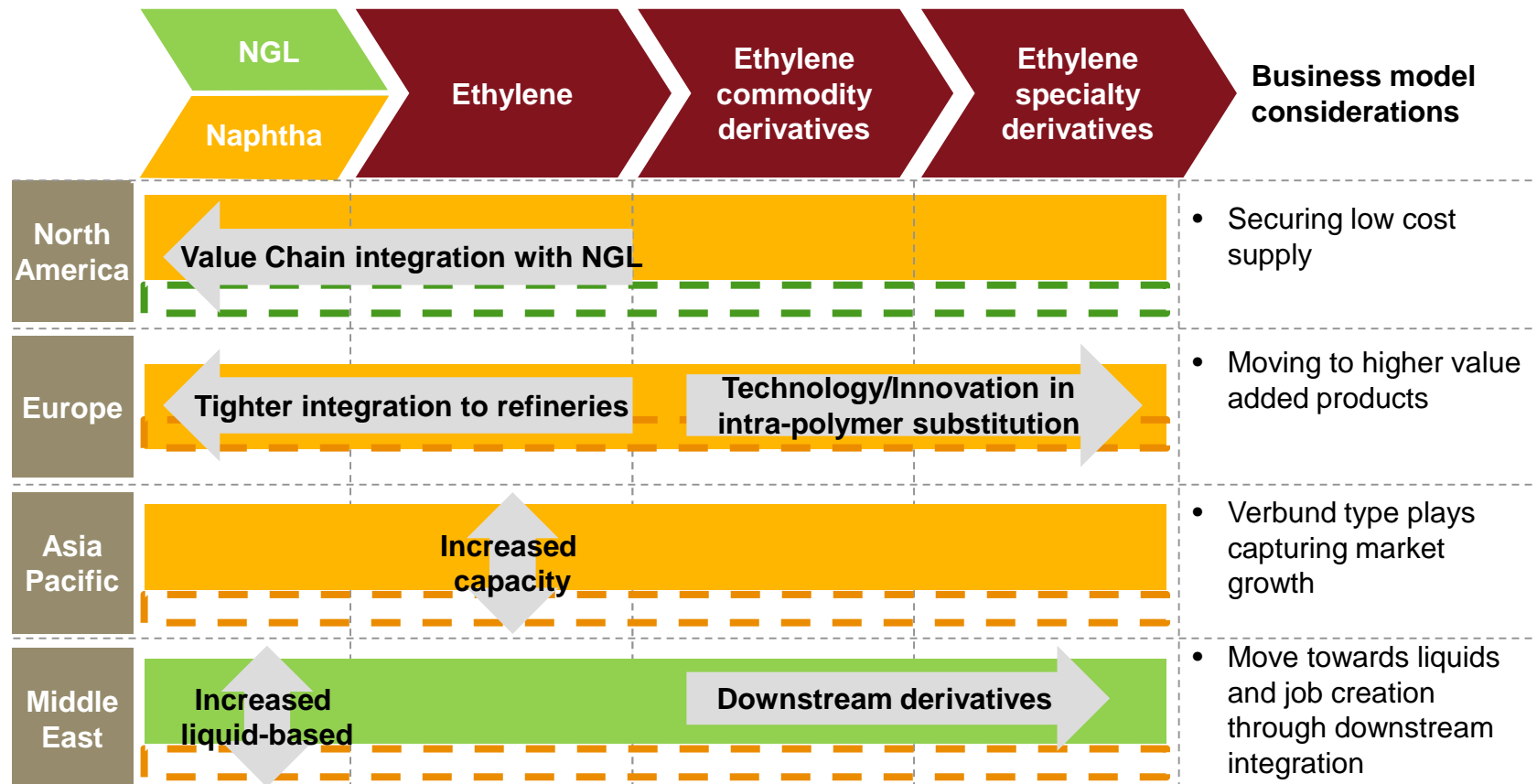
Impact on ethylene price



Likely to continue on a downward trend due to increased supply

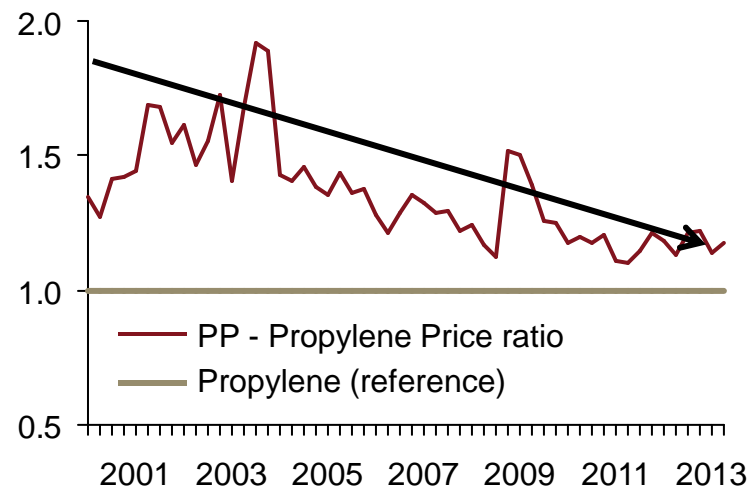
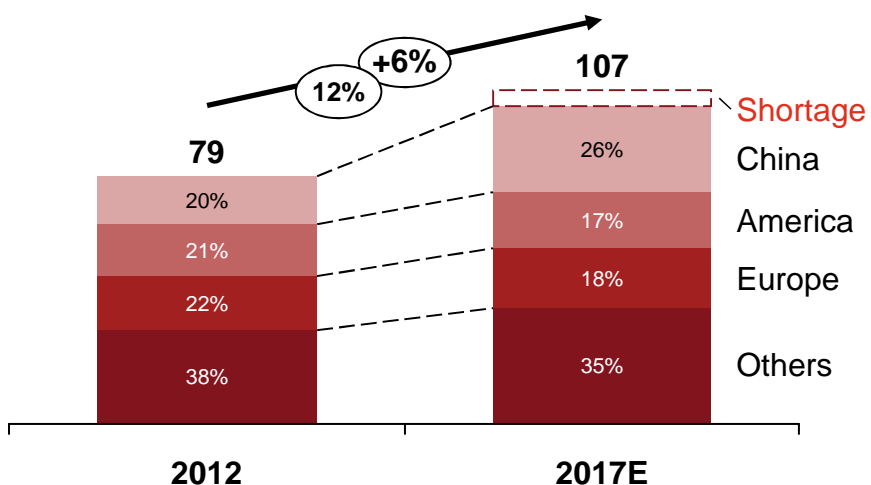
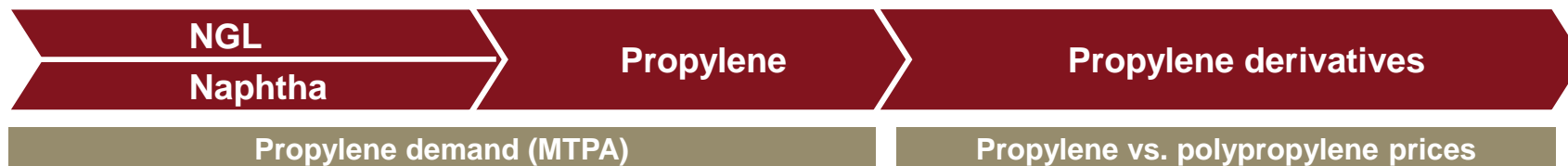
Source: Strategy& analysis

These disruptions will result in changes in the ethylene chain business models



Propylene is expected to be in shortage in the future – upwards price pressure is squeezing derivatives margins

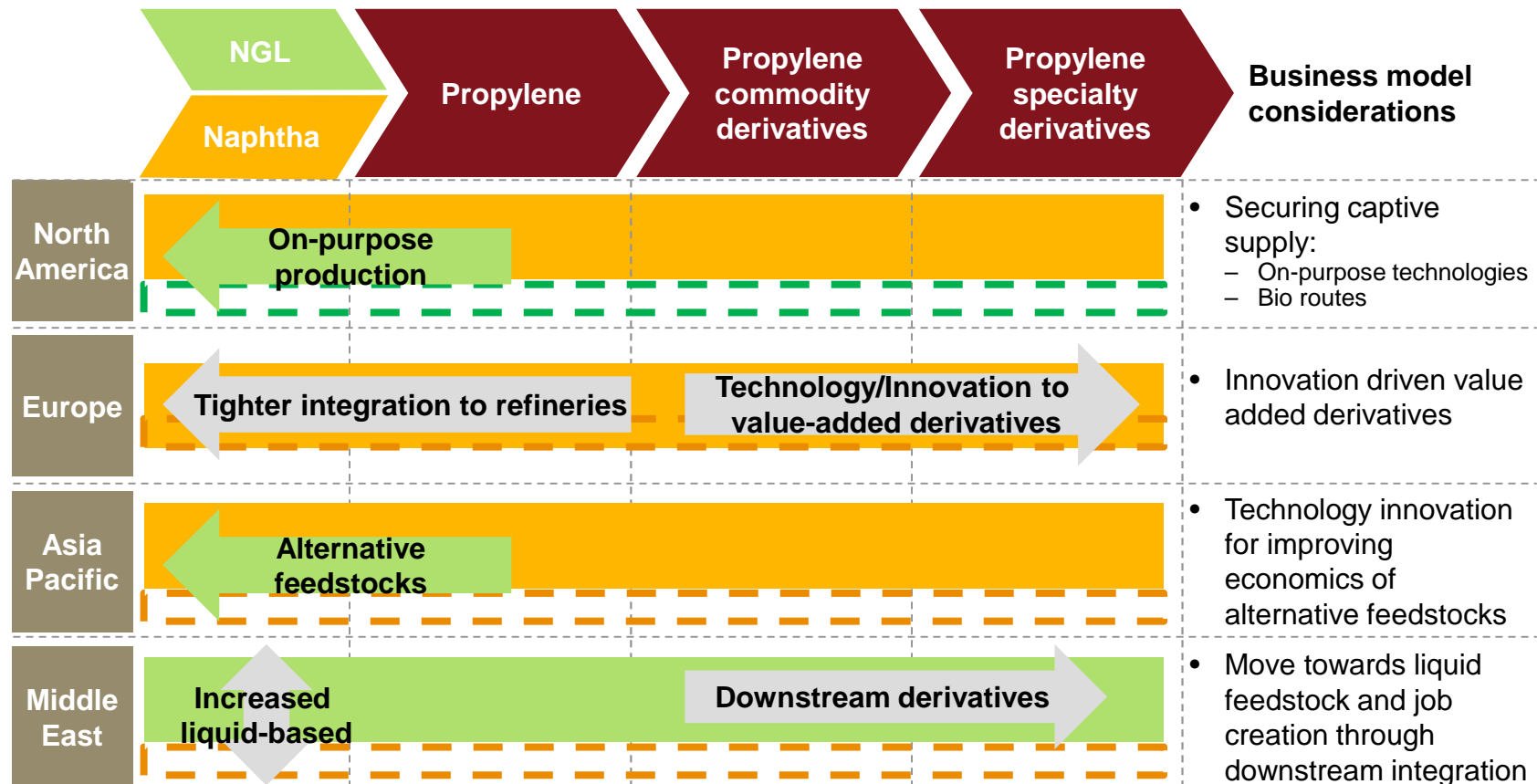
C3 chain supply and demand dynamics



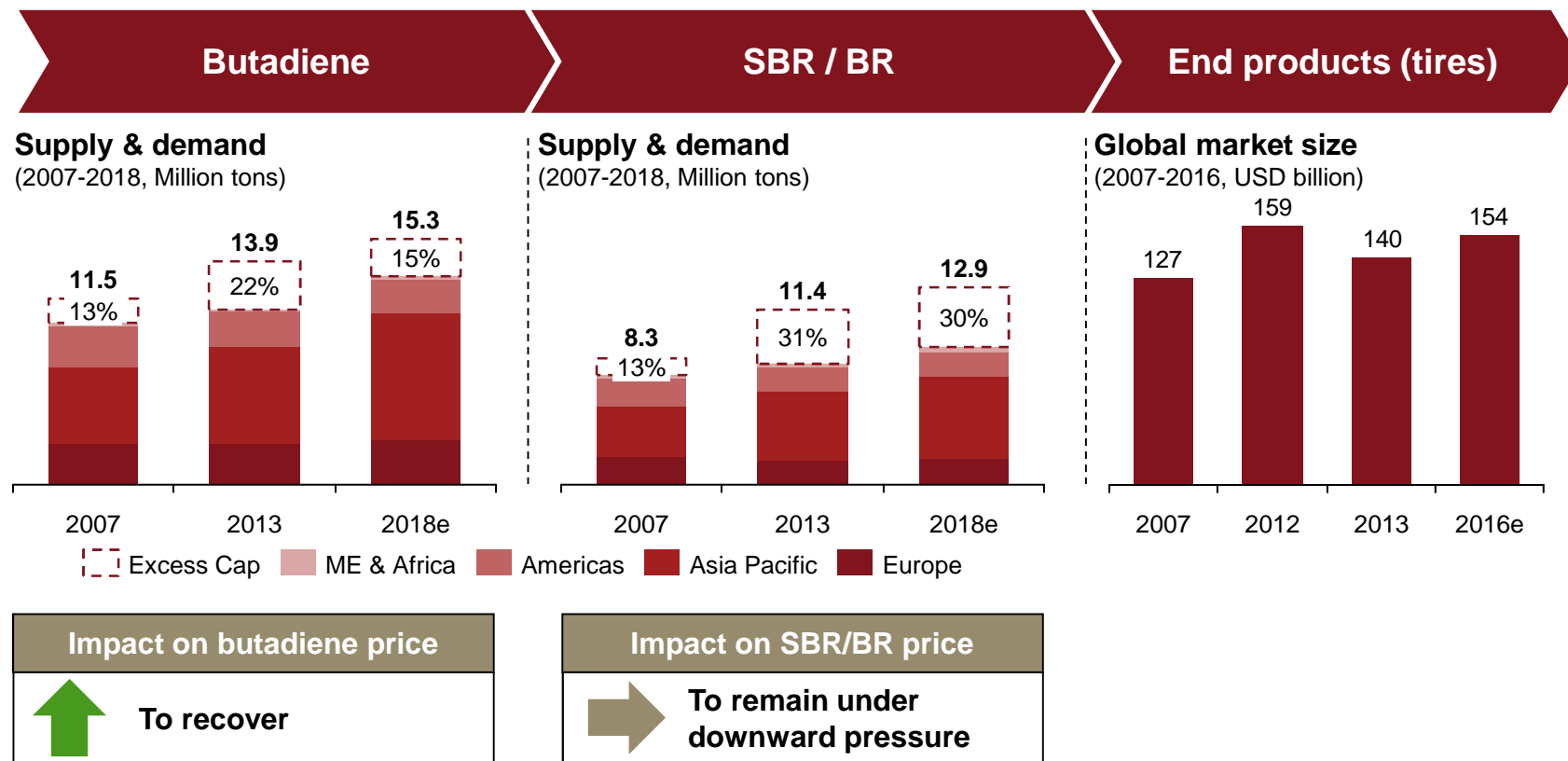
Impact on propylene price → **Likely to sustain high levels**

Impact on polypropylene margin → **Under downward pressure vs. propylene**

These disruptions will result in changes in the propylene chain business models

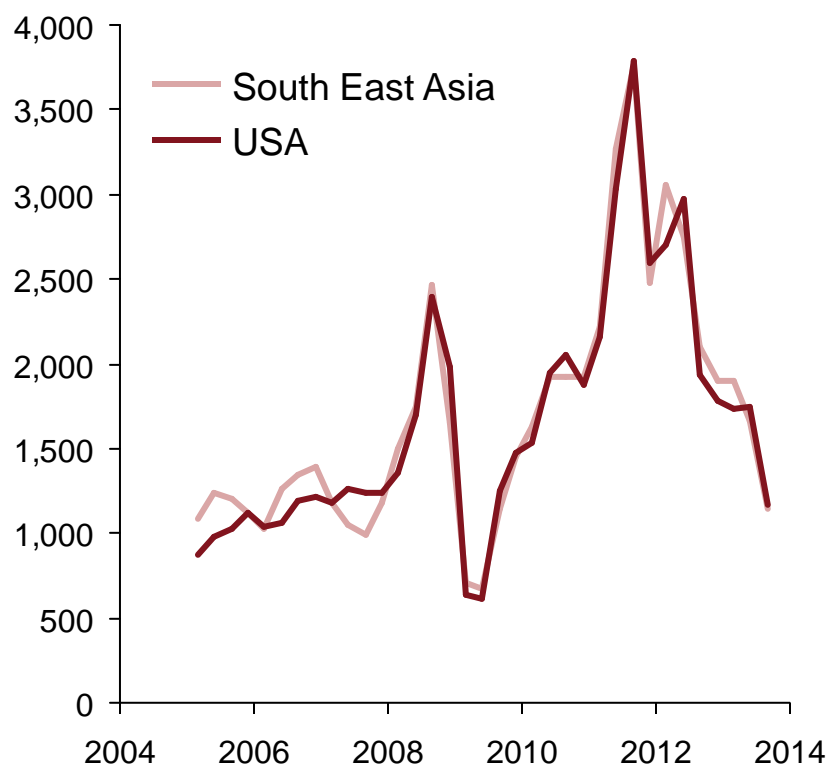


Butadiene & derivatives have significant overcapacity – this is expected to improve for Butadiene going forward

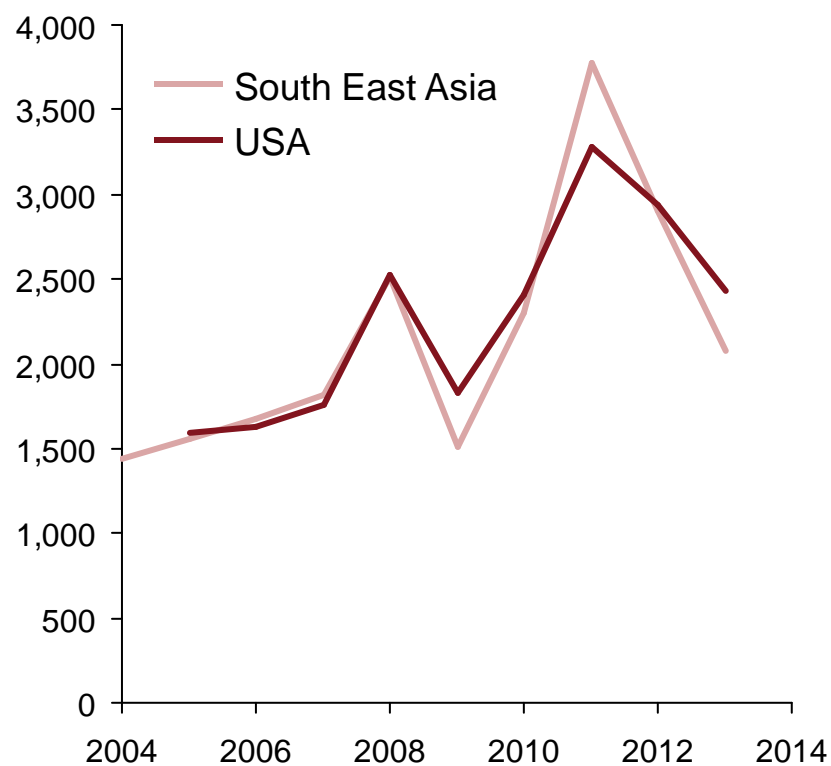


Recent demand and supply movements have resulted in significant price fluctuations in Butadiene and derivatives

Butadiene prices USD / ton, 2004 - 2013

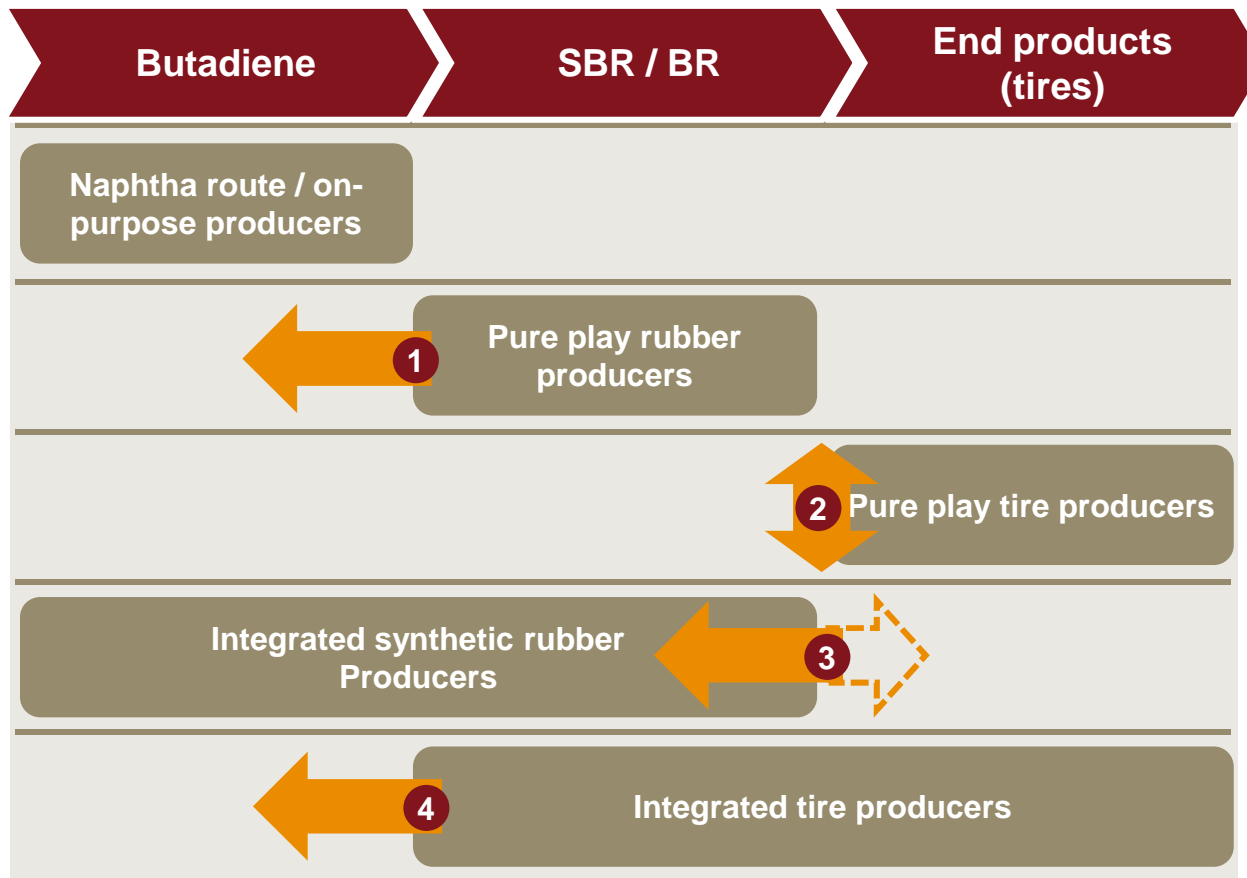


SBR prices USD / ton, 2004 - 2013



Source: Nexant; Strategy& analysis

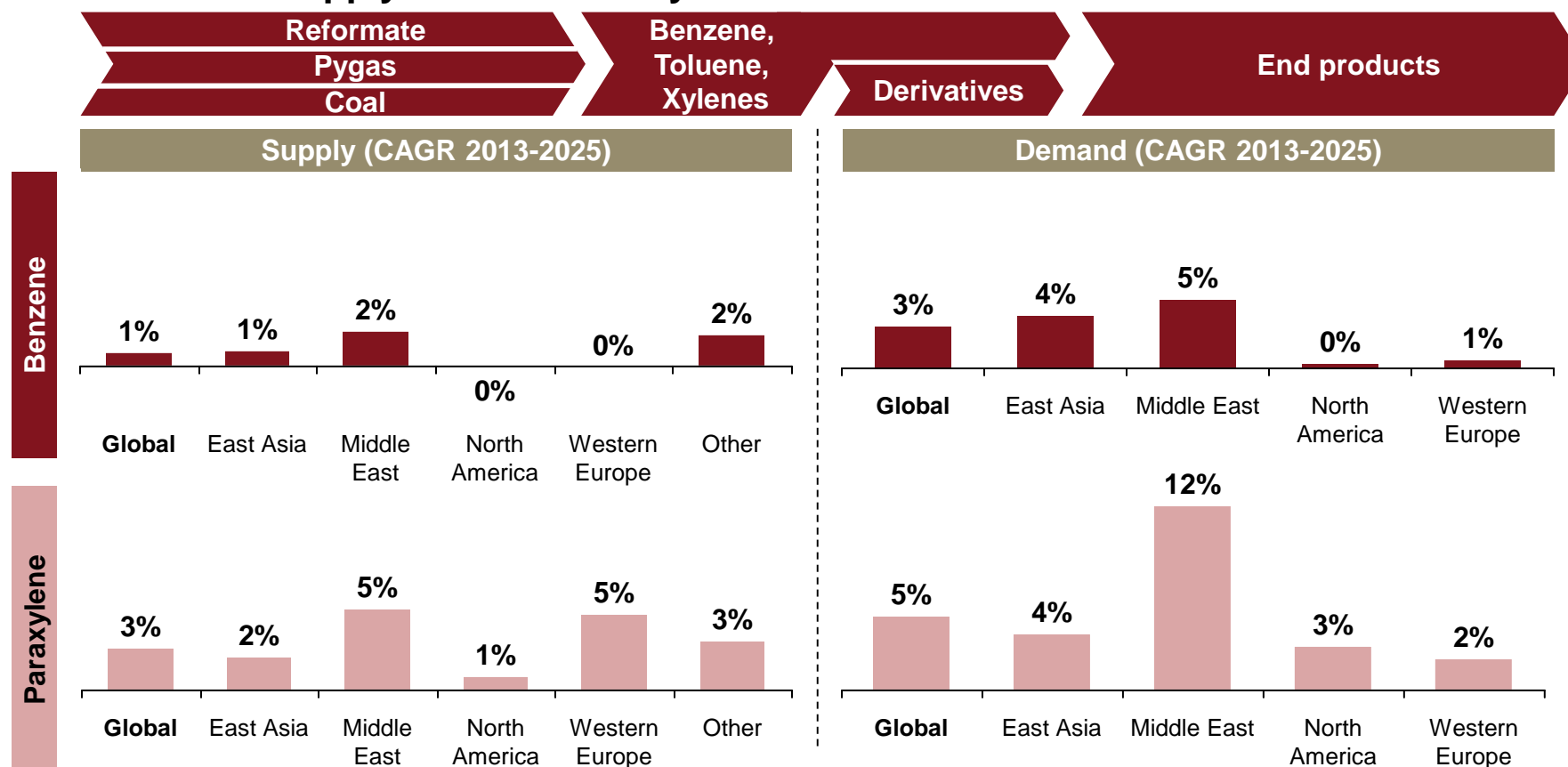
Vulnerability of SBR / BR producers might result in co-location of entire value chains closer to demand centers



Source: Strategy& analysis

BTX demand growth, particularly in Asia and Middle East, is outpacing capacity additions

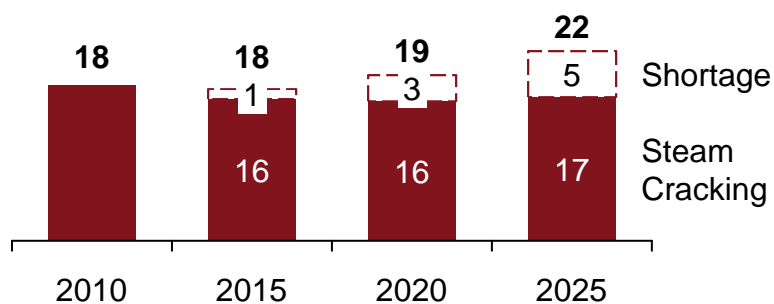
BTX chain supply and demand dynamics



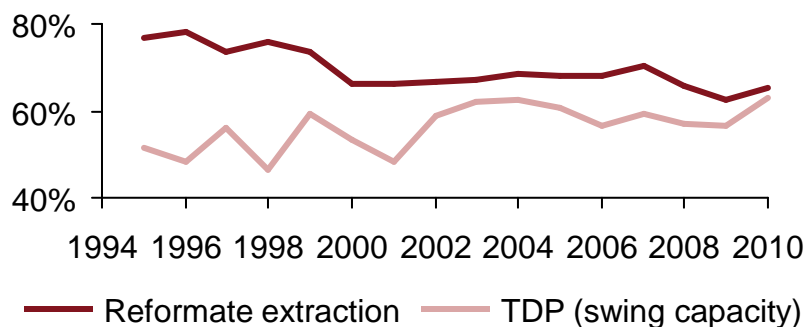
Source: Strategy& analysis

Feedstock constricting supply from steam crackers, while environmental regulations are limiting refinery output

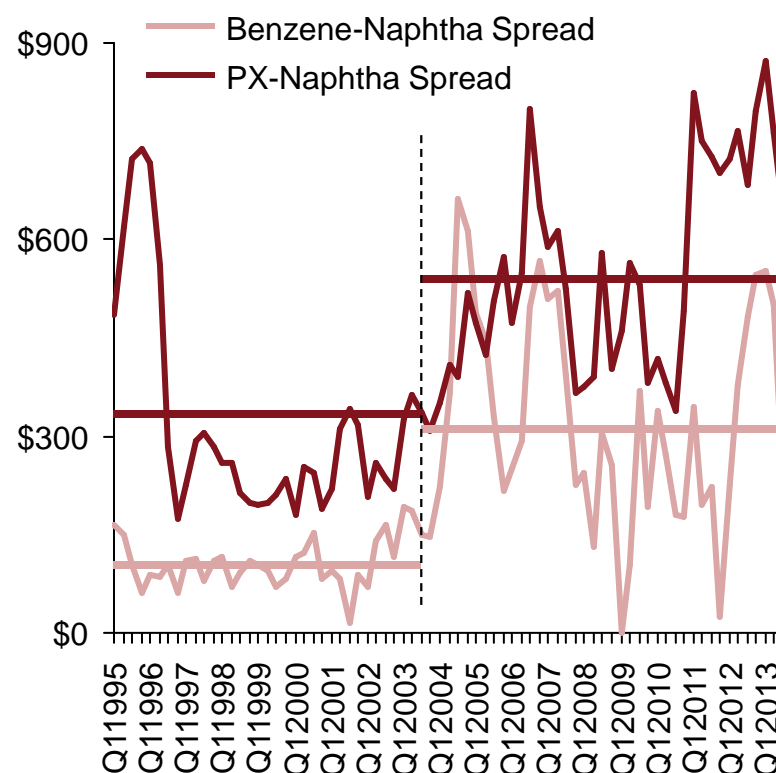
Potential benzene shortage from steam crackers In mmtpa



Utilization rates of refining processes
Global basis



Benzene and PX price spreads US prices, in USD / ton



These developments have implications for all players across the value chain; many opportunities lie upstream

