

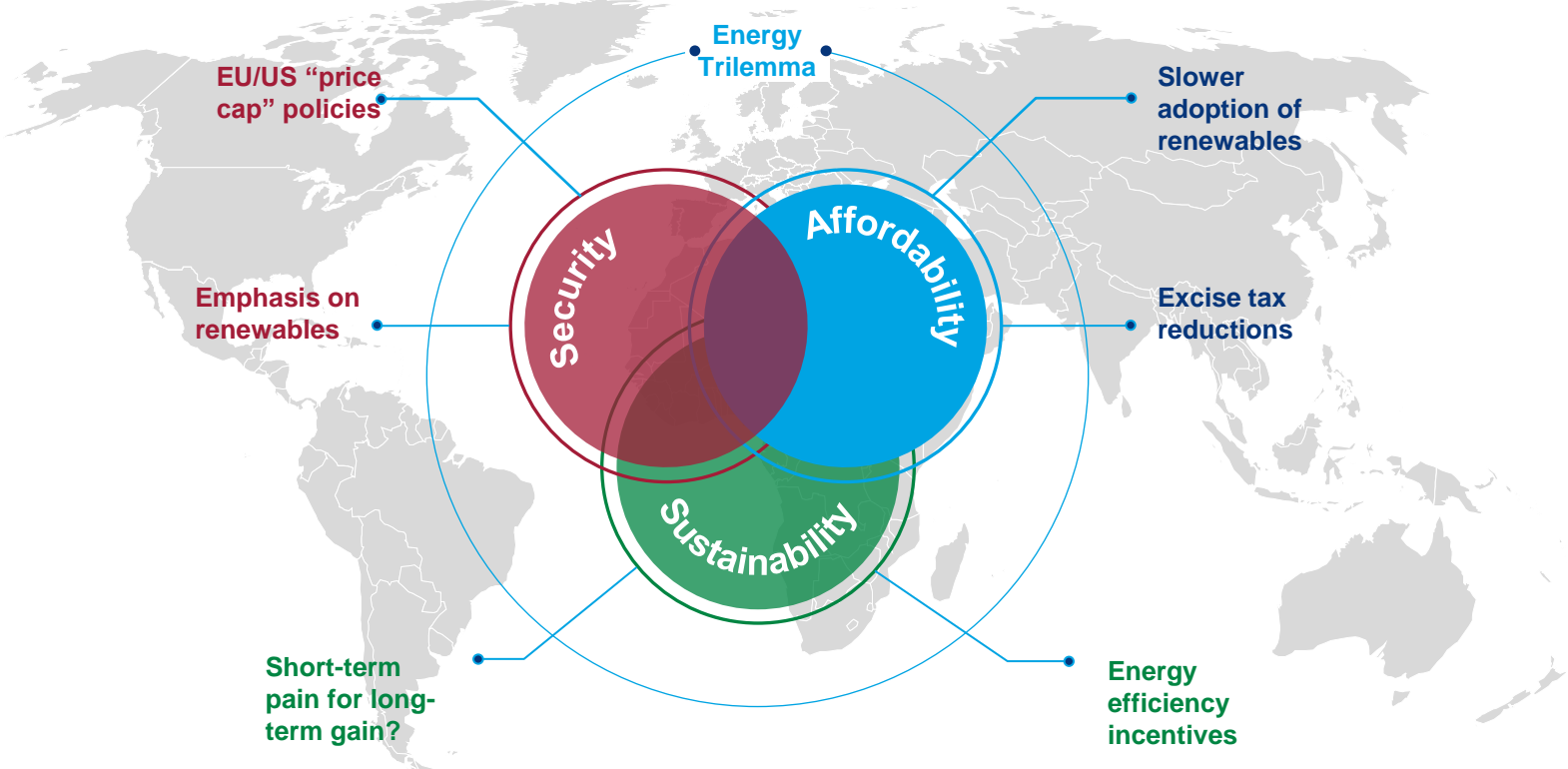
Secure, Affordable and Low Carbon: The Energy Trilemma

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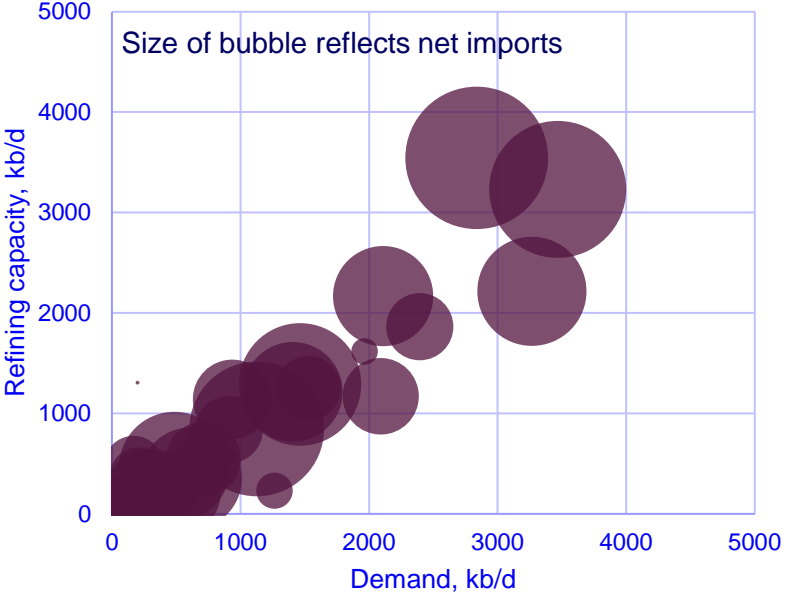
Balancing the energy trilemma has become a significant challenge



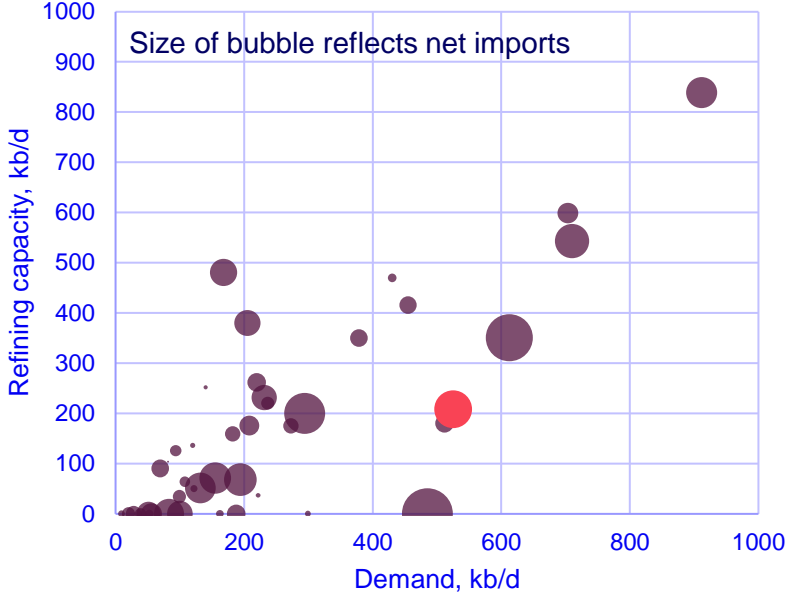
Security: South Africa has relatively low refining capacity relative to its oil demand, highlighting the importance of high-quality import infrastructure

There is a strong relationship between oil demand and refining capacity for major economies

Net importers – all countries ex China



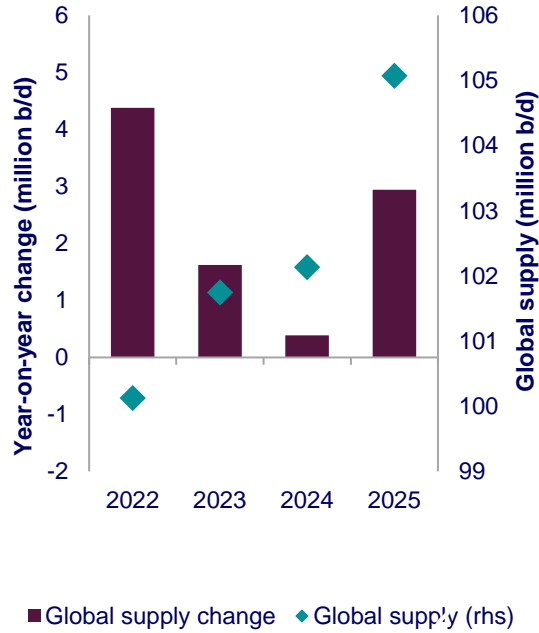
Net importers – smaller countries



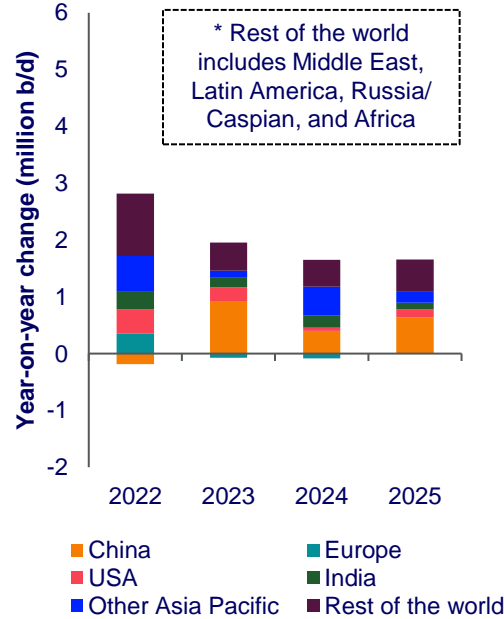
Affordability: Oil prices are projected to remain high in the near term

Demand growth and OPEC+ production restraint sets a floor to oil pricing

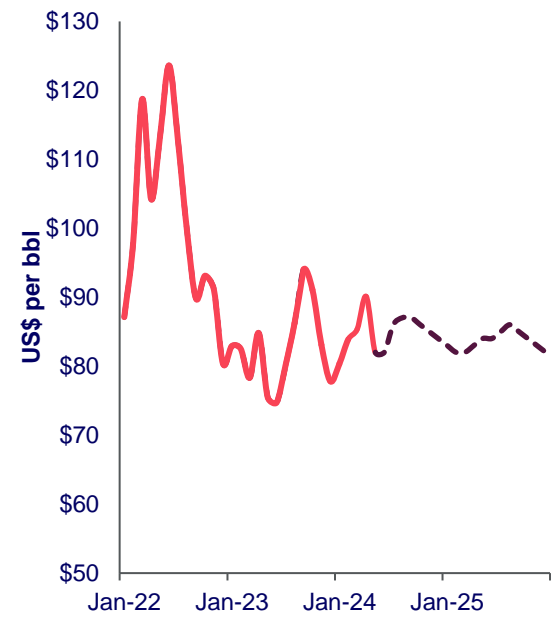
Global liquids supply



Global liquids demand



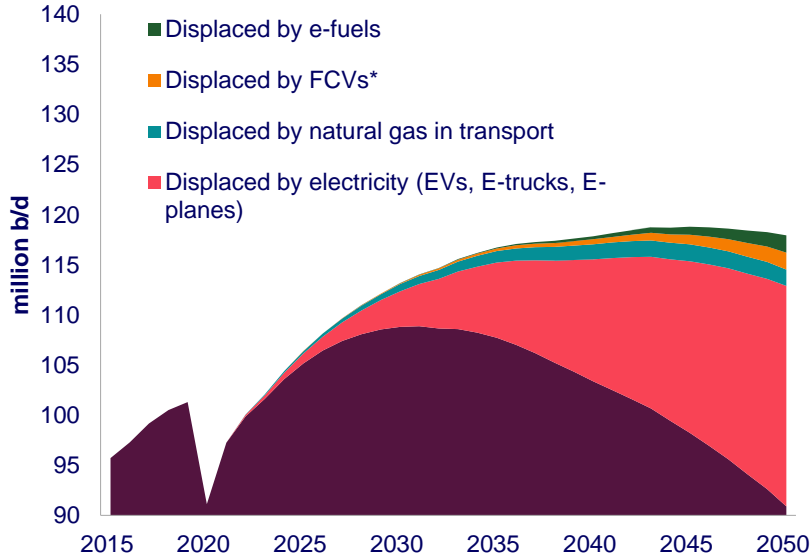
Brent price outlook



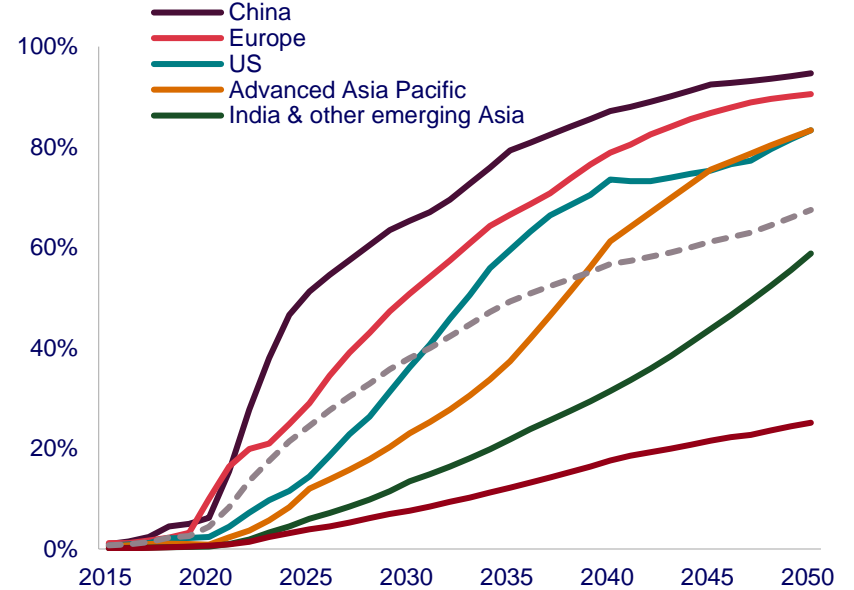
Affordability: long term oil demand peaks in the early 2030s at >5 million b/d more than current levels

Energy demand for mobility continues to grow, but electrification displaces oil demand from transportation

Global liquids demand and the displacement effects from EVs, FCVs and natural gas in transport



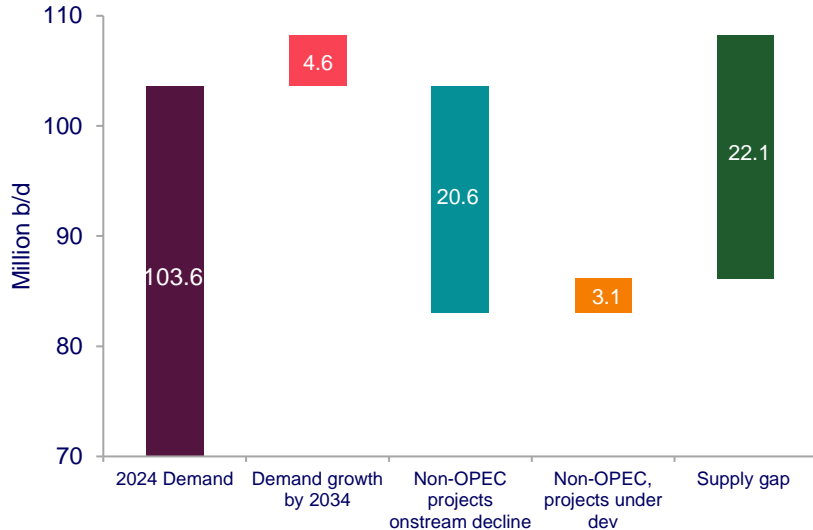
EV share of light vehicles sales (includes BEVs, PHEVs and AEVs)



Affordability: long term oil price supported by the need for an active Upstream sector to close the supply gap

This additional supply is required to offset demand growth and onstream production declines

What forms the 2034 supply gap?



Purple bar: 2024 demand is forecast to average 103.6 million b/d.

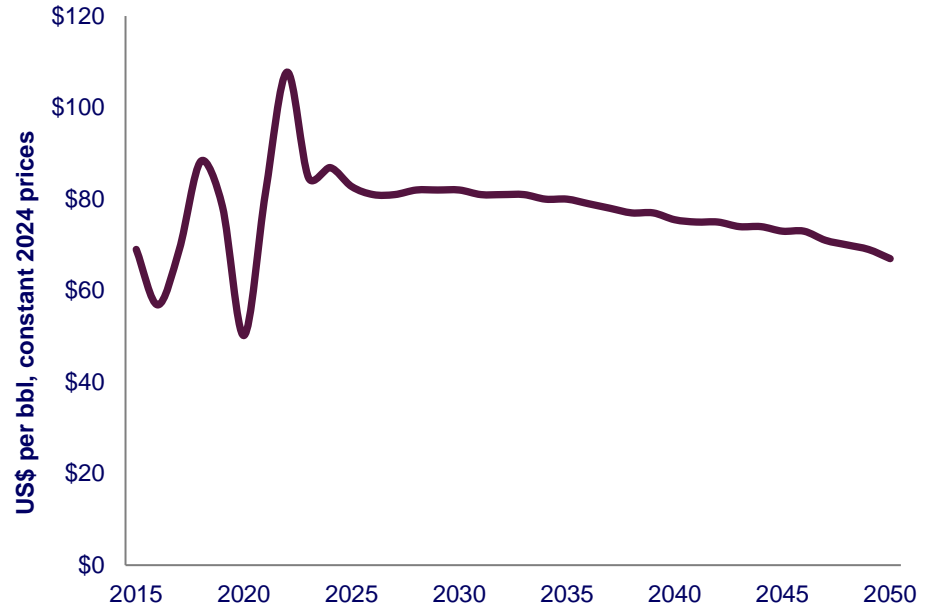
Pink bar: Oil demand is expected to grow by 4.6 million b/d to 2033, reaching a total of 108.2 million b/d.

Blue bar: Onstream non-OPEC fields are expected to decline by 20.6 million b/d to 2034. Assets in US (Lower 48), China, Russia and Norway drive these declines.

Orange bar: Projects which have already received an investment decision will contribute 3.1 million b/d by 2034. 70% of this comes from Russia, Brazil, Qatar and US (GoM Deepwater).

Green bar: The amount of new supply required to meet the growth in demand and offset onstream declines.

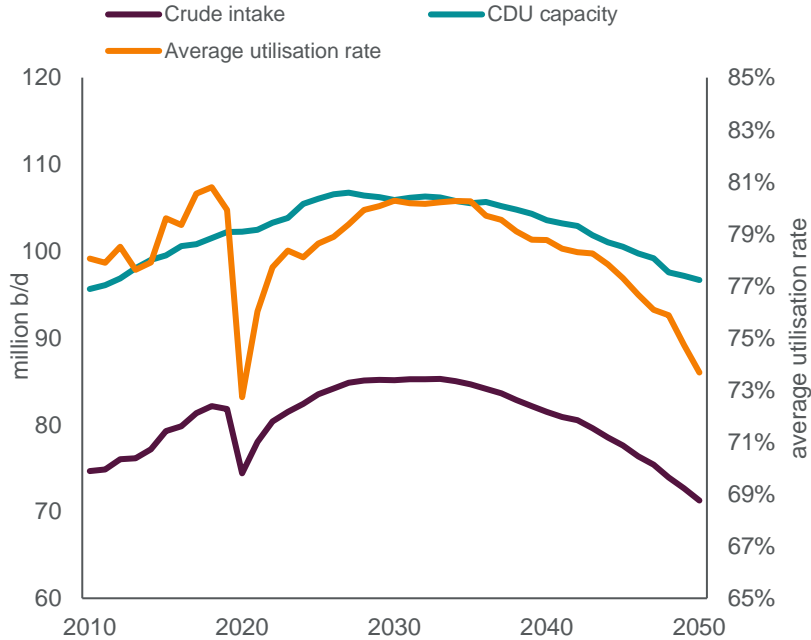
Brent price outlook (real terms)



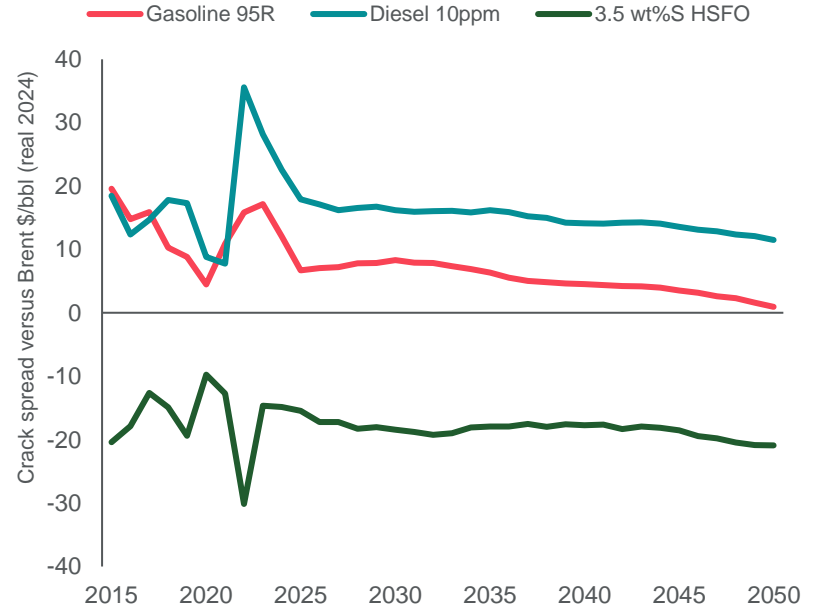
Affordability: Refining sector remains healthy until global oil demand starts to decline

Threat of refinery rationalisation remains low, supporting strong crack spreads for jet and diesel fuels

Global refinery capacity, utilisation and throughput



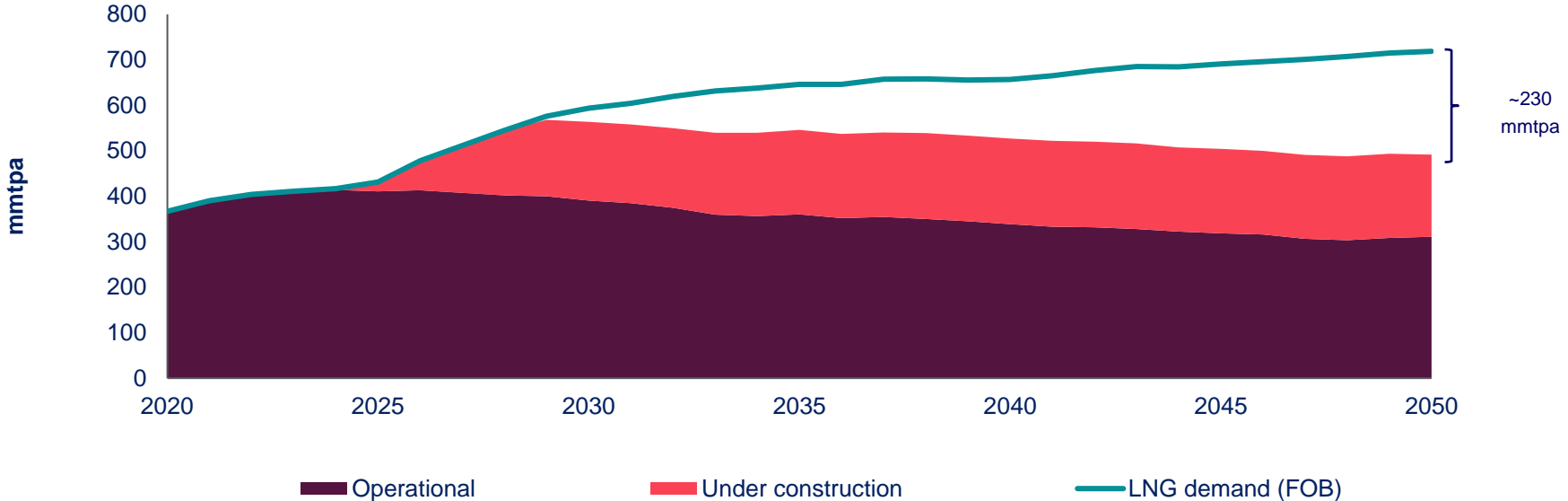
Northwest Europe crack spread forecast



Affordability: The global market will require ~230 mmtpa of new LNG supply by 2050

The need for new source of supply increases from 2040 as existing supply tails off and LNG demand continues to grow. But the timing and volume of Qatari expansions in 2030s will be critical in determining market space for others

LNG supply and demand by project development status

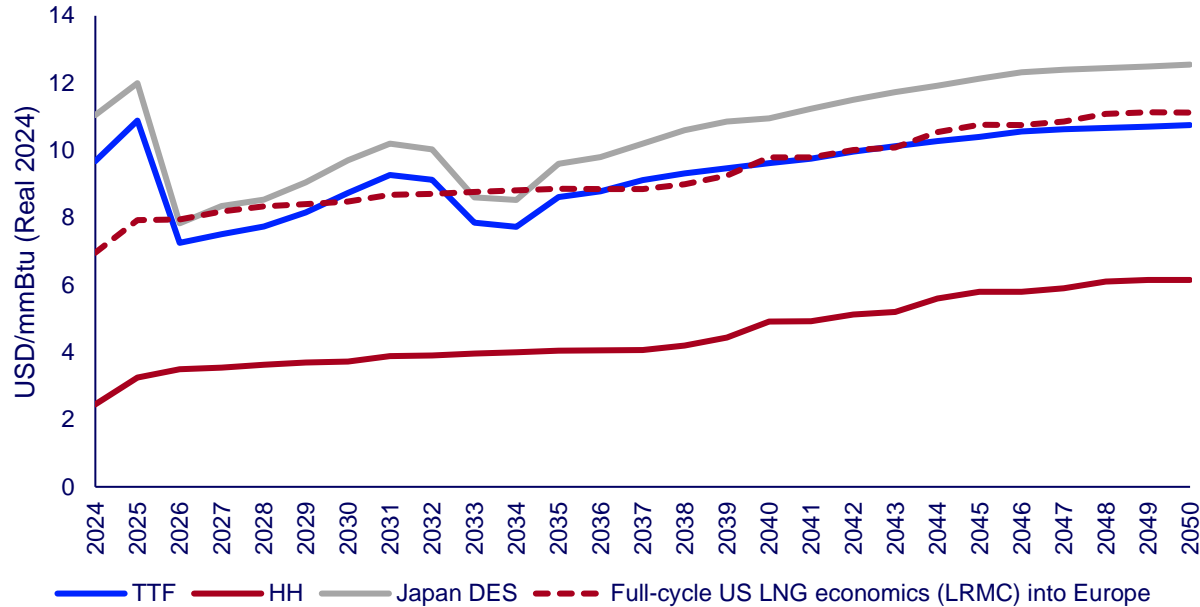


Source: Wood Mackenzie LNG Tool Q3 2023, [LNG Service](#)

Affordability: Global LNG prices are to remain strong, but will supply-side dynamics will drive cyclicality

Structural volatility will persist, including during periods of oversupply

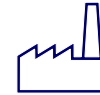
Prices: Japan Spot, TTF, Henry Hub and US LNG LRMC¹ to Europe



Key elements of mid-term price formation



Pace of LNG supply growth



Demand, price response, policy push



EU's approach to Russian imports



Europe's increased dependency on LNG means a structural change in global market flexibility

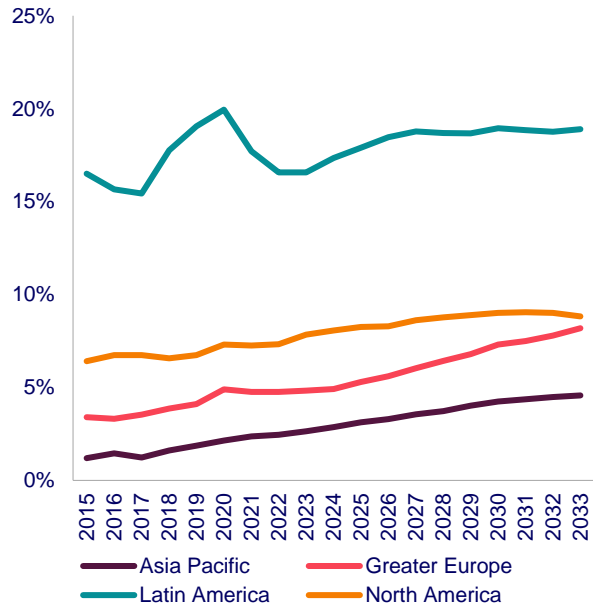
Source: Wood Mackenzie's LENS Gas and LNG (April 2024)

(1) We calculate full-cycle US LNG economics as 115% Henry Hub + liquefaction cost (US\$2.5/mmBtu) + shipping + regas and entry cost (US\$0.6/mmBtu)

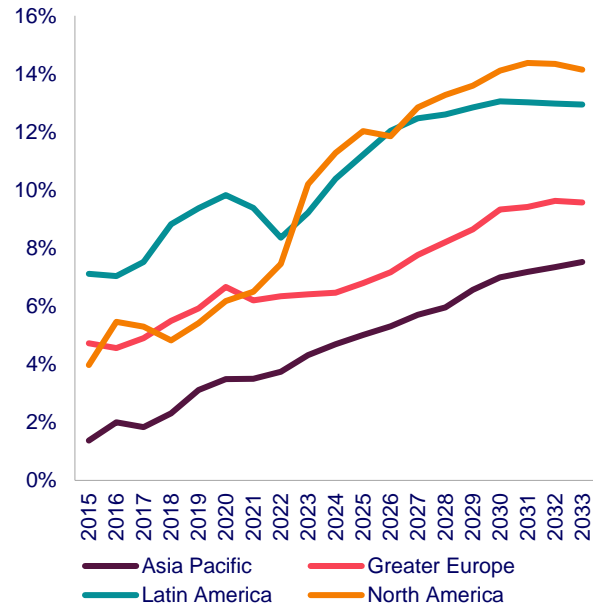
Sustainability: Most regions see liquid renewable fuels taking a growing share of transport markets

Policy is the major driver - Europe and North America have more developed regulatory requirements

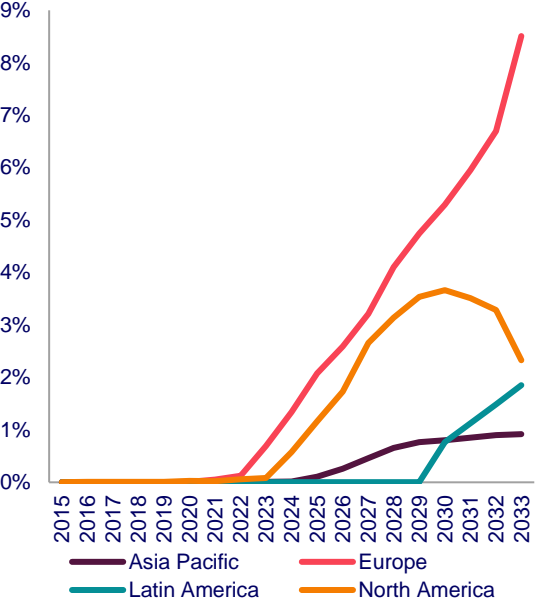
Liquid renewable share of respective regional transport fuel markets, %vol



FAME and HVO share of regional road diesel markets, %vol



Biojet share of regional jet fuel markets, %vol

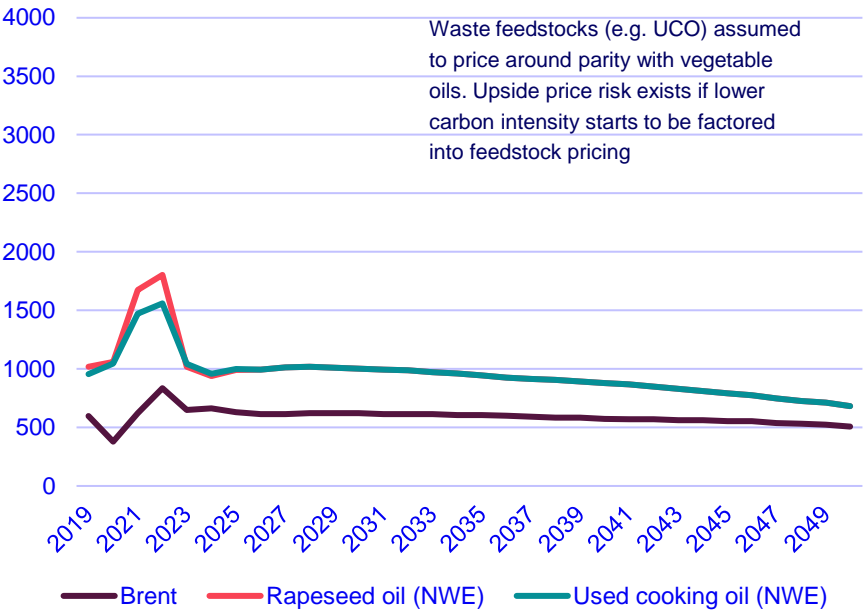


Source: Wood Mackenzie Liquid Renewable Fuels Service

Sustainability: Renewable liquids are more costly than fossil fuels from a combination of higher feedstock costs and investment economics.

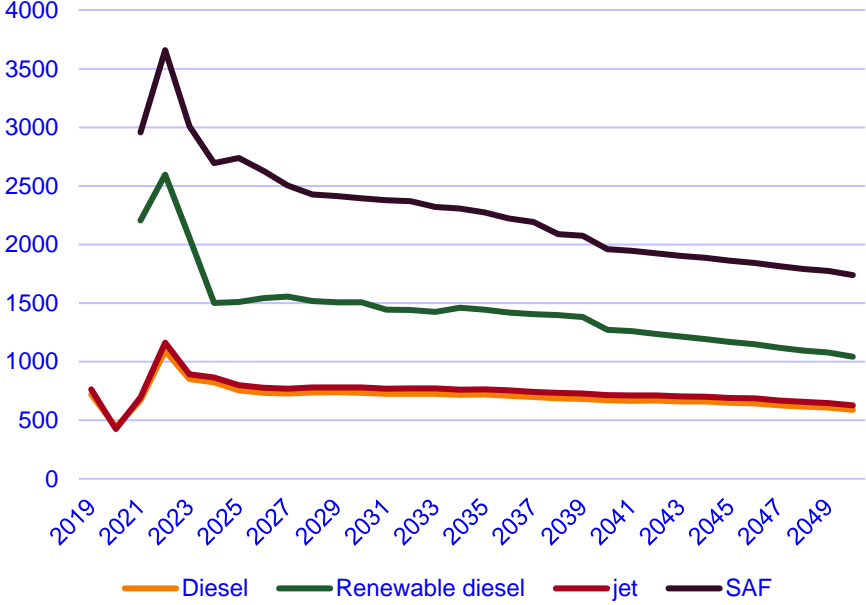
Food vs fuel is a major concern that requires shift to waste feedstocks and efuels.

Feedstock price forecast (NW Europe, US\$/ton, real)



Source: History the Argus Media group, USDA, Forecast Wood Mackenzie

Product price forecast (NW Europe, US\$/ton, real)



Source: History the Argus Media group, USDA, Forecast Wood Mackenzie

Despite the ambition at COP28*, a slower energy transition looks increasingly likely

WoodMac's 'delayed' scenario highlights the importance of gas in meeting energy demand growth.

Key points from UAE Consensus at COP28

Fossil fuels

- Transitioning away from fossil fuels.
- Natural gas as the bridging fuel.

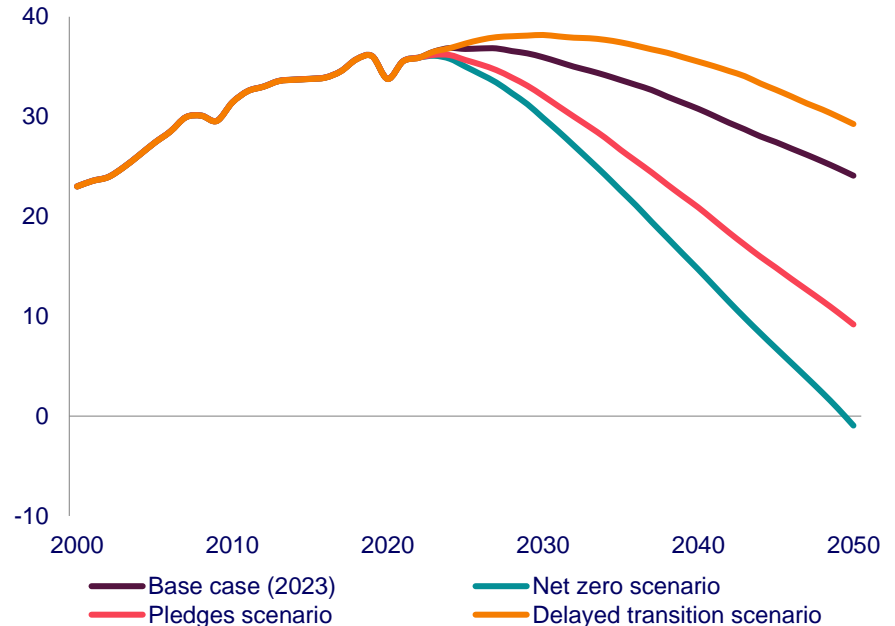
Low carbon

- Triple renewable energy capacity by 2030; nuclear by 2050.
- Double the rate of energy efficiency improvements by 2030.

Finance

- Climate finance gap may balloon to between US\$4 to US\$5 trillion a year by 2030.
- Closing the gap is a task for COP29 in Azerbaijan.

WM scenarios: global energy-related CO₂ emissions, (Billion tonnes)



* Conference of the Parties- parties to United Nations Framework Convention on Climate Change

Q&A

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