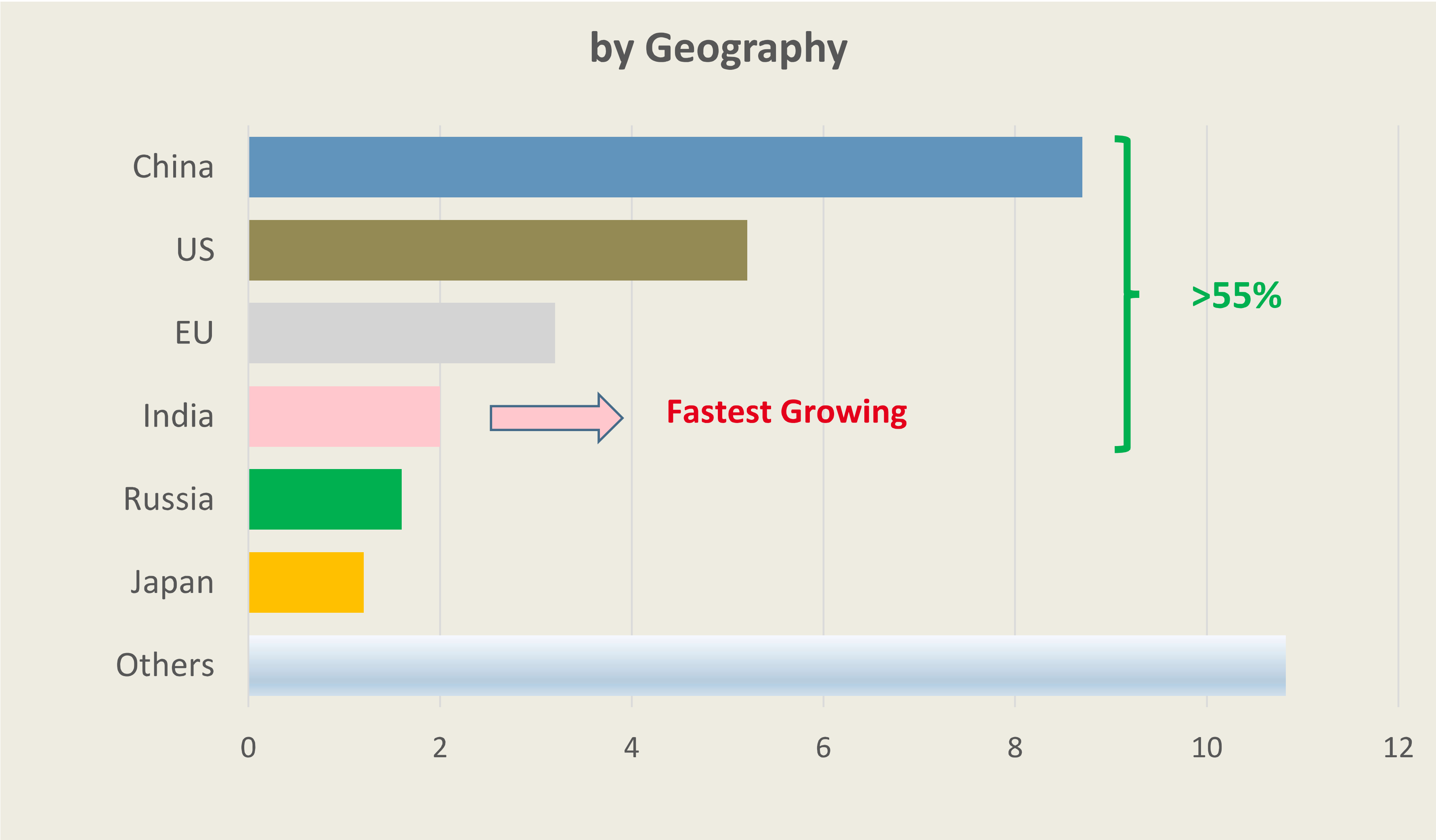
ICIS

Energy, Refining and Petrochemical Feedstocks

New Demand Trends: COP21 Points to Climate Change Mitigation Efforts

Energy Related CO2 Emissions (*)



- Progress
- US and China
- IOCs
- It will take time...

(*) CO2 represents the majority of GHG, and energy related accounts for 2/3 of it

Source: ICIS Elaboration from IEA, BP, ExxonMobil, Industry data

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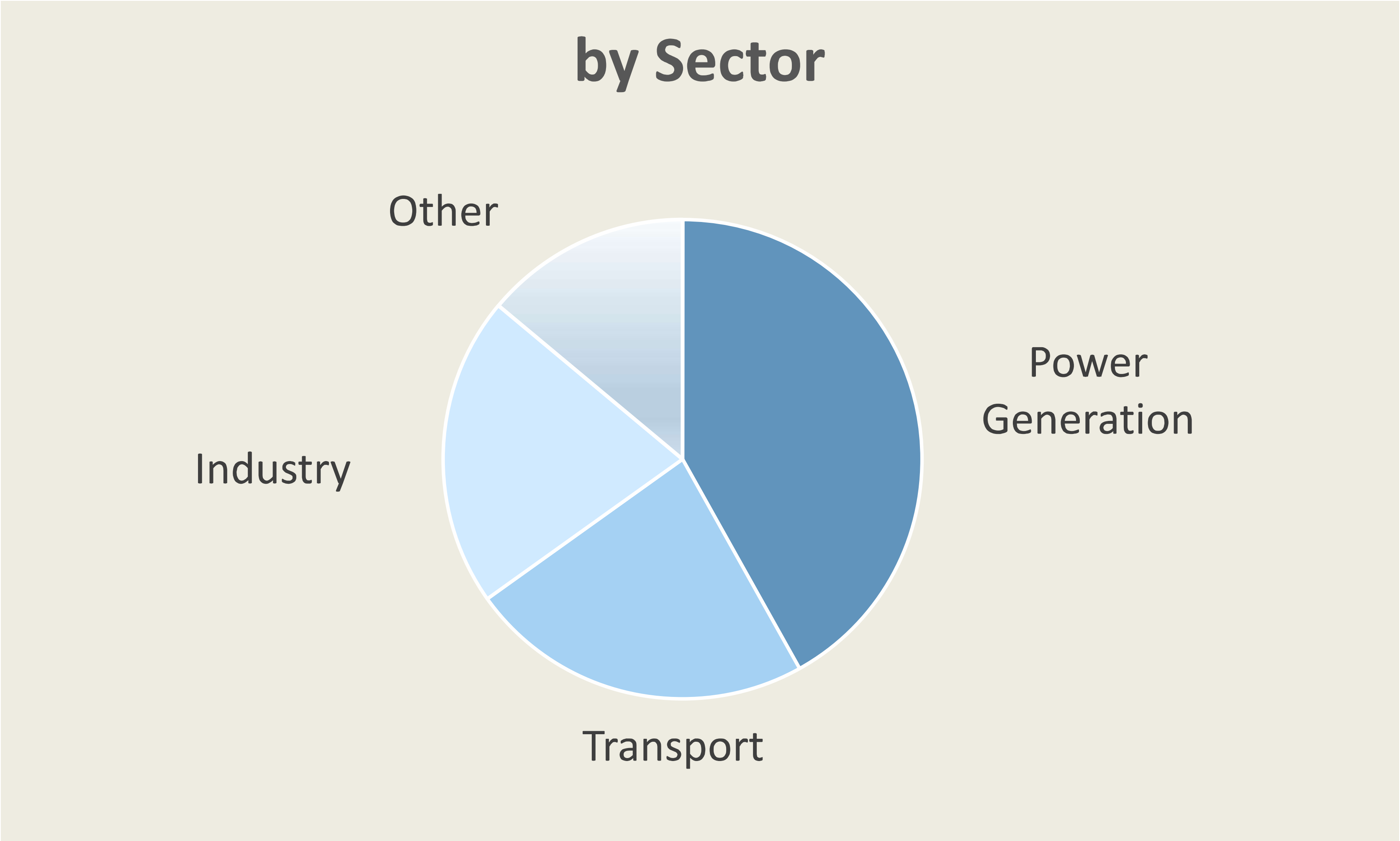


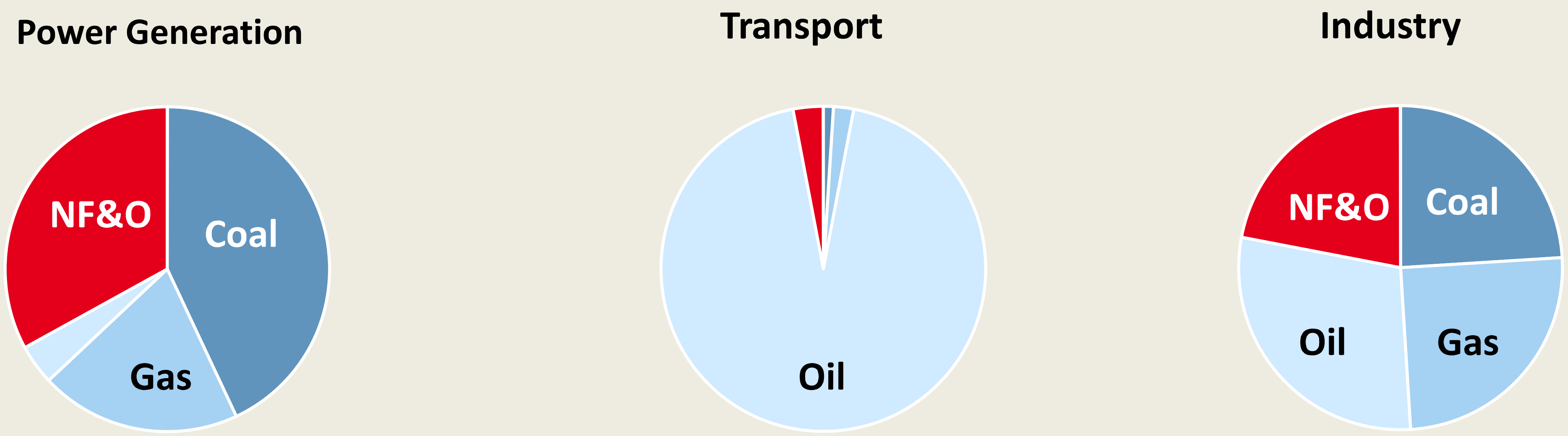
Most Affected

(*) CO_2 represents the majority of GHG, and energy related accounts for 2/3 of it

Source: ICIS Elaboration from IEA, BP, ExxonMobil, Industry data

Demand growth for Oil, Gas and Coal to be affected, but subject to different drivers

Fuels Contribution by Selected Sectors (million TOE)



NF&O = Non Fossil, Other

Source: ICIS Supply and Demand Database, ICIS Elaborations from IEA, BP, ExxonMobil, Industry data

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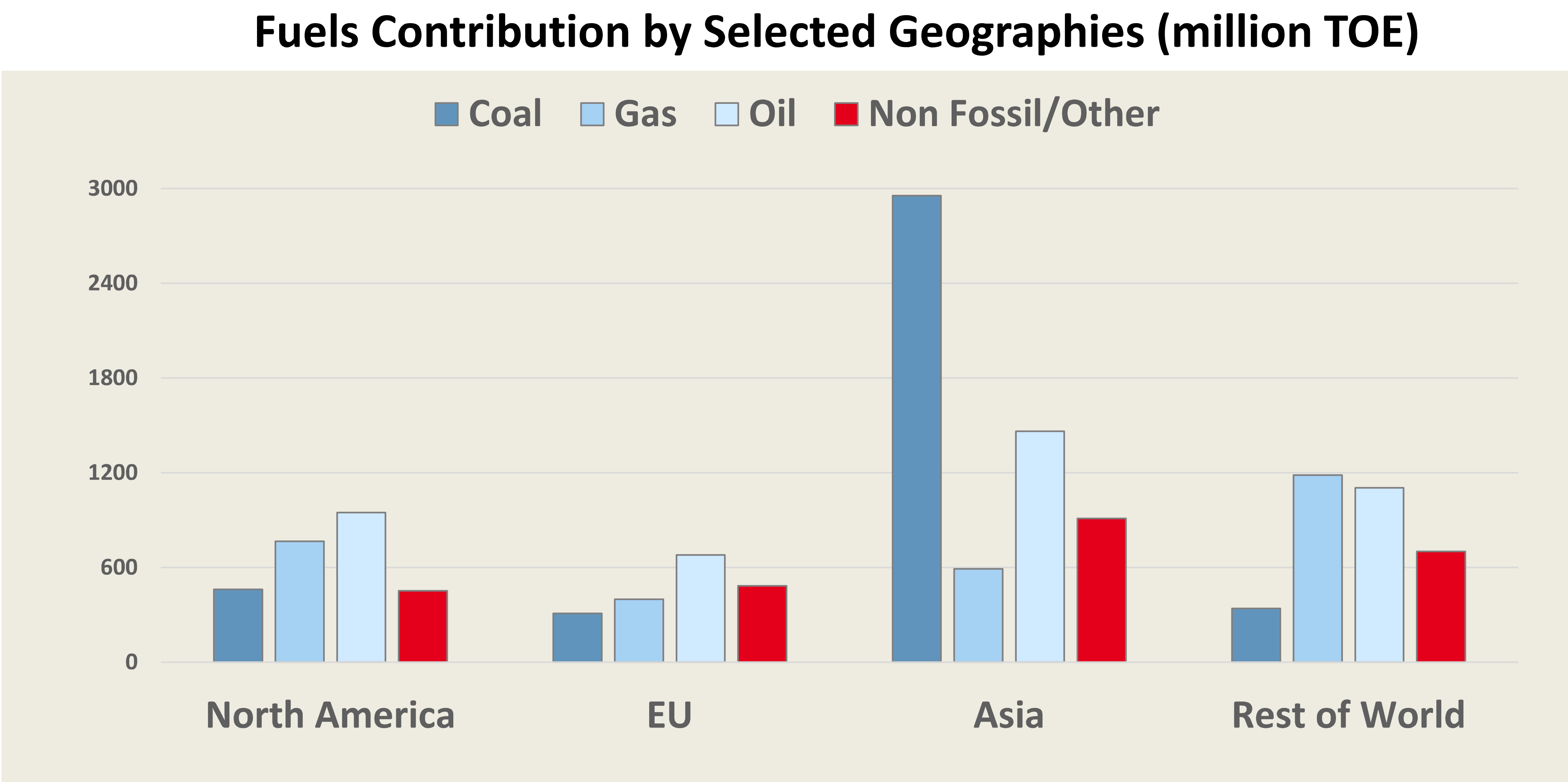
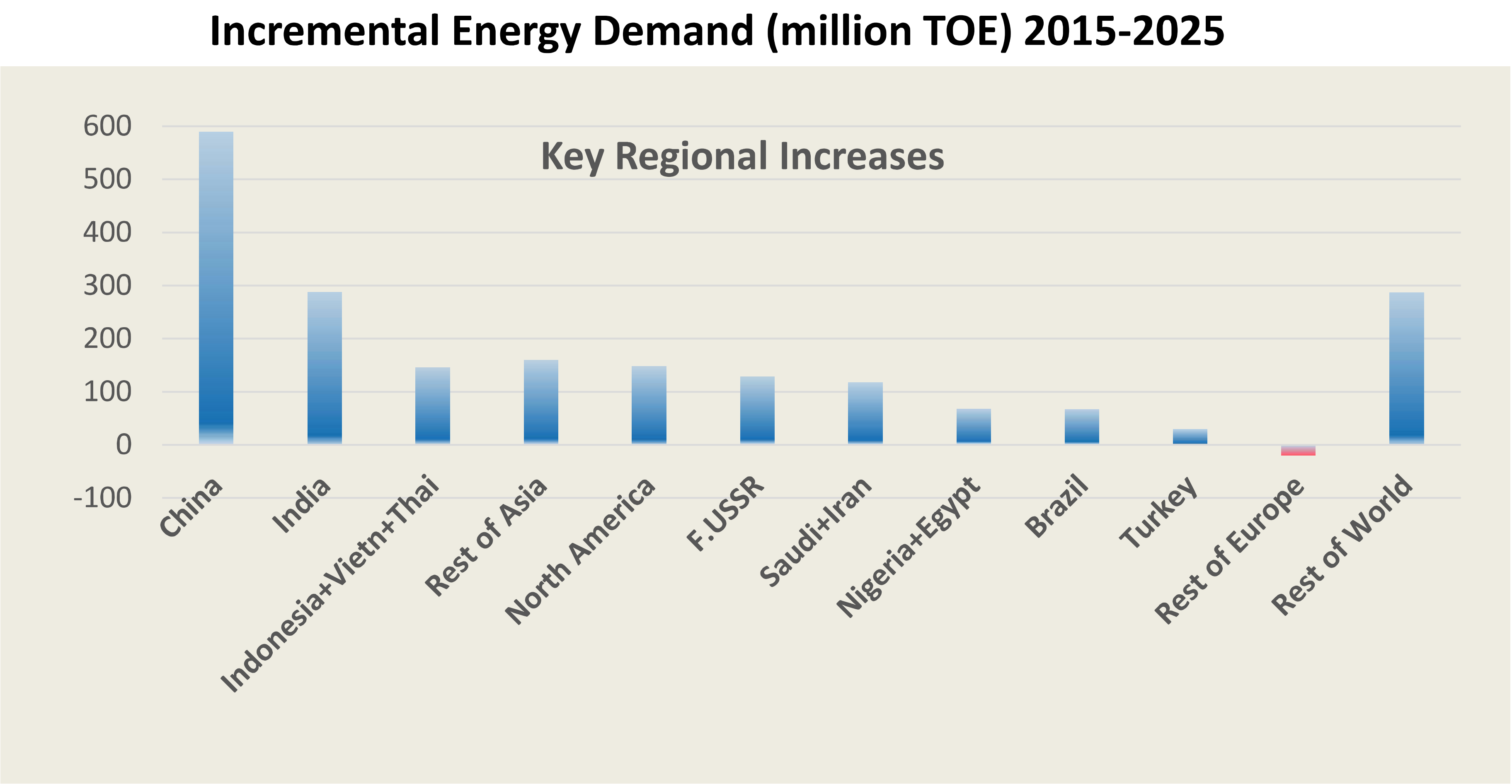


Source: ICIS Supply and Demand Database, ICIS Elaborations from IEA, BP, ExxonMobil, Industry data

Peak Coal Demand is approaching, but Peak Oil Demand may take more time…

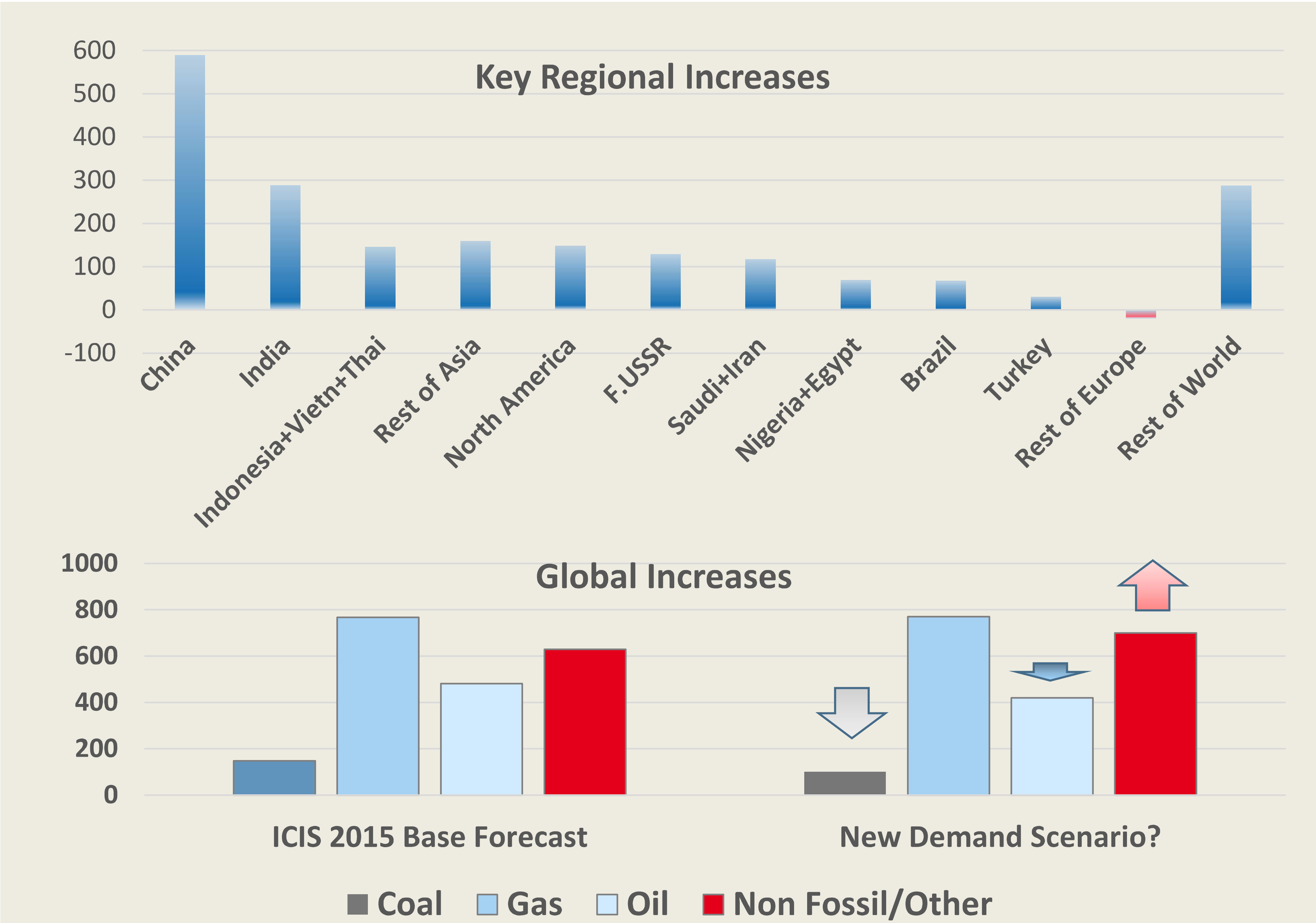


- China is Big…
- …But More countries **(India!)**
- Coal demand already down **(except for India!)**
- Efficiency

Source: ICIS Supply and Demand Database

Peak Coal Demand is approaching, but Peak Oil Demand may take more time…

Incremental Energy Demand (million TOE) 2015-2025

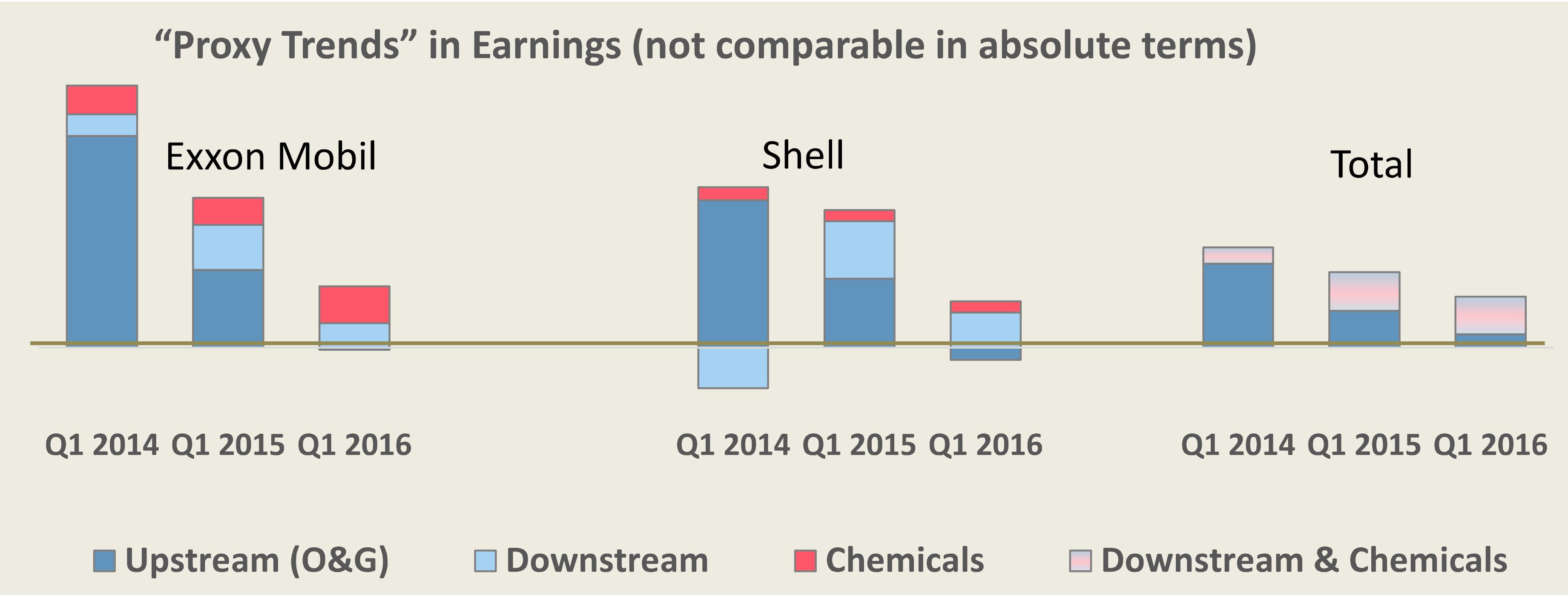


Source: ICIS Supply and Demand Database

In a "New Demand Scenario"

- Renewables up
- Coal down.
- Gas remains a lower carbon enabler.
- Petrochemicals will capture a growing share of oil demand
- more oil and gas required,
- steady feedstock supply
- NGLs

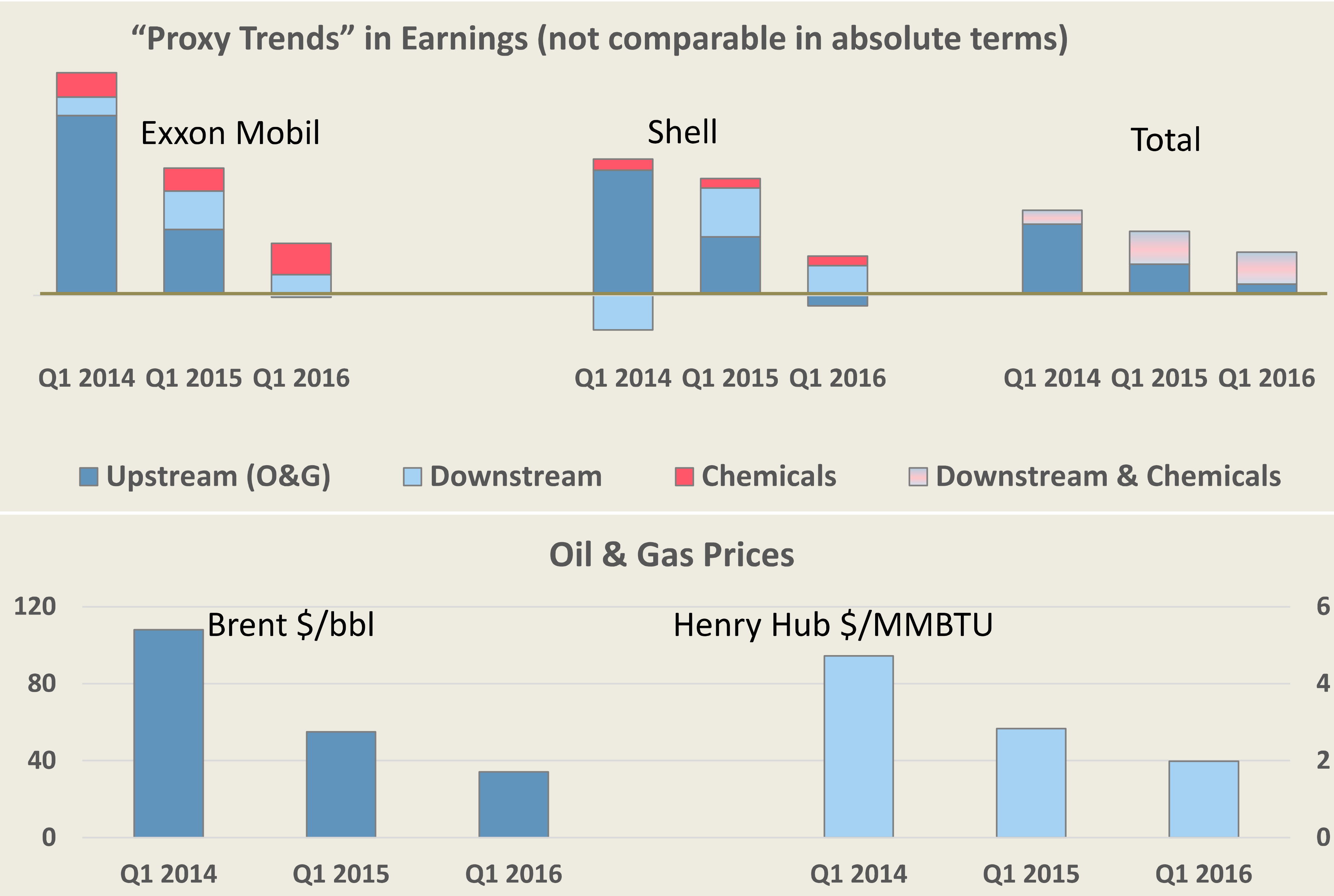
A “Lower Oil” Price Environment Reinforces Petrochemicals’ Role!



- Upstream vs Refining and Petrochemicals

Source: Elaborations from Company web sites, ICIS Pricing

A “Lower Oil” Price Environment Reinforces Petrochemicals’ Role!



- Upstream vs Refining and Petrochemicals
- The Saudi vision
- More Refining and Petrochemicals
- Oil is an enabler

Source: Elaborations from Company web sites, ICIS Pricing

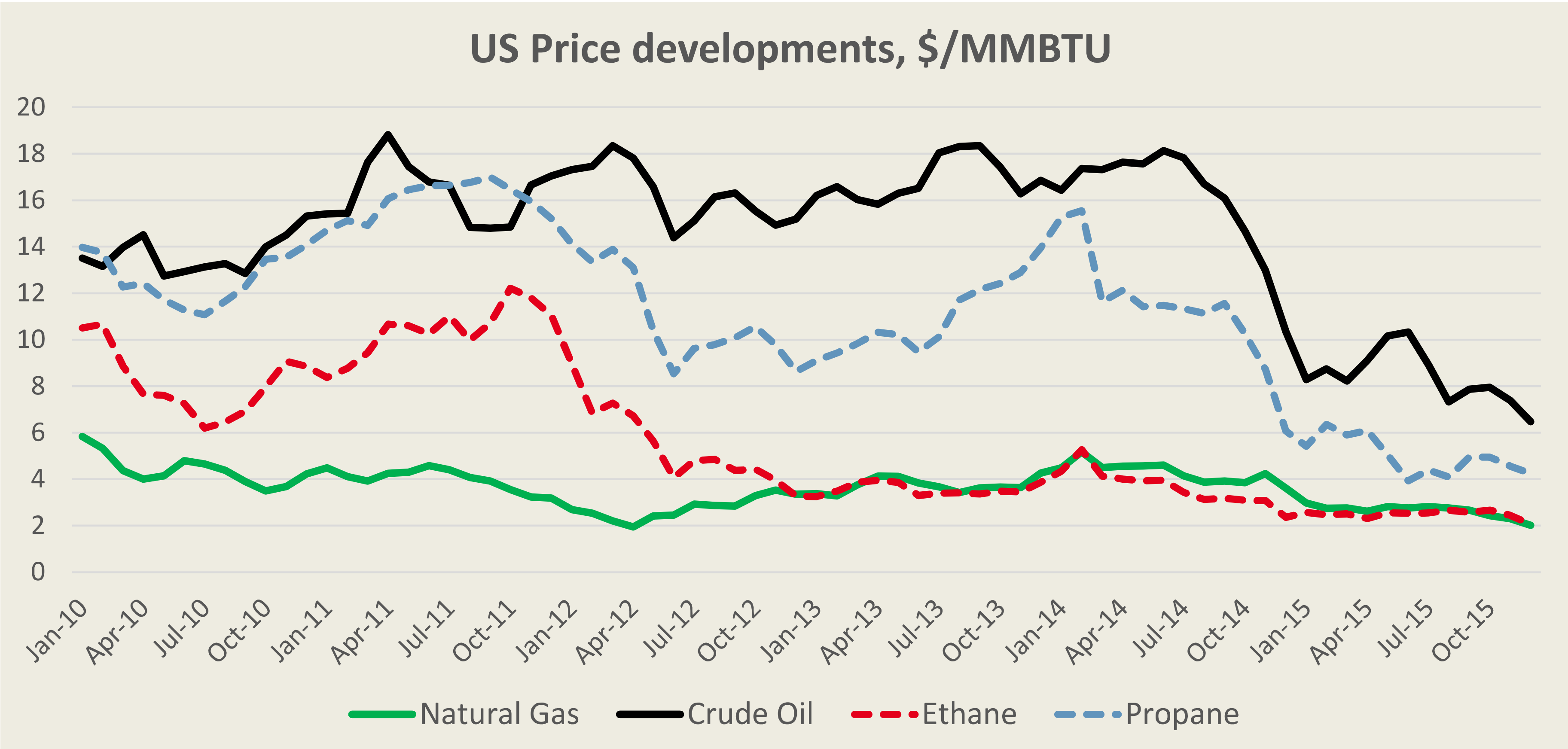
Agenda

The New Demand Scenario: Energy & Oil

Oil in Petrochemical Feedstocks: NGLs & Naphtha

What about Refining?

US Shale developments in a lower oil price scenario



- Surplus of light NGLs,
- Ethane at natural gas value
- New Ethylene
- Ethane Exports:

Deep sea, Pipeline

Source: ICIS Supply and Demand Database

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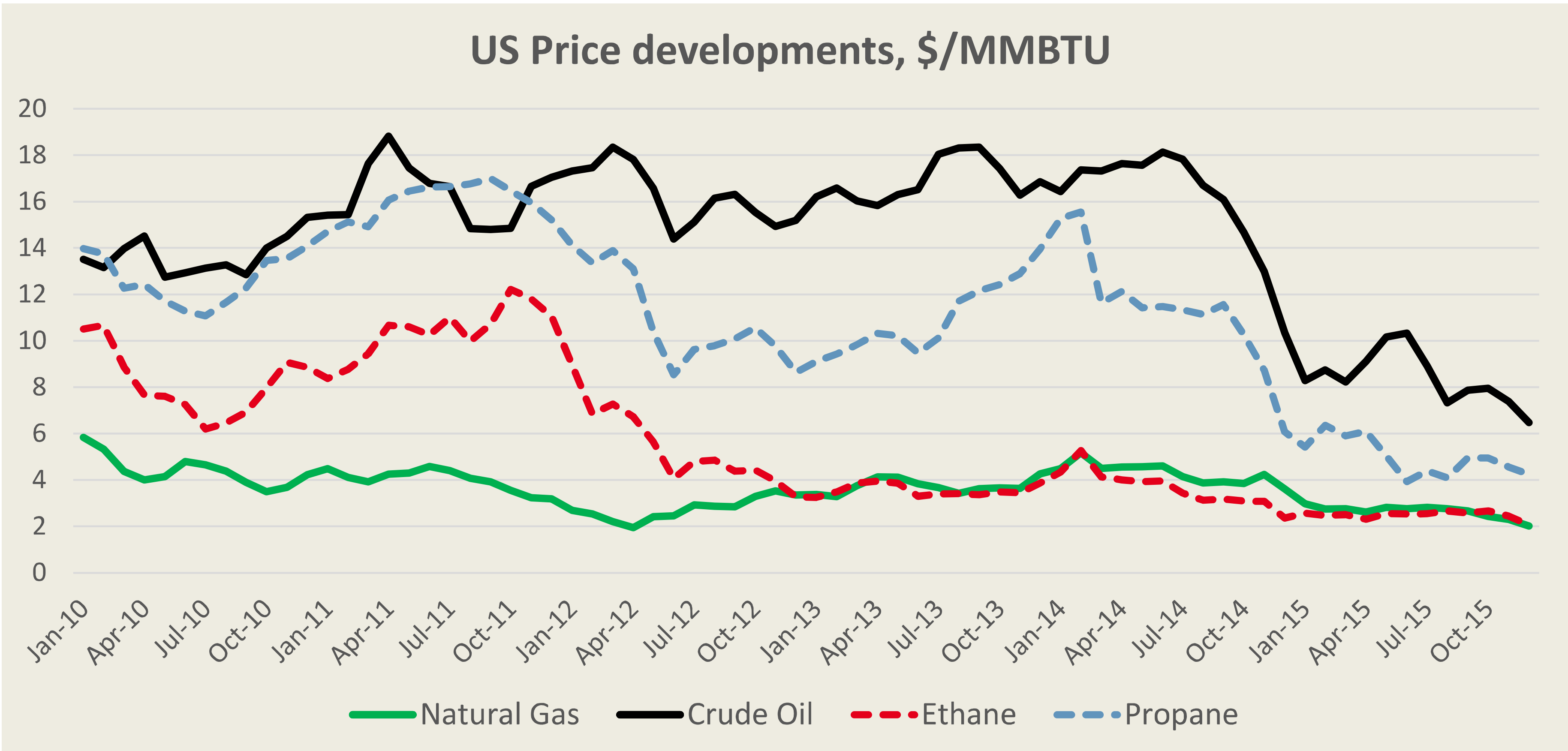

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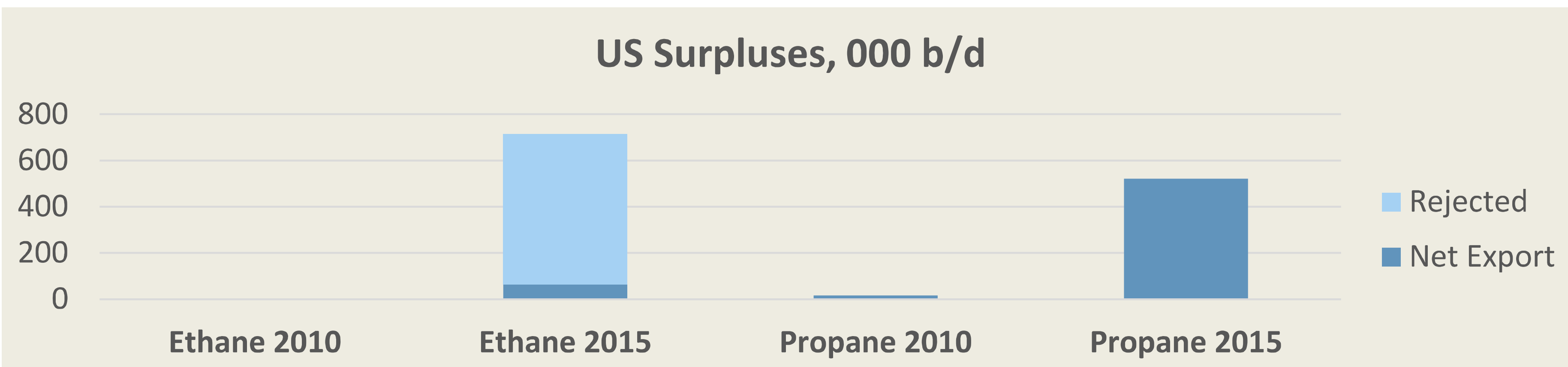
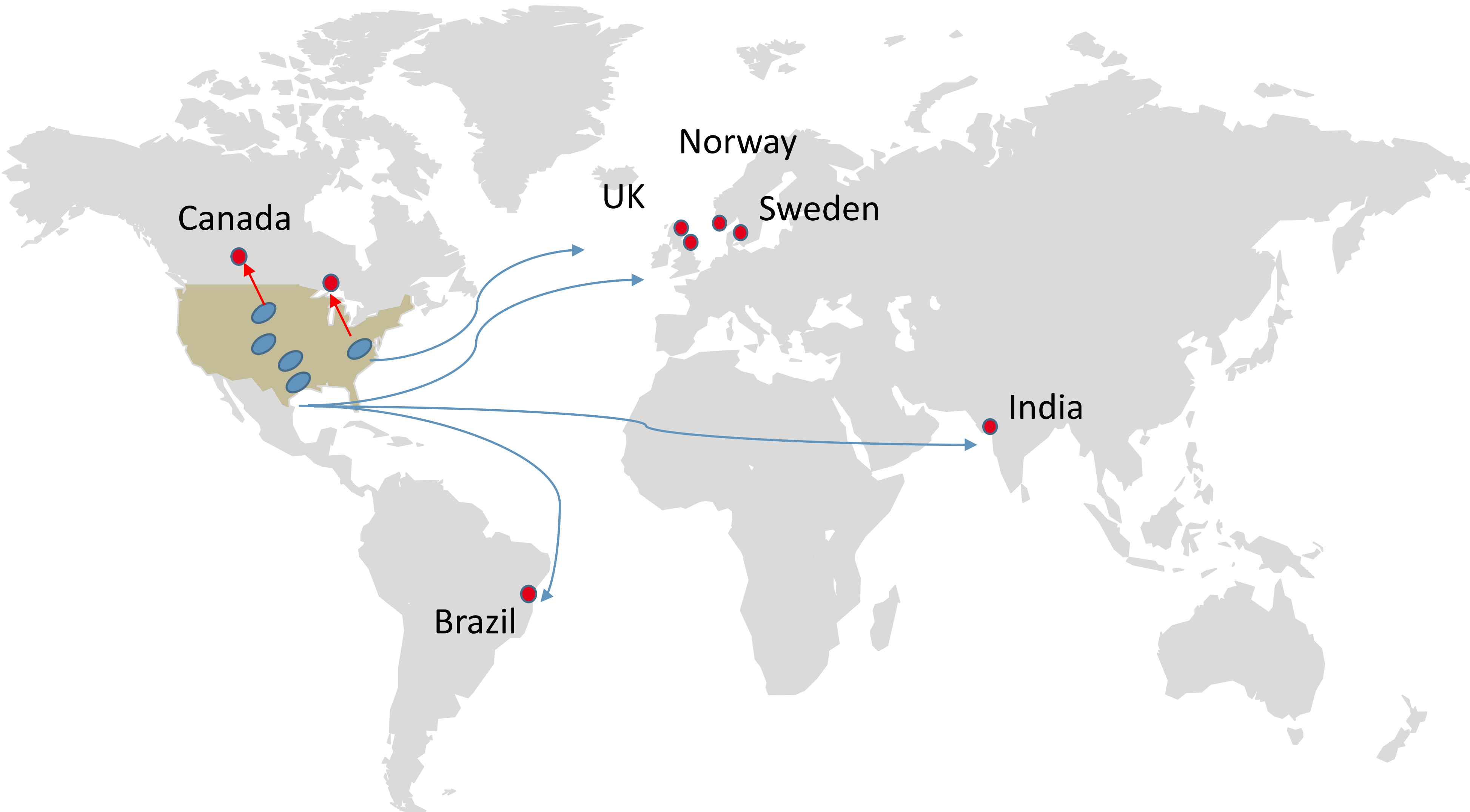


- Rejection
- Lower crude prices
- Propane Export & PDH

Source: ICIS Supply and Demand Database

US Ethane Balances may get tighter, and prices likely to rise above Natural Gas



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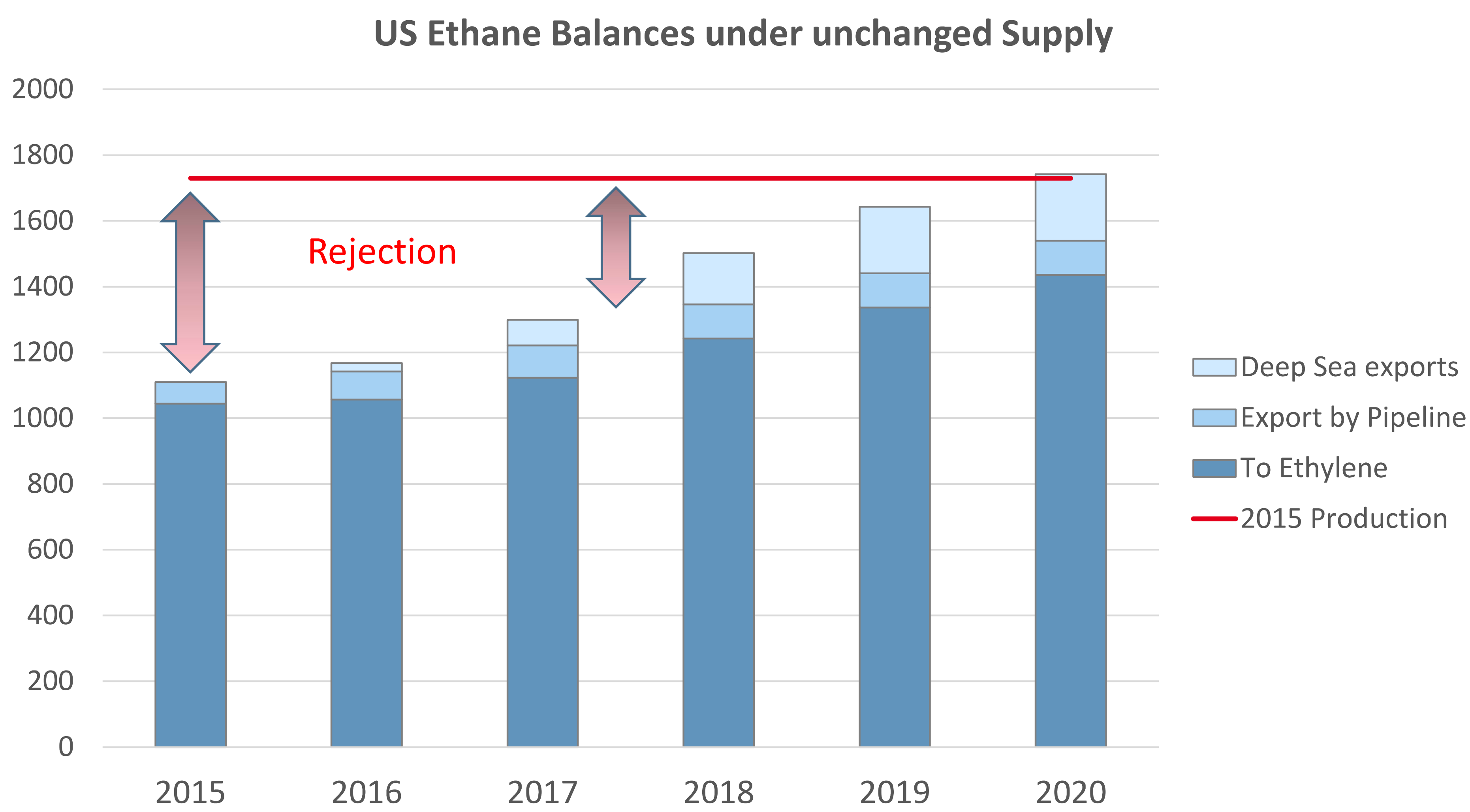
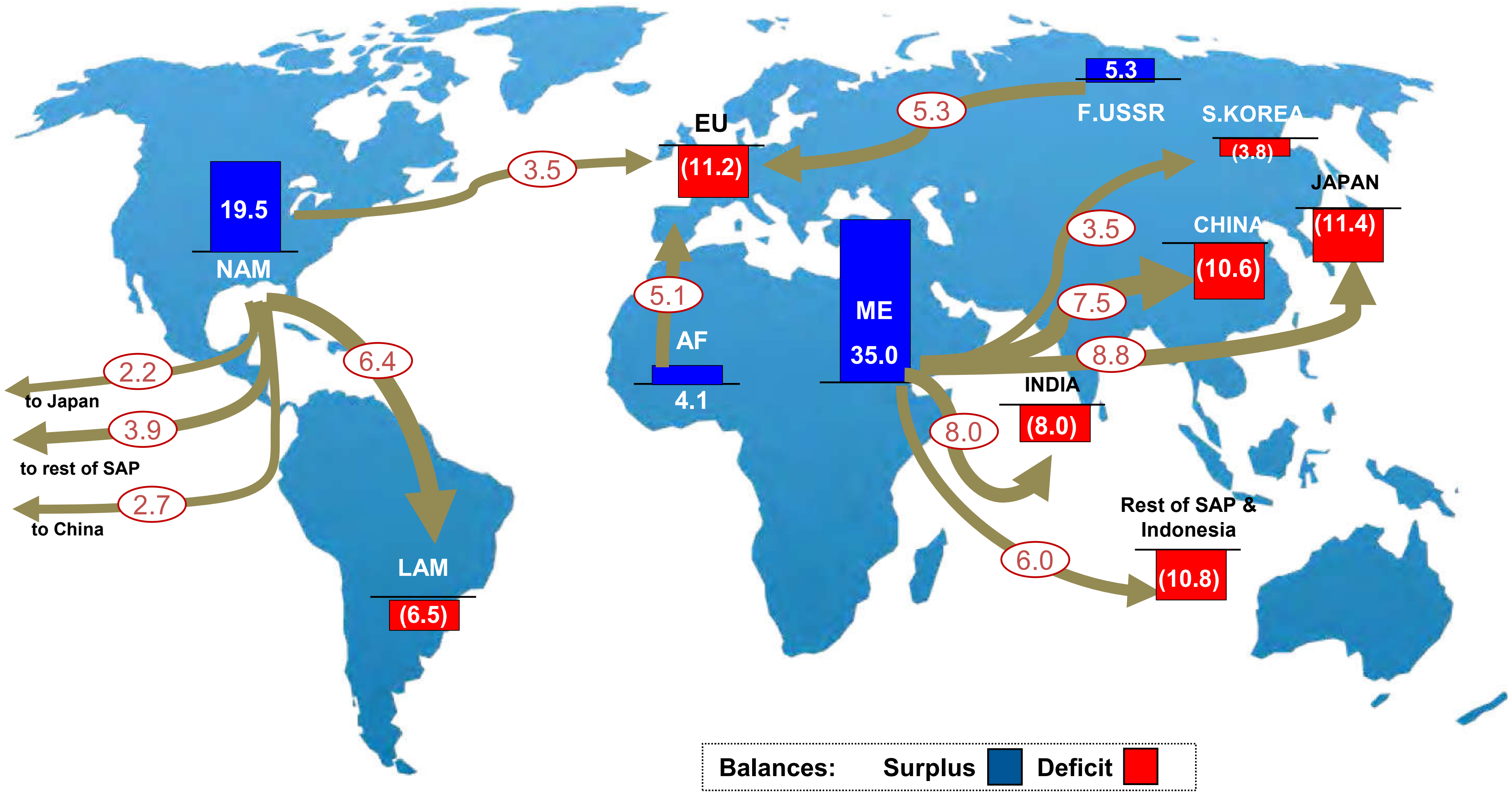


Source: ICIS Supply and Demand Database

US LPG will remain long: flows to International Markets rapidly increasing

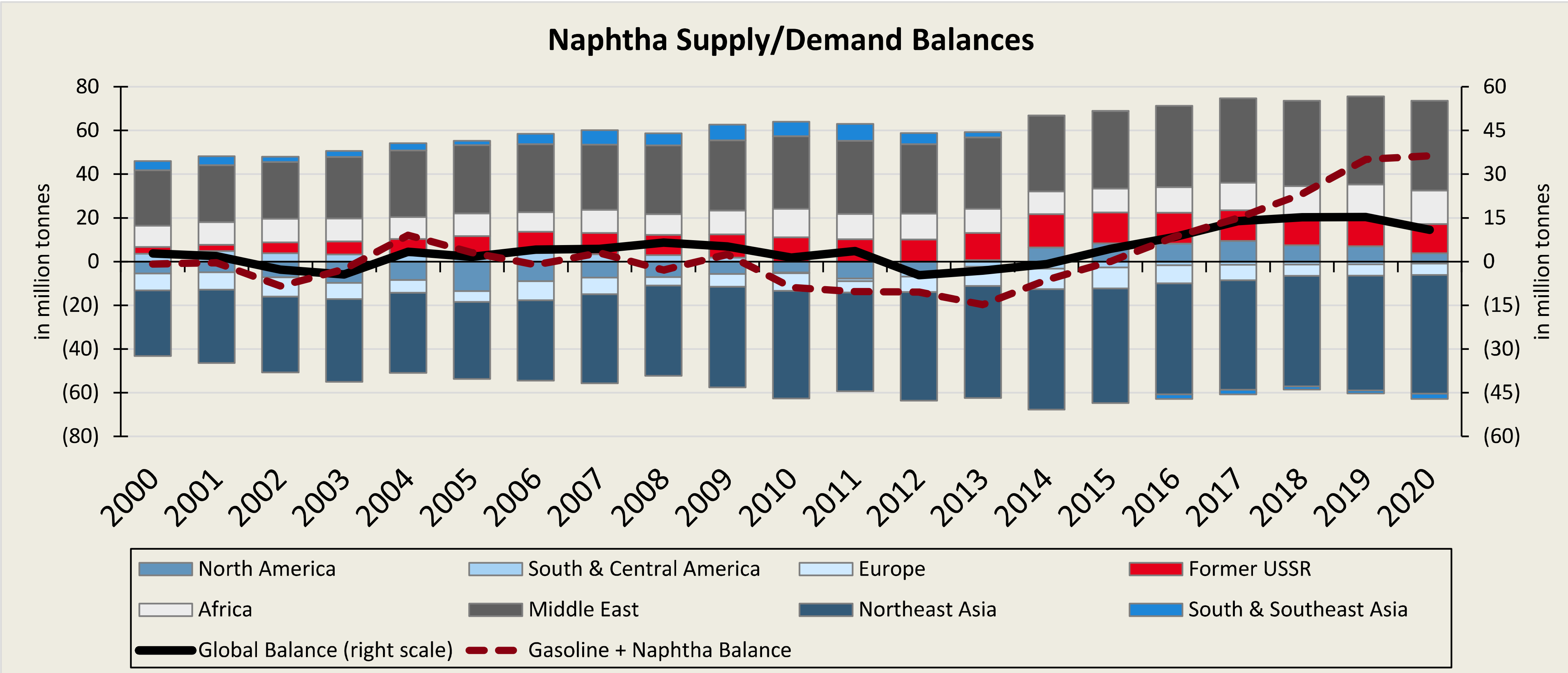
Global LPG: Key Trade Flows (2015)

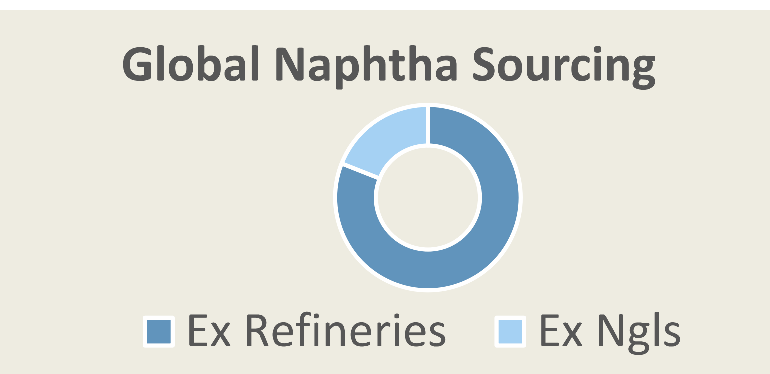


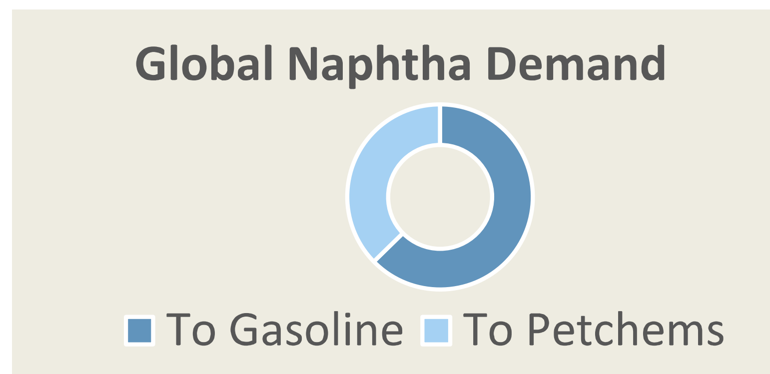
- The US is by now the largest country exporter of Propane in the World. It was a net importer of LPG just a few years ago.
- Fuel related demand is not increasing, and demand for Petrochemicals is not keeping pace with supply
- Exports are now flowing to Asia
- The Middle East remains the largest region in terms of exports
- Ample avails in international markets have promoted Asian PDH developments
- China imports are now exceeding those of Japan

*Volumes in Million tonnes

Naphtha is expected to remain comfortably available in the future







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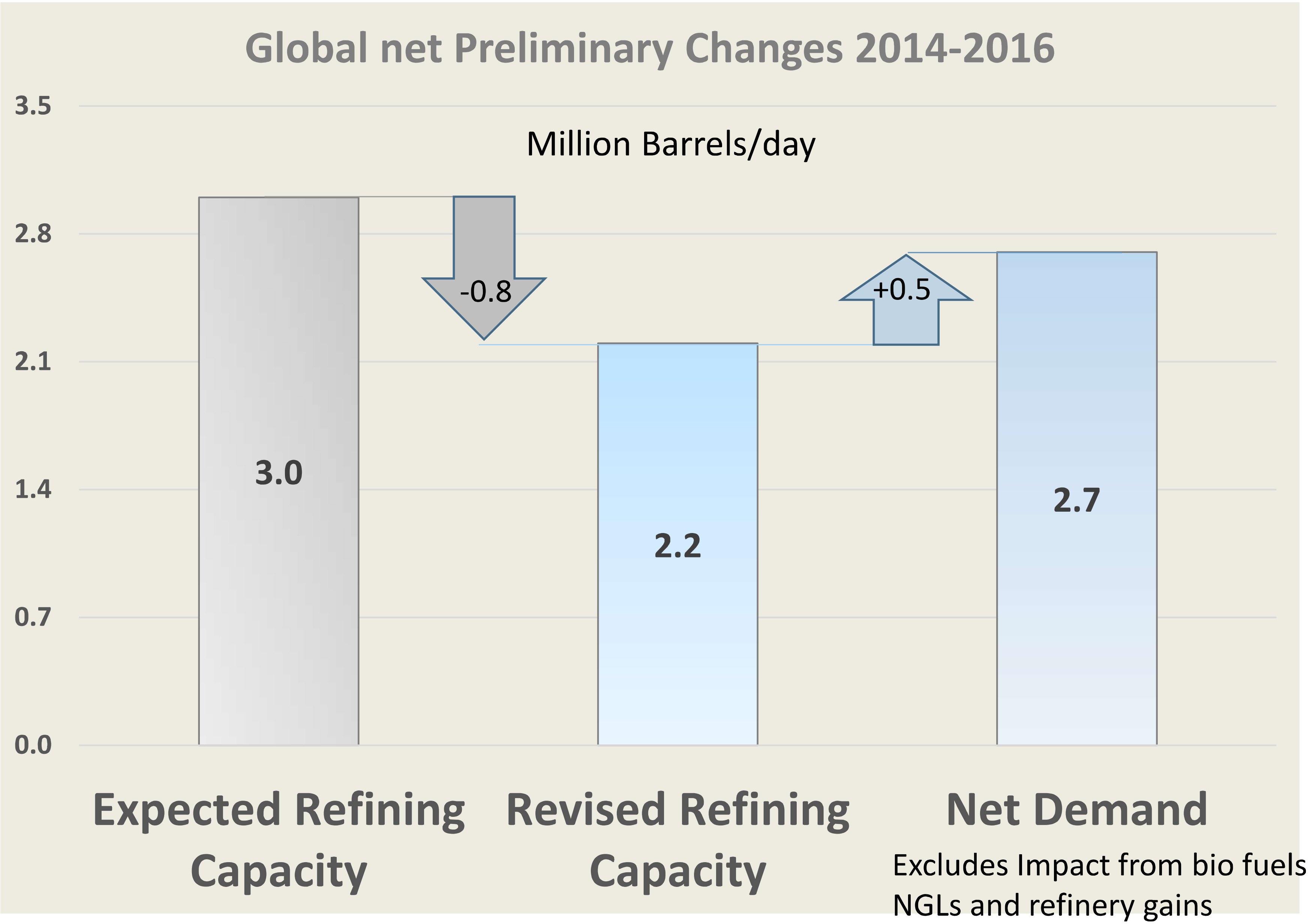
The New Demand Scenario: Energy & Oil

Oil in Petrochemical Feedstocks: NGLs & Naphtha

What about Refining?

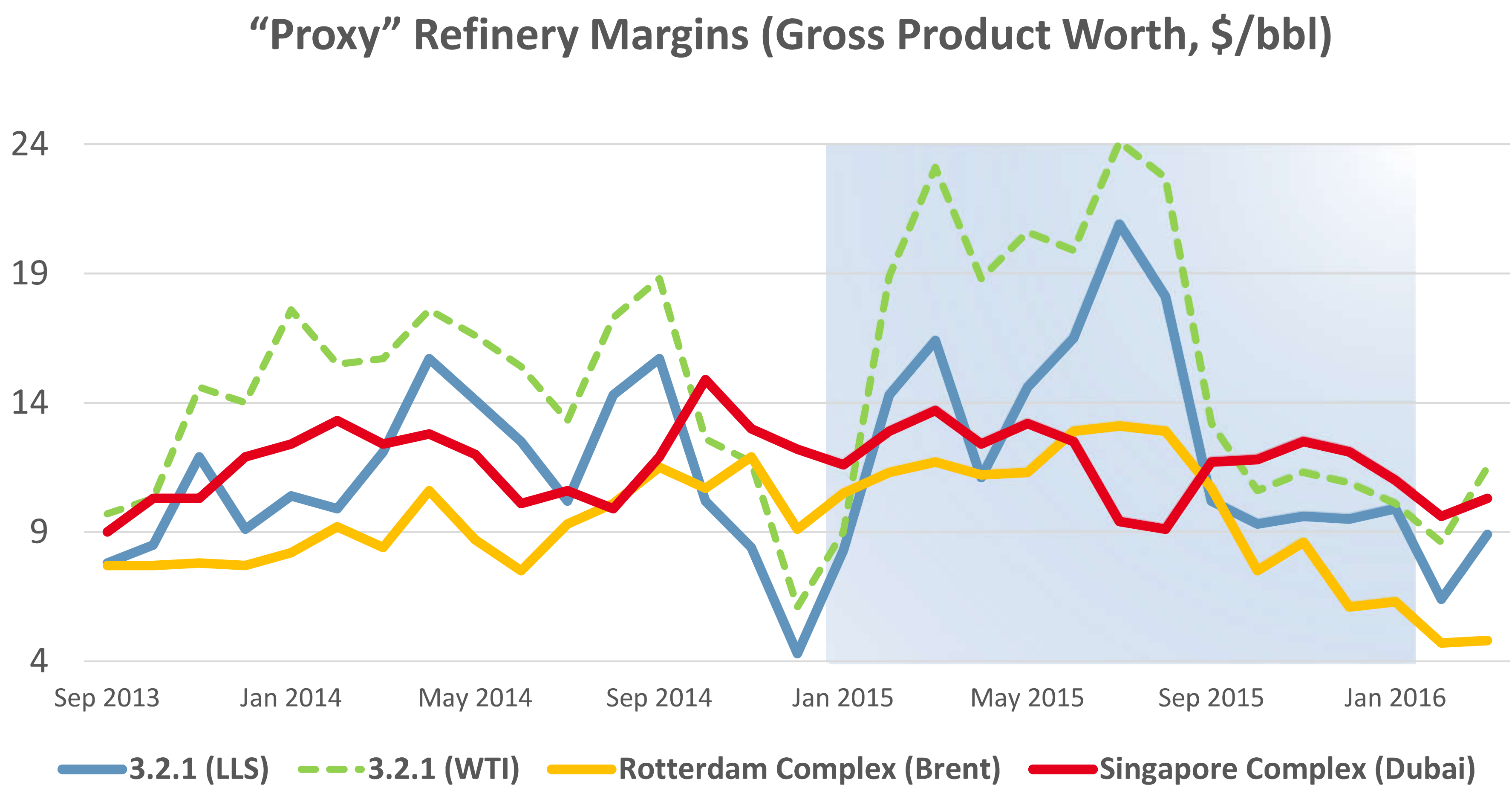
Recent Refining Capacity Growth seems not enough…



- Delays, technical problems and repositioning have slowed refining capacity expansions
- Lower crude oil prices benefitted demand, particularly for gasoline
- It seems paving the way for improved refinery utilizations and margins

Source: ICIS Supply and Demand Database

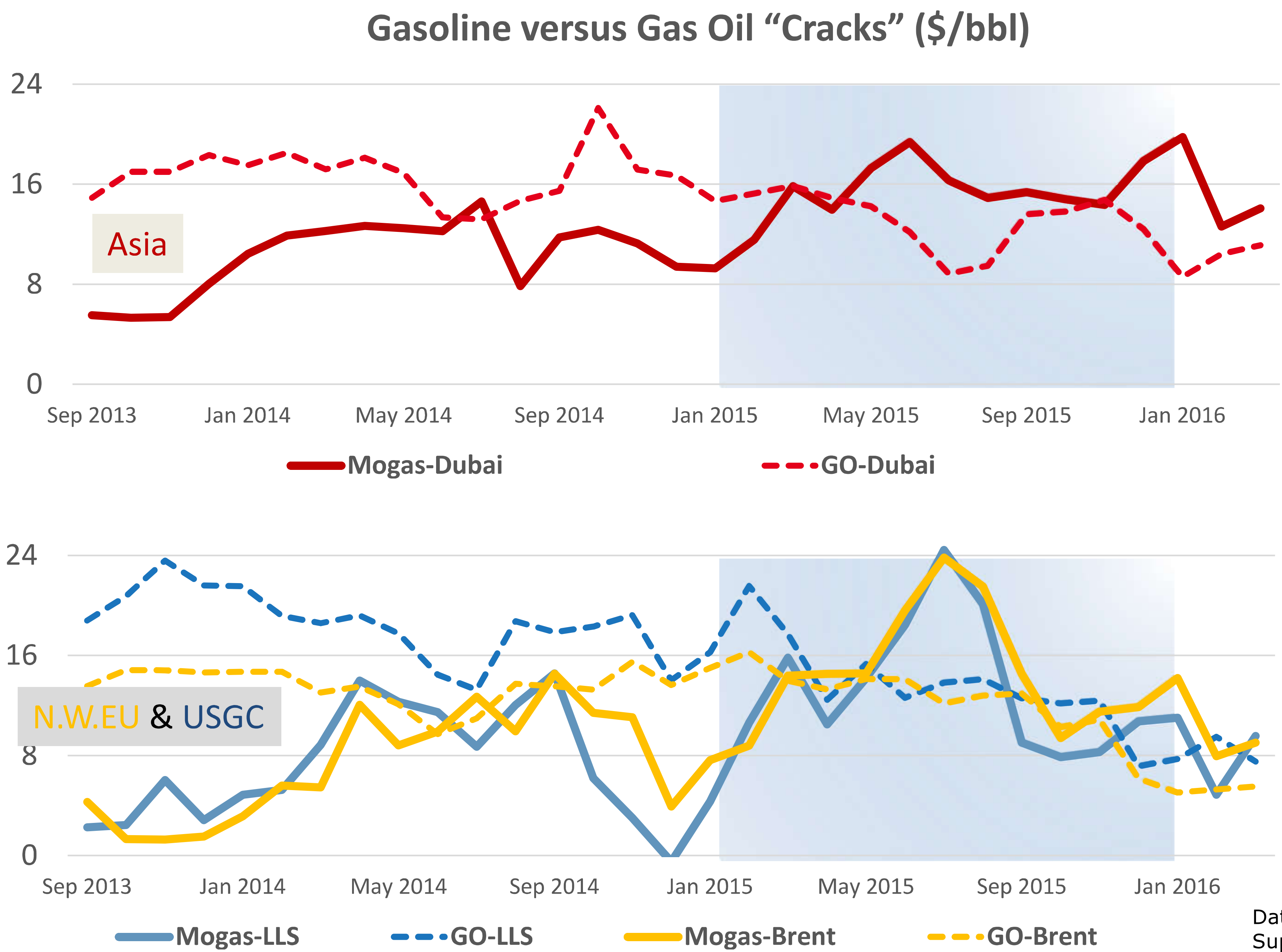
A tighter refining capacity supported runs and healthy margins until Q3 2015



- Demand has supported margins until Q3 2015, but these are fading
- Even without accounting for energy cost advantages, US competitive positioning is resilient.
- As Brent-WTI spread declines, interest for heavier grades increases
- Higher Middle Eastern Oil output increases Brent-Dubai differentials, benefitting Singapore (and Middle Eastern) margins

Source: ICIS Consulting, Supply and Demand Database

As refiners increase runs to profit from Gasoline, Middle Distillates get long…

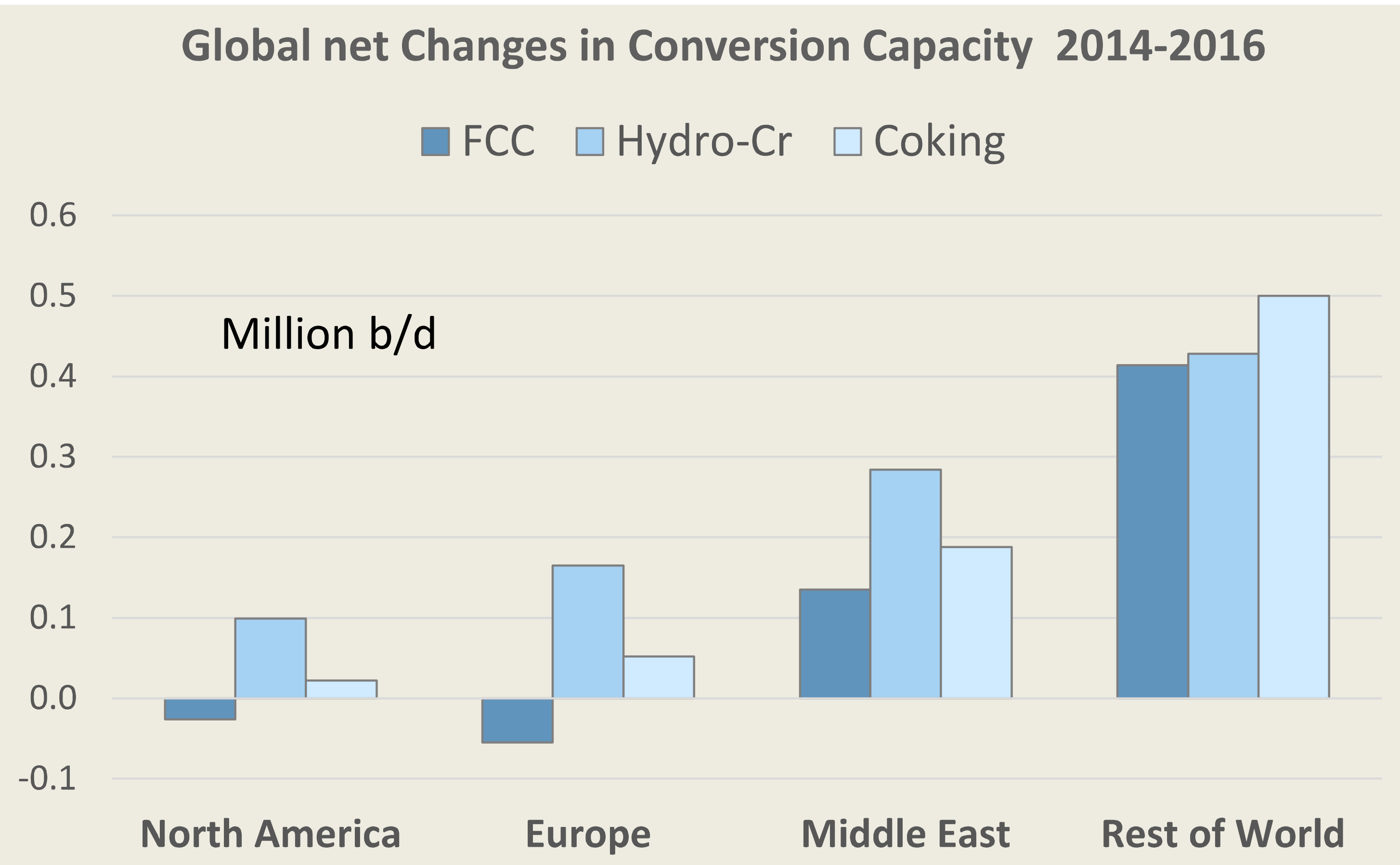


- Gasoil Cracks have dropped below those of Gasoline
- Gasoline Cracks remain the driver, but the weakness in Middle Distillates affects margins

Data source: ICIS Consulting, Supply & Demand Database

Flexibility for Gasoline is cut, new Conversion Capacity is focused on Diesel, at the wrong time…

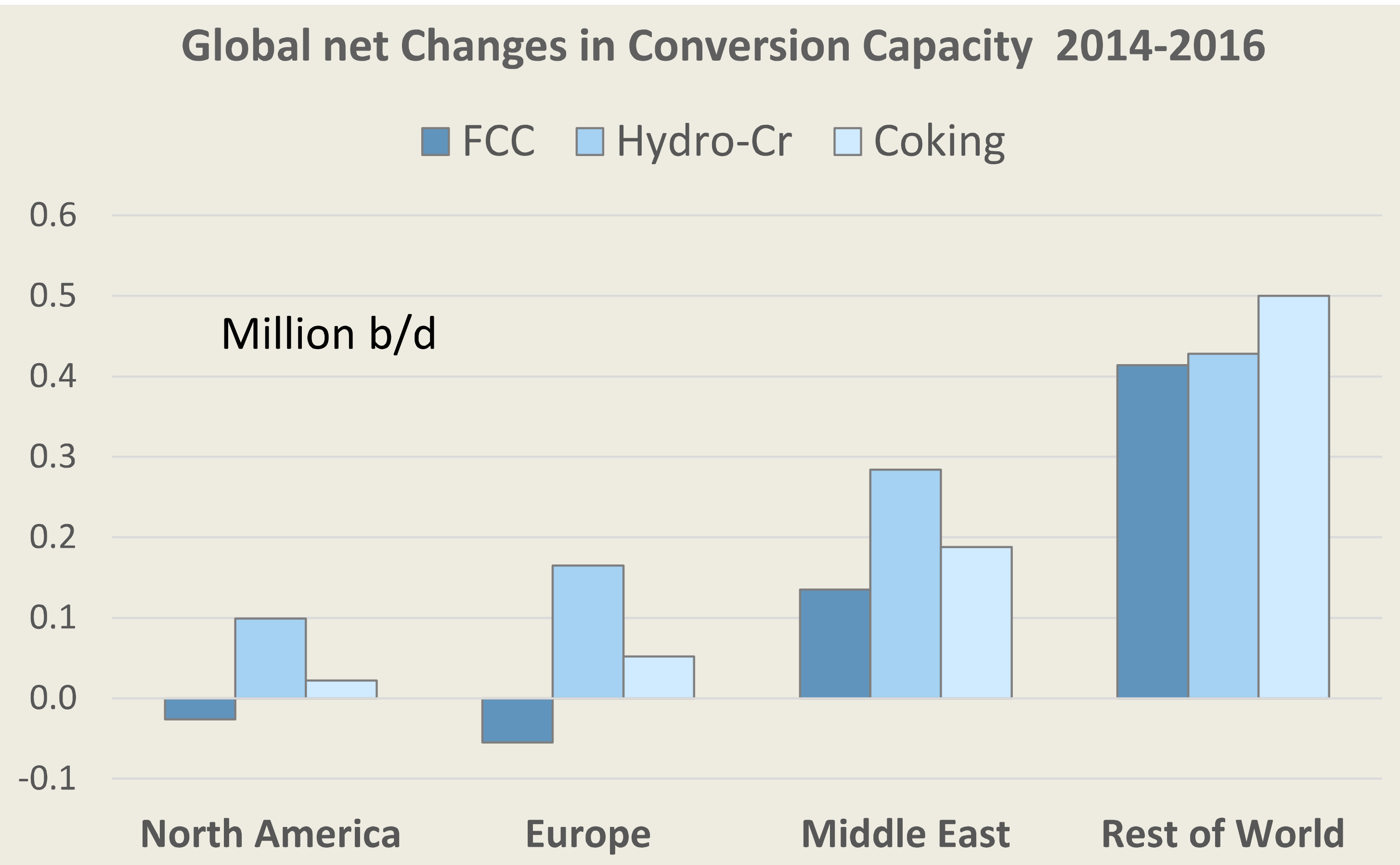
- The largest Gasoline exporter (EU) and the largest Gasoline market (US) are rationalizing FCC capacity

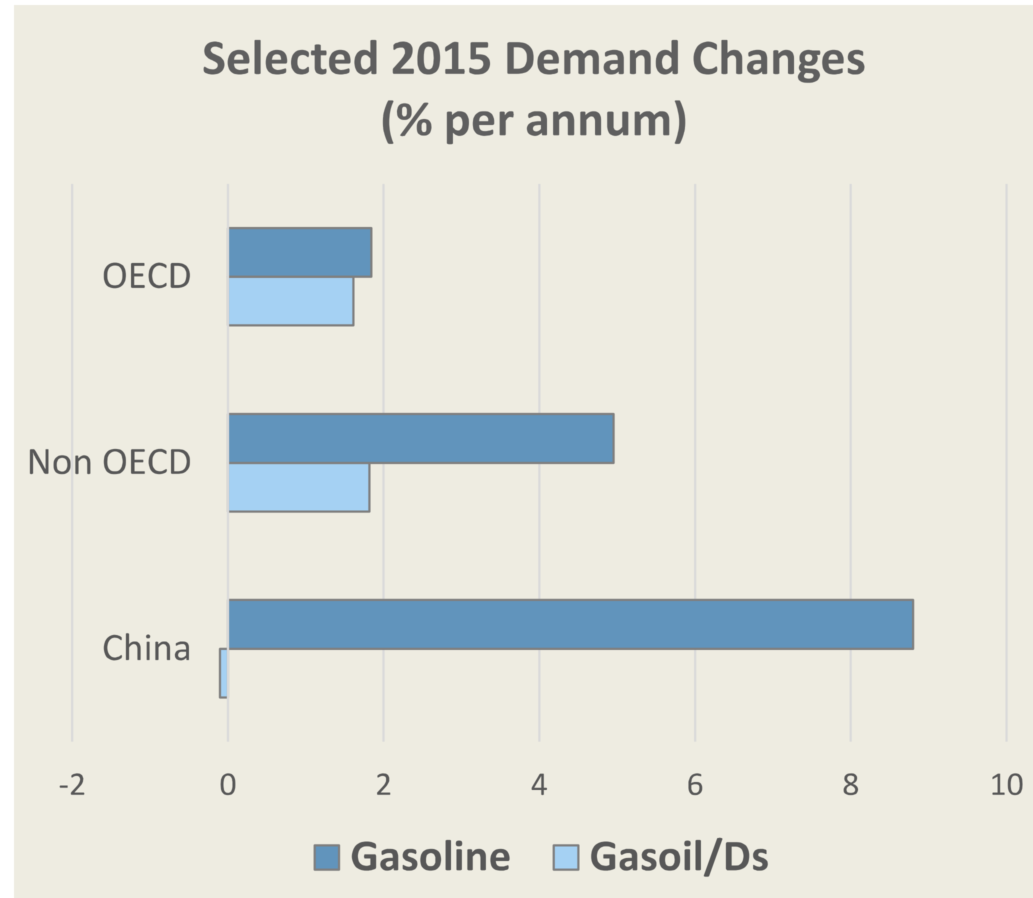


Source: ICIS Consulting, Supply and Demand Database

Flexibility for Gasoline is cut, new Conversion Capacity is focused on Diesel, at the wrong time…

- The largest Gasoline exporter (EU) and the largest Gasoline market (US) are rationalizing FCC capacity
- Non OECD Diesel demand is affected by a slow down in industrialization growth, particularly in China
- Lower oil prices stimulate private car usage, globally, supporting gasoline
- But this will not last… Gasoline demand growth will ease in the US and continue to fall in Europe: efficiency !





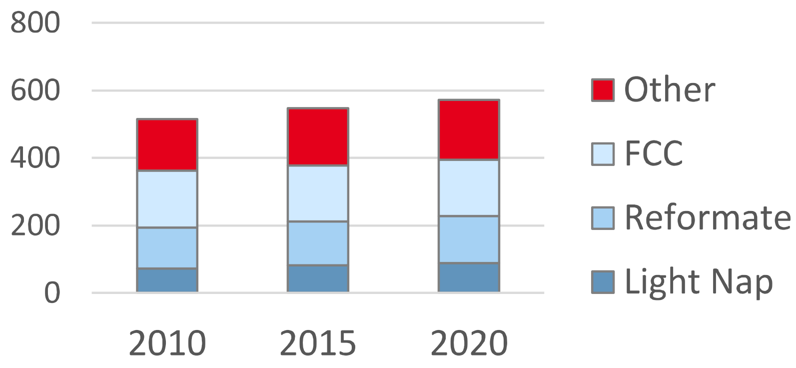
Source: ICIS Consulting, Supply and Demand Database

Gasoline Pools vs Reformate use: the Asian thirst for PX increases Competition with Fuels

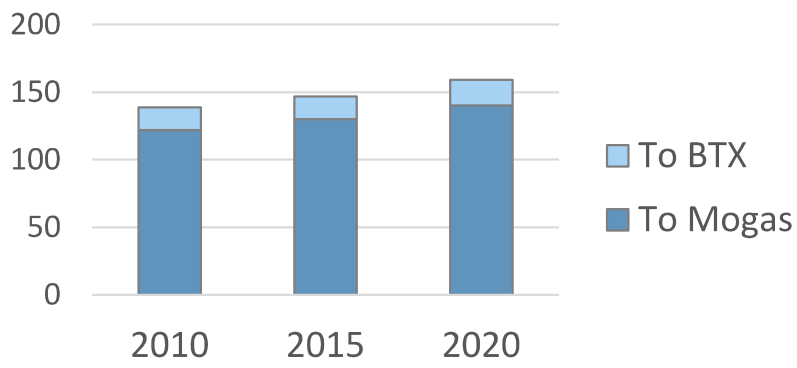
Million tons

AMERICAS

Gasoline Pools



Reformate Use



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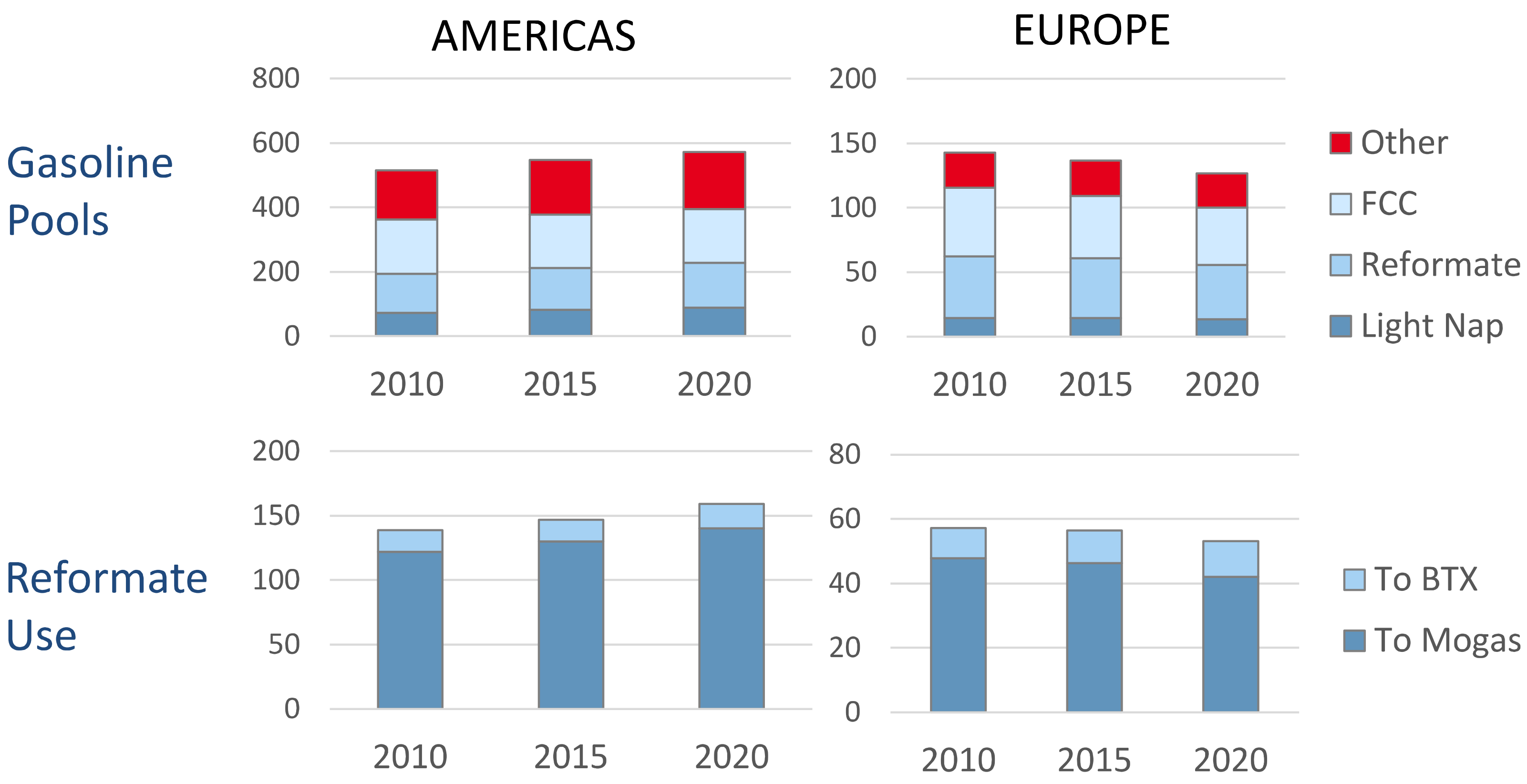

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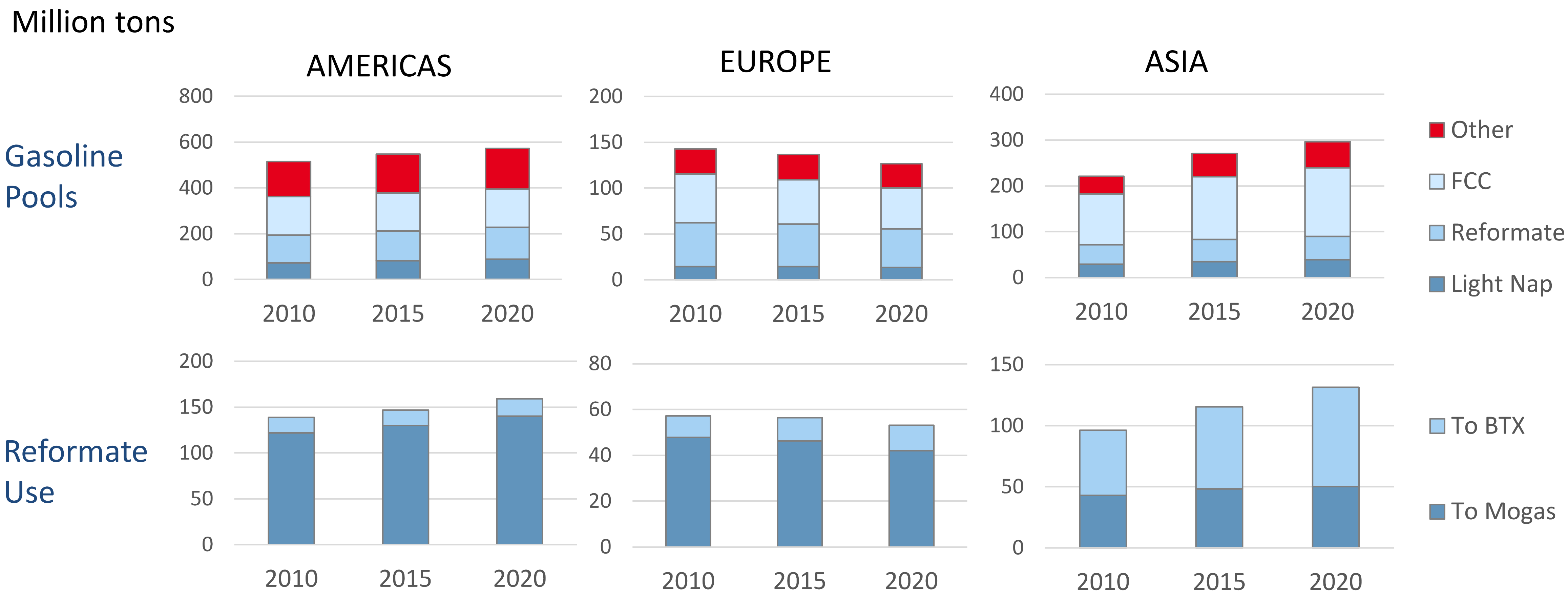
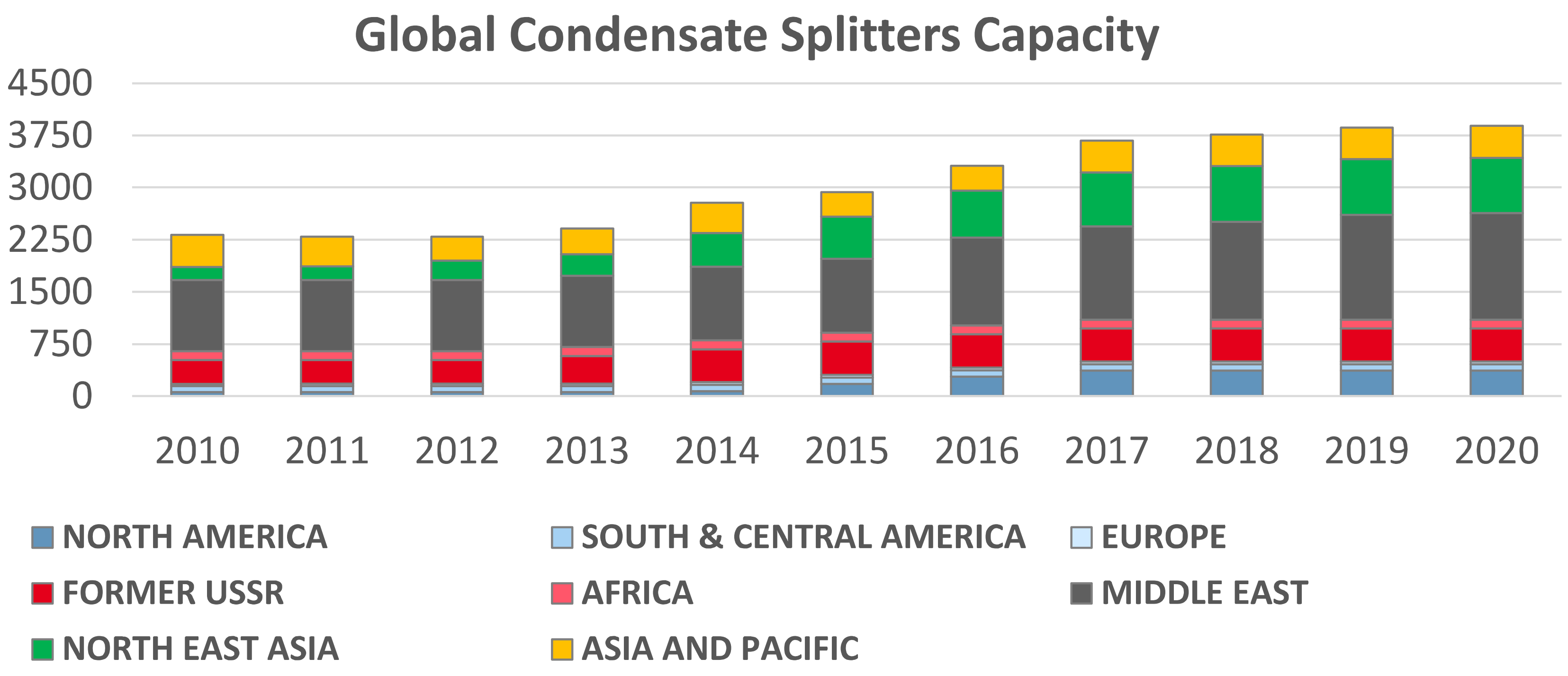


- Asian reformate is widely dedicated to Aromatics: the need of higher volumes and octane in gasoline is creating competition
- Asia has invested in condensate splitters to ensure heavy naphtha feedstock to reformers for PX
- The strength in gasoline and weakness in middle distillates is affecting condensate splitters not integrated with refinery operations and/or steam crackers: light naphtha and middle distillates are not optimised
- Will aromatics feedstocks and gasoline components start flowing from US and Europe to Asia?

Source: ICIS Consulting, Supply and Demand Database

Condensate Splitters are added throughout the World: which merchant Feedstock?



- Asia is not the only place…
- Major additions in Middle East, targeting large gasoline output (Iran!)

Source: ICIS Consulting, Supply and Demand Database

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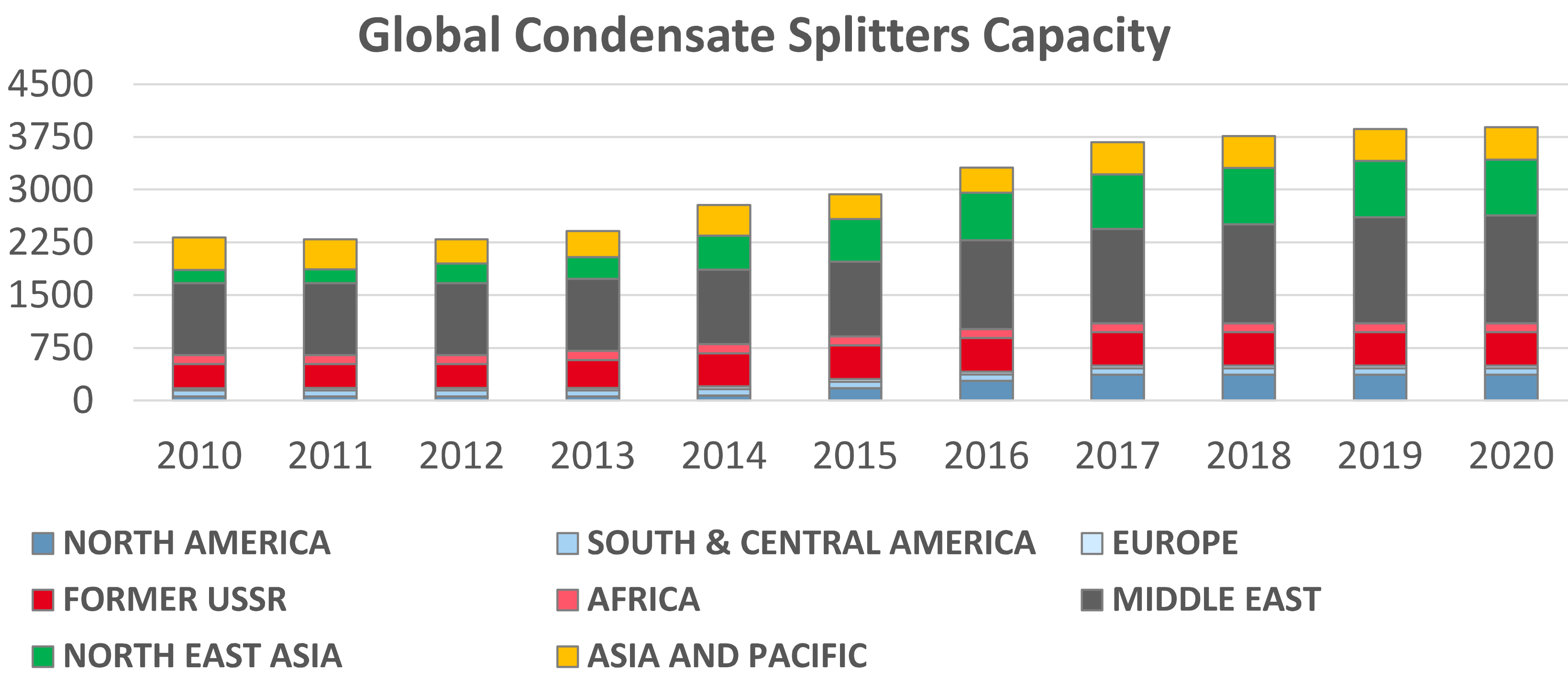
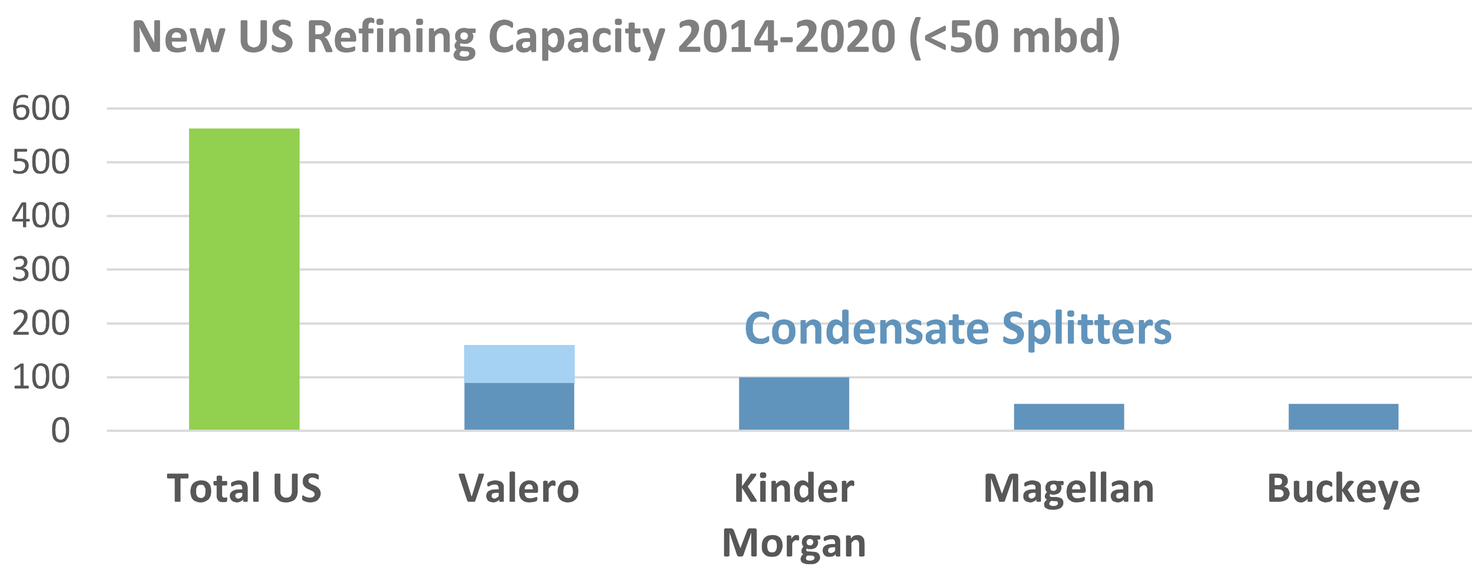
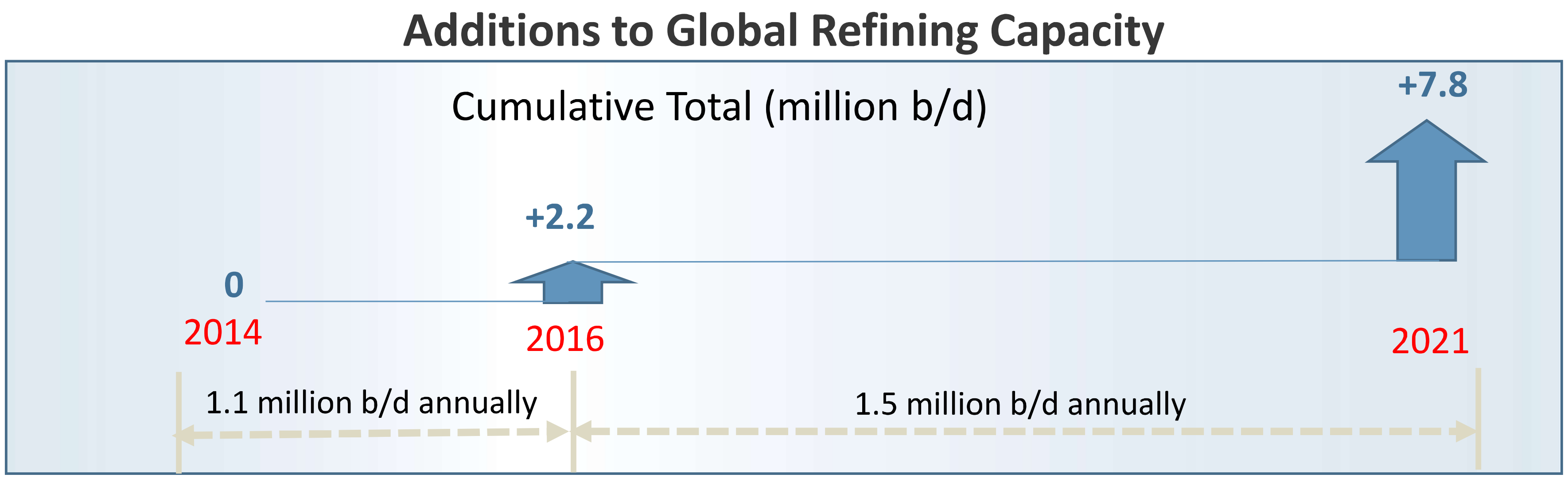




- Asia is not the only place…
- Major additions in Middle East, targeting large gasoline output (Iran!)
- US is also adding (shale). Some of the original condensate splitter projects where repositioned as “Stabilizers” after Crude Exports Allowances, but about 200 mbd are already on line
- Condensate splitters based on merchant supply will need to ensure volumes and quality (max heavy naphtha, min mid distillates?)
- More light naphtha in international markets? Good for naphtha crackers

Source: ICIS Consulting, Supply and Demand Database

Refinery Projects' Pipeline likely to exceed demand: Easy naphtha availability?



Incremental by Region ('000 b/d)

- Even cancelling 50% of Asian projects in 2017-2018, global additions would approach 1.5 Million b/d in each year

Data source: ICIS Consulting, Supply & Demand Database

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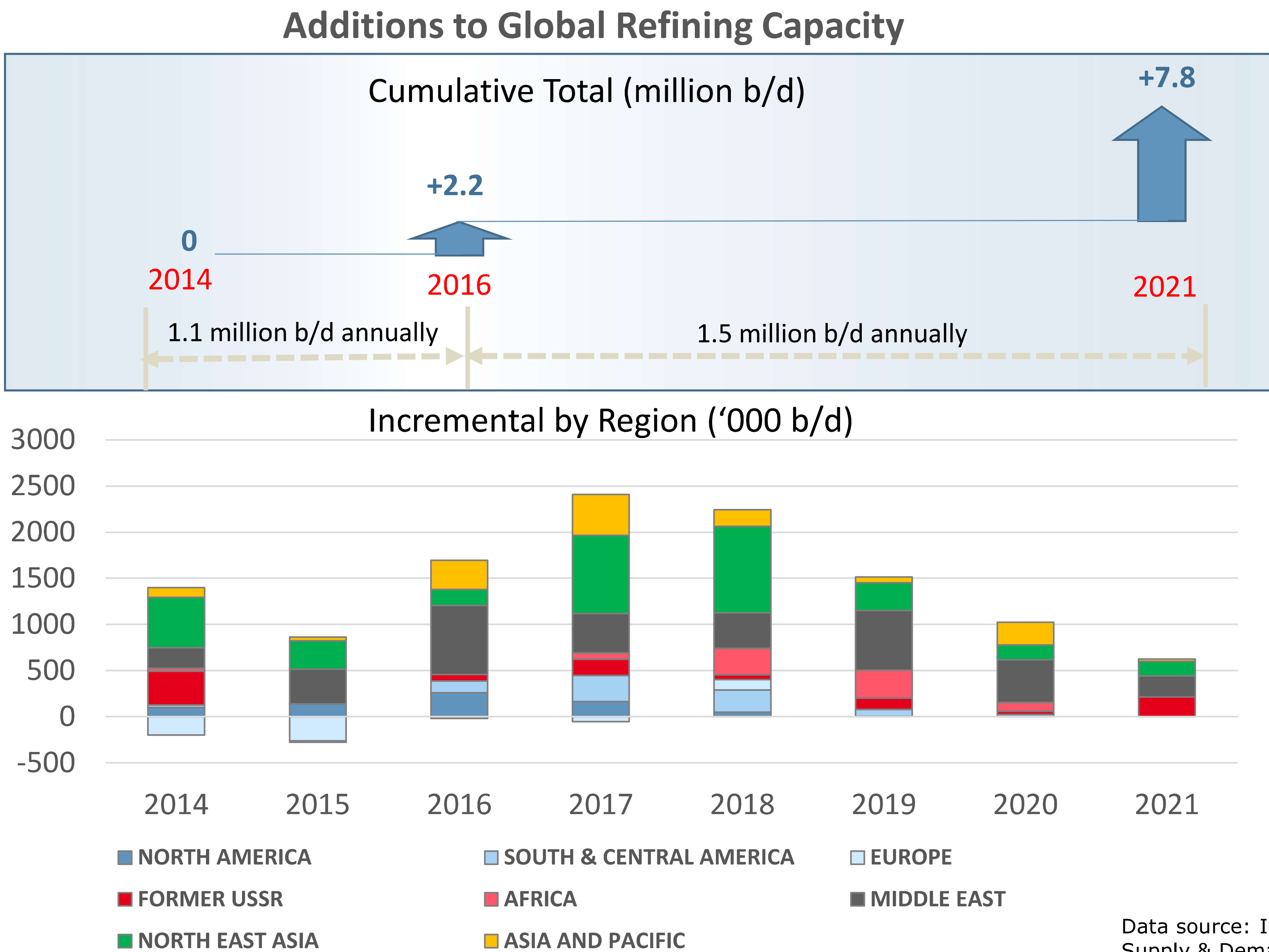

- Even cancelling 50% of Asian projects in 2017-2018, global additions would approach 1.5 Million b/d in each year
- Delays, rather than cancellations are expected in the Middle East
- Unless incremental closures are implemented, recent margins unlikely to be maintained
- Once gasoline export opportunities fade, European runs and capacity are at risk.
- Option for naphtha diversion from gasoline pool should remain

Data source: ICIS Consulting, Supply & Demand Database

Summary Conclusions:
Petrochemical Feedstocks will be well supplied in the next few years

- Efficiencies needs are accelerated in the "New Demand Scenario". Demand for oil will increasingly be for petrochemicals, the material of choice for improving quality of life
- As more oil and gas will be required, more NGLs will be available. A lower oil scenario may will still leave US with wide light NGLs availability and LPG exports, whilst ethane balances could get tighter
- Despite some recent tightness in gasoline, fuel efficiencies and rapidly growing refining capacity will ensure comfortable naphtha supply in international markets.

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Final Wrap-up

Final Wrap-up

- The economic Supercycle is over. One reason for the end of the Supercycle is the retirement of the Babyboomers. Another reason is China's economic reforms. These reforms have major implications for the country's petrochemicals supply and demand patterns. The petrochemicals industry thus needs a new global business approach, aligned with the real needs of changing social, political and economic drivers. These challenges are opportunities for the petrochemicals industry, given its ability to efficiently deliver the products needed to improve our lives in the future
- Non-traditional routes to olefins production have gained importance, and shale developments have provided surplus ethane. This has an impact on polymer trade and on relative economics, but naphtha cracking will still be needed. A lower crude oil scenario has moved naphtha cracking economics into more positive territory
- The aromatics industry is confronted with uncertain supply trends, recent gasoline strength and a high dependency on China. The need for heavy naphtha feedstock for incremental PX demand has promoted numerous dedicated condensate splitter projects. Integration with fuels refineries and steam crackers will enhance viability

Final Wrap-up

- The new demand scenario will require a shift in the energy mix towards a lower carbon intensity, and growing efficiencies. Gas will be a key enabler, whilst oil use as a raw material for petrochemicals will steadily increase. Low oil prices are further promoting refining and petrochemical integration. Peak Oil Demand will take some time to reach. Incremental volumes of oil and gas will be produced, and more NGLs will be available
- A prolonged scenario of low oil prices may affect shale developments. This could gradually reduce the current surplus of US ethane. Relative competitiveness for domestic ethylene may be reduced, but remains in place. The LPG surplus will remain for a prolonged period of time, enabling its role as an alternative feedstock for ethylene production. Delayed expansions in refining capacity and low oil prices have resulted in a temporary gasoline tightness. This will change in the near future. New refining capacity and growing fuel efficiencies will ensure comfortable naphtha supply in the future

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