

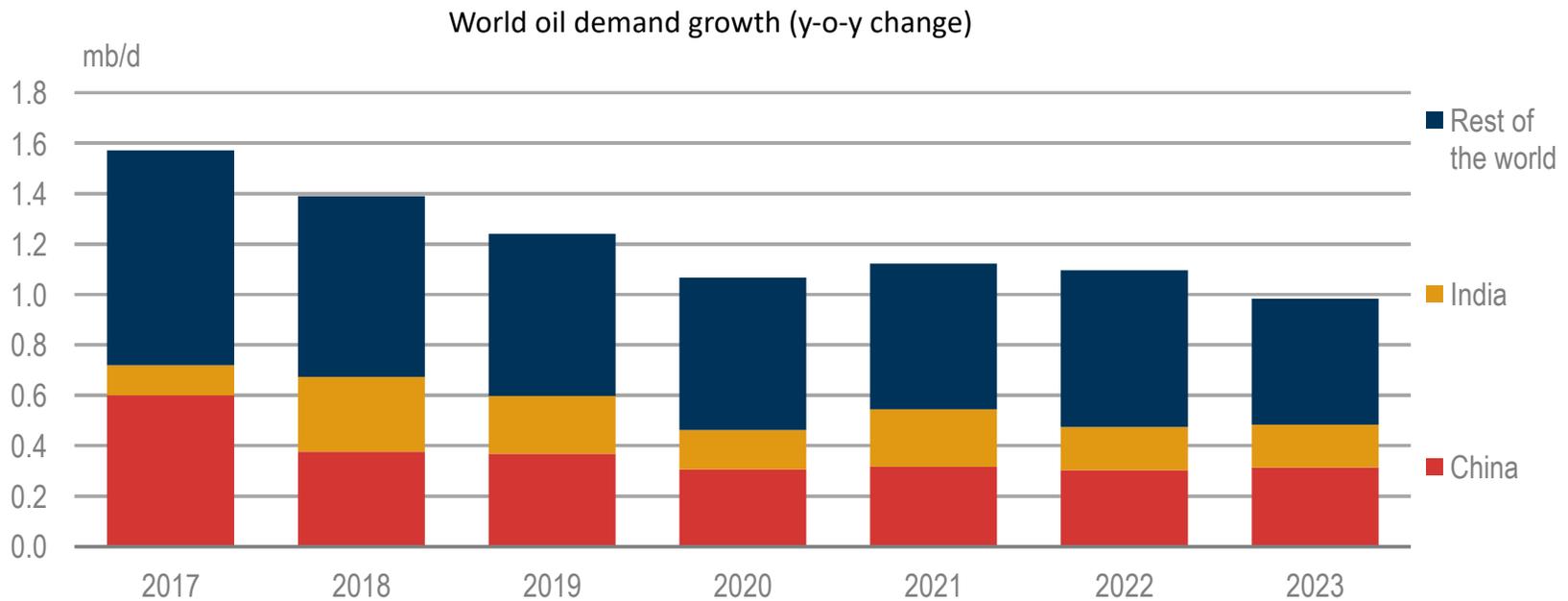


Market Report Series

Oil 2018 – Analysis and Forecasts to 2023

Columbia University – Centre on Global Energy Policy, New York, May 22nd 2018

Robust global oil demand growth to 2023

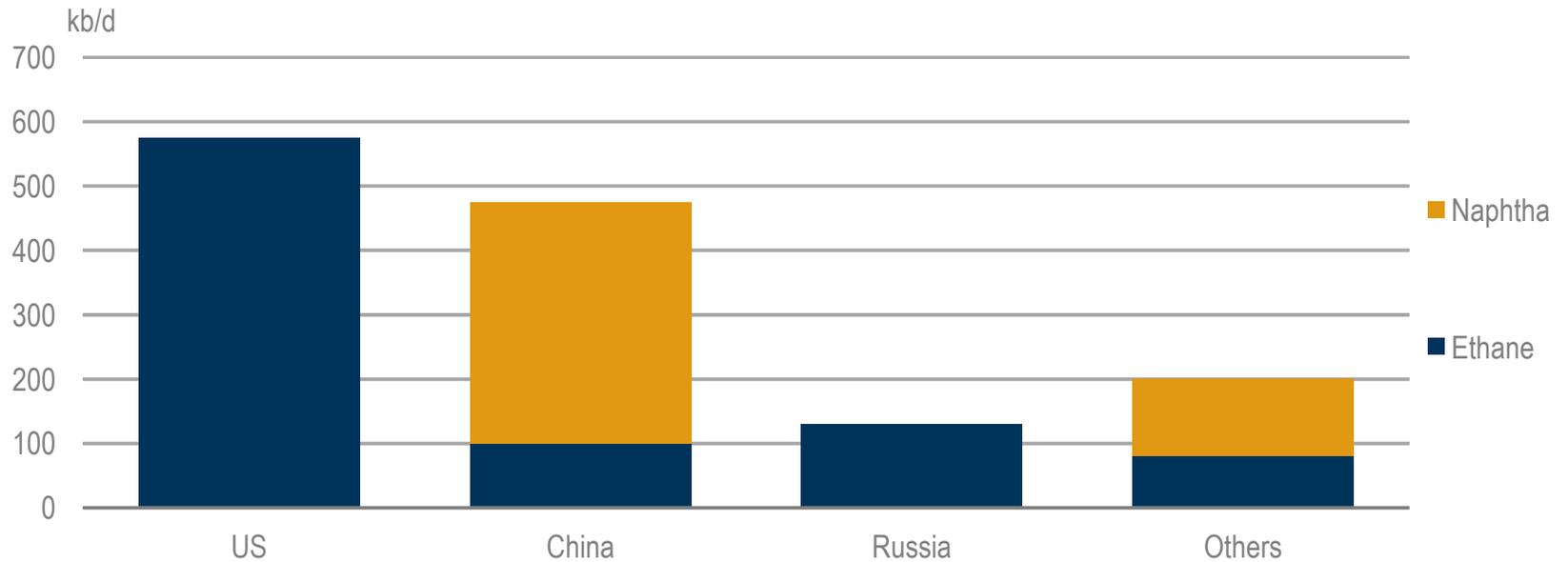


China and India account for almost half of world oil demand growth of 6.9 mb/d.

Petrochemicals drive global oil demand growth to 2023



Feedstock requirements for new steam crackers

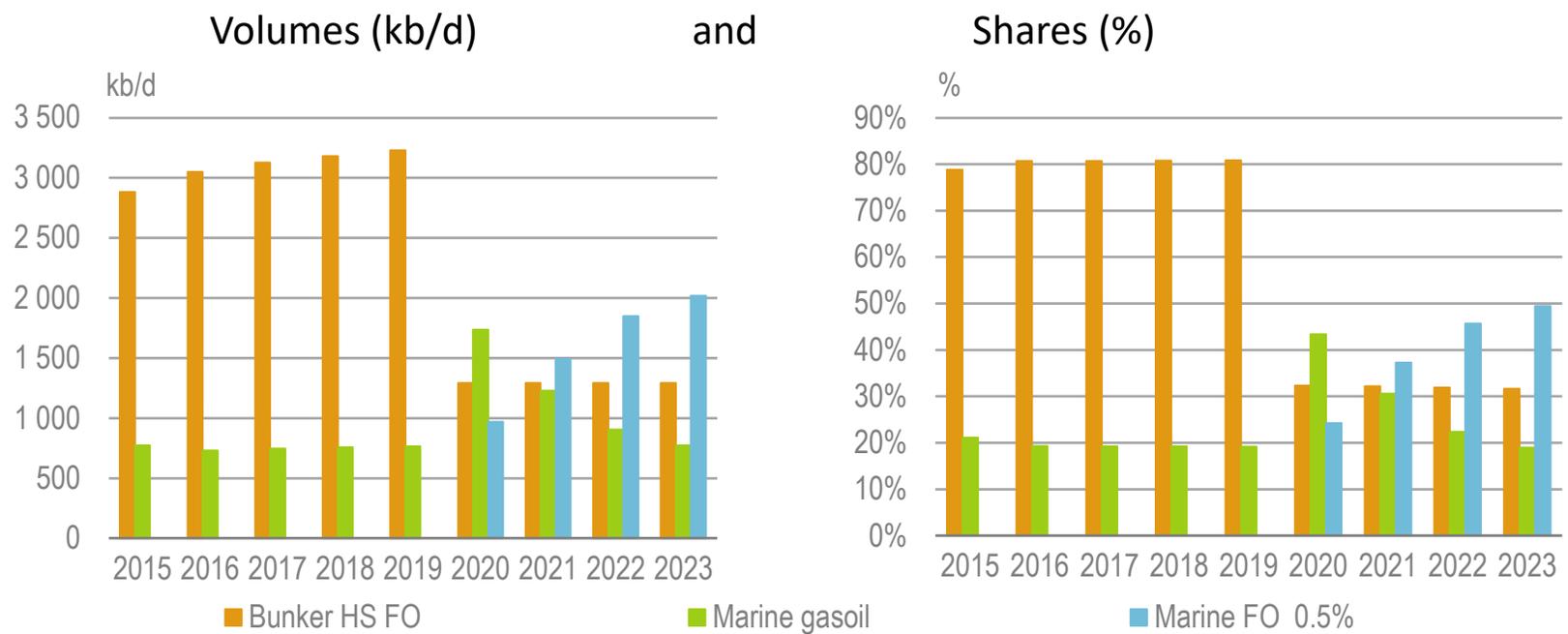


Petrochemical feedstocks (ethane and naphtha) responsible for 25% of global oil demand growth

IMO 2020 specs – enormous implications for products mix

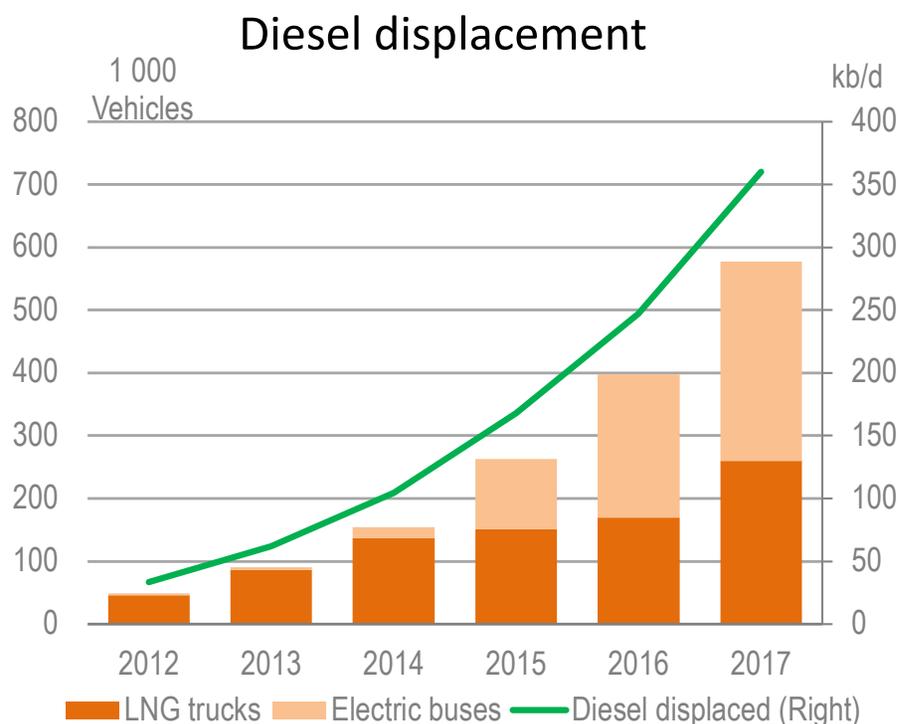
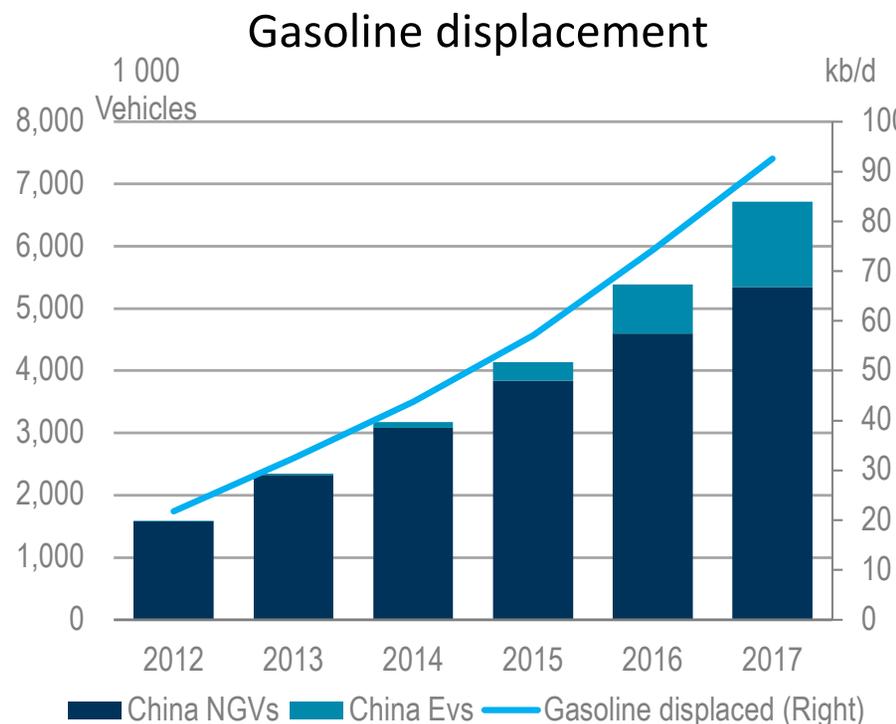


Marine bunkers in OECD and major non-OECD countries



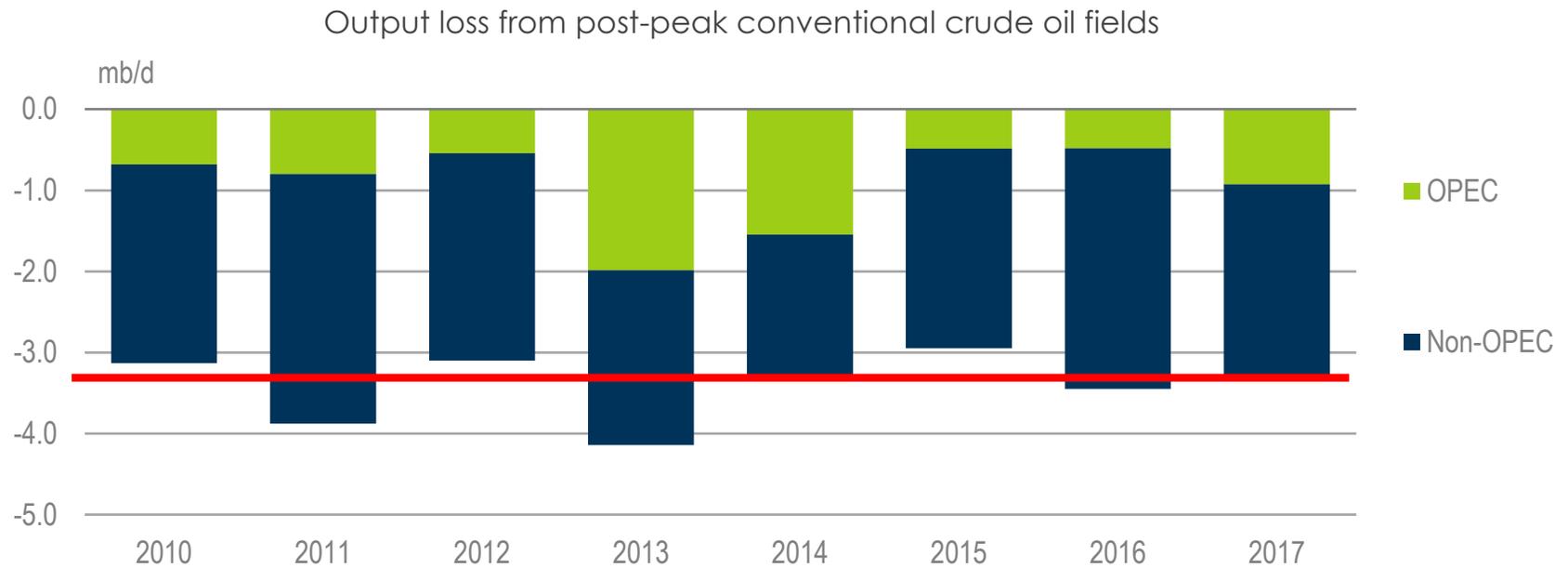
HSFO replaced by a new 0.5% fuel and gasoil. Gasoil availability is the main constraint.

China use of alternative fuels displacing oil



Growing switch in fleets to electric vehicle's, CNG, LNG

Oil industry needs to replace one North Sea each year

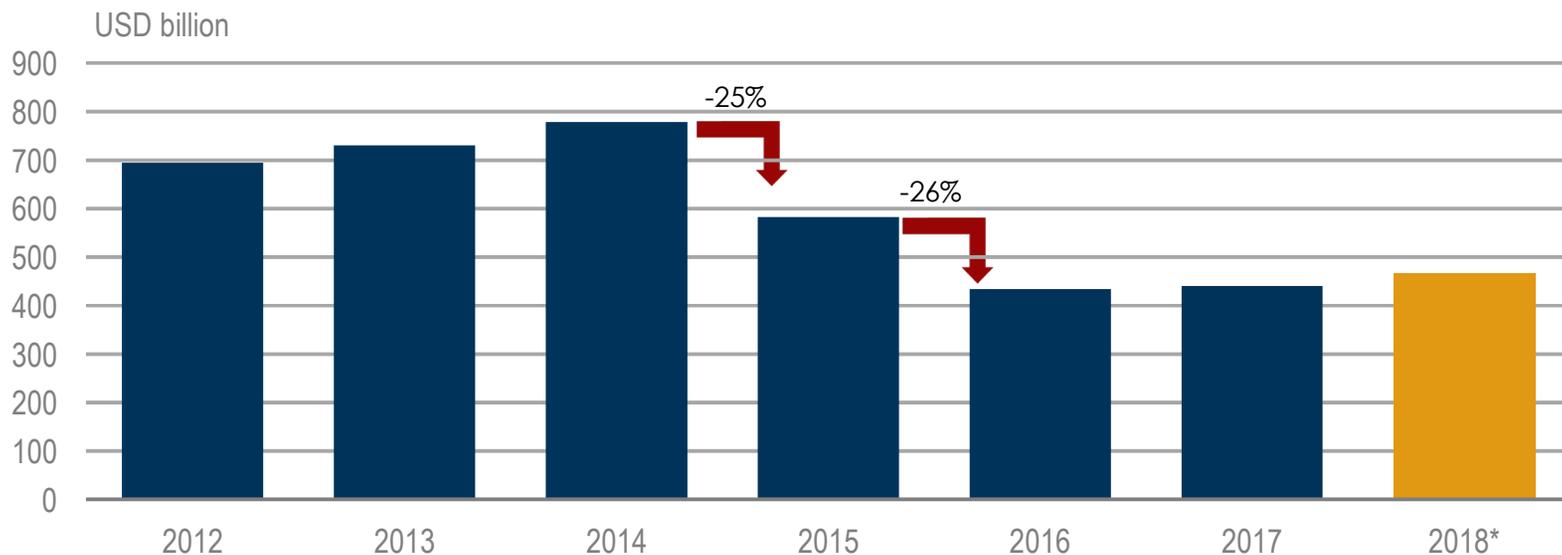


Ageing oil fields lose more than 3 mb/d per year despite slowing decline rates.

Only limited uptick in global upstream spending



Global oil and gas upstream capital spending 2012-2018



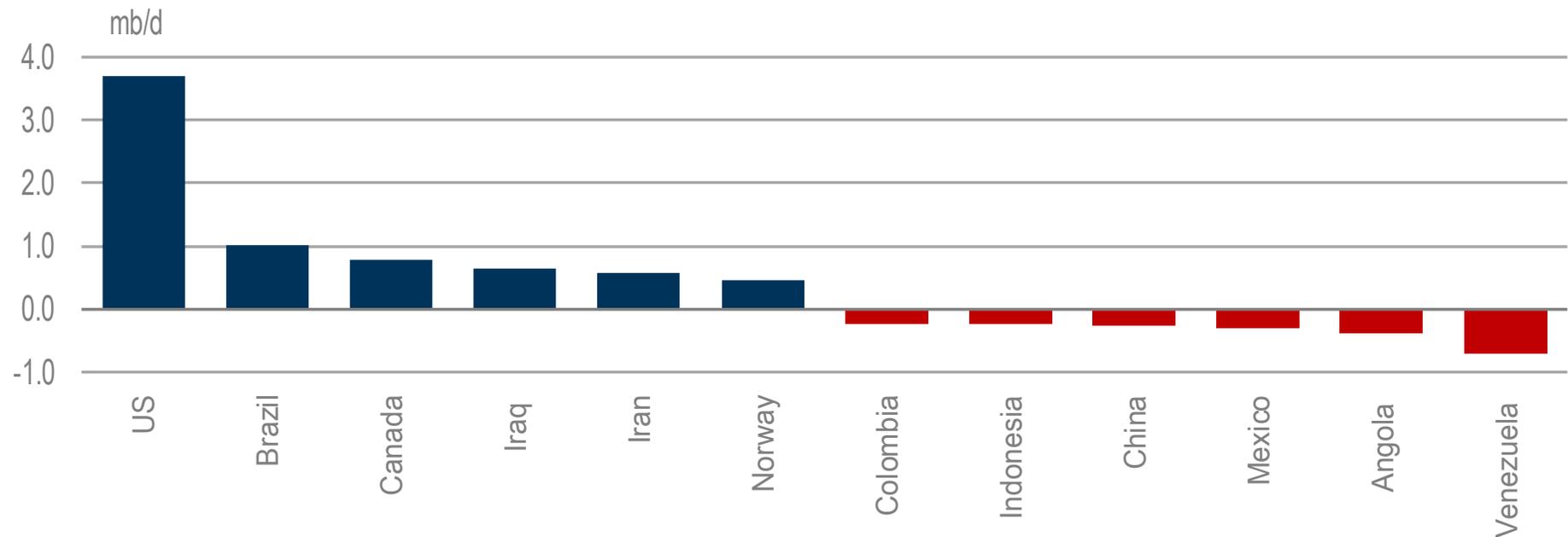
*Preliminary based on selection of investment updates

**Producers spend more on short cycle supply, especially US LTO.
Investments in conventional fields remain depressed, but some signs of renewed interest in offshore.**

Booming non-OPEC supply in early years of forecast...



Changes in global oil supply capacity 2017-2023

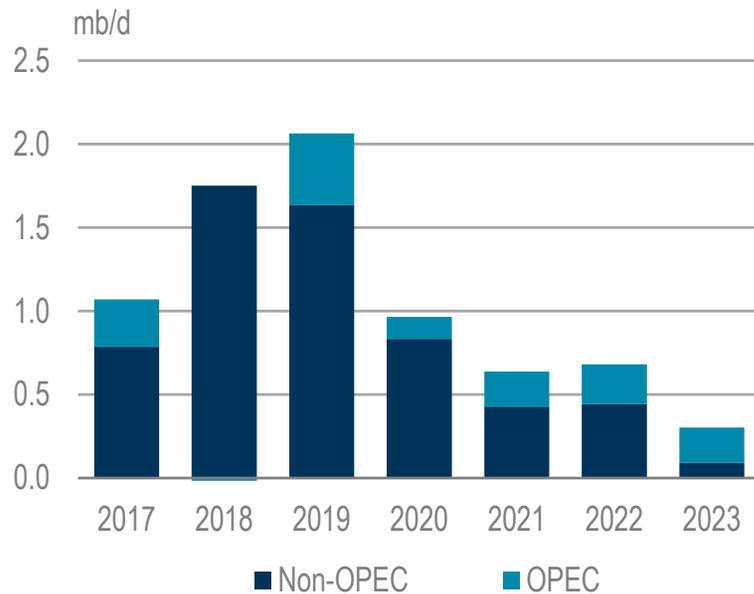


... more than covers demand growth to 2020. By 2023, non-OPEC supply grows by 5.2 mb/d. OPEC capacity rises only 1.2 mb/d due to Venezuelan collapse and limited increases elsewhere.

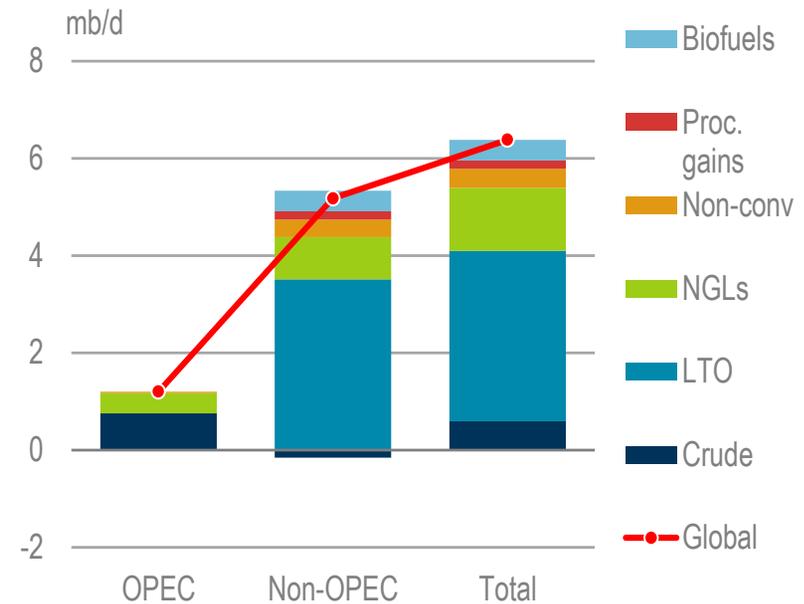
Supply growth front loaded & dominated by US & NGLs



Global liquids capacity growth

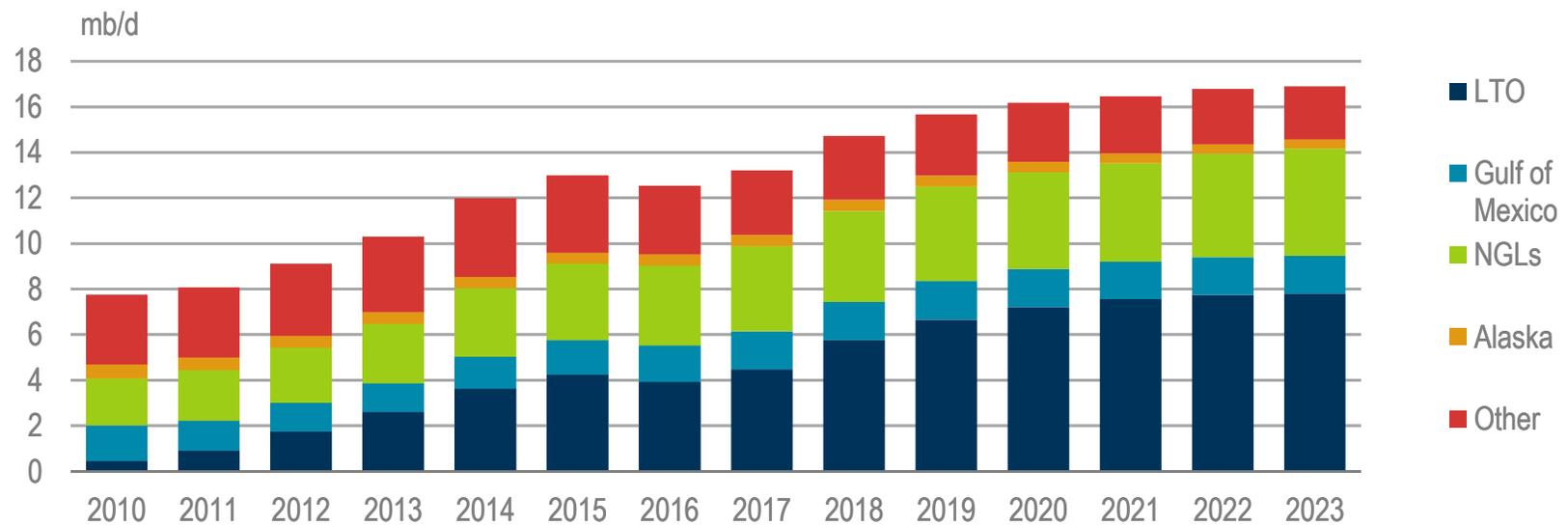


Global oil supply capacity growth 2017-23



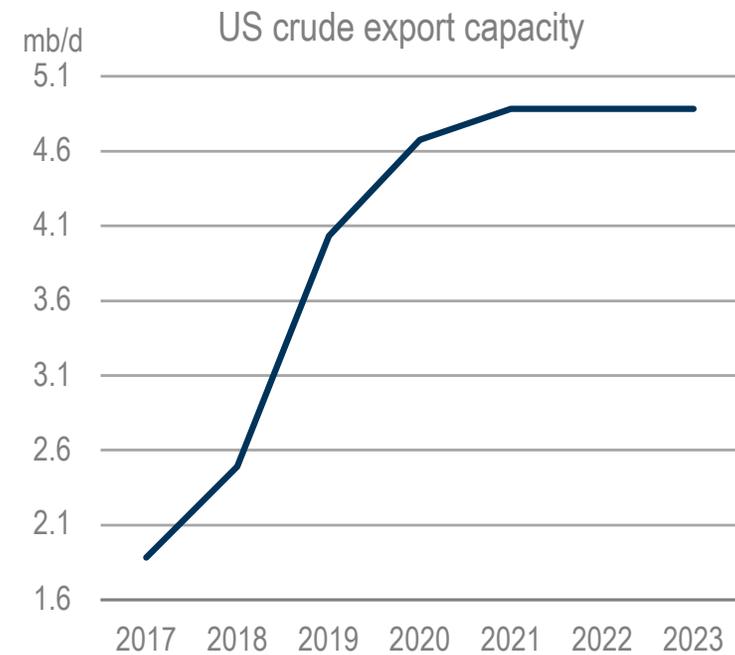
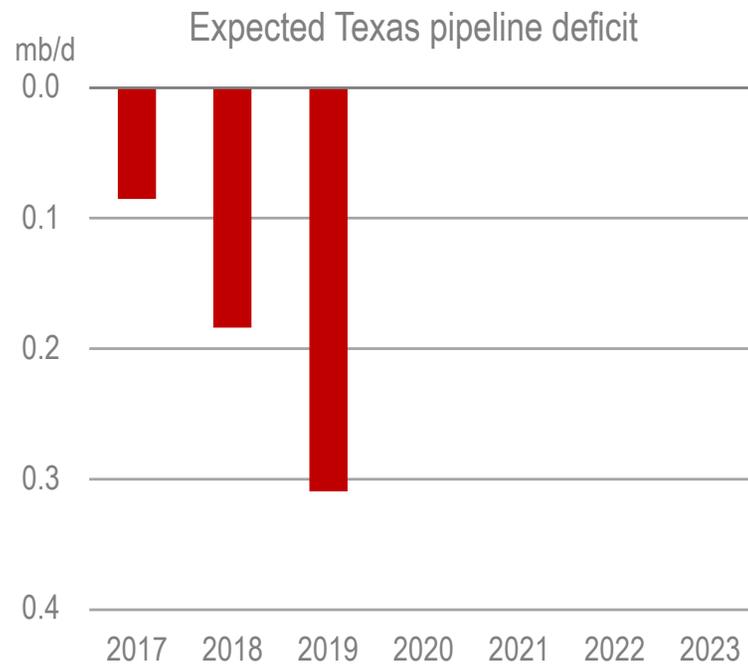
But will projects be brought forward? Projects sanctioned today tend to have shorter lead-time.

Higher oil prices unleash second wave of US supply



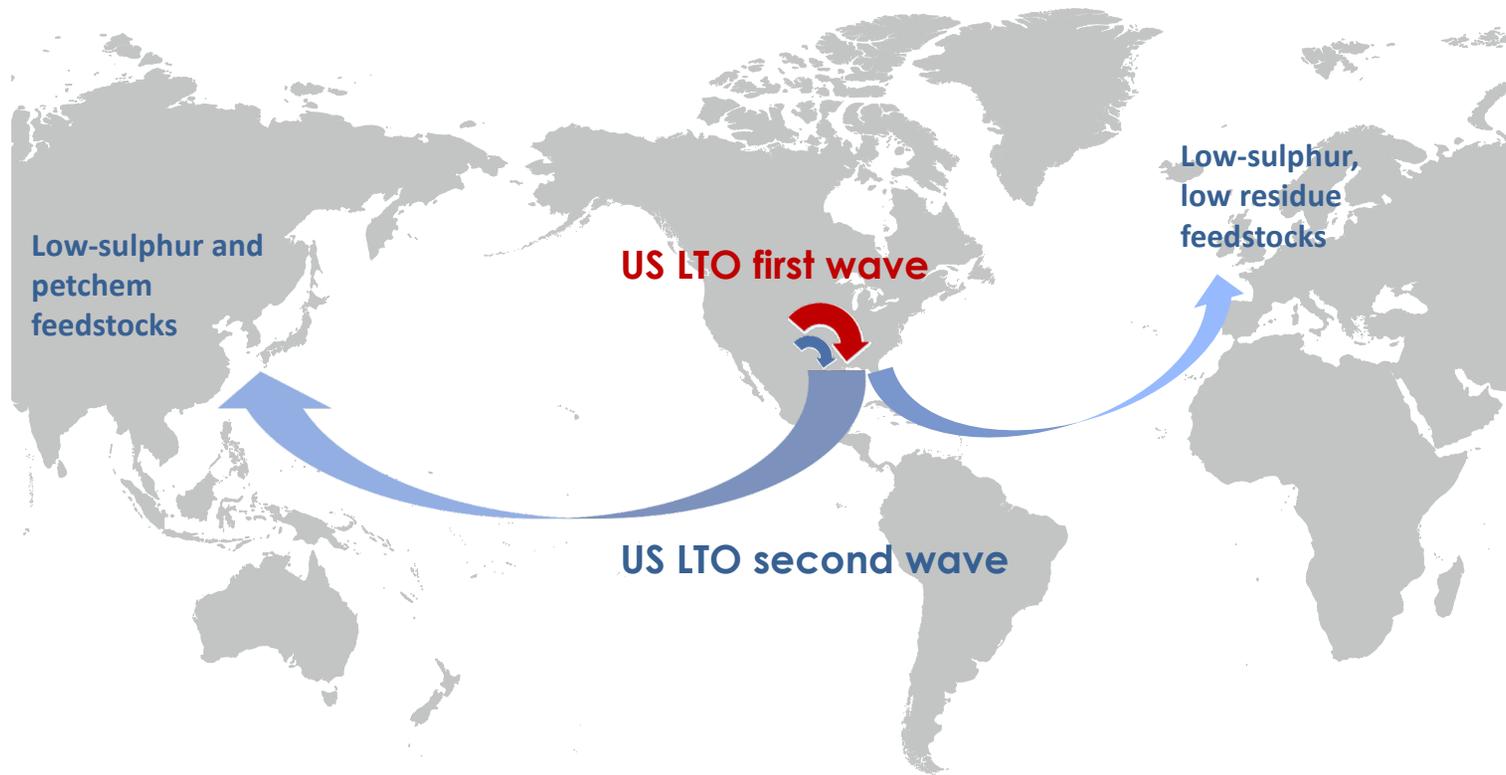
Total output reaches 17 mb/d by 2023 – and could be even higher if prices rise/bottlenecks ease.

US bottlenecks ease, export capacity more than doubles



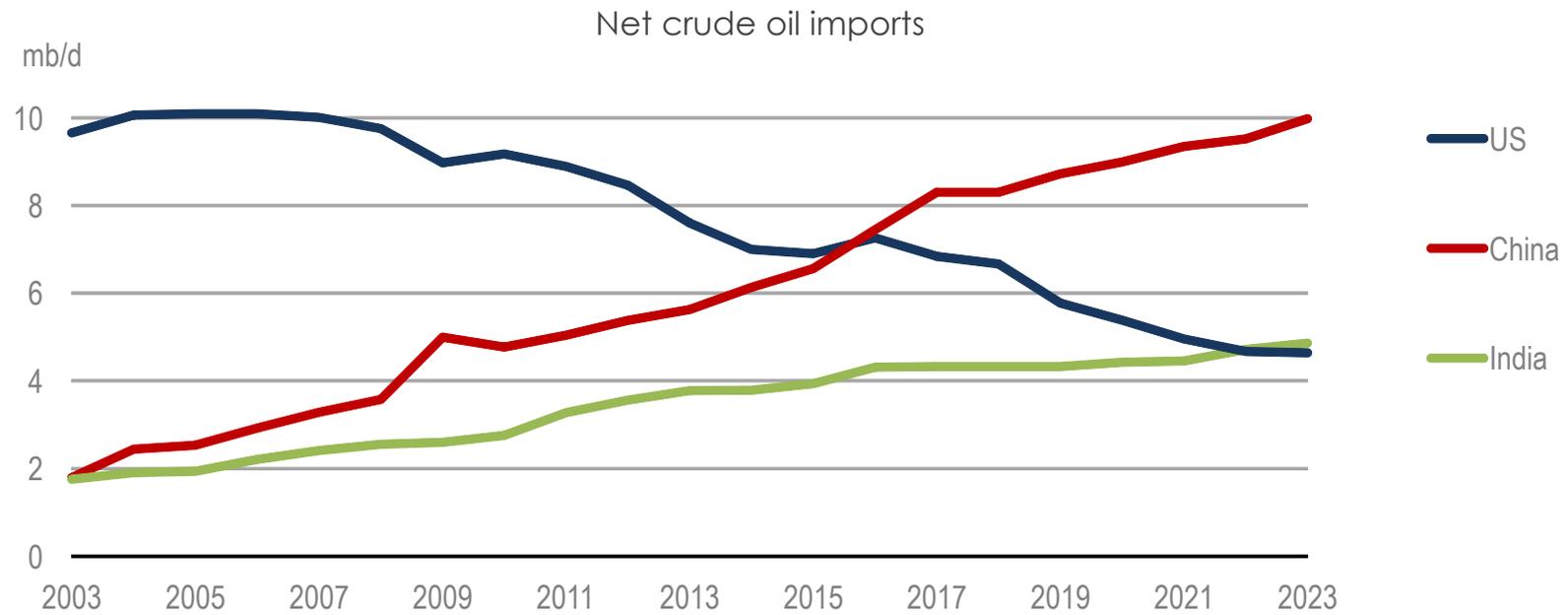
New pipeline projects ease constraints. US export capacity rises to 4.9 mb/d by 2023. Corpus Christi solidifies position as largest US export hub.

US oil enters global markets



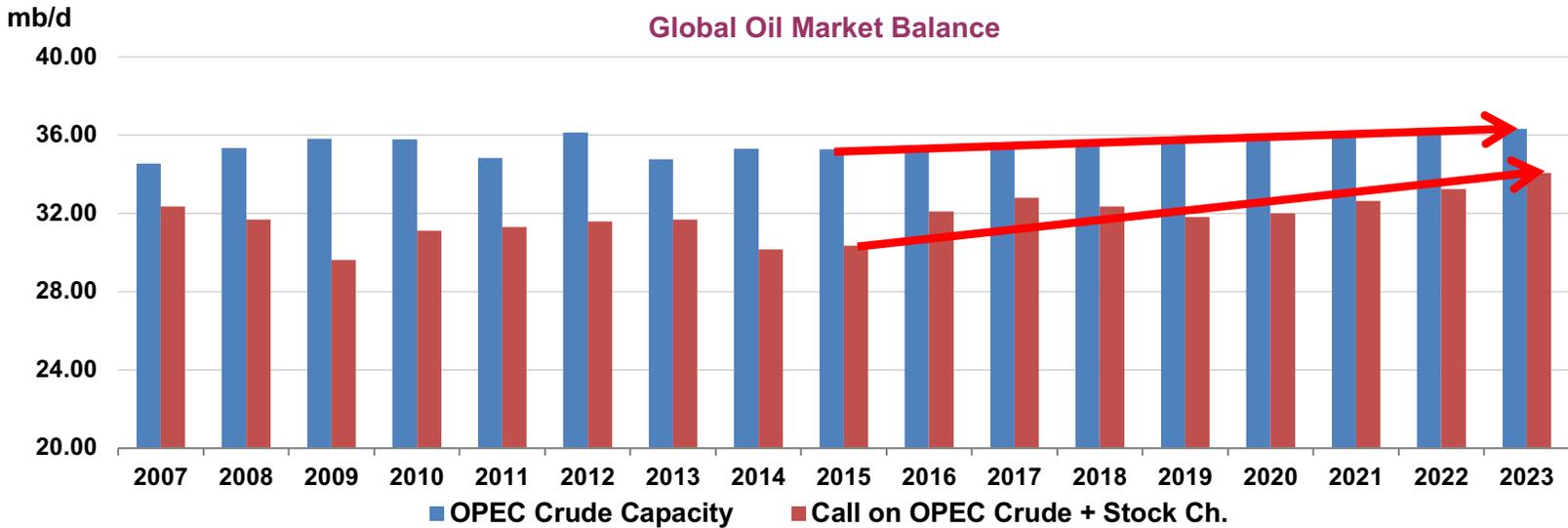
Refiners in Asia and Europe look for suitable crude oil to produce petrochemical feedstocks and low-sulphur fuels

China net crude oil imports double the US in 2023



Indian imports, too, surpass the US in 2023 as shale growth reduces US import dependence.

Spare capacity cushion shrinks to lowest level since 2007



Supply/demand tighter at the end of the forecast

Conclusions



- Robust world oil demand growth to 2023 – petrochemicals key driver.
- Non-OPEC output growth exceeds demand increase through 2020.
- US, Brazil, Canada, Norway dominate growth. New infrastructure investments relieve US export bottlenecks.
- US crude finds new markets as refiners seek light, low sulphur crude to meet petrochemical demand and IMO specifications.
- More upstream investment needed today to meet future demand and offset 3 mb/d of declines from mature oil fields each year.
- As spare capacity cushion shrinks, supply security concerns remain critical.

