

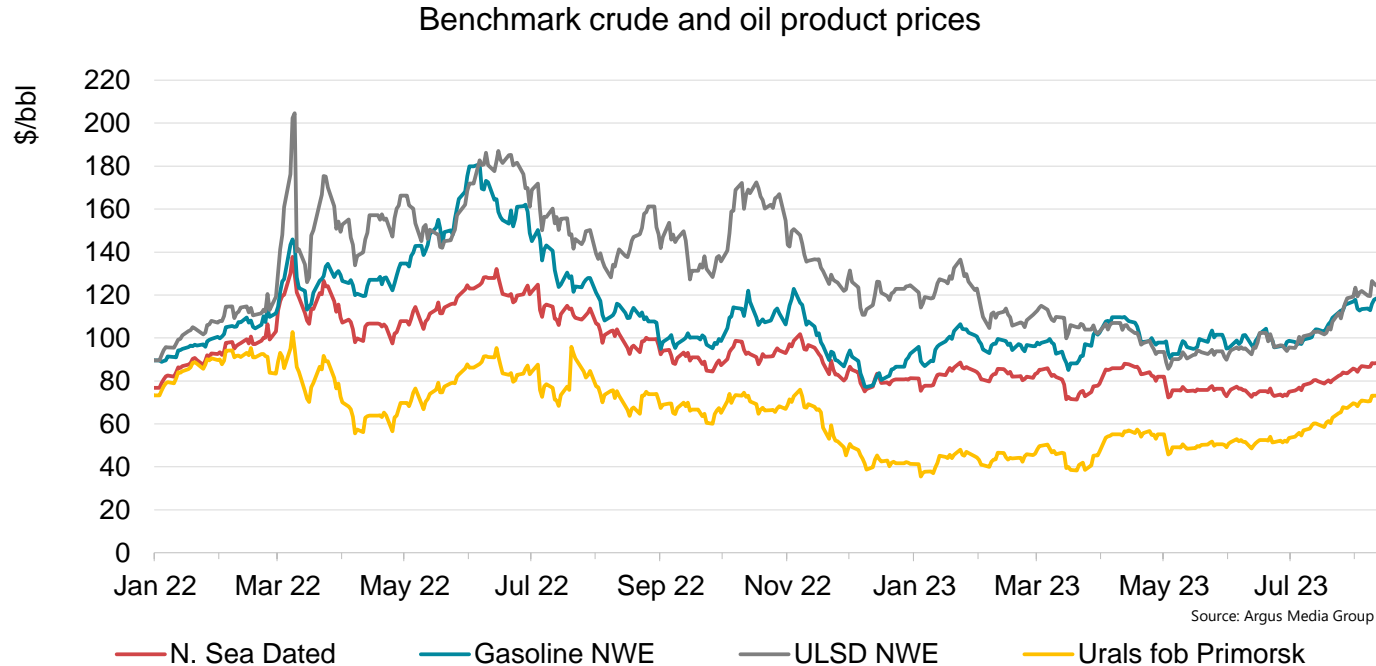


石油需給の見通しとエネルギートランジションの動向

国際エネルギー機関 エネルギー市場・安全保障局長 貞森恵祐

中東協力現地会議 ウィーン 2023年8月22日

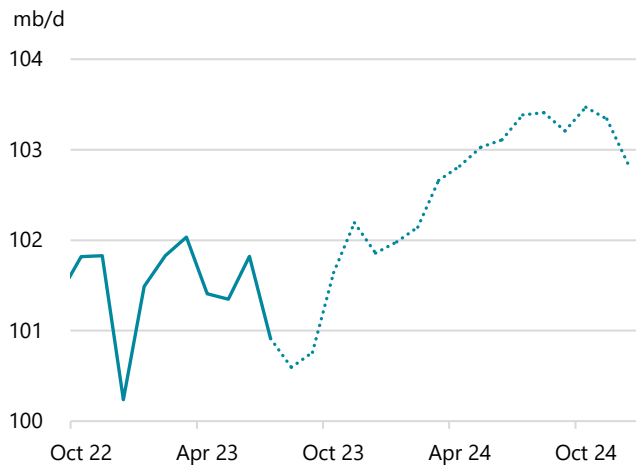
After a period of relative calm, oil prices are moving higher



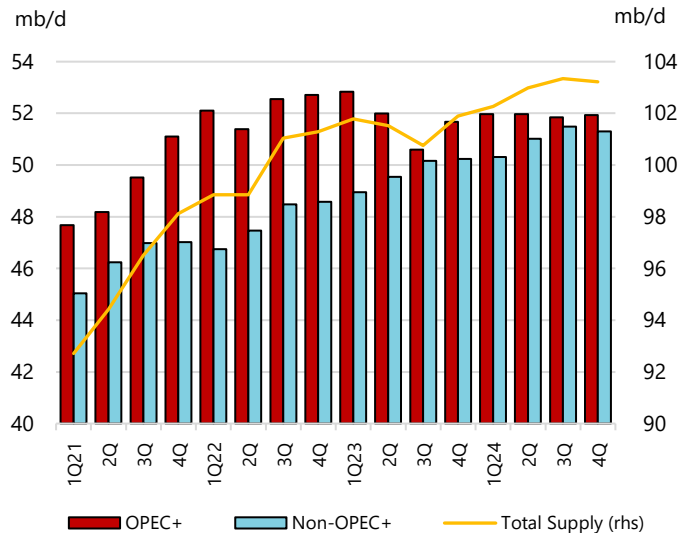
Crude and product prices have increased since the start of July as additional OPEC+ output cuts is tightening the market, and as refiners struggle to keep up with seasonally higher demand.

World oil supply plunges as Saudi slashes output

Global Oil Supply

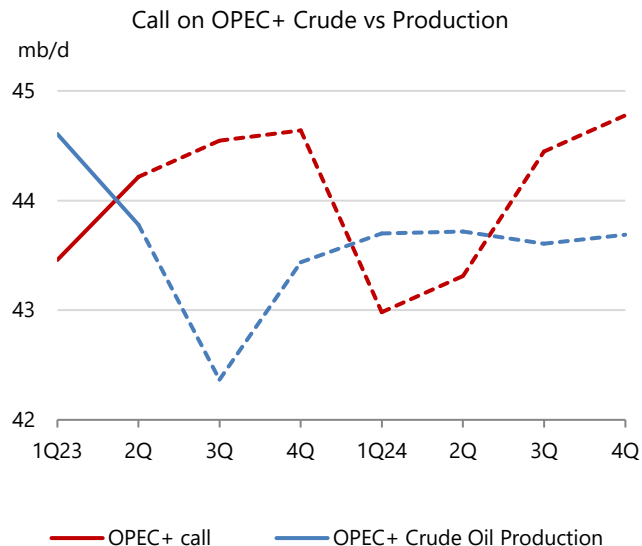
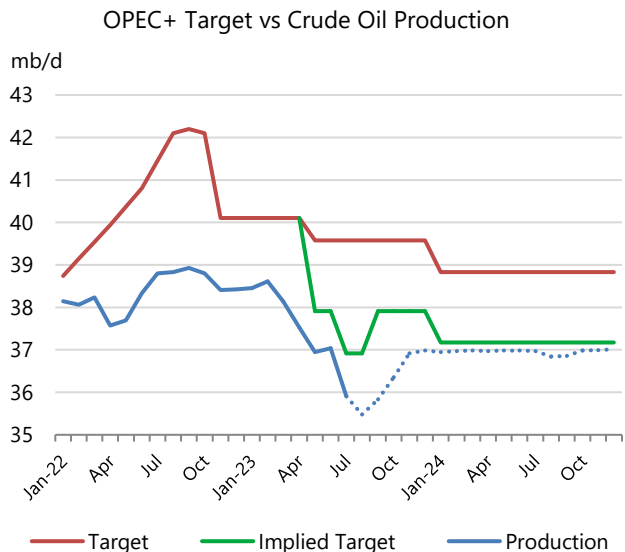


OPEC+, Non-OPEC+ Total Oil Supply



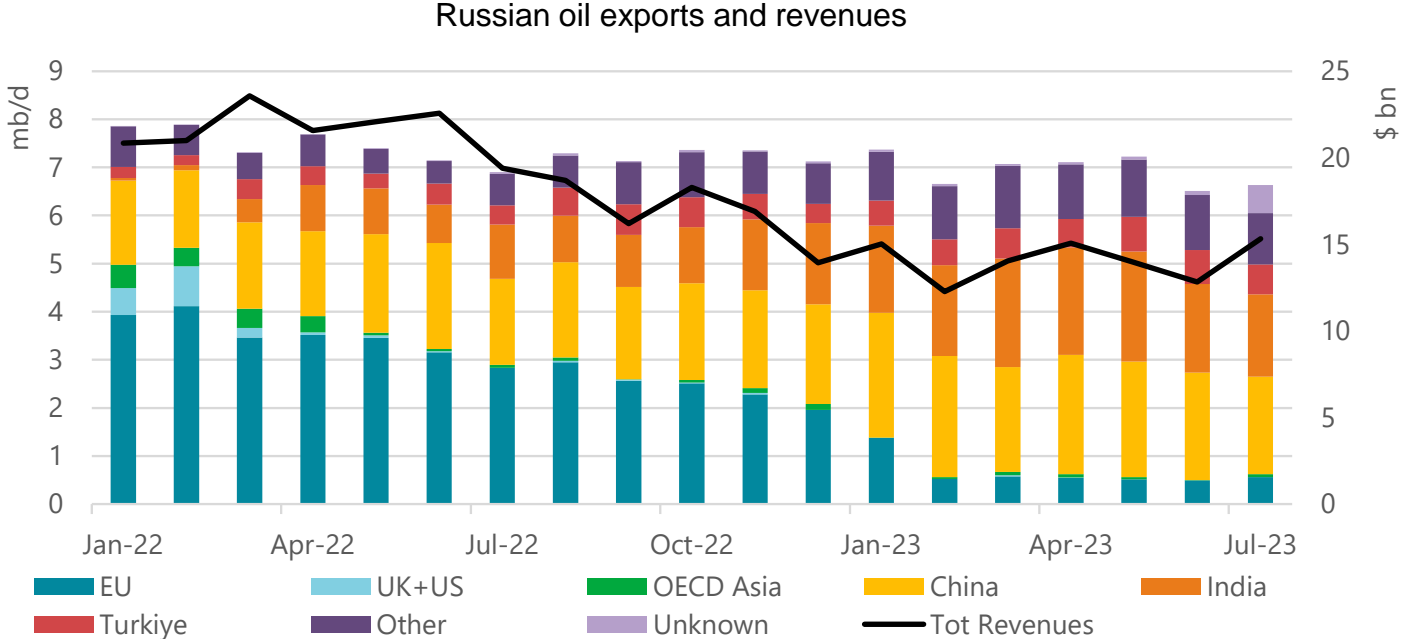
Production down 910 kb/d in July to 100.9 mb/d. OPEC+ output falls 1.2 mb/d to 2-year low, while non-OPEC+ up 310 kb/d. Global supply to rise by 1.5 mb/d to record 101.5 mb/d in 2023, with the US driving non-OPEC+ gains of 1.9 mb/d.

Saudi, Russia extend cuts through 3Q23, tightening world oil market



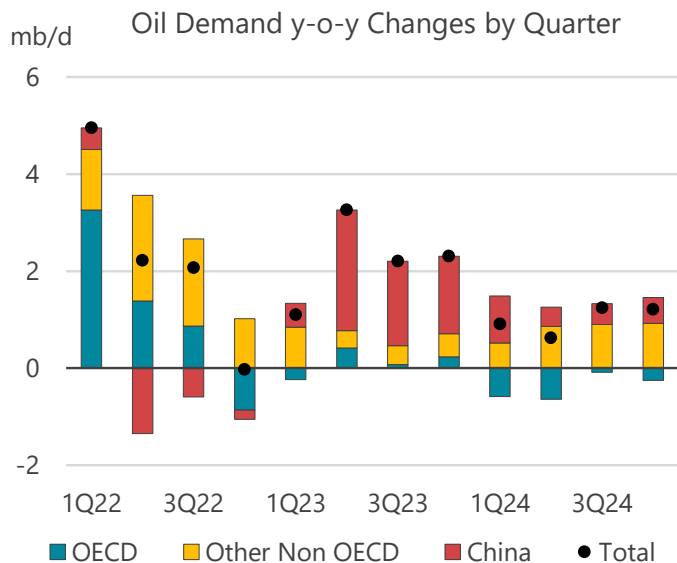
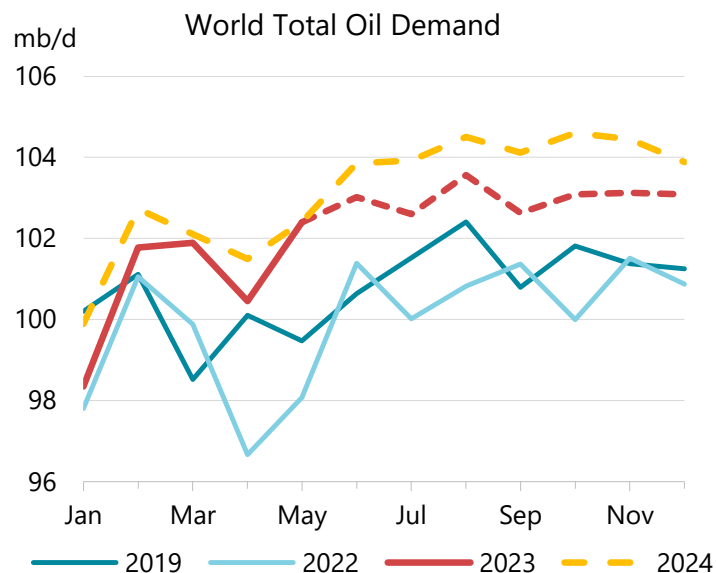
Saudi sticks with 1 mb/d through Sept, at least. Russia to curb exports by 300 kb/d in Sept following cut of 500 kc/t in Aug. OPEC+ to pump far below call in 2H23.

Russian oil exports hold steady in July, revenues rebound



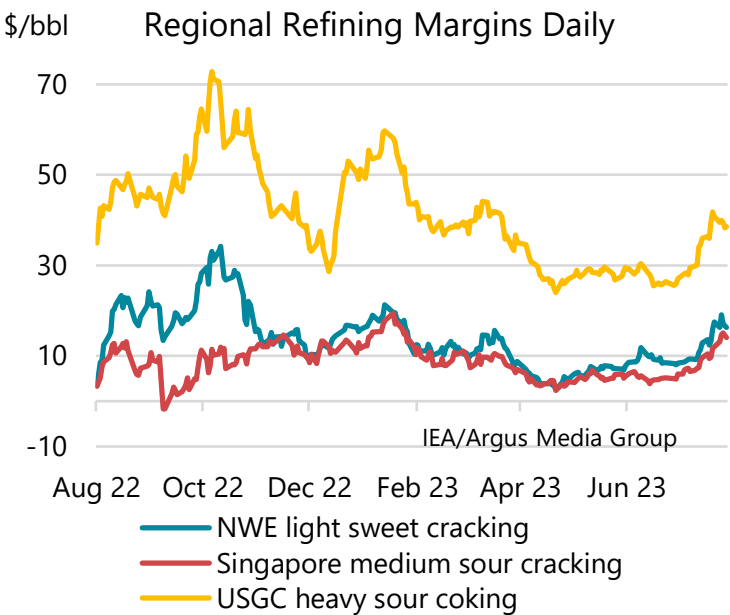
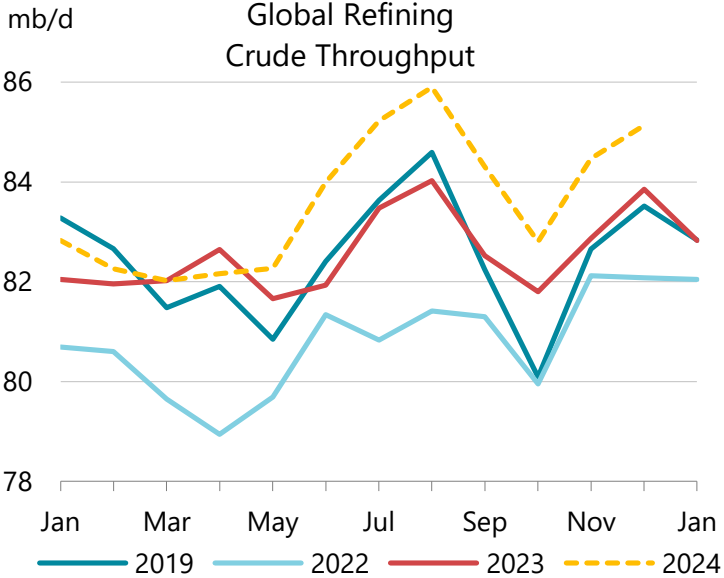
Total oil shipments held largely steady in July at 7.3 mb/d, as product trade rose 200 kb/d m-o-m to 2.7 mb/d and crude exports fell by 200 kb/d to 4.6 mb/d. Revenues rose by \$2.5 bn to \$15.3 bn.

Oil demand hit record 103 mb/d in June, further gains expected



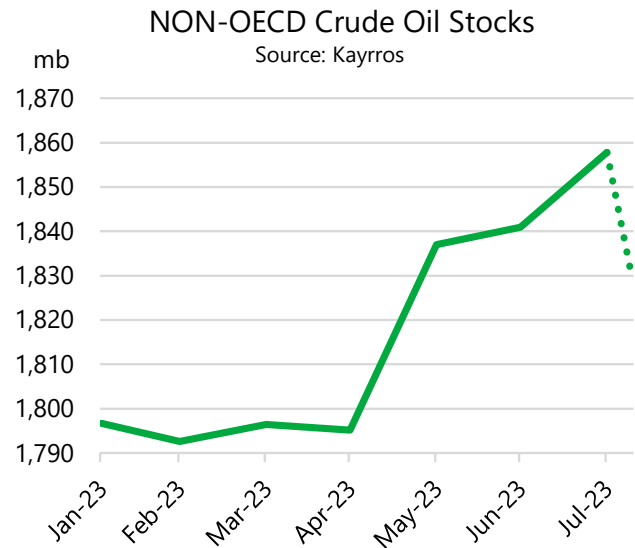
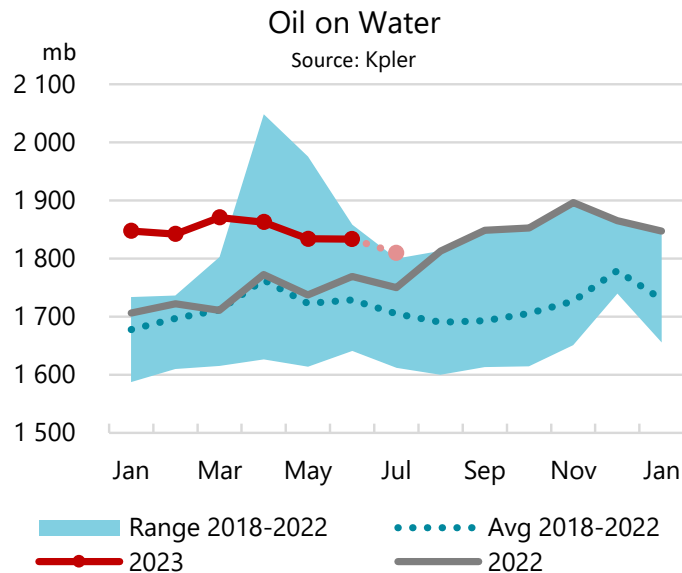
Total oil demand is set to rise by 2.2 mb/d to 102.2 mb/d in 2023. With the post-pandemic recovery having largely run its course and as the energy transition gathers pace, growth will slow to 1 mb/d in 2024.

Refinery activity rise seasonally but struggle to keep up with demand



A surge in gasoline and diesel prices push refinery margins back to near record-highs.

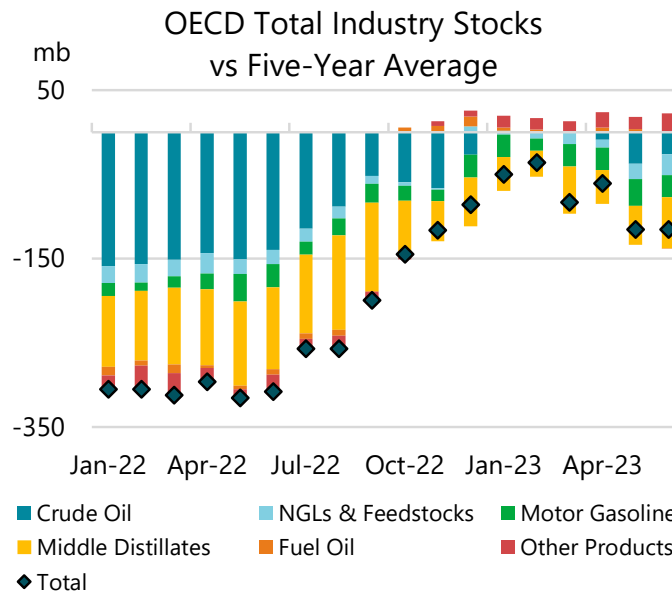
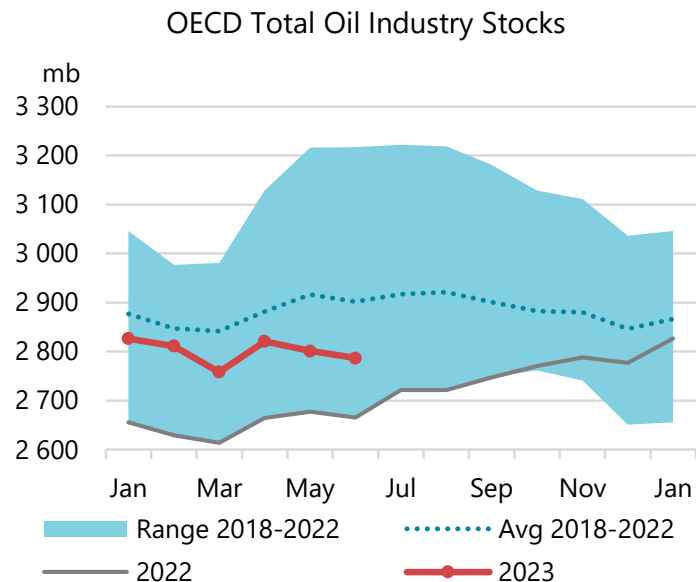
Global oil inventories decline sharply in July and August



August data is up to 10th August

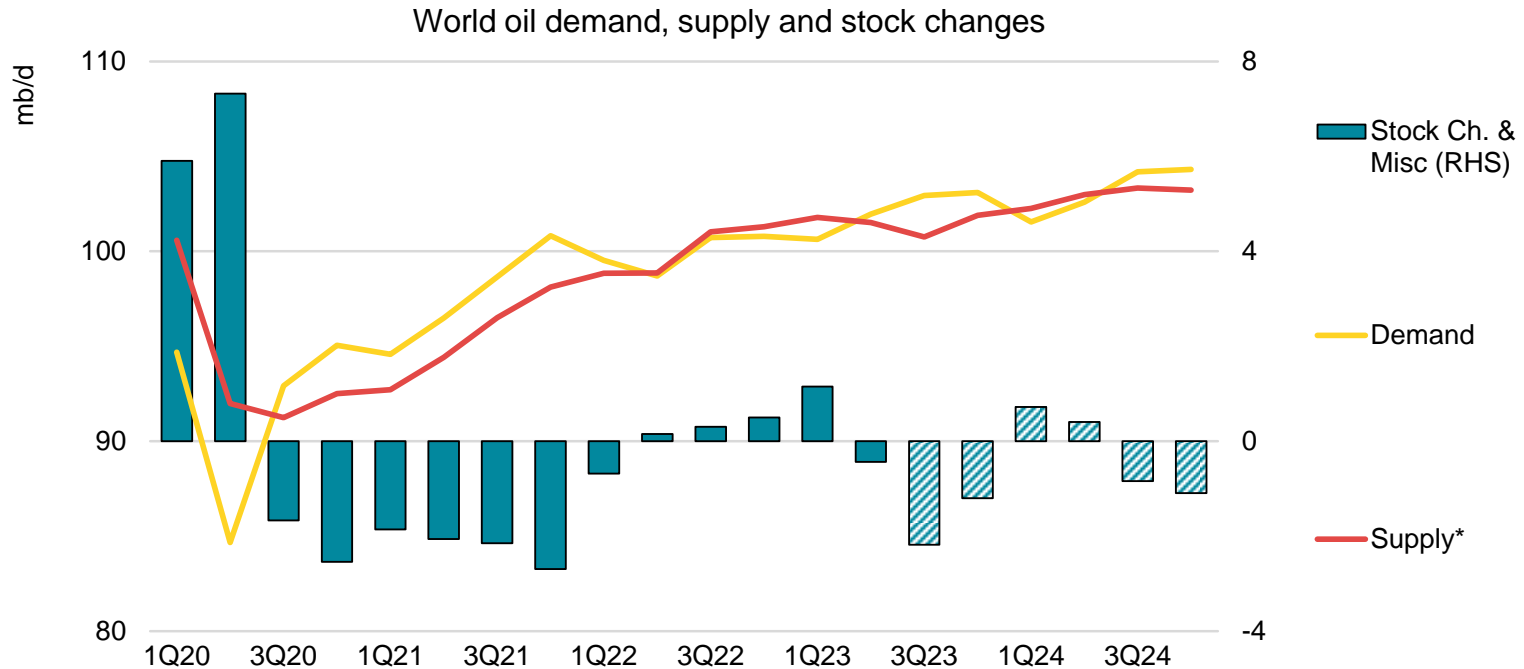
Early data indicate oil on water declined 800 kb/d in July and fell further in early August for oil on water. Non-OECD crude oil stocks sharply fell to a two-month low in August.

OECD industry stocks fell by 15 mb in June, 115 mb below the average



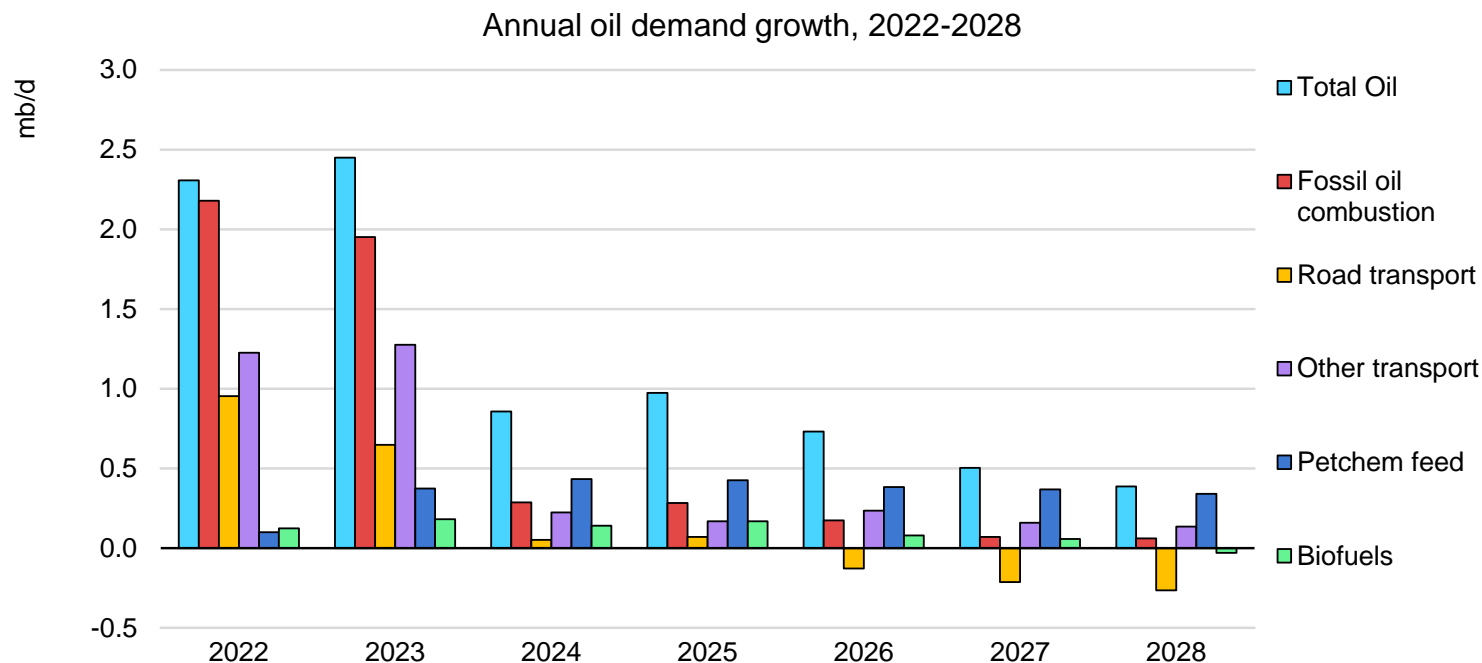
OECD industry stocks posted a seasonal decline. Only other products built m-o-m and kept stock levels above the five-year average.

Market set to tighten sharply in 2H23 on additional supply cuts



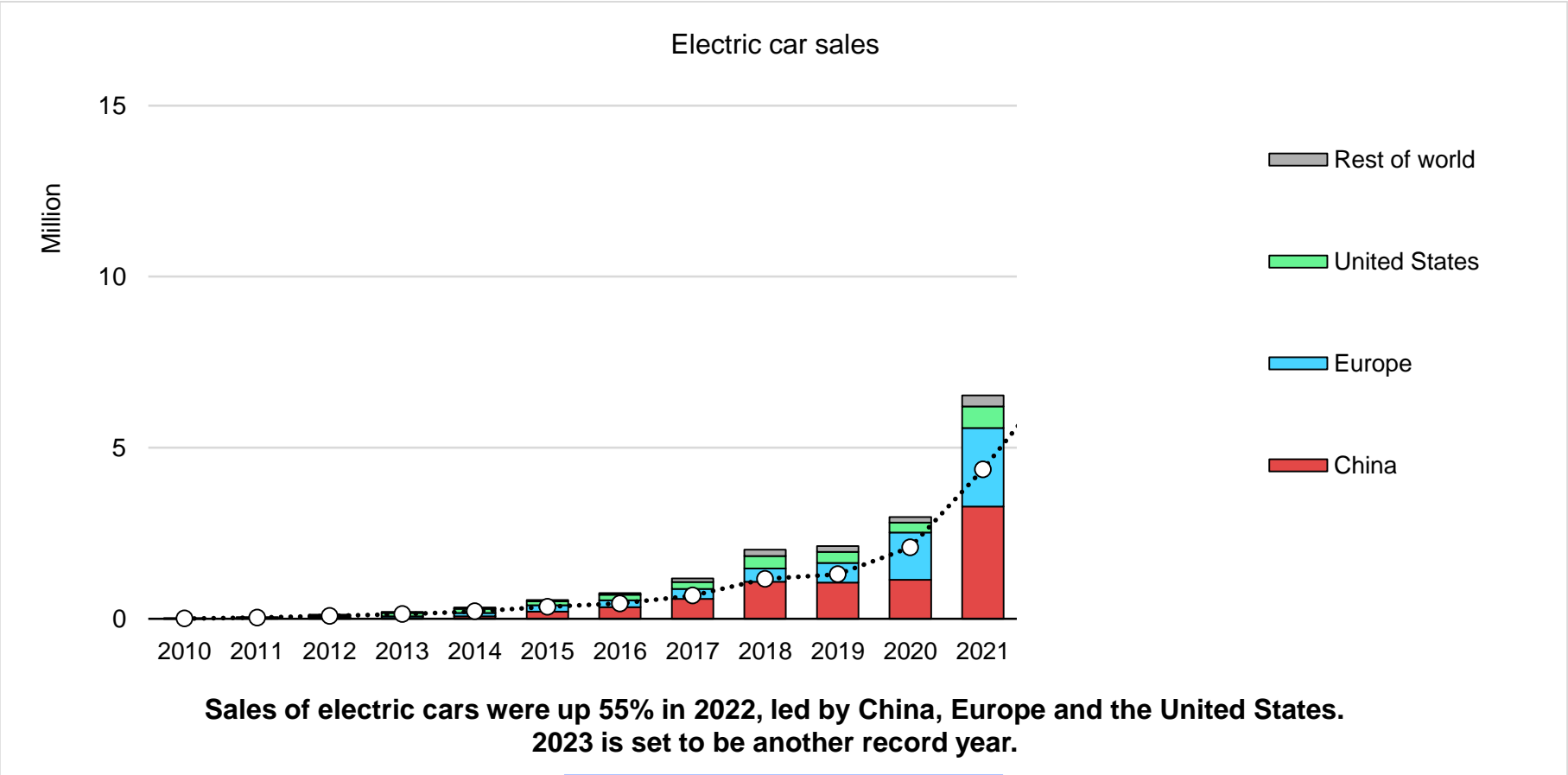
An extra 1 mb/d production cut from Saudi Arabia in July and August, and the extension of OPEC+ quotas through 2024, will see the market shift to a steep deficit in 3Q23.

Global energy crisis accelerates transition away from oil

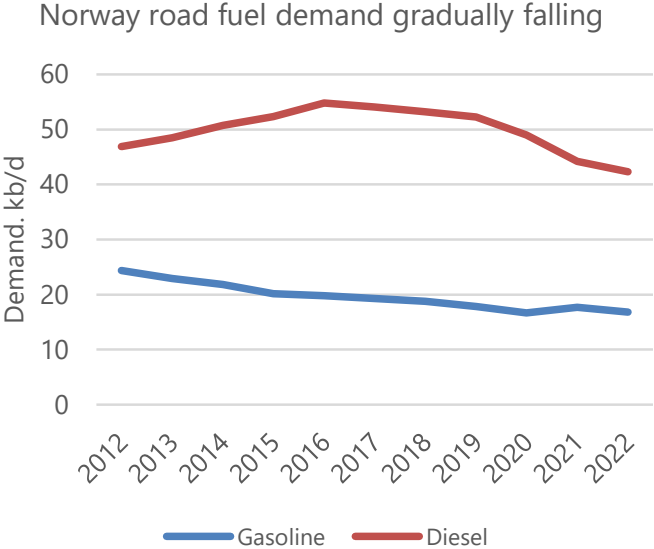
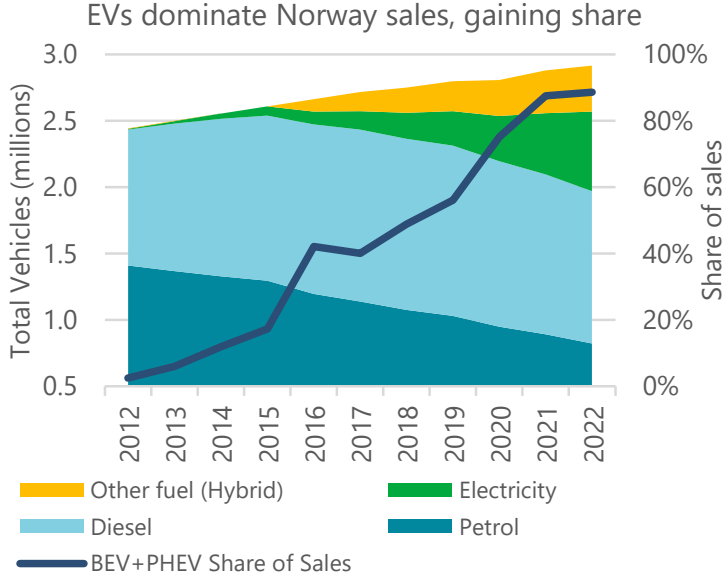


Growth in oil demand will slow from 2.4 mb/d in 2023 to 400 kb/d in 2028. Fossil fuel combustion peaks in 2028 on rising efficiencies and EV sales. Petrochemical feedstocks continue to increase.

Electric car sales exceeded 10 million in 2022



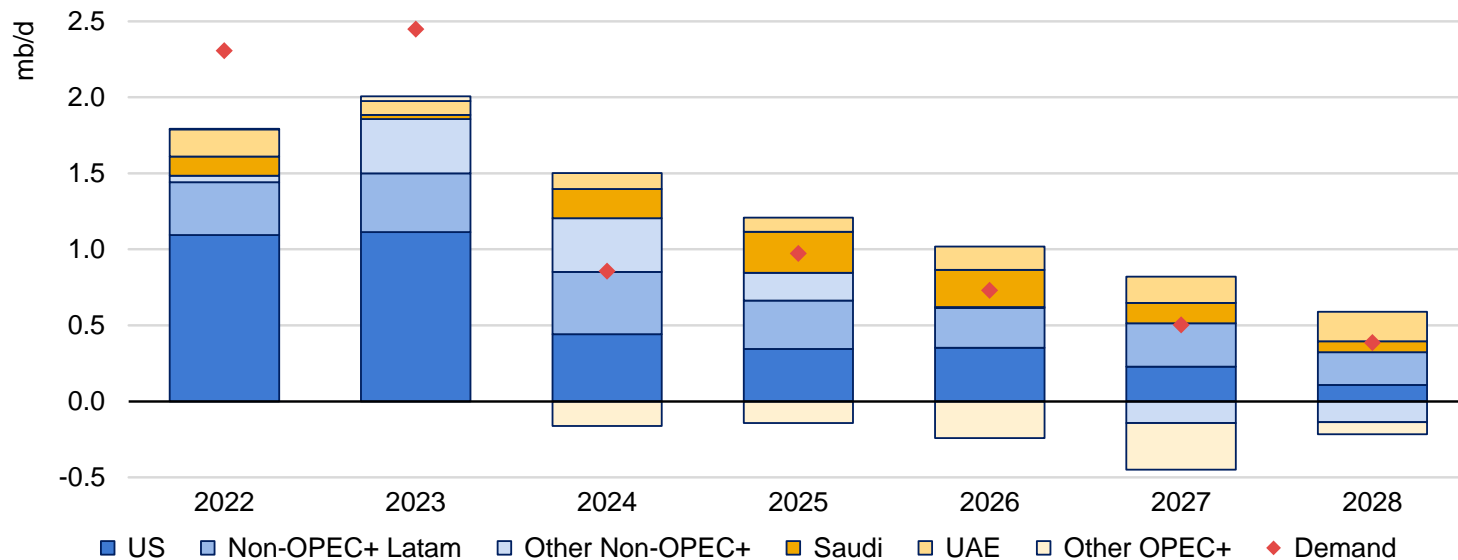
EVs are growing rapidly, and are gradually eroding oil use



Norwegian EV and hybrid sales have grown rapidly in recent years, to almost 90% of total registrations. These accounted for almost one third of personal cars by 2022, with gasoline and diesel demand 21% below the 2016 peak.

US-led capacity building slows but keeps up with demand

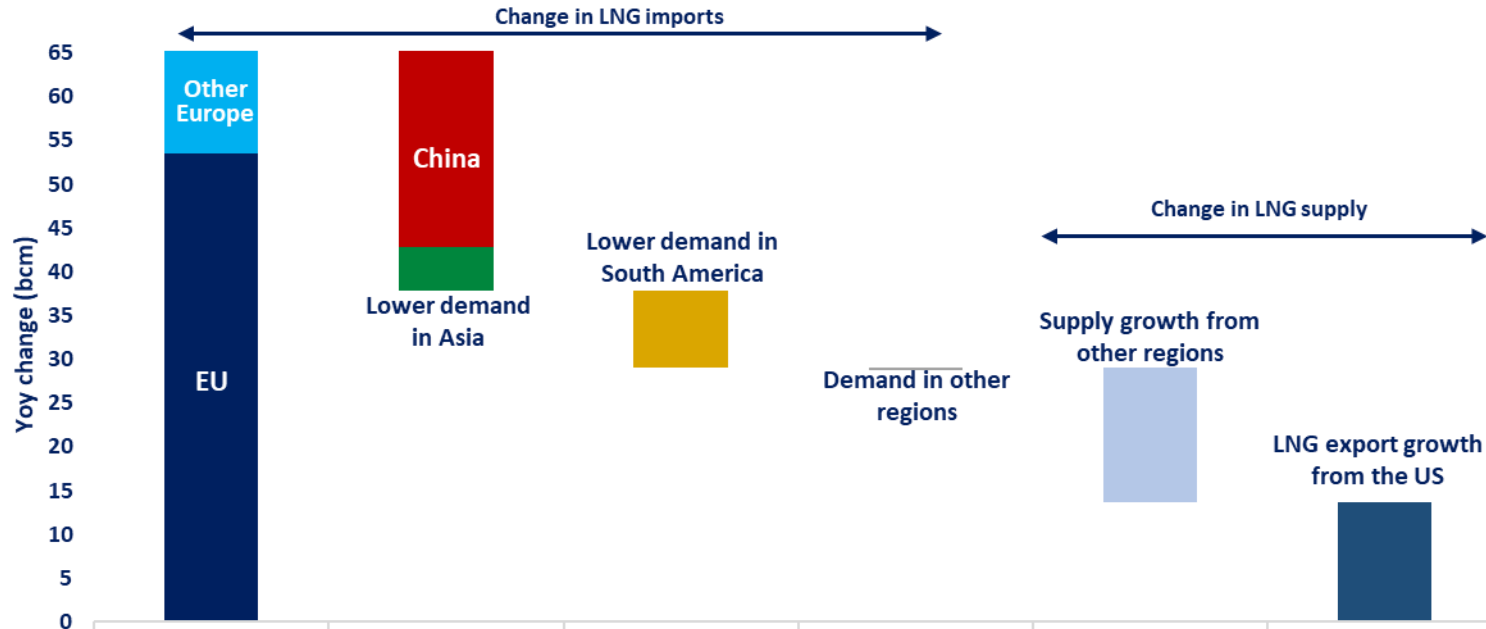
Capacity growth by key regions and demand growth forecast (y-o-y change)



US, non-OPEC+ Americas dominate expansion of 5.9 mb/d vs similar demand growth. Saudi, UAE fuel OPEC+ increase. Capacity growth slows from 1.9 mb/d in 2022 to 300 kb/d in 2028.

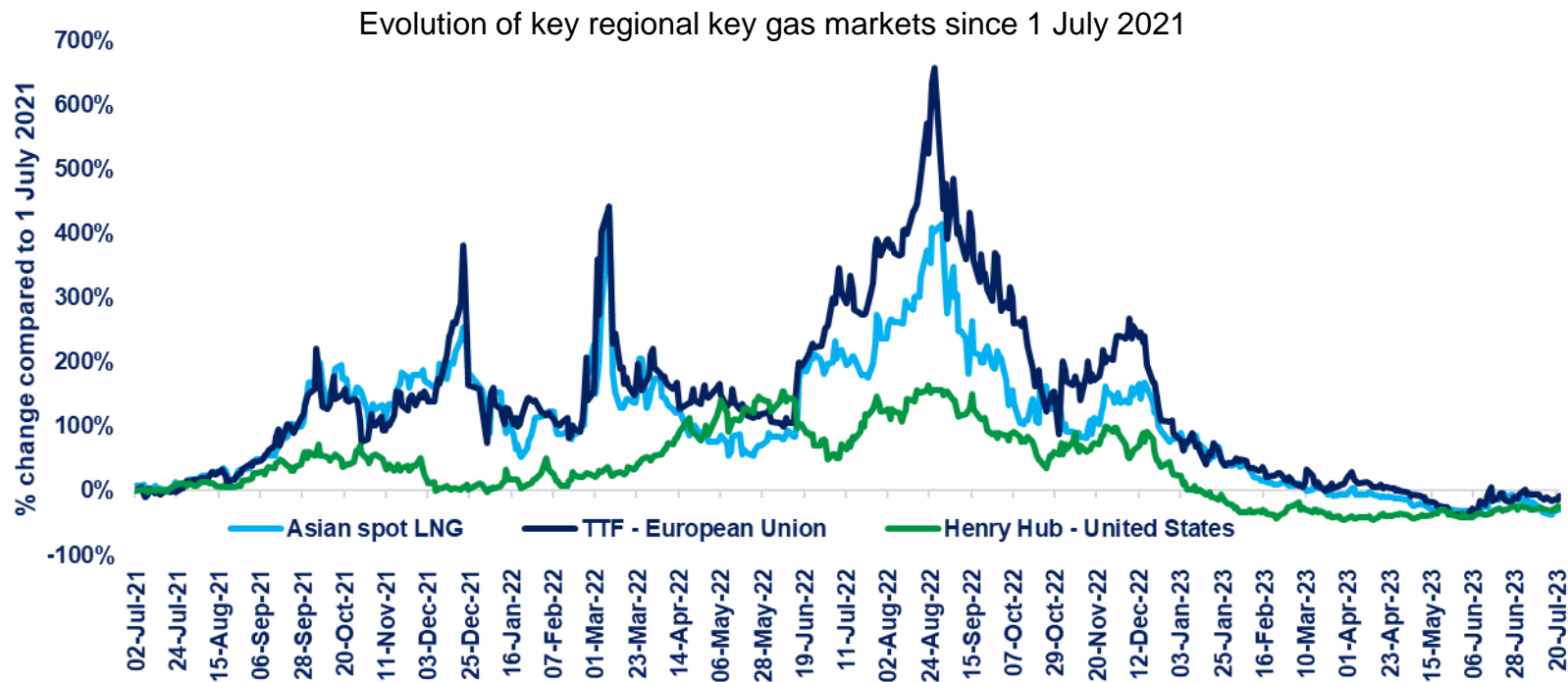
Reconfiguration of LNG flows

Y-o-y change in global LNG exports and imports by key region, 2021-2022



The 2022 gas supply shock led to a readjustment of global LNG flows: while European LNG imports increased by 60% in 2022, Asian LNG imports declined by 7%, primarily driven by lower inflows to China.

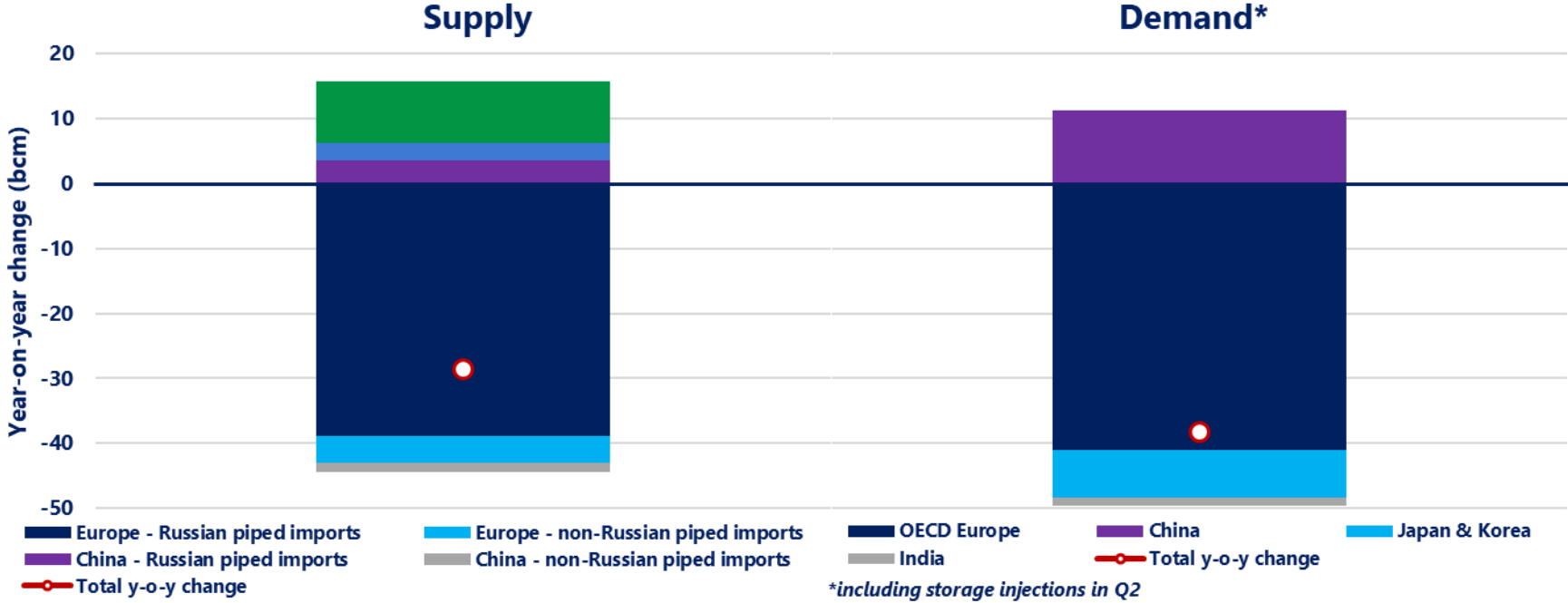
Market tensions moderated significantly since their 2022 highs



After reaching all-time highs in 2022, Asian and European spot gas prices fell close to their 2021 levels over Q2 2023 amidst easing market fundamentals.

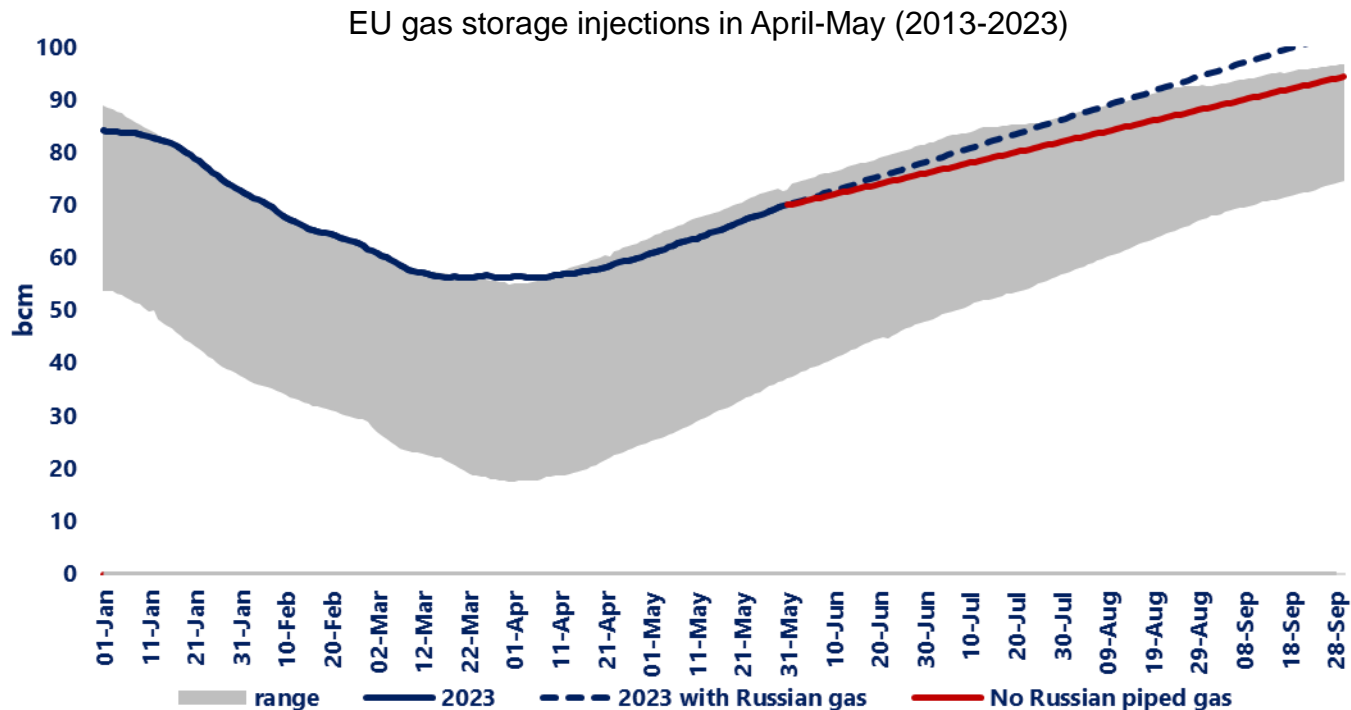
Demand played a key role in easing market fundamentals

Y-o-y change in natural gas supply and demand in key Asian and European imports markets, H1 2023 vs H1 2022



Timely policy actions, mild weather and slower economic growth were key to bring down gas demand through the first half of 2023, which counterbalanced the impact of lower gas supply.

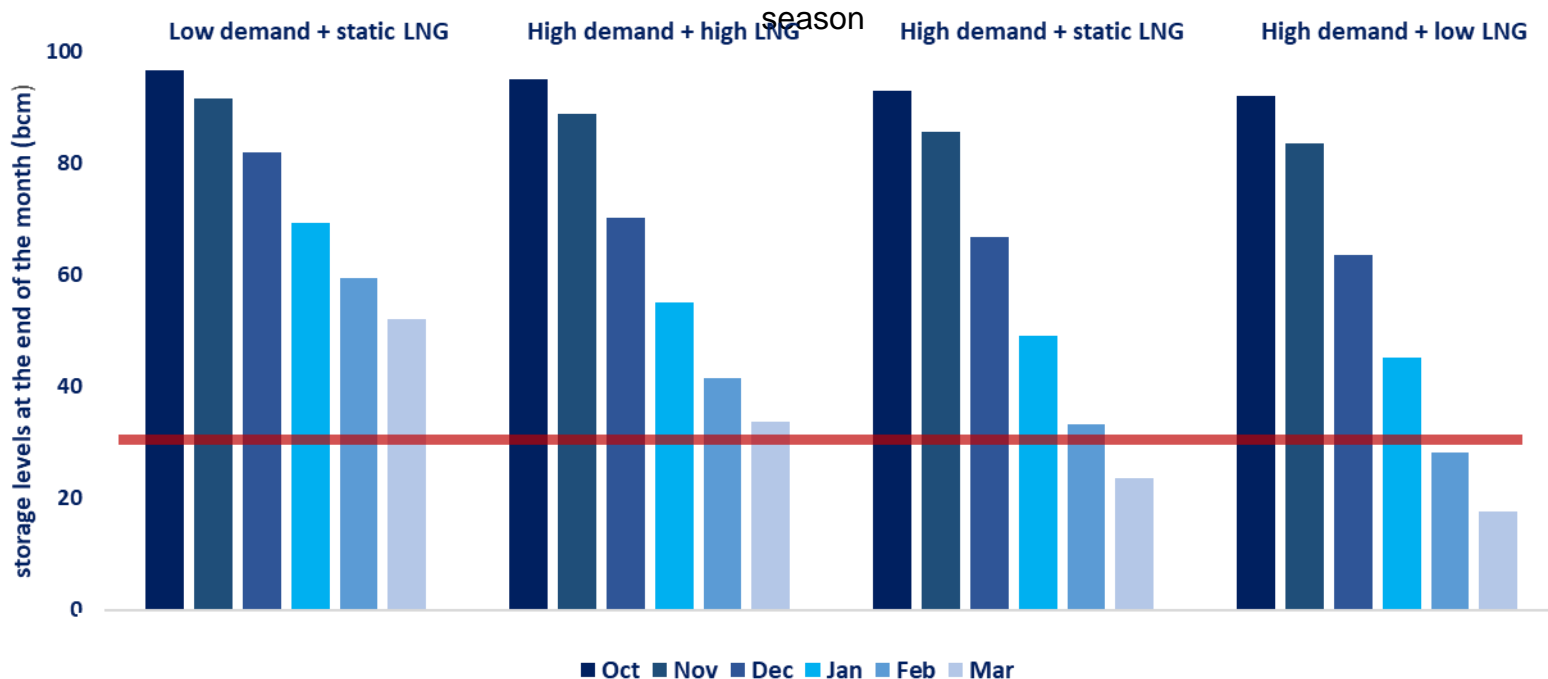
In the EU storage sites are well on track to reach 90% fill target



Assuming that storage injections continue at their average rate observed since mid-April, EU storage sites would reach 90% fill levels by early August and close to 100% by mid-September.

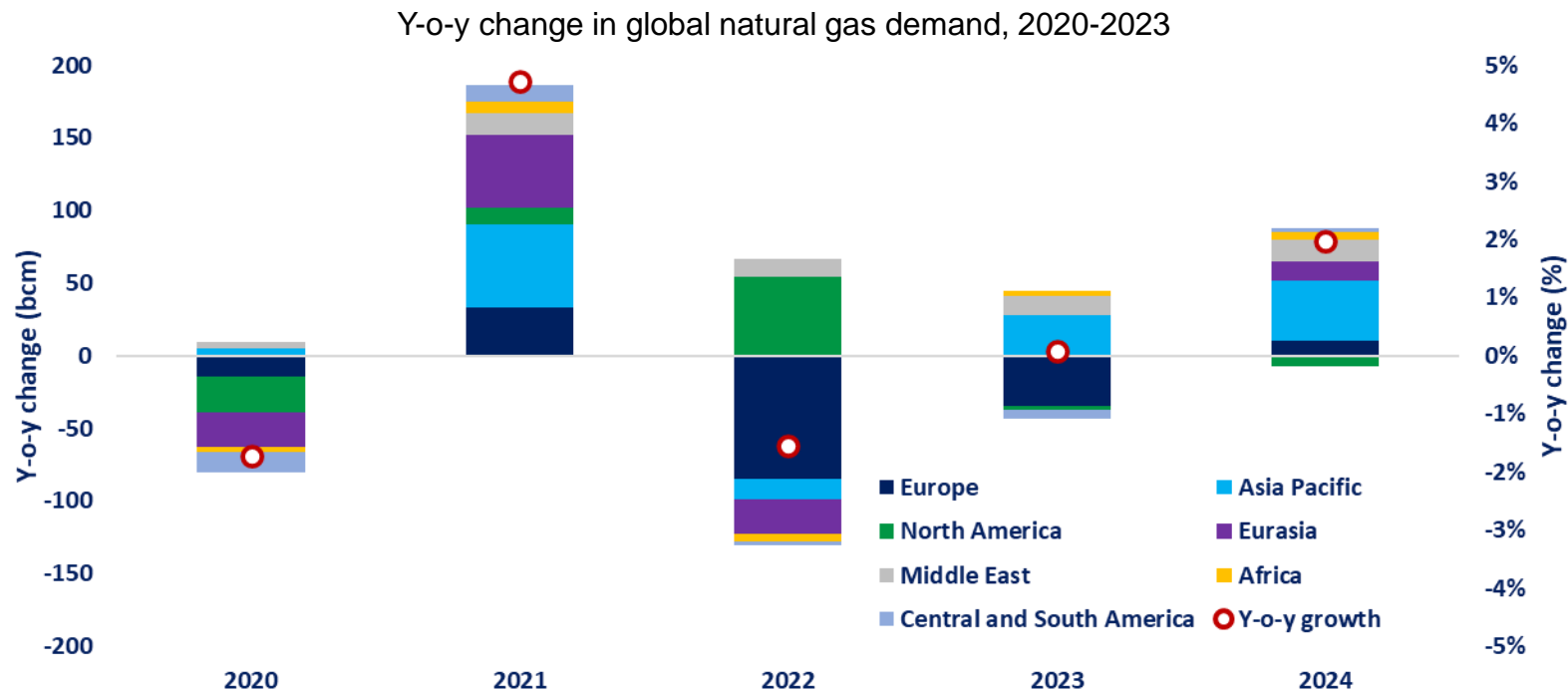
Supply disruptions and a cold winter could deplete EU storages

Potential EU gas storage trajectories without Russian piped gas under different scenarios during the 2023/23 winter



A cold winter combined with Russian piped gas supply cuts could break Europe's delicate gas balance. Keeping gas demand in check will be key for a secure gas market over the 2023/24 heating season.

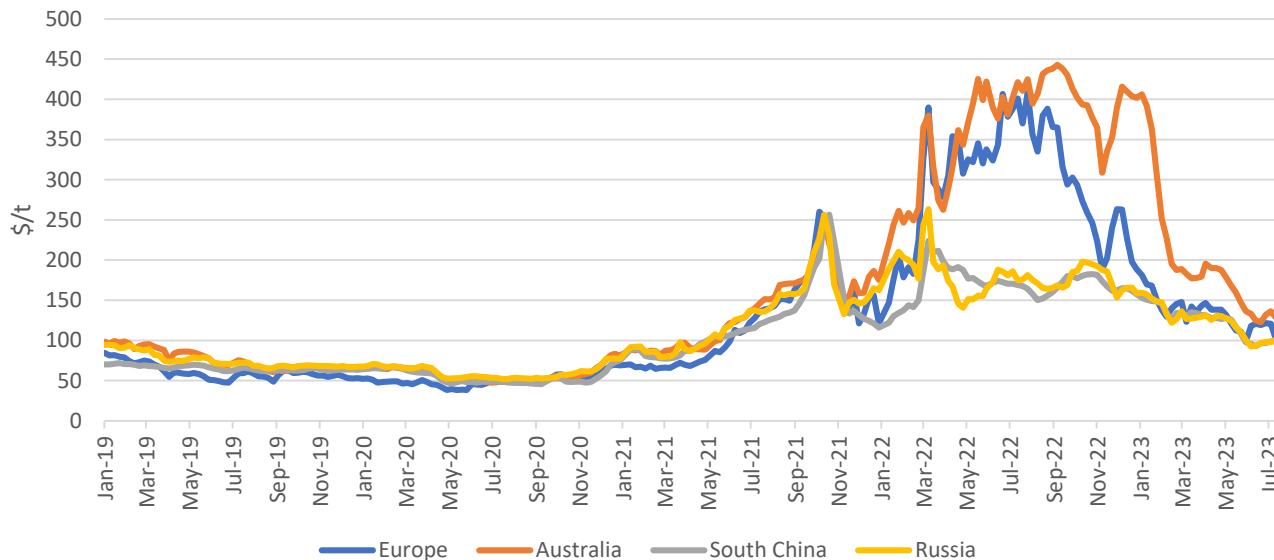
Gas markets are expected to return to moderate growth in 2024



Global gas demand is expected to remain broadly flat in 2023 and return to moderate growth of 2% in 2024. The Asia Pacific region is forecast to account for over 80% of net demand growth in 2023-2024.

Coal prices are returning to normal levels

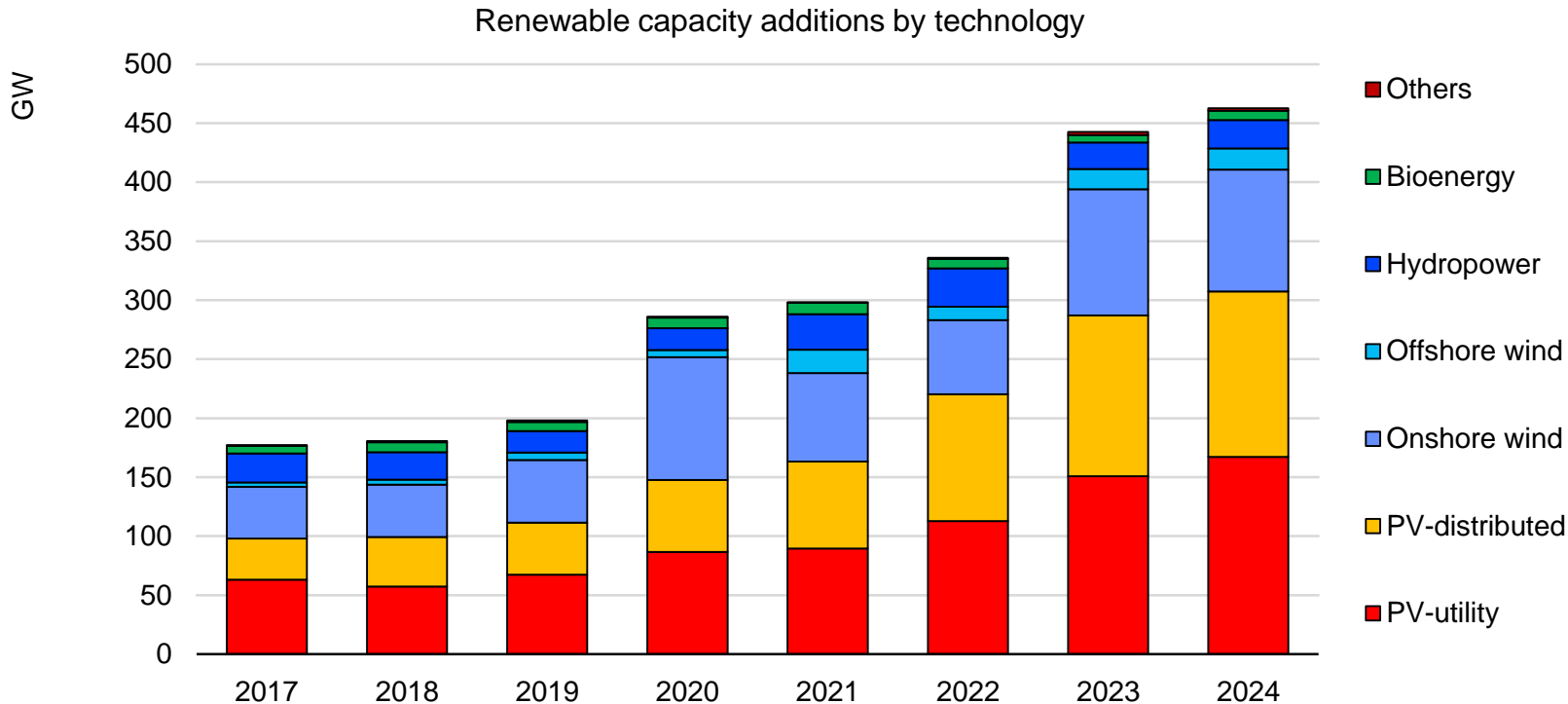
Weekly prices of thermal coal in Europe, Australia, China and Russia



* Europe refers to CIF price (6000 kcal/kg), Australia to FOB price (6000kcal/kg), China to CFR price (5500kcal/kg) and Russia to FOB (6000kcal/kg)

With the decline of gas prices and robust production in China and India, thermal coal prices are returning to more logical levels

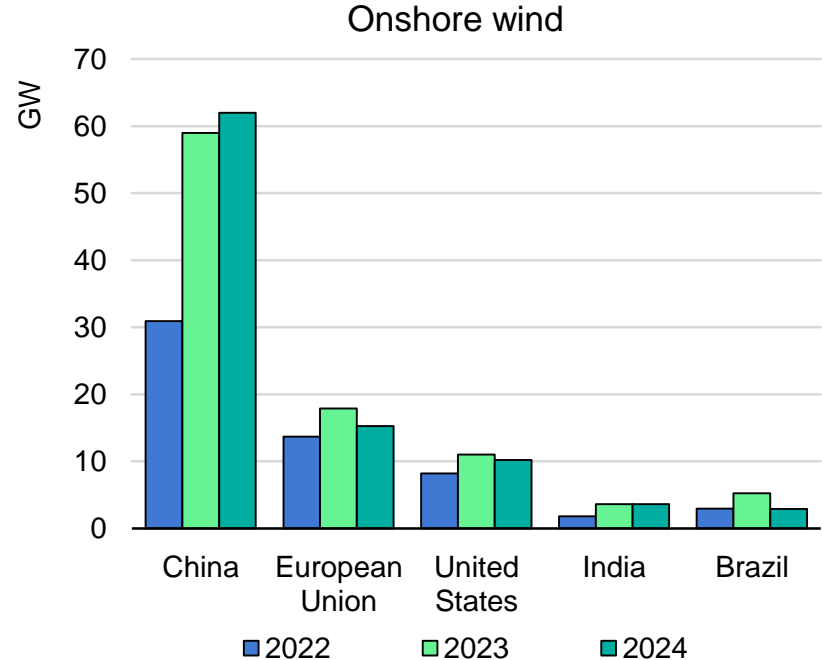
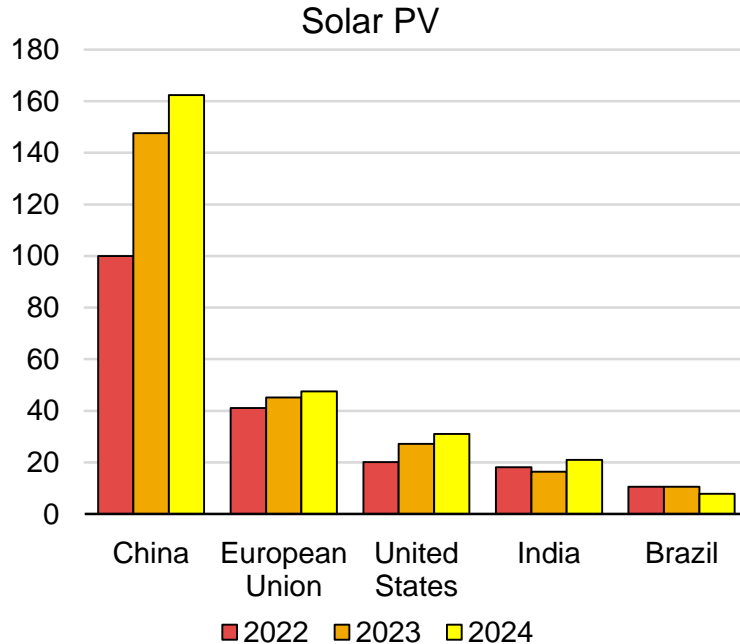
Led by solar PV, renewable power growth is breaking new records



Following two consecutive years of decline, onshore wind capacity additions are on course to rebound by 70% in 2023 to 107 GW, an all-time record amount. High energy prices also underpin distributed PV growth

China's role in solar PV and wind demand is increasing

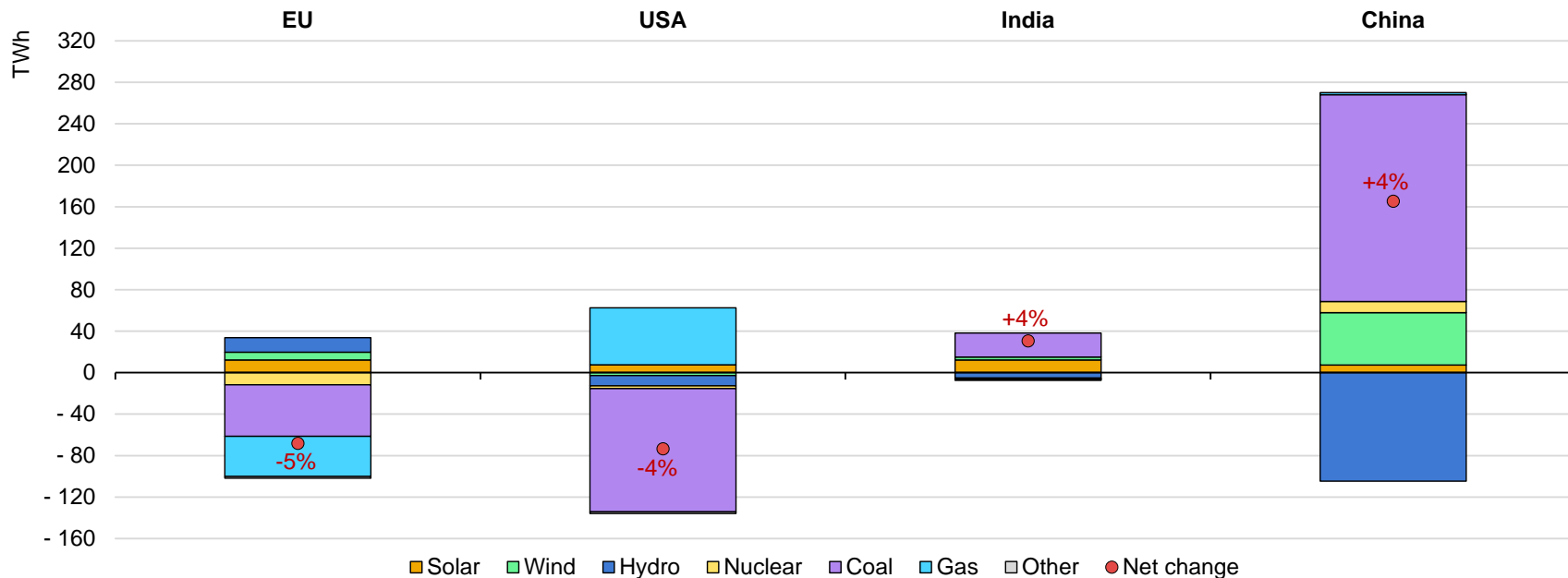
Onshore wind and solar PV additions by country/region



Energy security concerns push EU to install renewables faster. US additions will rebound this year after difficult last year. Faster onshore drive India's annual additions while PV growth struggles due to local supply chain challenges

The period of Jan-Jun 2023 shows varying trends among regions

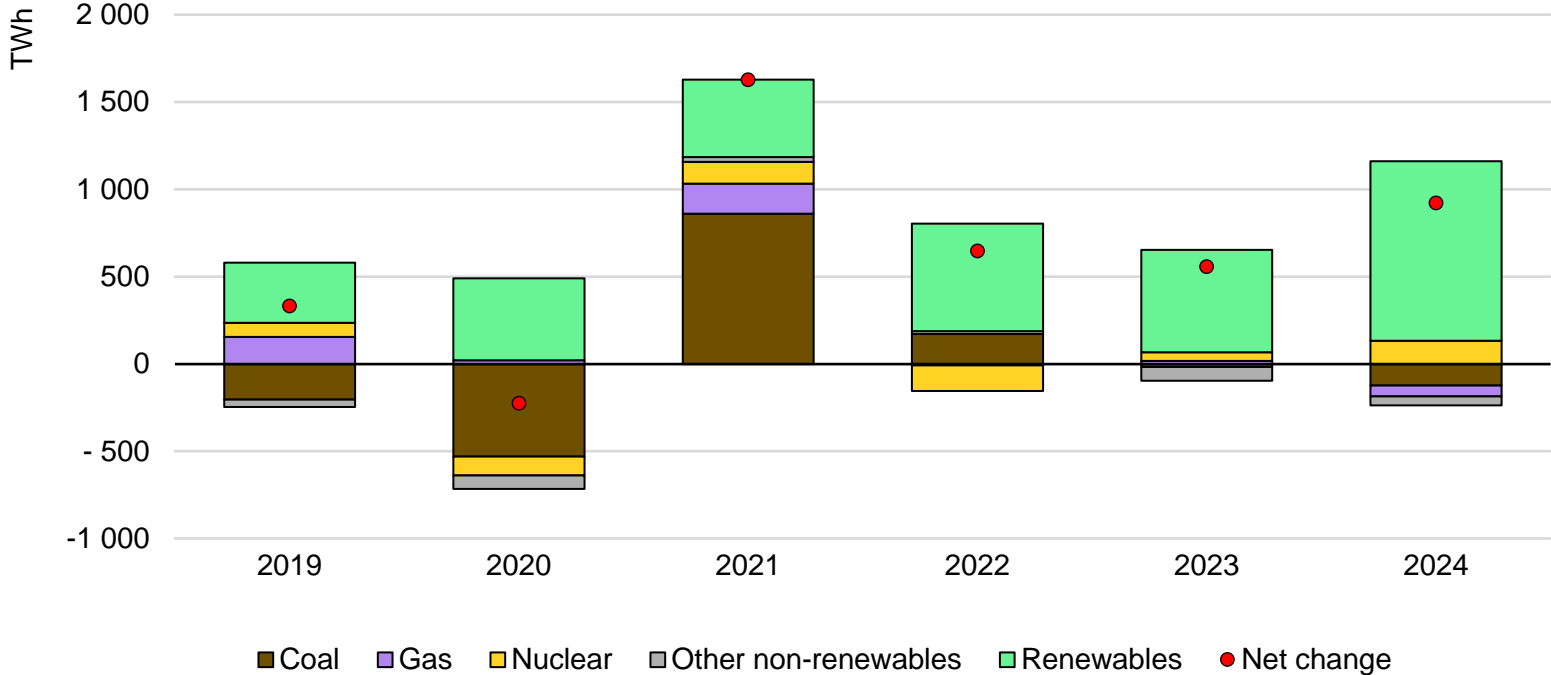
Change in electricity generation in Jan-Jun 2023 vs Jan-Jun 2022 in selected regions



Year-on-year electricity generation declined in the EU and the USA, whereas India recorded a significant growth. In China, wind grew strongly but hydro stayed lower, boosting coal-fired generation.

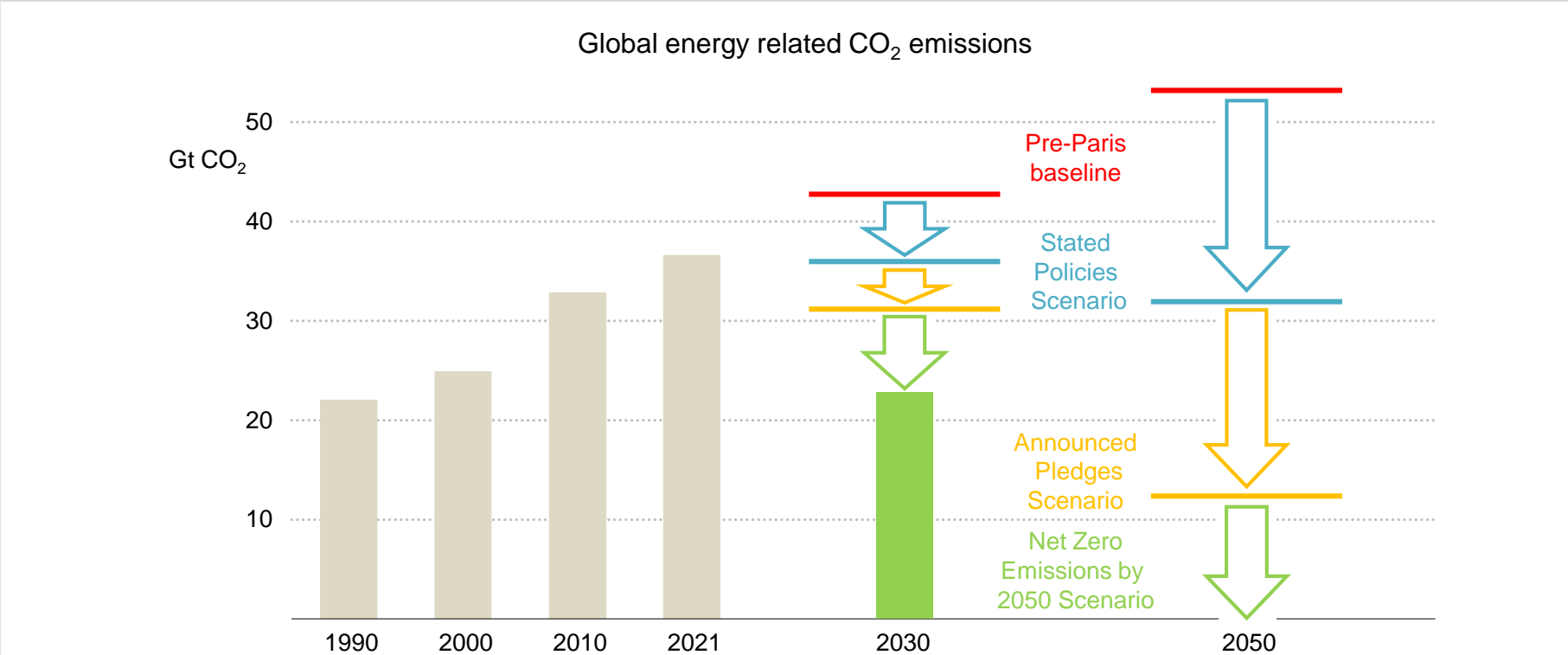
Renewables set to cover all global demand growth over 2023-2024

Changes in global electricity generation by source, 2019-2024



By 2024, the share of renewables in global electricity generation is expected to exceed one-third for the first time

Keeping the door to 1.5 °C open

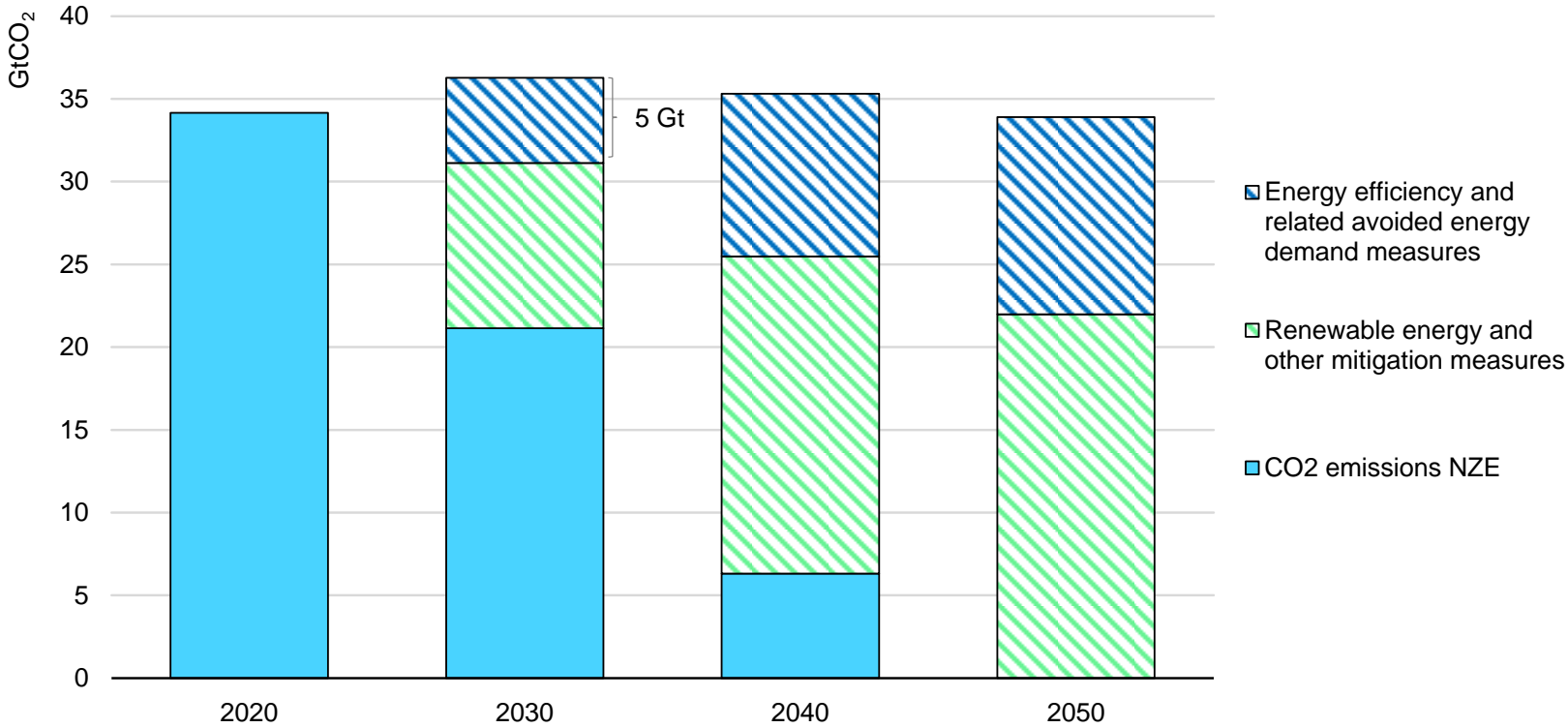


Policy and technology progress since 2015 has shaved 1 °C off projected warming, a step in the right direction; but much more needs to be done in order to avoid severe climate disruptions

Efficiency provides one-third of the mitigation in Net Zero Scenario



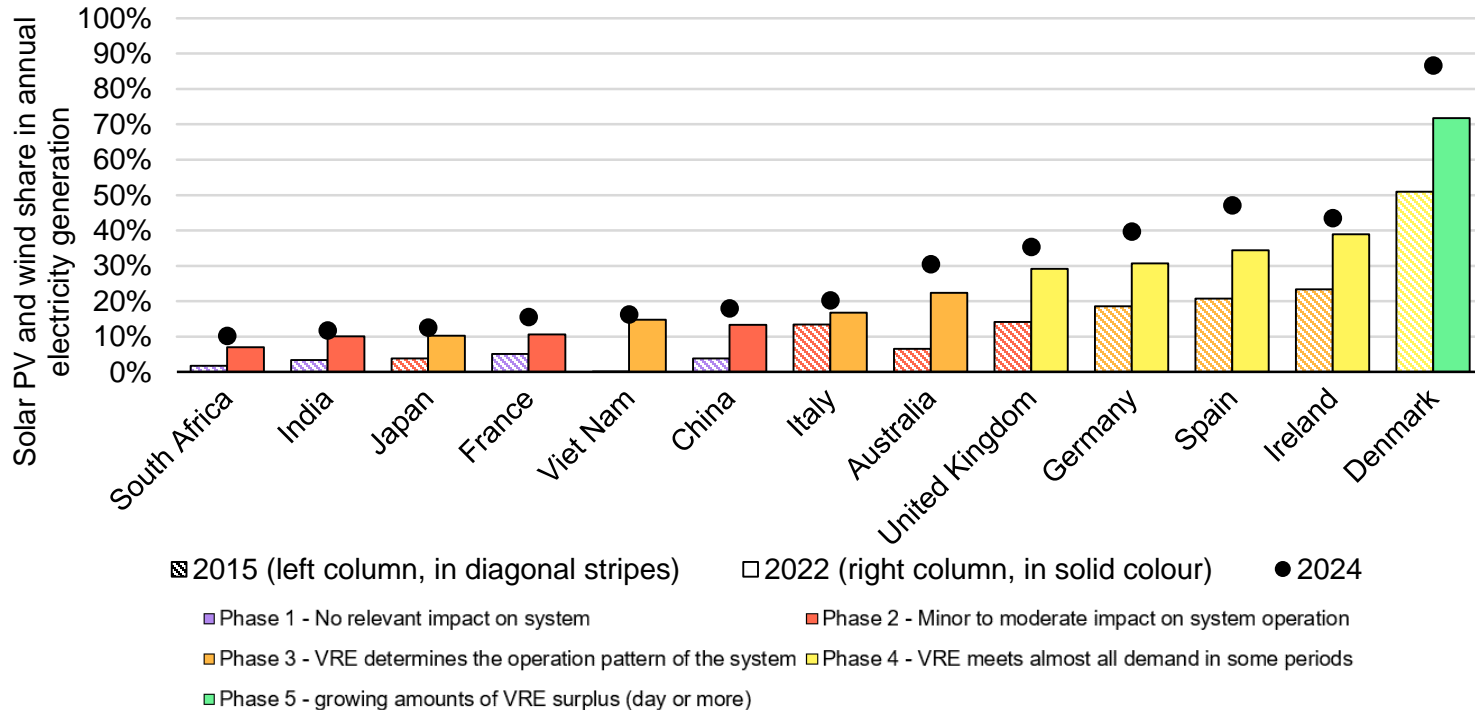
CO2 emissions and main mitigation measures in the Stated Policies Scenario and the Net Zero Scenario, 2020-2050



Over 5 Gt CO2 can be avoided through energy efficiency related measures through to 2050

Managing rapid uptake of variable wind and PV increasingly important

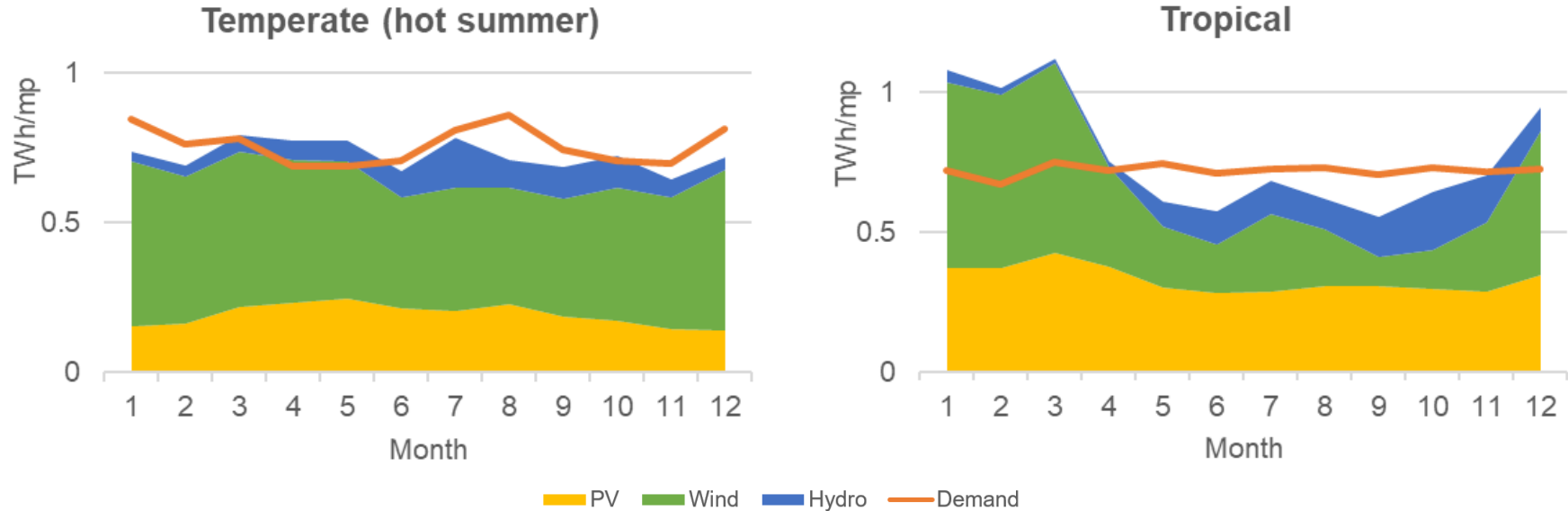
Shares of solar PV & wind and system integration phases for selected countries



Rapid uptake of variable renewables requires accelerated and timely investment in all forms of flexibility, in particular for those which have longer lead times such as grids and interconnections

Managing seasonal variability becoming increasingly important

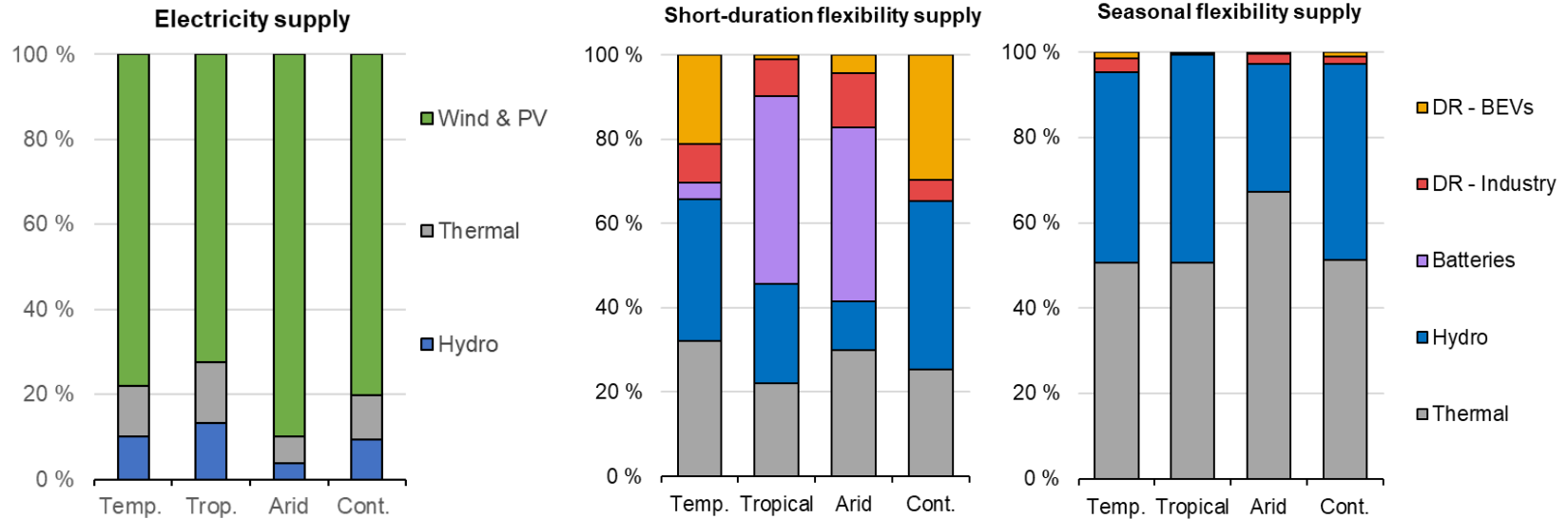
Monthly variation in electricity demand and in generation potential from renewables based on hourly optimisation model.



At very high shares of variable renewables (70-90%), system level surpluses and periods of lower generation eventually expand beyond daily variations to seasonal timescales, with seasonal patterns driven by climatic conditions.

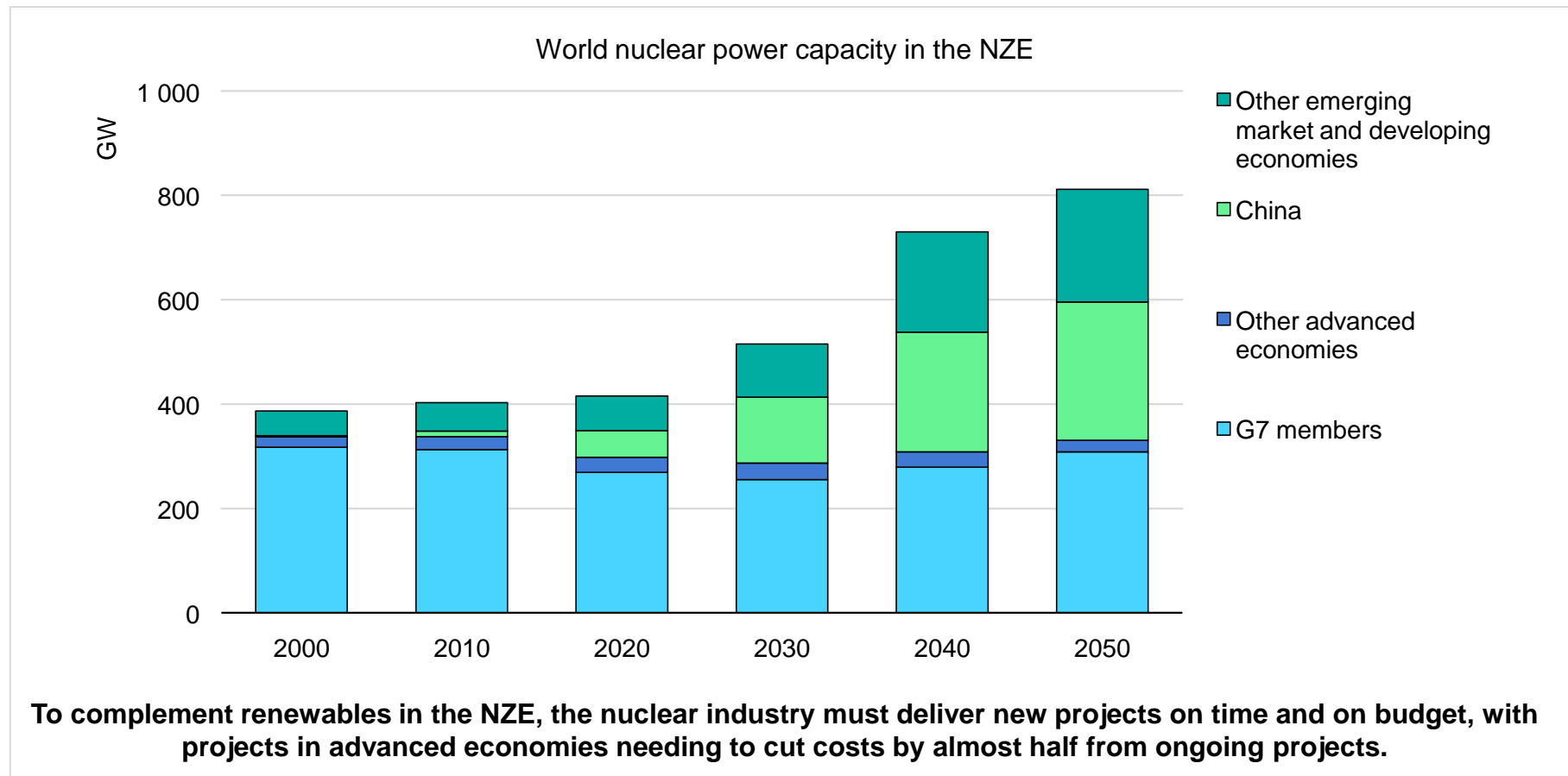
Thermal plants are a key source of flexibility in high VRE systems

Electricity and flexibility supply by technology in different climatic conditions



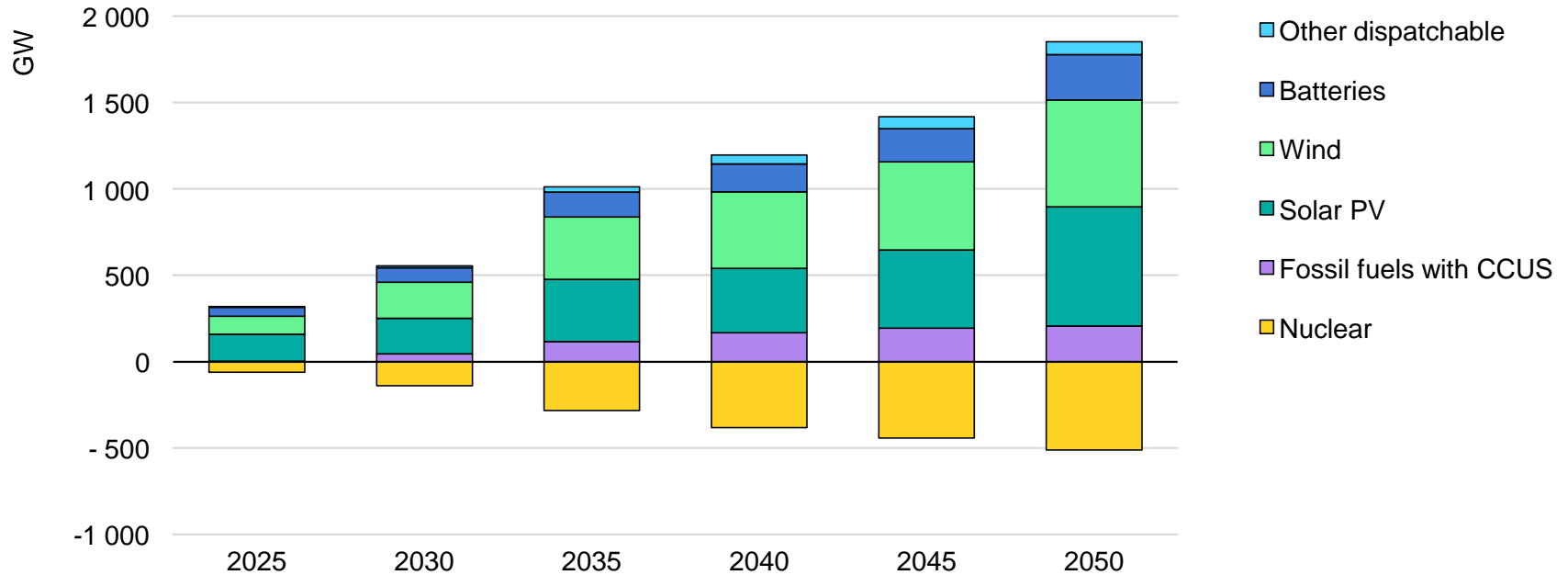
At 70%-90% share of VRE from annual generation, thermal plants cover half to two-thirds of seasonal flexibility supply, with hydropower covering most of the remaining needs.

Nuclear capacity doubles to 2050 on the path to Net Zero



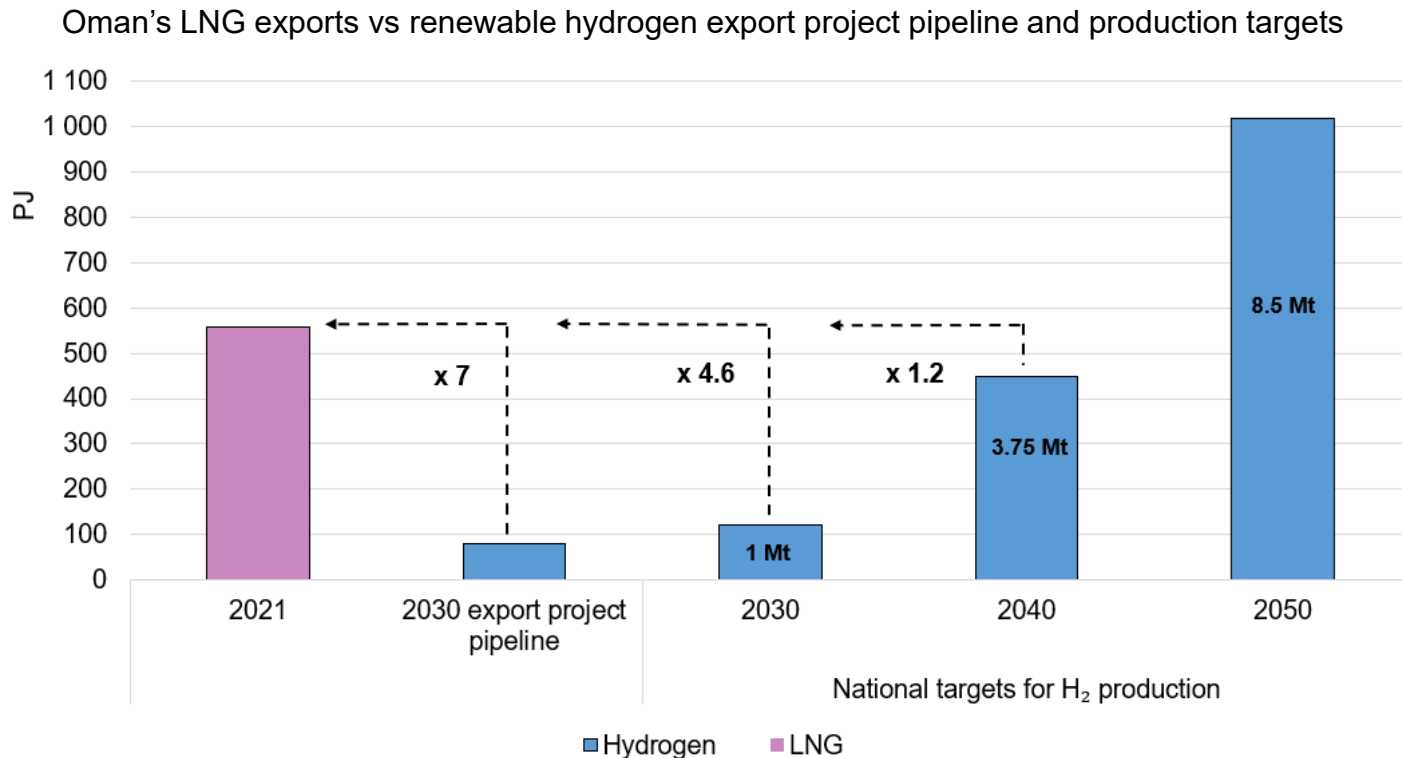
The path to net zero with less nuclear is narrower

Change in capacity in the Low Nuclear Case relative to the NZE



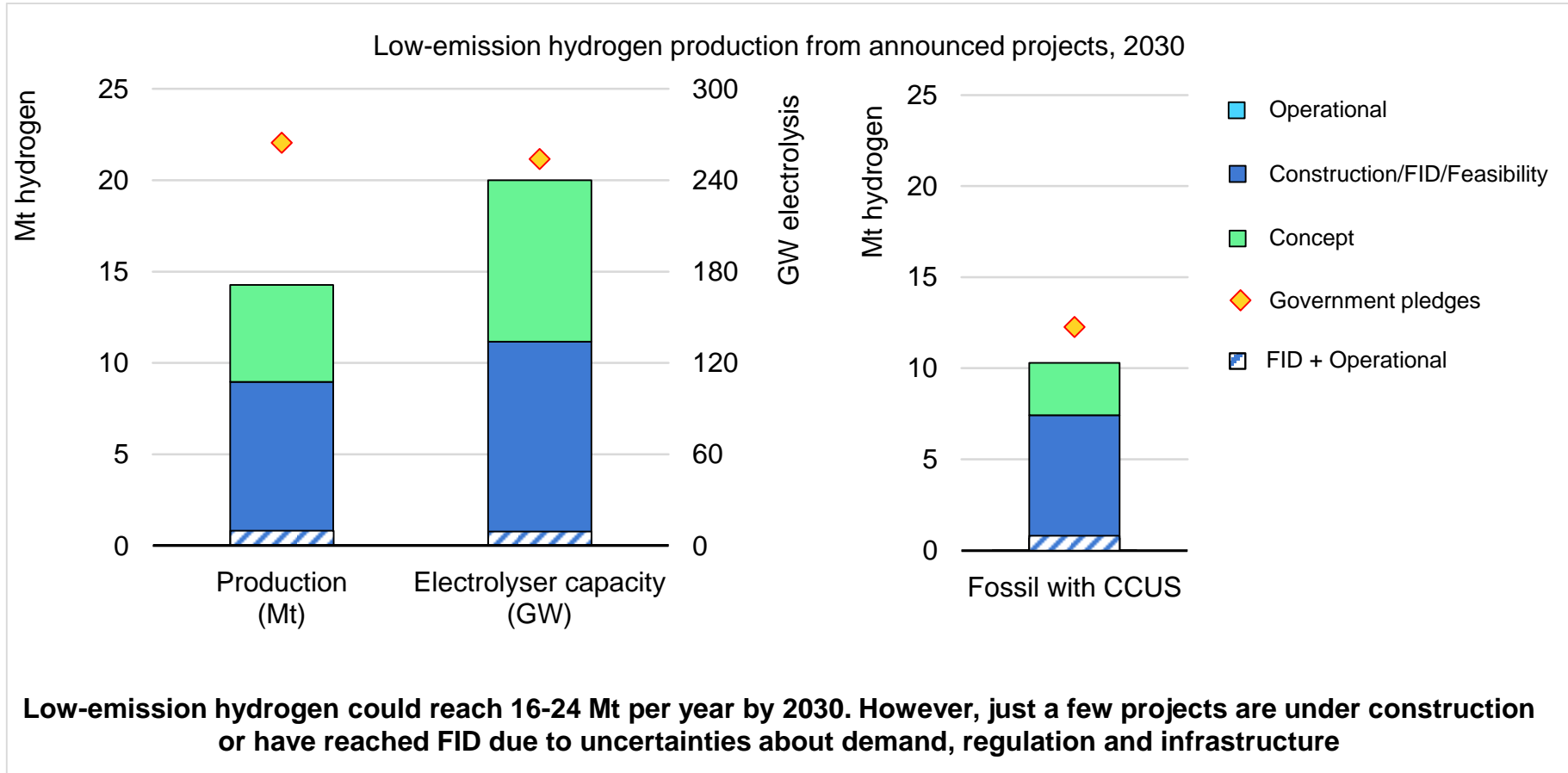
While reaching net zero by 2050 would still be possible, failing to step up nuclear construction or extend lifetimes , would cost consumers USD 20 billion more per year and strain supply chains and the need for critical minerals

Oman's long-term H₂ targets exceed the size of its current LNG exports



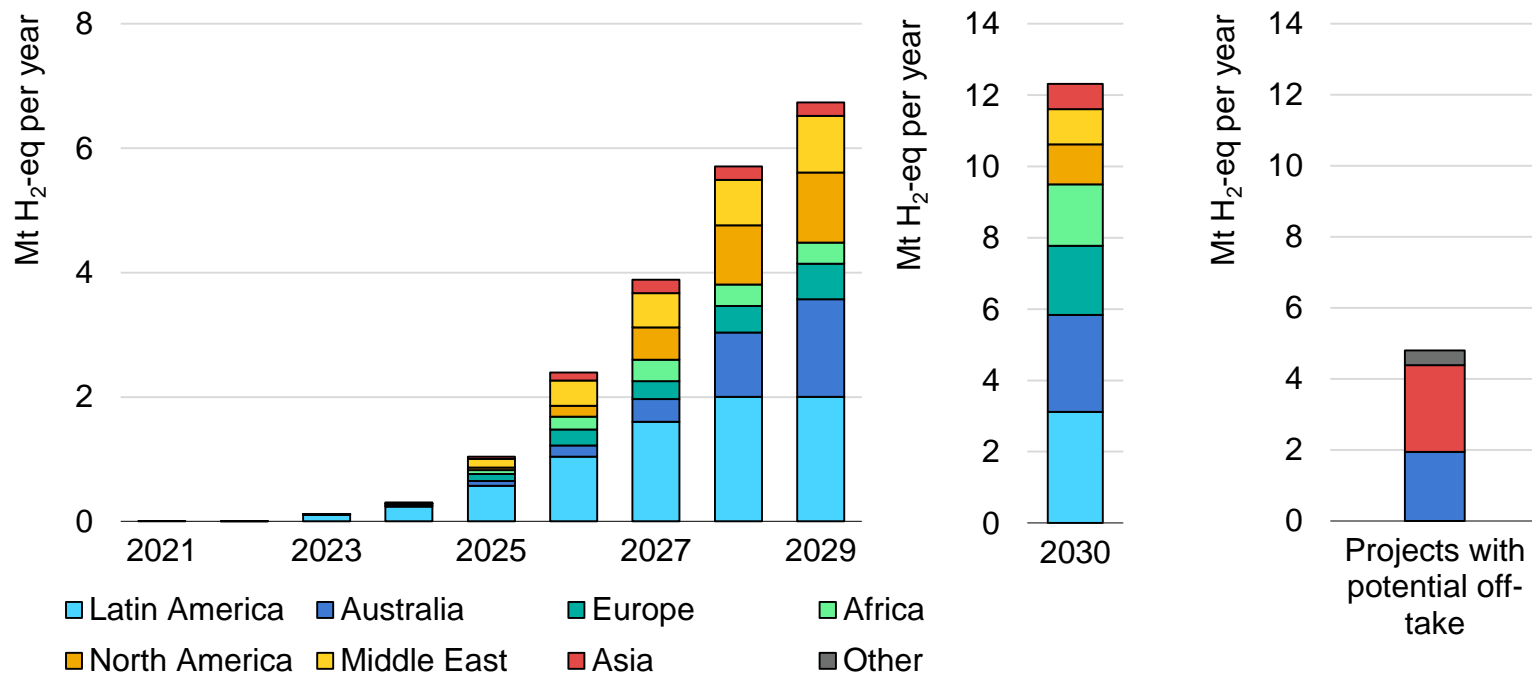
According to IEA assessment of global hydrogen project pipelines as of end 2022, Oman is on track to become the sixth largest exporter of hydrogen globally by 2030 and the biggest exporter in the Middle East.

An increasing project pipeline for low-emission hydrogen production



Hydrogen trade can kick start soon, but barriers remain

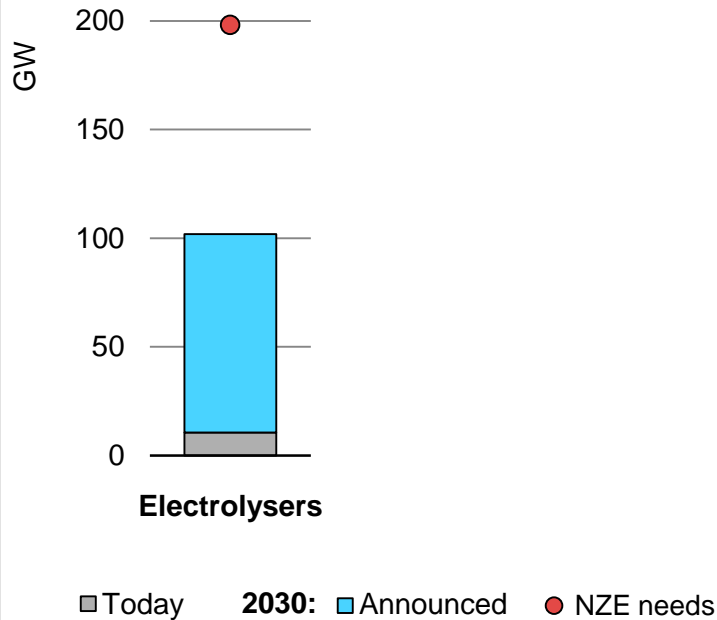
Planned hydrogen exports by year and exporting region, 2020-2030



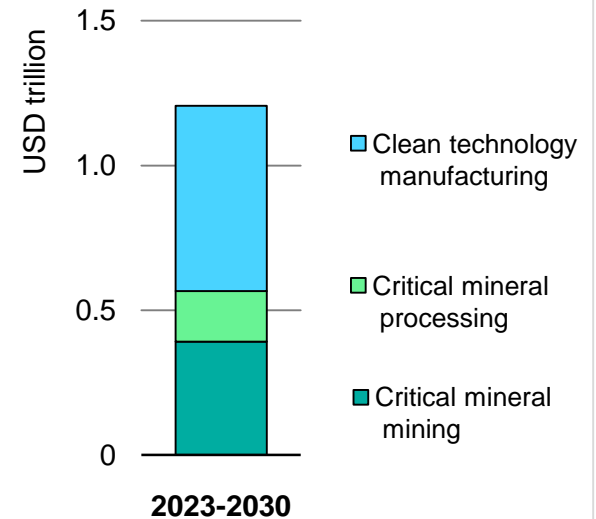
Annual exports could reach 12 Mt of hydrogen by 2030, but off-take agreements are lagging behind. Key challenges remain in regulation, infrastructure, demand creation, value for exporters and trade rules

Investment in clean technology supply chains is on the rise

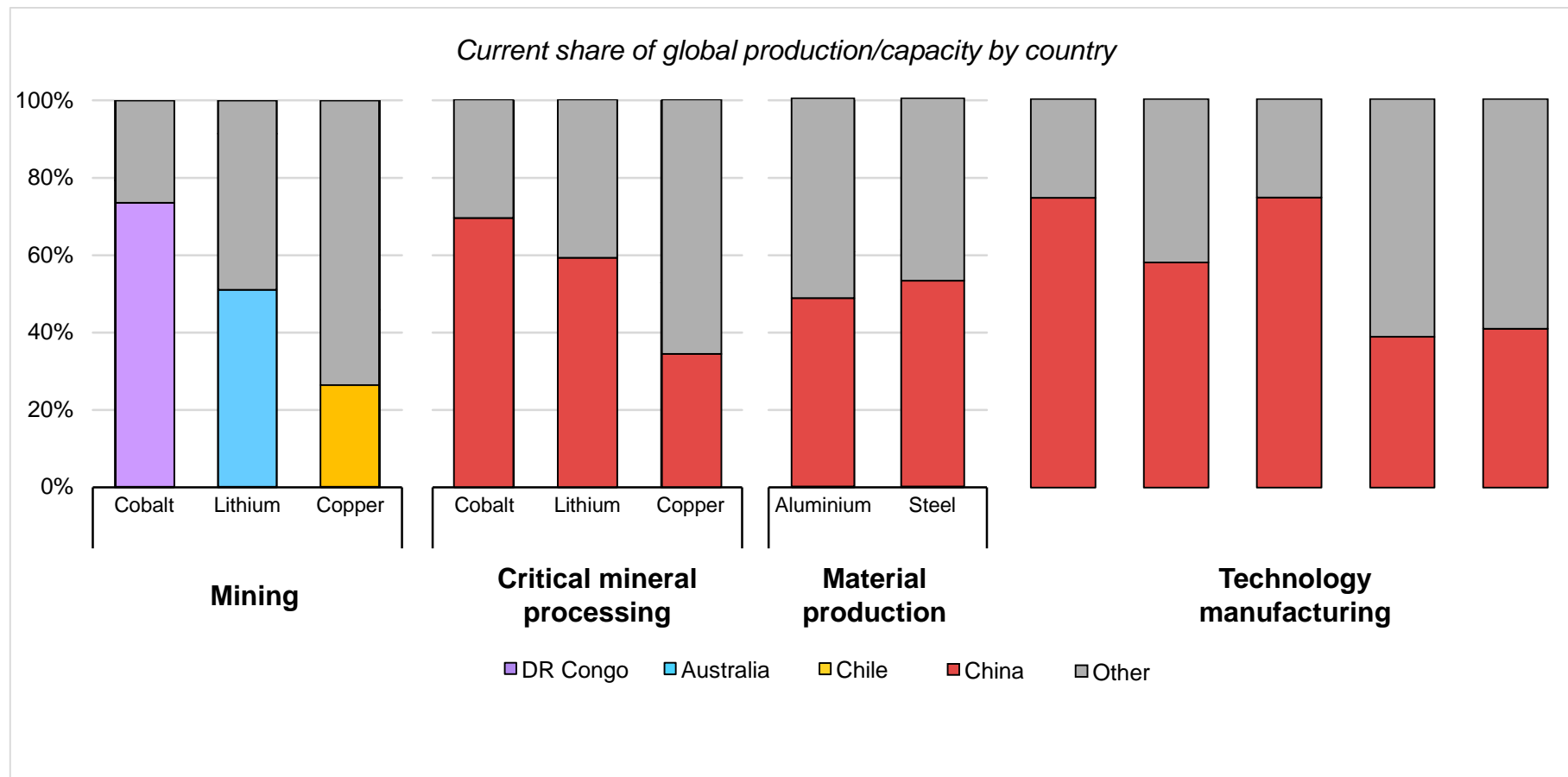
Annual manufacturing capacity for selected clean technologies



Cumulative investment needs in key clean technology supply chains in the NZE



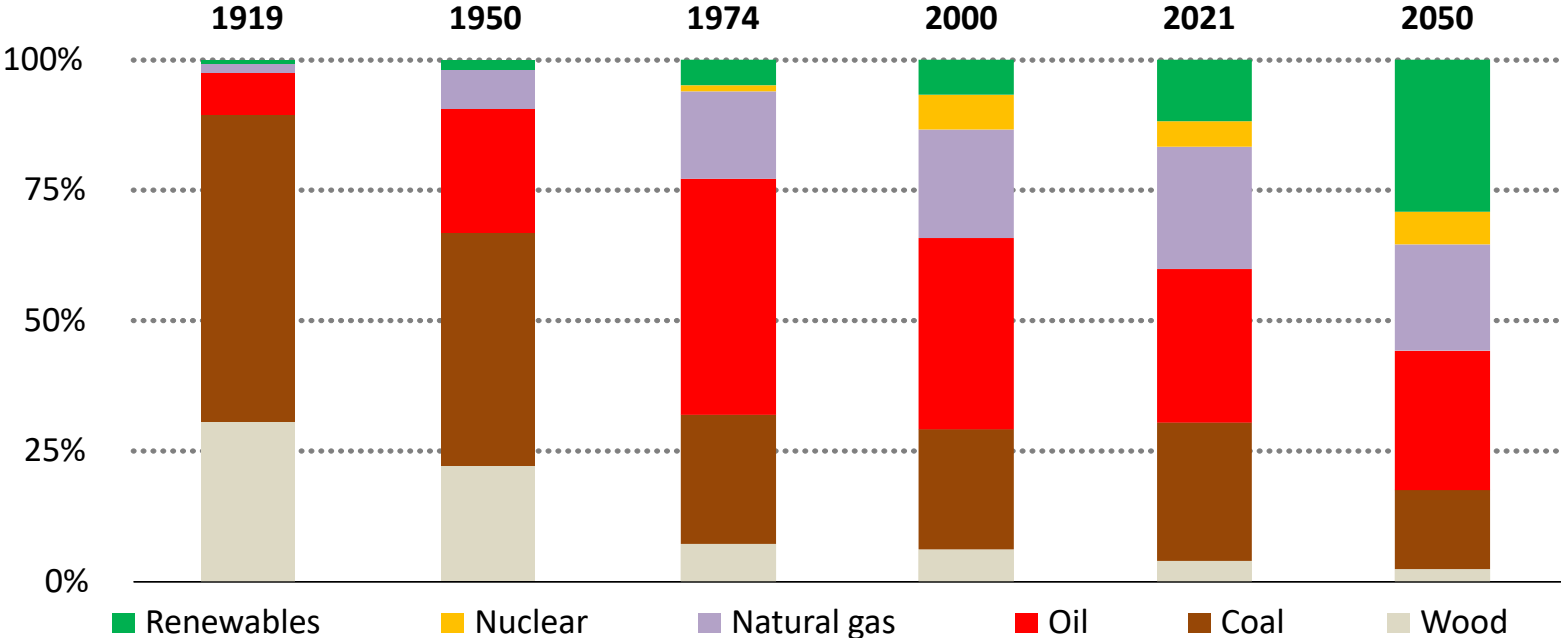
Clean technology supply chain concentration risks extend beyond mining



- Clean energy transitions are progressing fast, but not fast enough to stay on NZE path.
- We need to mobilize all low carbon technologies. Market-driven, technology neutral approach is key.
- Transition must be secure, affordable and people-centered.
- Energy efficiency first, not only for decarbonization but also for energy security.
- Renewable is growing fast, contributing to cleaner and more secure energy systems.
- In very high-VRE future systems, legacy thermal assets, ideally with CCUS or low-carbon fuels, would provide major portion of seasonal flexibility services although they provide minor share in electricity.
- Electricity market designs must recognise the value of dispatchable low emissions capacity.
- In countries where it is accepted, nuclear energy could play an important role in ensuring rapid and secure energy transitions. Energy transitions with less nuclear would be more difficult and costly.
- Clean energy technology supply chains are growing fast, but with regional concentration. Diverse and resilient supply chains are needed.

Perspectives from energy history

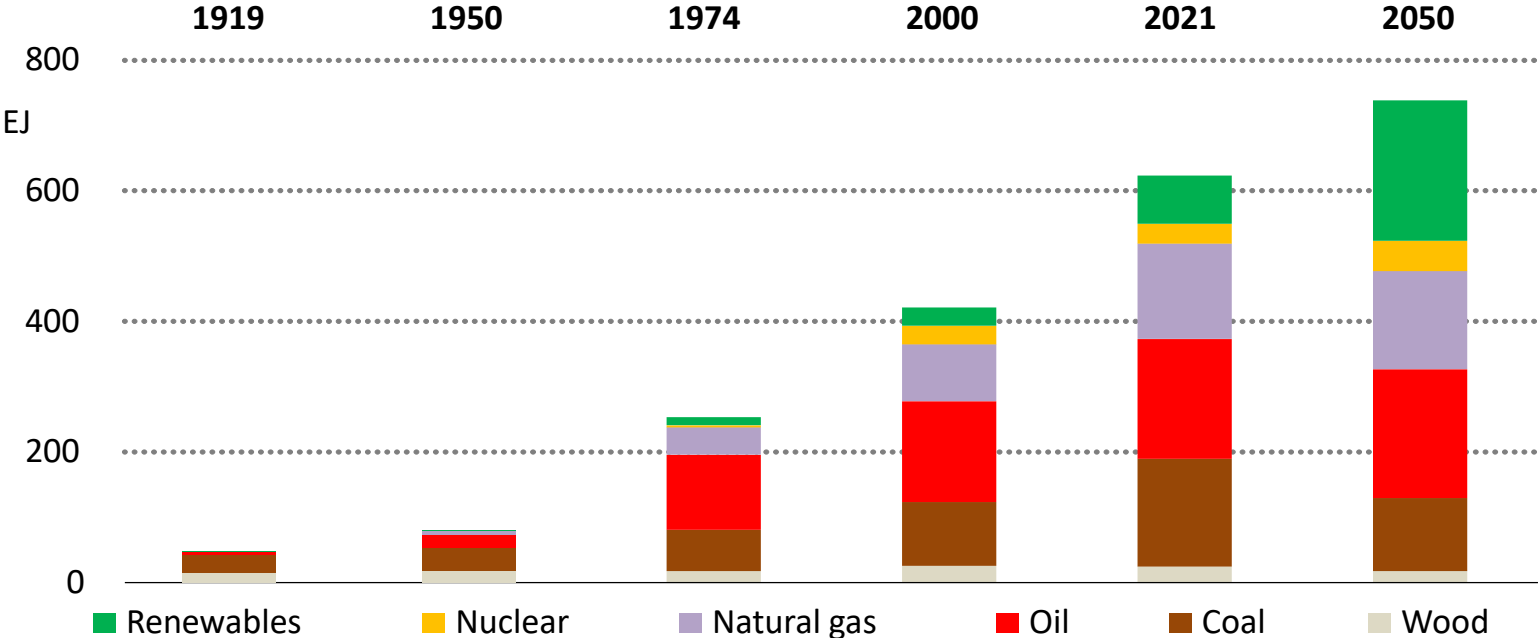
Global energy demand in the Stated Policies Scenario



The last century has witnessed multiple transitions to and from different fuels and technologies

Perspectives from energy history

Global energy demand in the Stated Policies Scenario



The last century has witnessed multiple transitions to and from different fuels and technologies
 The challenge today is one of scale: global energy use is ten times higher than in 1919... and growing

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