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GLOBAL OVERVIEW OF THE ENERGY INDUSTRIES AND THE OUTLOOK FOR 2023 AND BEYOND

Institute of Measurement Control Webinar, 14 March 2023
Neil Golding, Executive Director, Energy Industries Council



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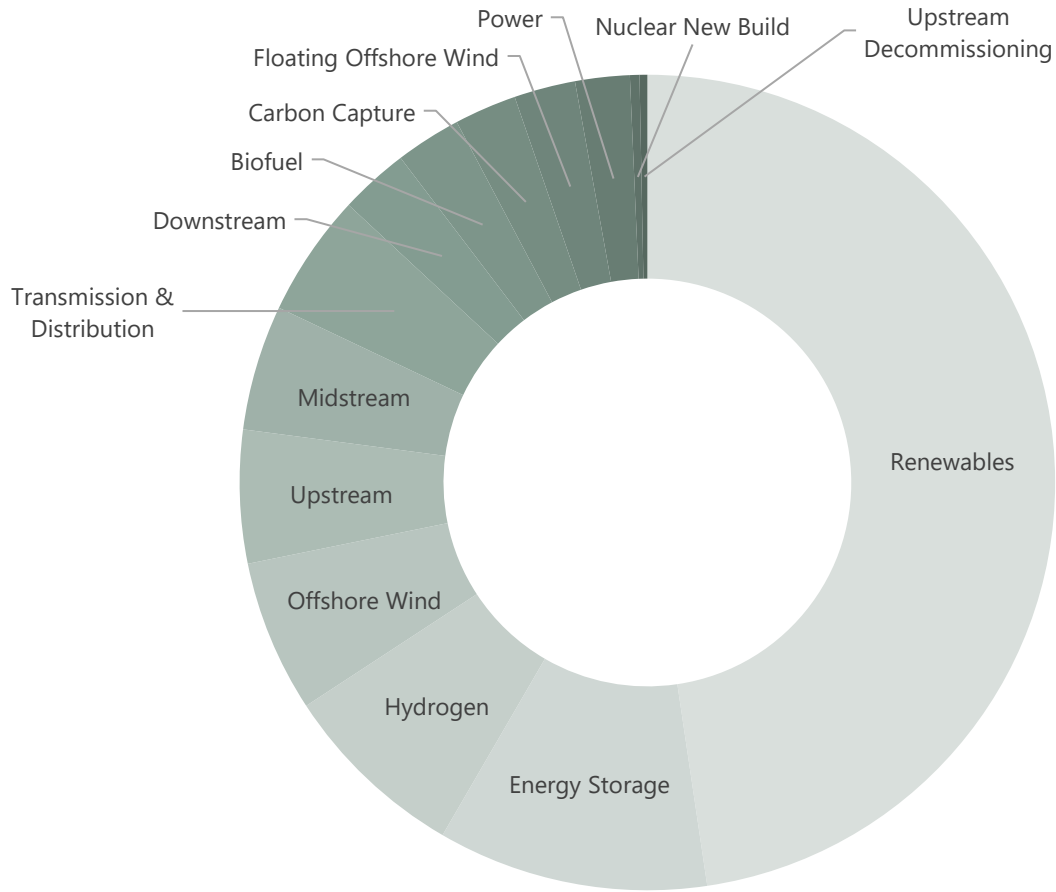
- Review of 2022 and beginning of 2023
 - Energy project review – Growth in opportunities around the world
 - 2023 and beyond
 - Oil and Gas
 - Hydrogen
 - Carbon Capture
 - Clean Fuels – Biofuels / E-fuels / SAF
 - Renewables
 - Nuclear
 - Summary remarks
-

REVIEW OF 2022

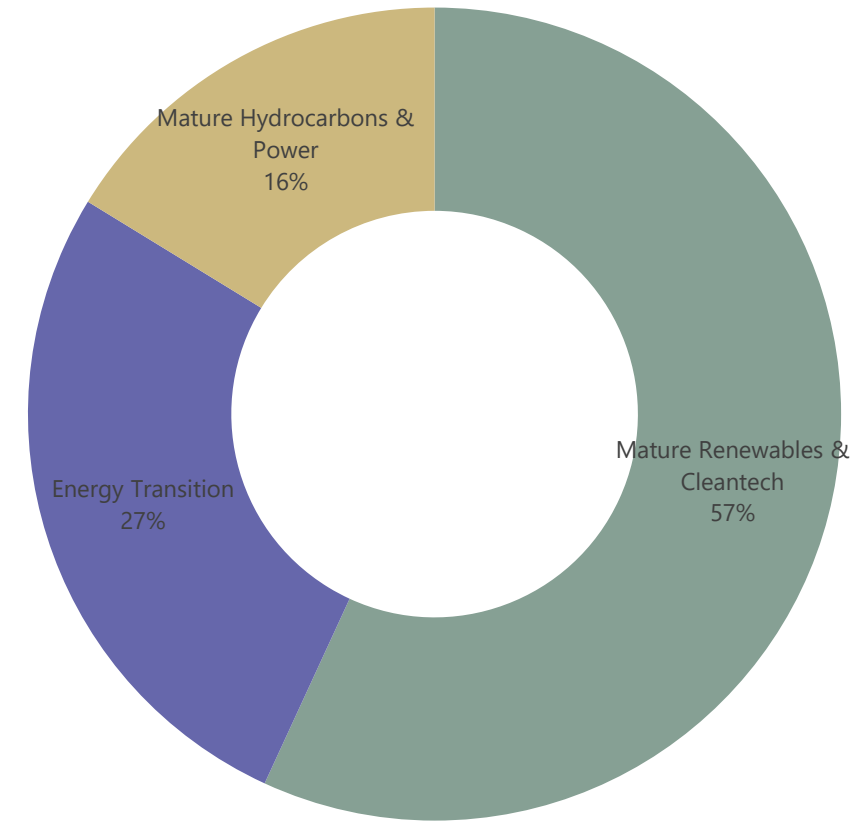


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Project announcements all sectors in 2022



Quantity of projects announced in 2022 (excluding T&D)

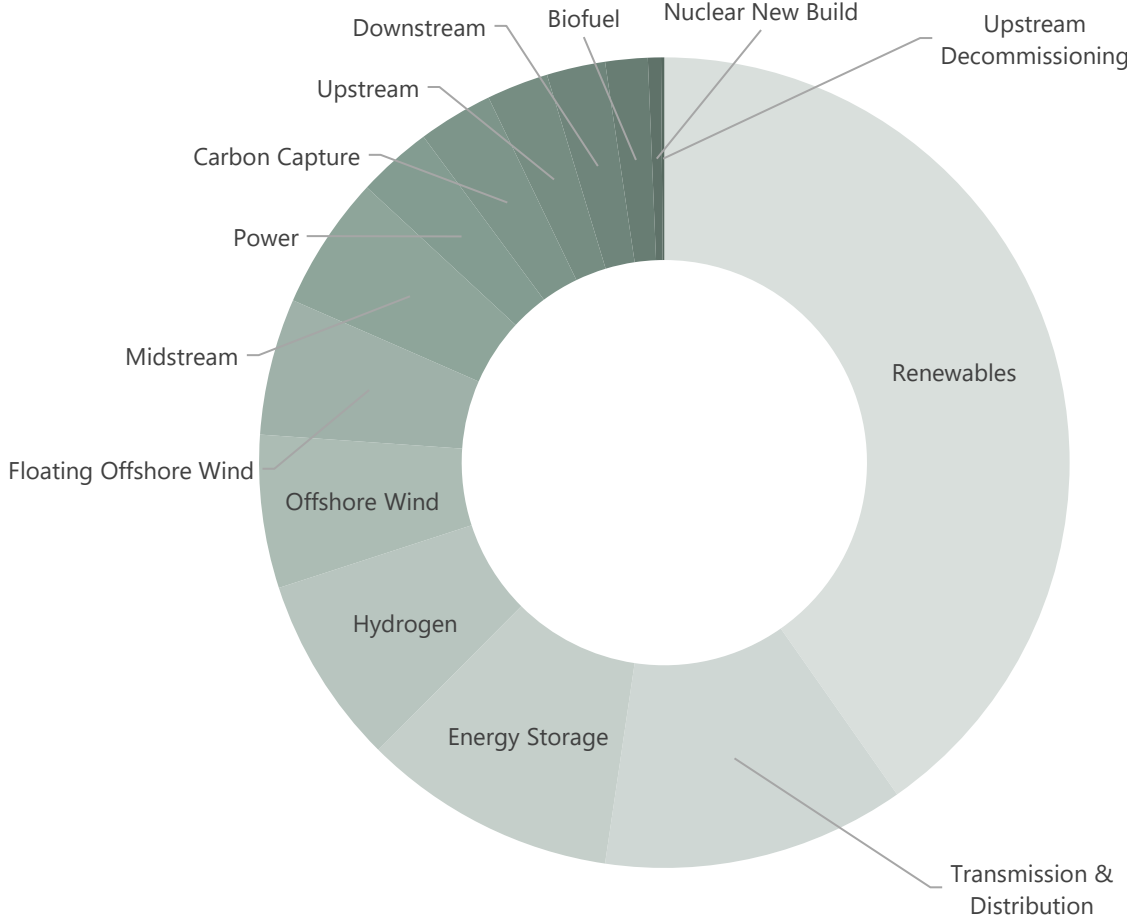


WHAT'S HAPPENED IN 2023 SO FAR

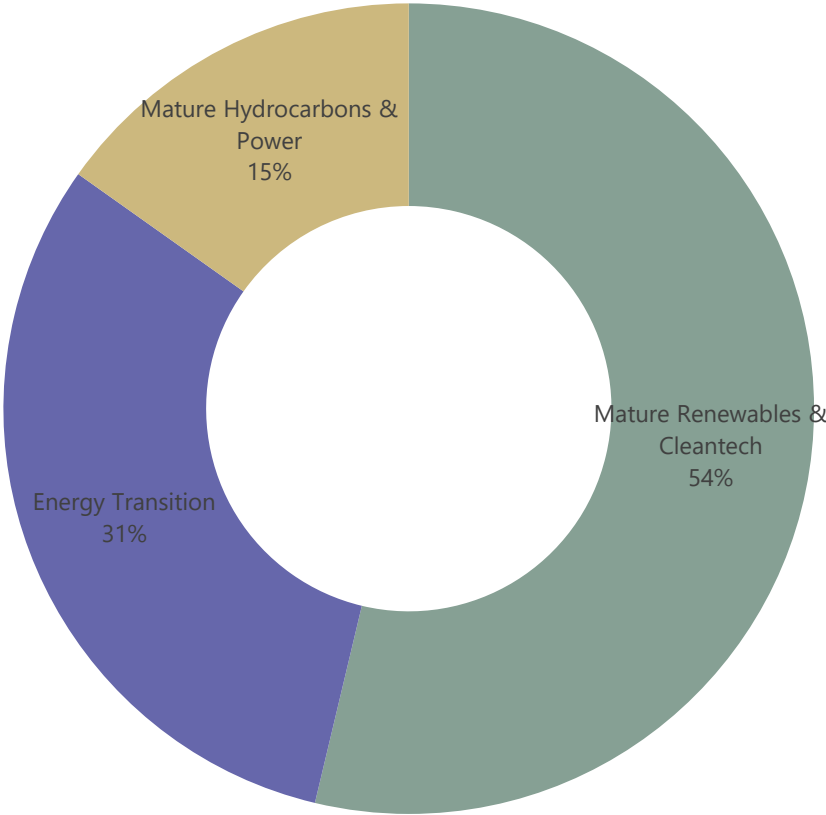


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Project announcements all sectors in 2023



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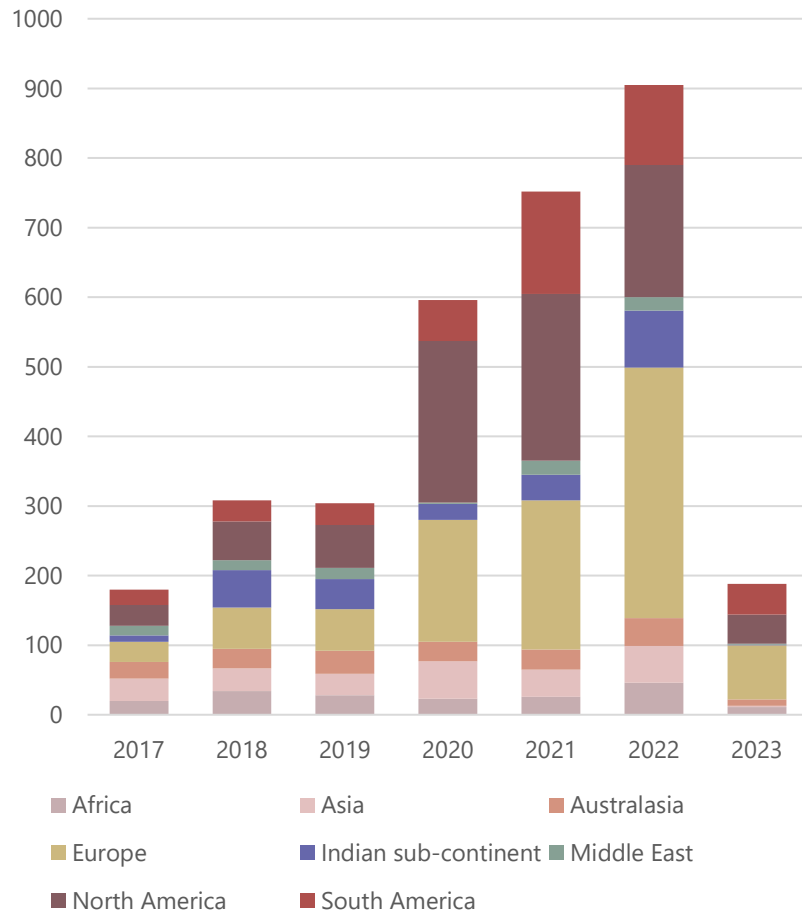


ENERGY PROJECT REVIEW - RENEWABLES

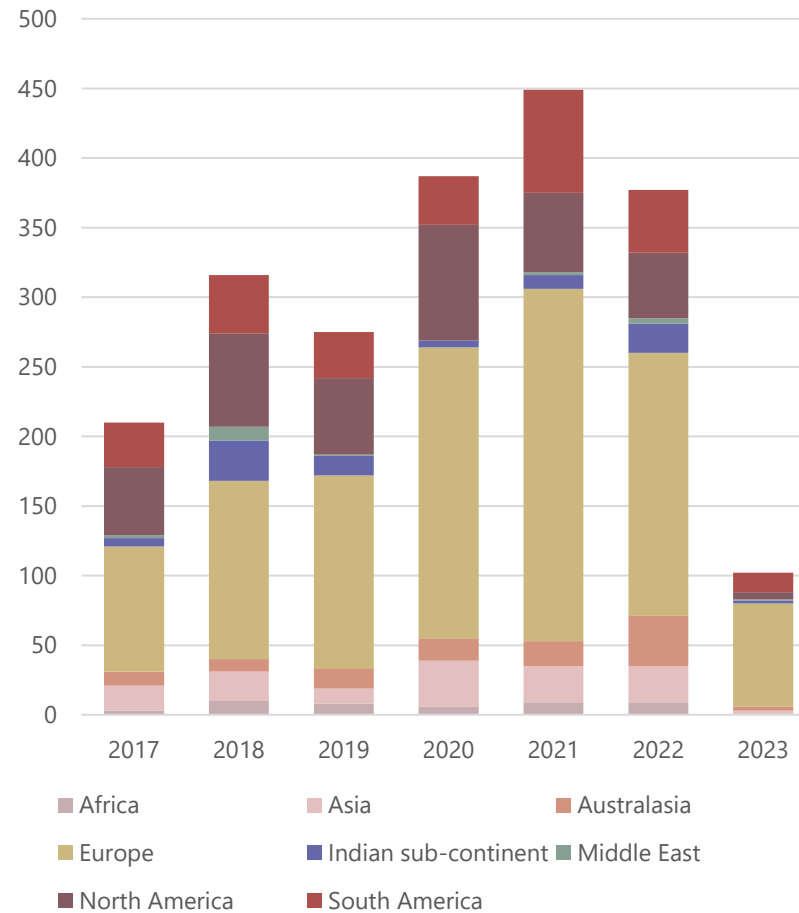


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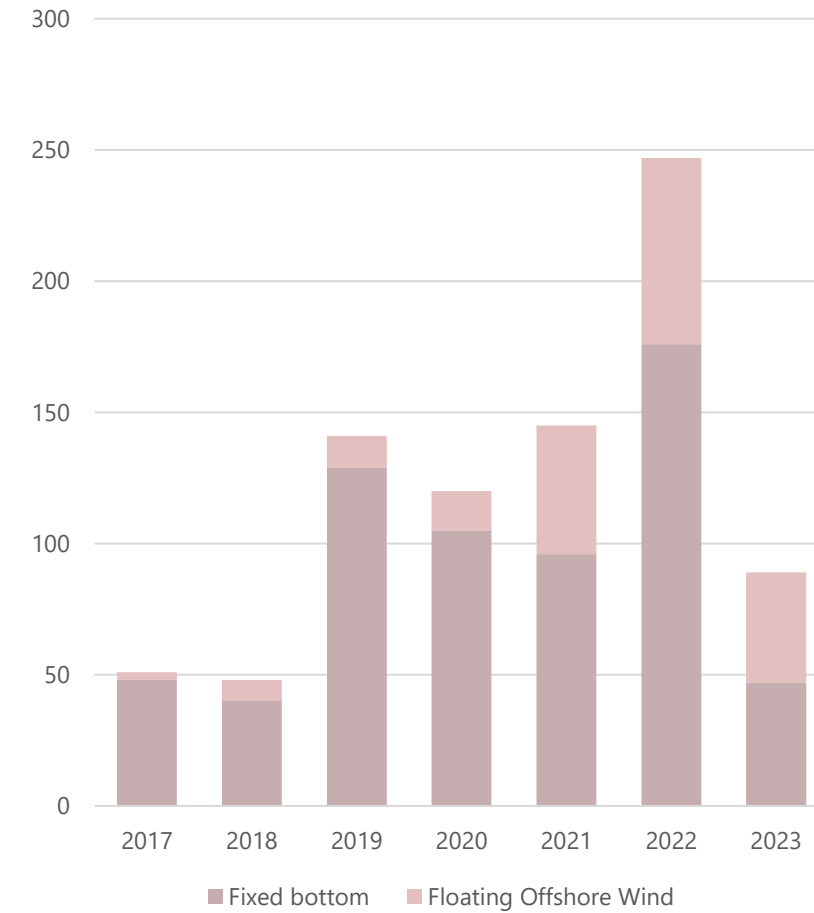
Number of projects announced 2017 - 6 March 2023 (Solar PV)



Number of projects announced 2017 - 6 March 2023 (Onshore Wind)



Number of projects announced 2017 - 6 March 2023 (Offshore Wind)

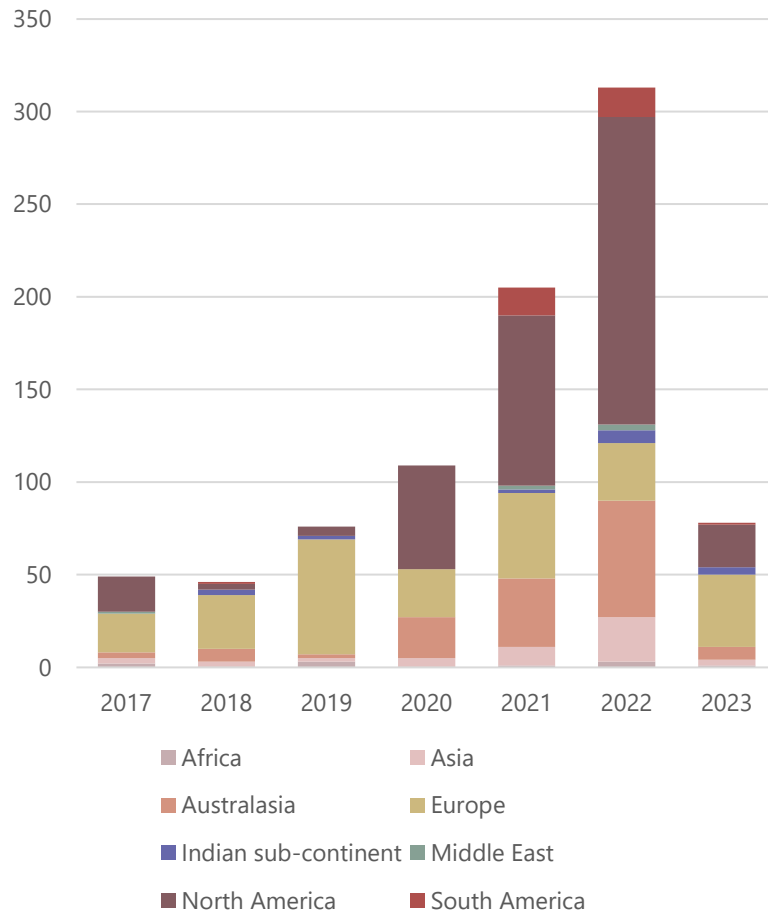


ENERGY PROJECT REVIEW – ENERGY TRANSITION

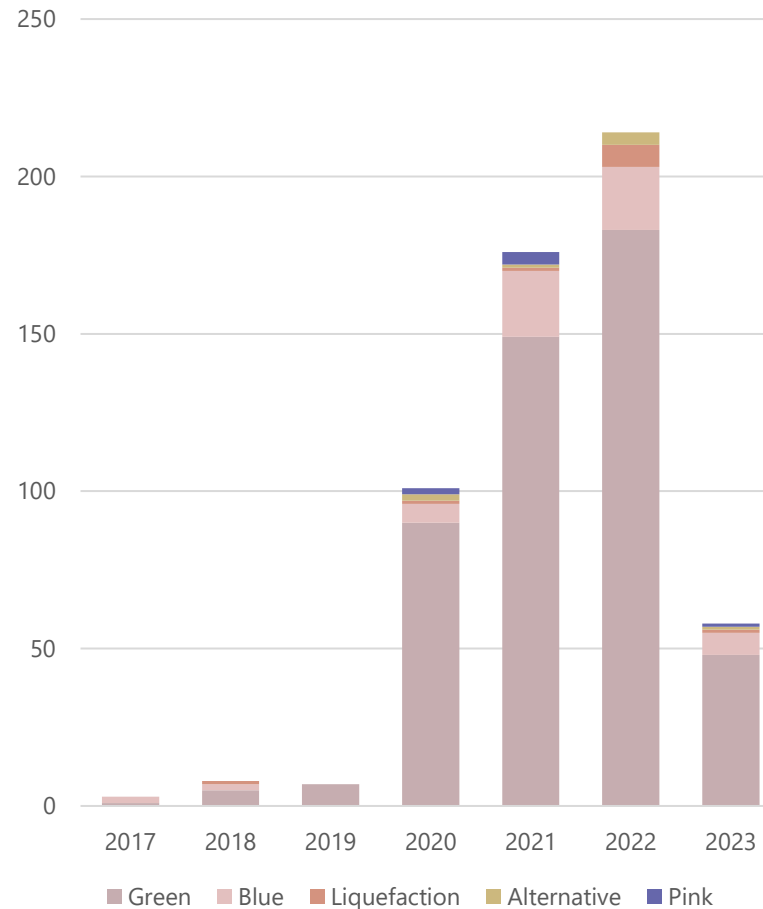


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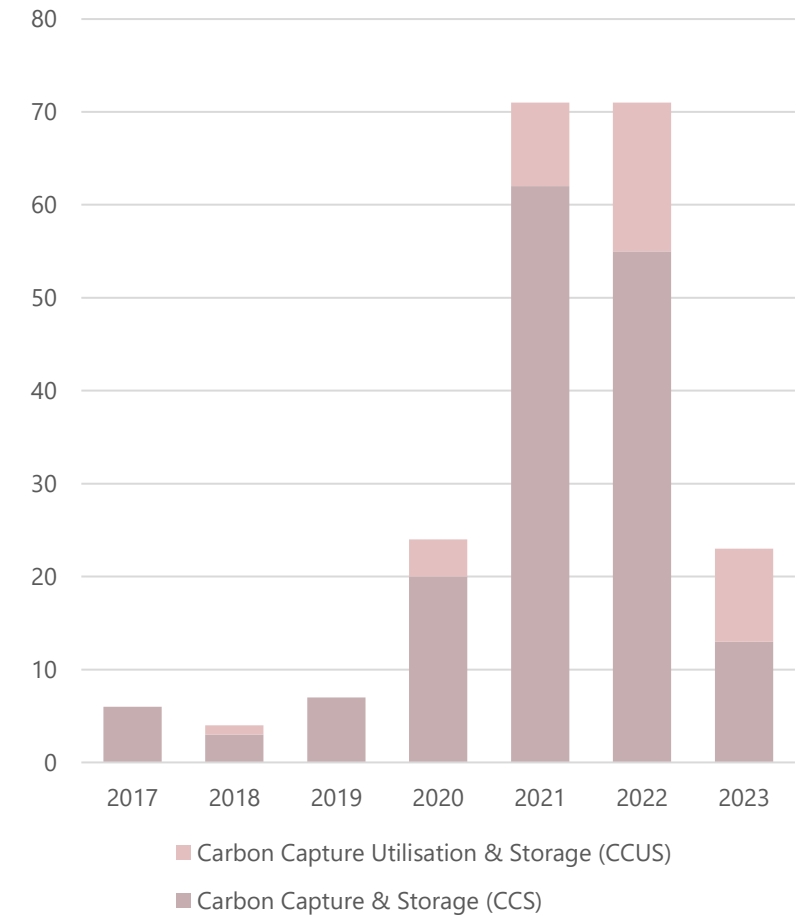
Number of projects announced 2017 - 6 March 2023 (Energy Storage)



Number of projects announced 2017 - 6 March 2023 (Hydrogen)



Number of projects announced 2017 - 6 March 2023 (Carbon Capture)

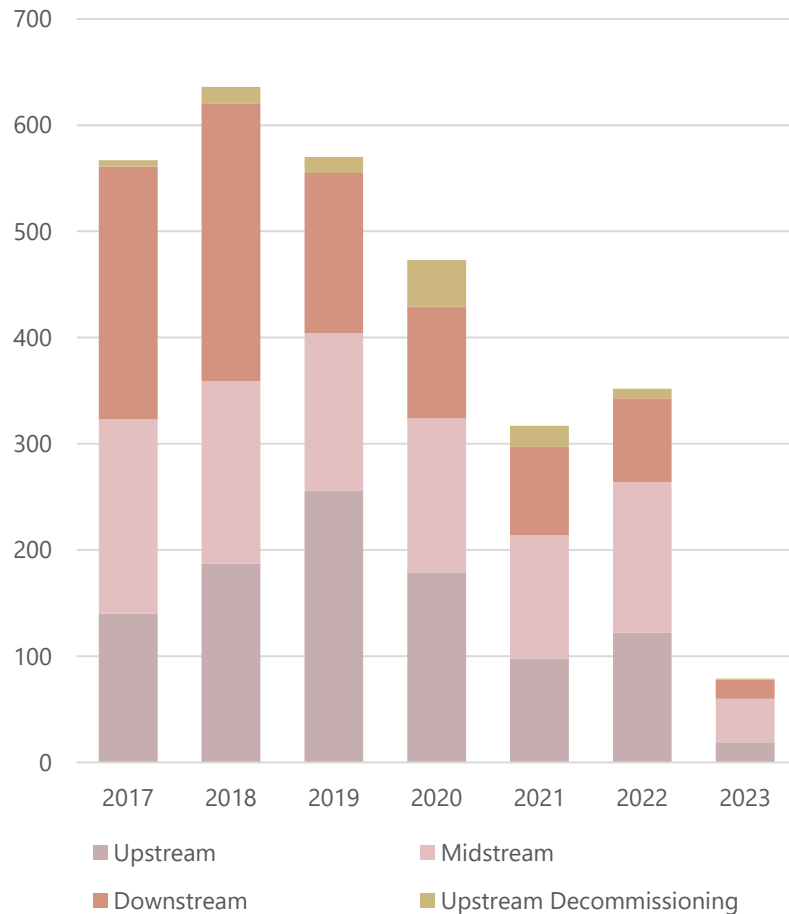


ENERGY PROJECT REVIEW – OIL & GAS

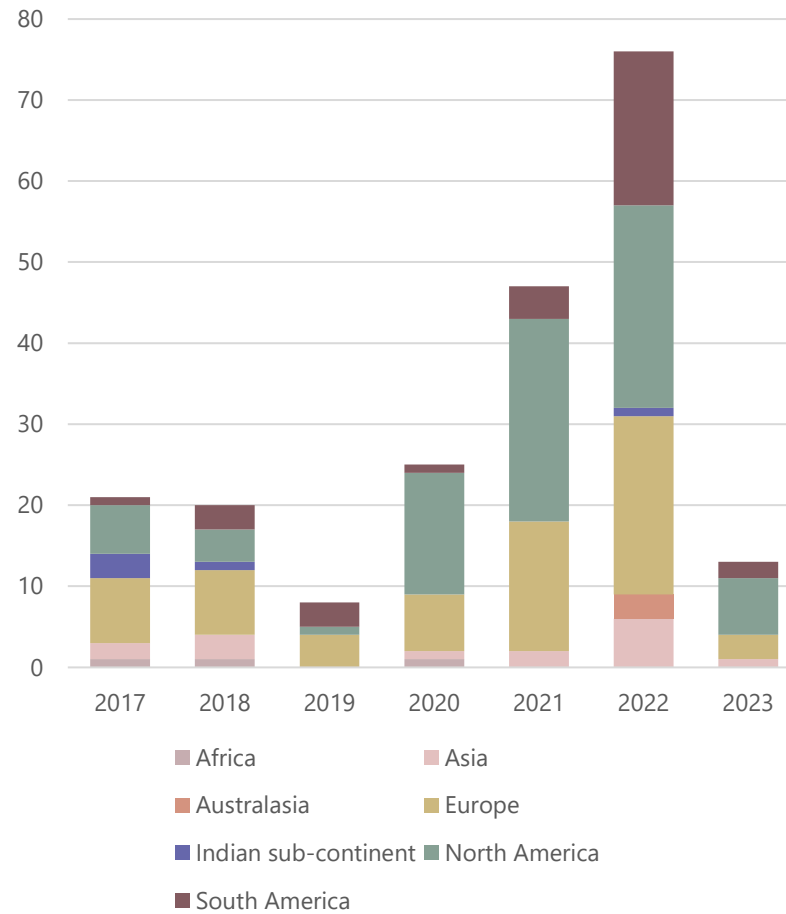


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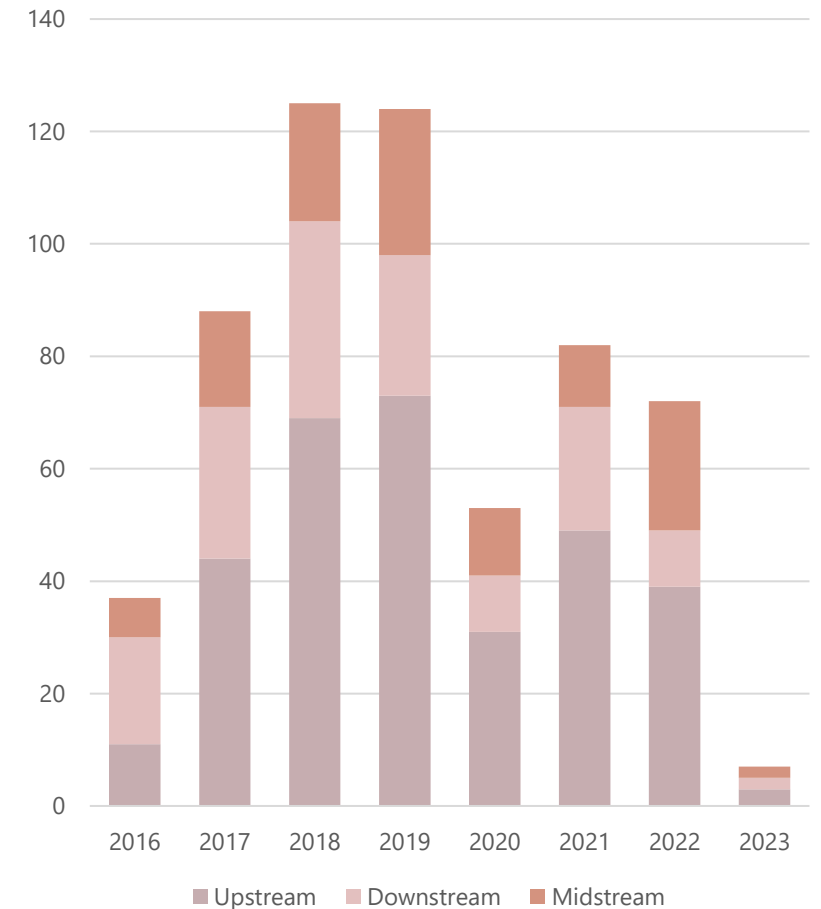
Number of projects announced 2017 - 6 March 2023 (Oil & Gas)



Number of projects announced 2017 - 6 March 2023 (clean fuels)



Number of project FIDs announced 2016 - 6 March 2023 (O&G)



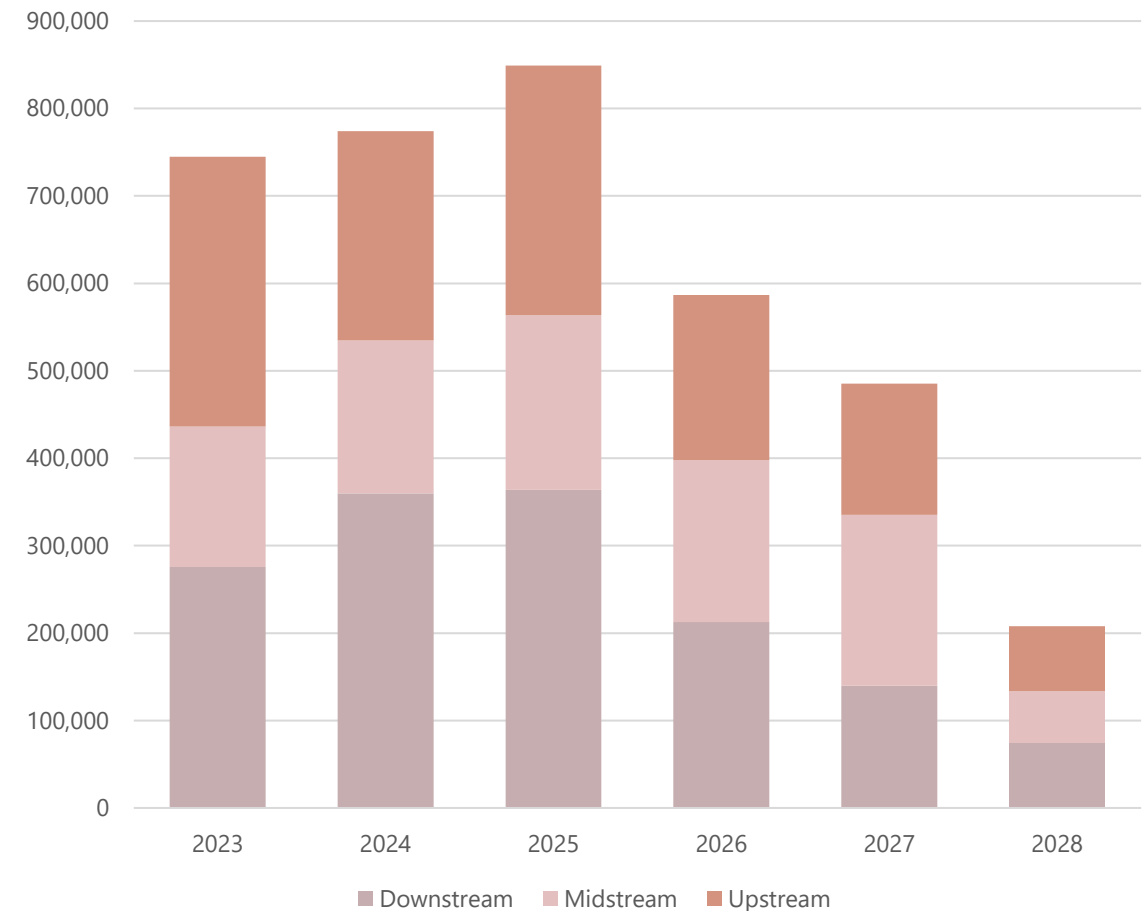
2023 AND BEYOND – OIL & GAS



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- Strong industry rebound seen with contractors retrenching into O&G due to higher profit margins; however short to medium term outlook is uncertain
- Key themes post-Covid = 1) Gas, gas, gas, 2) Energy security, 3) Climate change, and 4) Supply chain crunch
- Continued move towards cross-sector coupling and opportunities for the decarbonisation and optimisation of the industry
 - Offshore electrification
 - Re-use of offshore structures
 - CCUS and blue hydrogen
- Operators are continuing to heavily re-strategise towards renewables and clean tech; but are now openly coming out in support of spend on their oil and gas assets
- Helped by record profits e.g. Saudi Aramco \$161 billion for 2022, operators will continue to invest in hydrocarbons, following years of perceived under investment

Estimated CAPEX (\$million) on projects based on commissioning date up to 2028

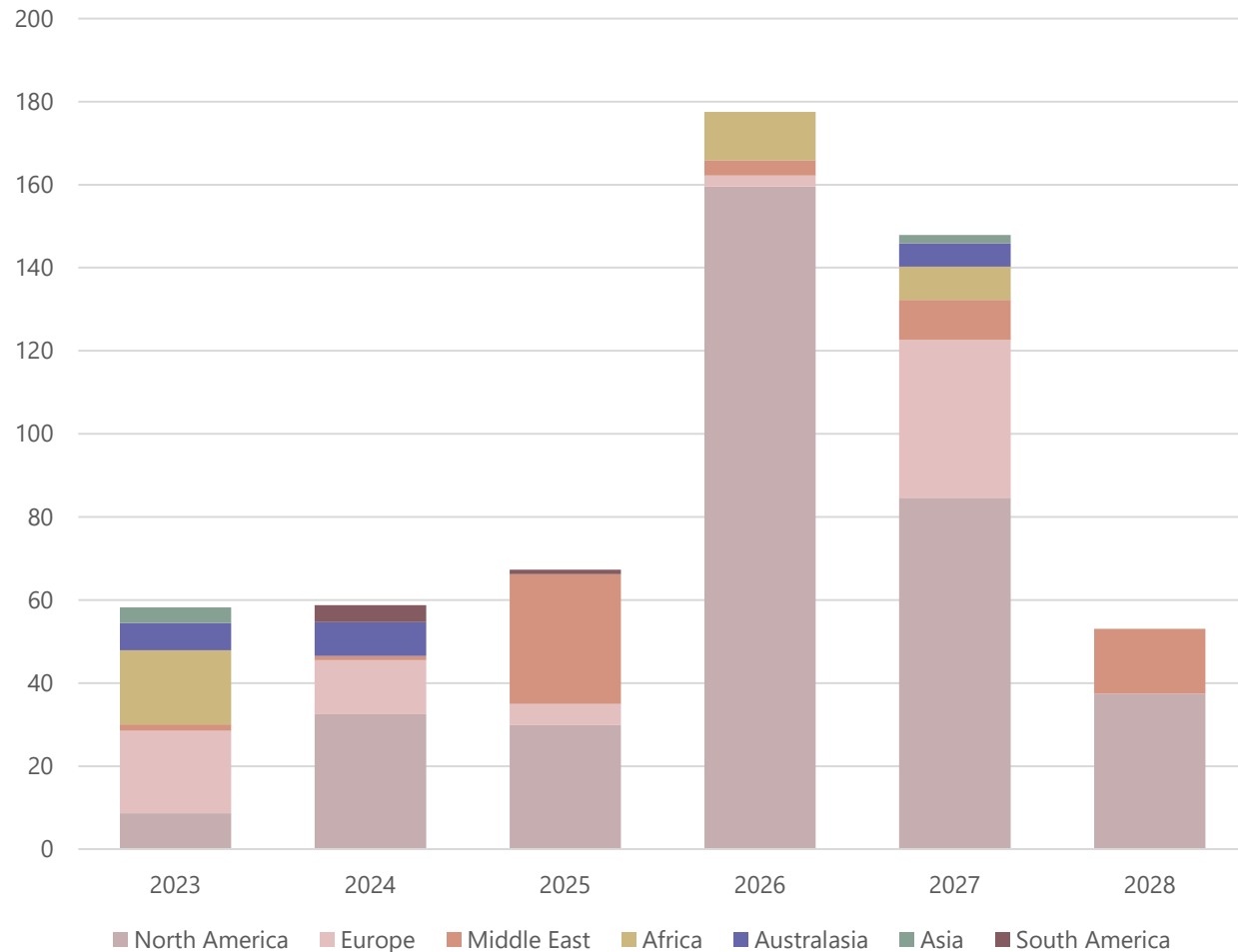


2023 AND BEYOND – THE ROLE OF GAS

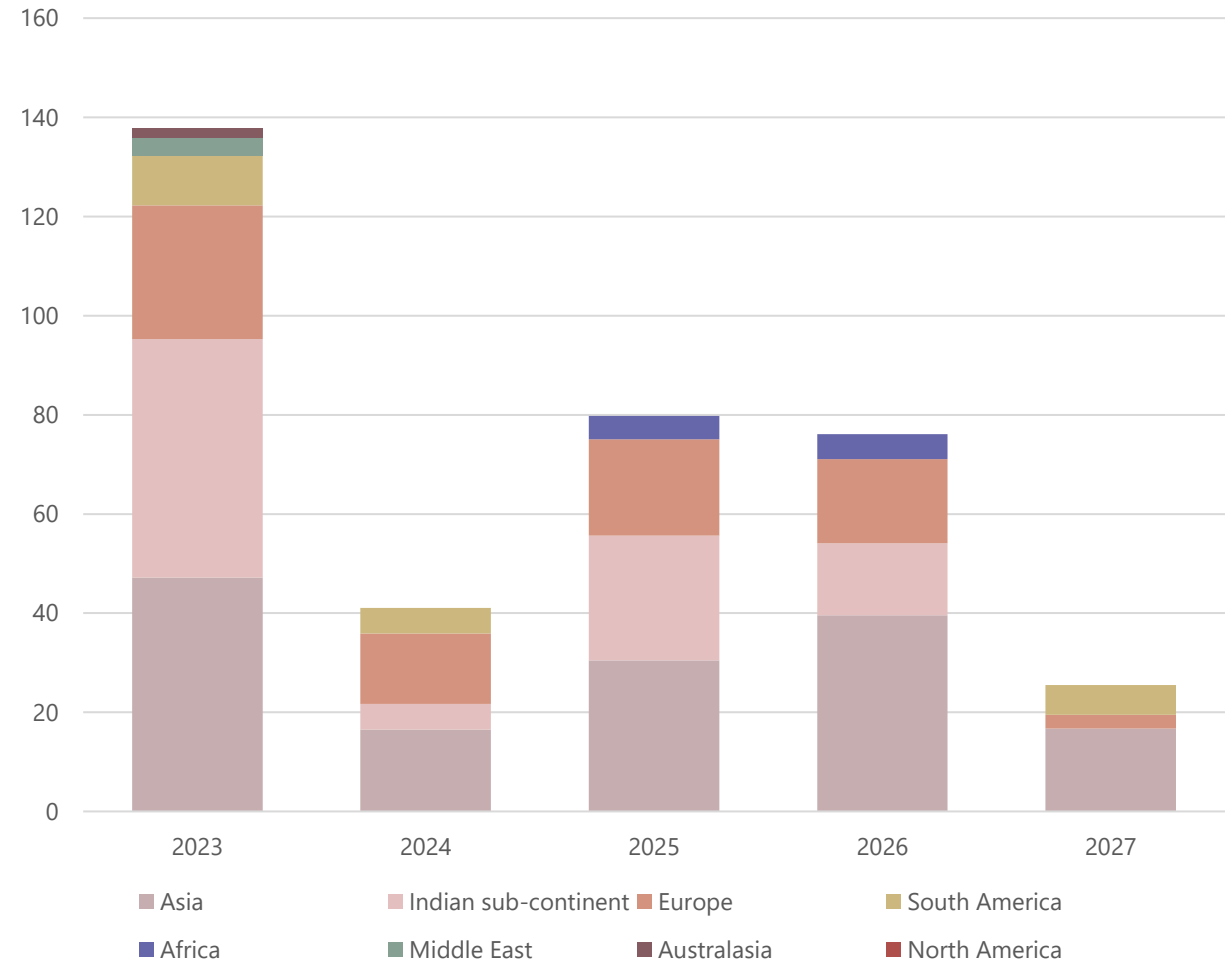


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LNG Liquefaction capacity (mtpa) due online up to 2028



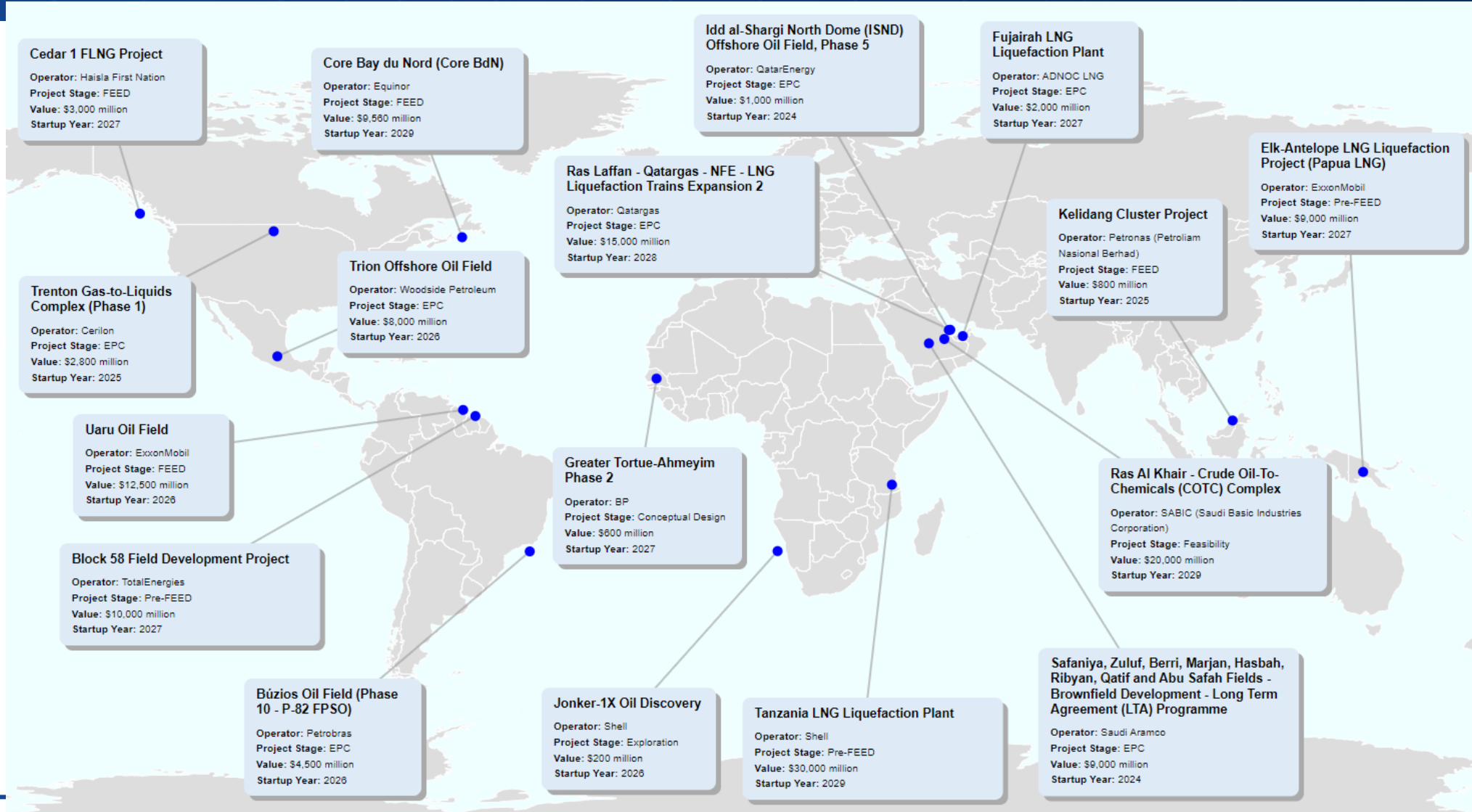
Regas capacity (mtpa) additions by start-up year



PROJECT OPPORTUNITIES – OIL & GAS



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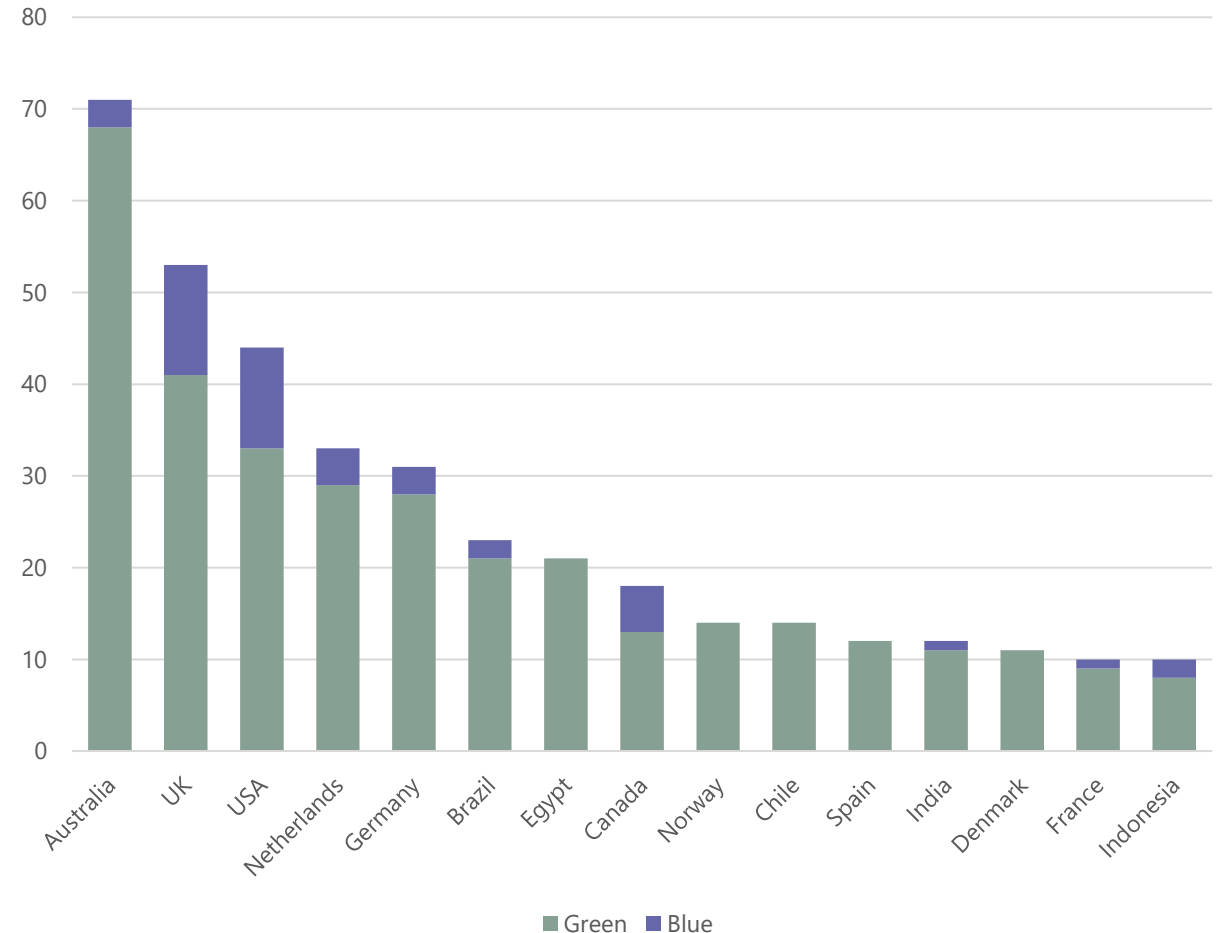
2023 AND BEYOND – HYDROGEN



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- Growth being driven by government targets, policies and ambition
- Major regional markets include:
 - **EU** – driven by the Green Recovery Plan. Hydrogen Strategy targets 2x40GW of electrolyser capacity to be installed by 2030; 40GW within the EU and another 40GW in Ukraine and North Africa
 - **UK** – 10GW of clean hydrogen capacity by 2030.
 - **North America** - Public vs private funding in the USA; has led to \$8 billion worth of funding available for four clean regional hubs. **US IRA** – Up to \$3/kg tax credit. Hydrogen in Canada is expected to account for 30% of the total demand in 2050.
 - **Australia** – Main aim to become major exporter of H2 by 2030, and to achieve production at under AUD\$2/kg. The adoption of Hydrogen Hubs appears to be key, AUD\$464 million has been committed to fund seven hubs for early-stage developments
 - **Middle East – Saudi Arabia** - Become the world’s leading producer and exporter of clean hydrogen, 4 mtpa by 2035. **UAE** – To own a 25% share of global export market by 2030. **Oman** – 10GW by 2030.
- Markets for demand need to be developed.

Number of projects under development - Top 15 countries

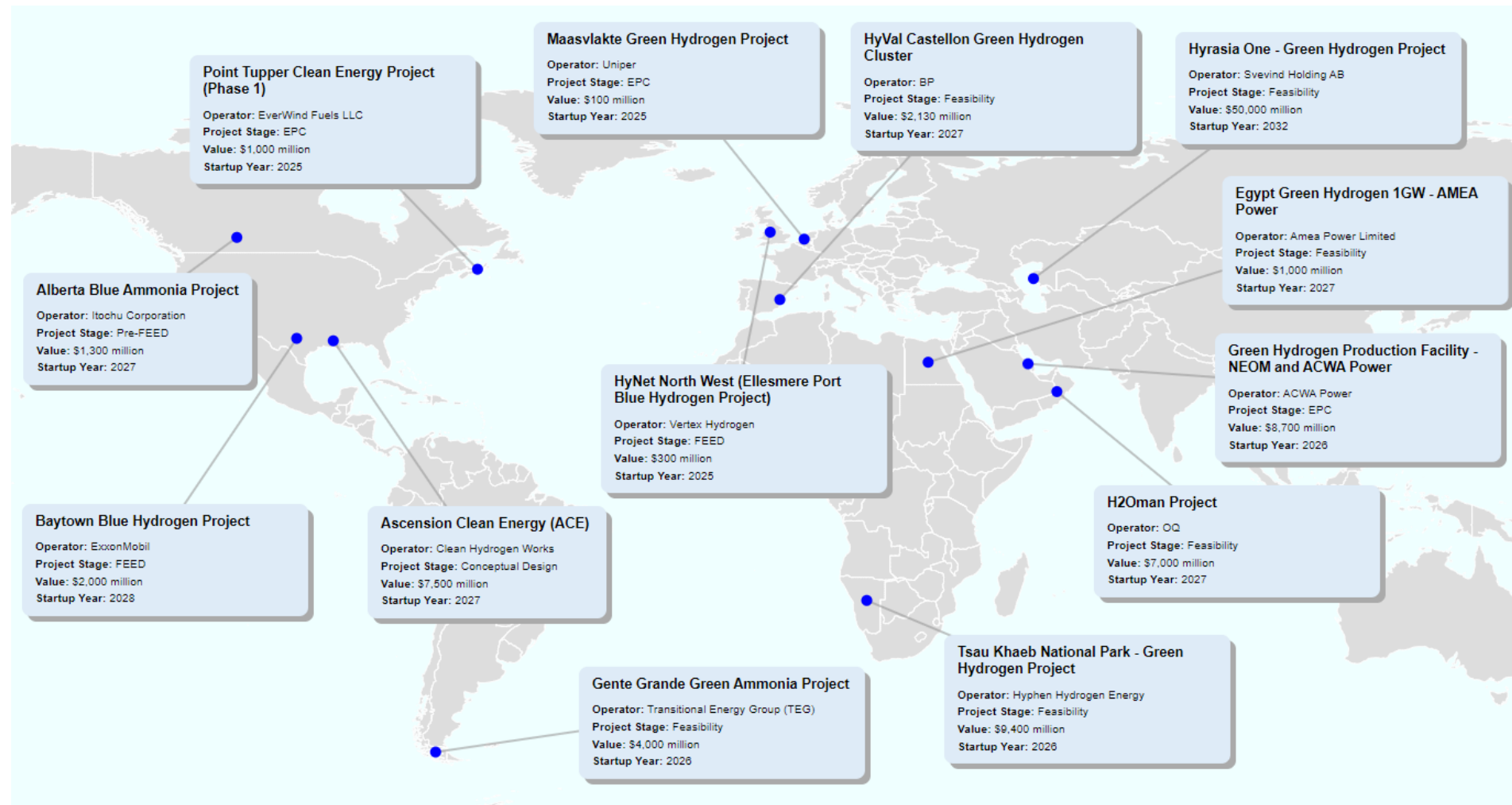
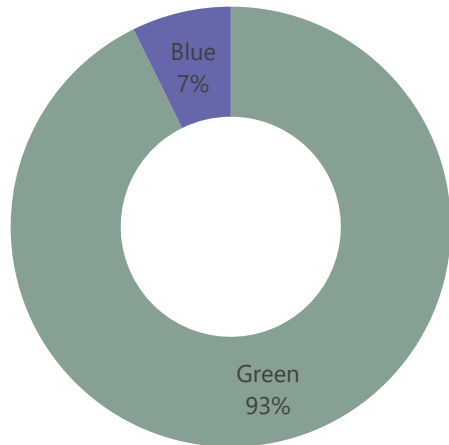


PROJECT OPPORTUNITIES – HYDROGEN



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CAPEX comparison for commercial scale H2 projects proposed globally



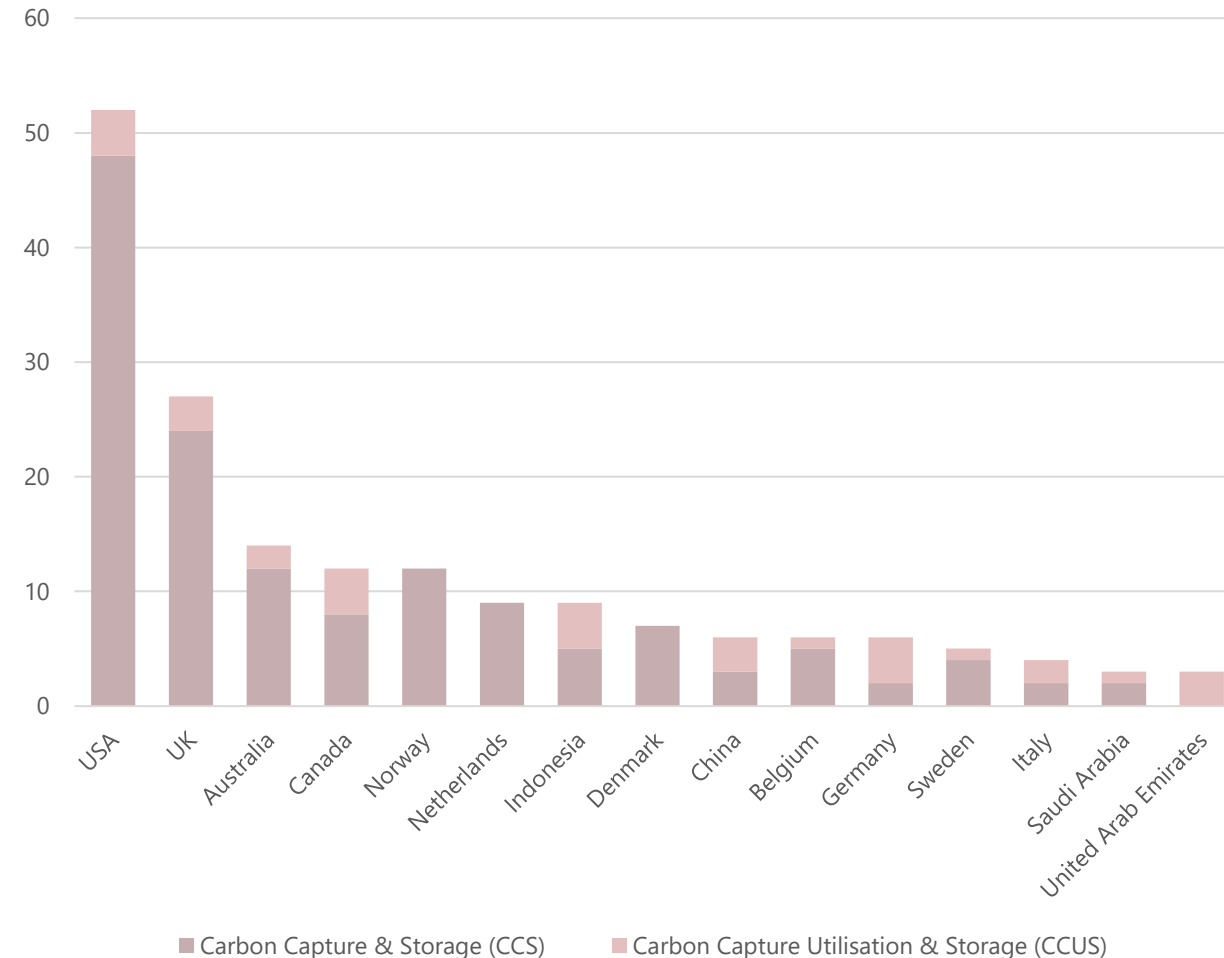
2023 AND BEYOND – CARBON CAPTURE



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- Growing support globally for the technology
 - £20 billion government support in the **UK**
 - **US IRA** – 45Q tax credit, will incentivise the use of carbon capture. Increased credit values with the aim of using CCS as a solution for hard to abate industries.
 - **Saudi SGI** ambition to capture 44 mtpa by 2035
 - **EU** - CCUS Strategic Energy Technology (SET)-Plan. EU Innovation Fund \$10 billion of support over 10 years.
- When will the projects happen?
 - Some of the ‘new’ wave of projects are already under construction. E.g. Norway
 - FID’s for UK projects have slipped to Q1 2024, but projects ready to break ground. RfQ’s expected in the 2nd half of the year.
- UK has the potential to be a world leader.....and already is in the engineering aspect.

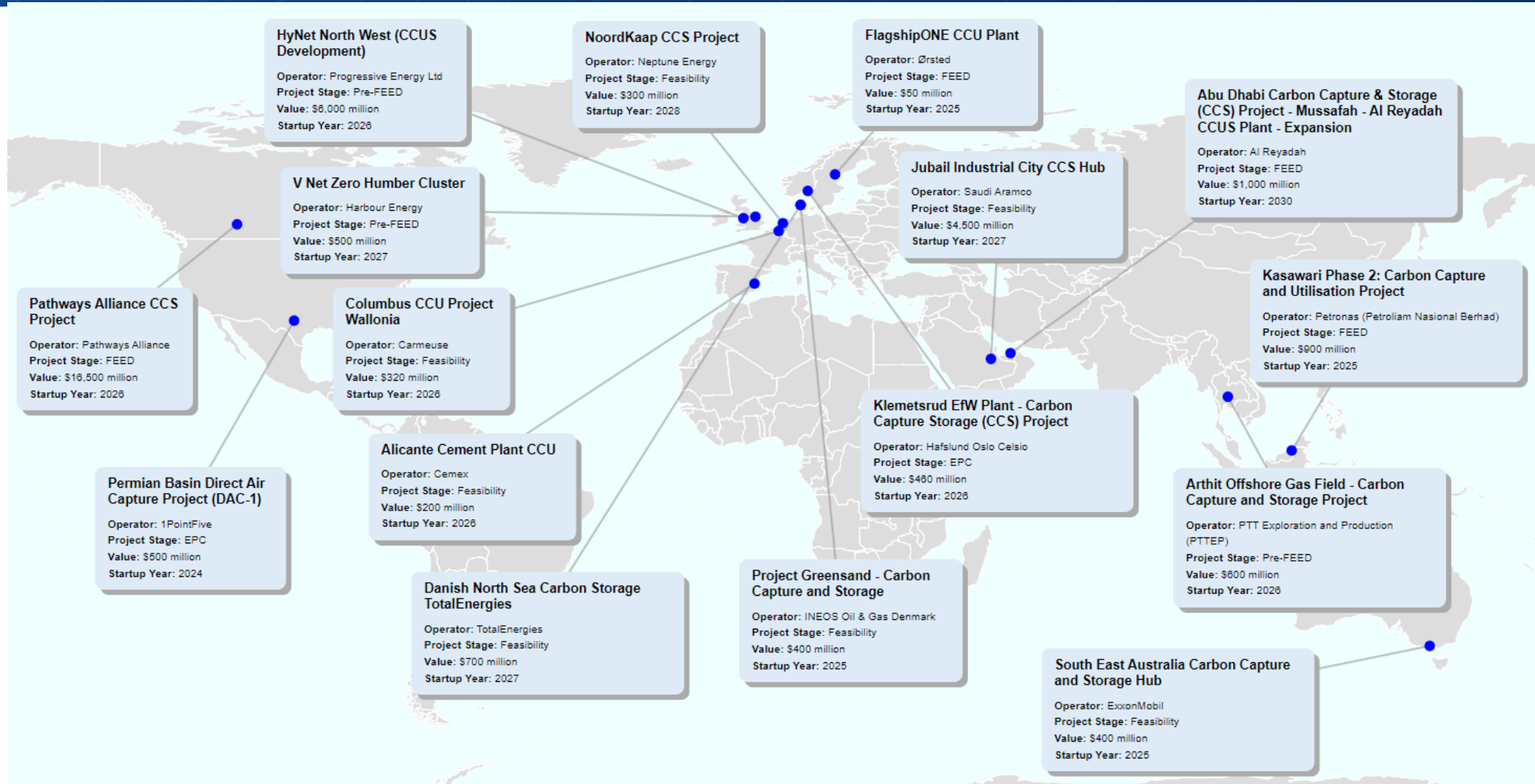
Number of projects under development - Top 15 countries



PROJECT OPPORTUNITIES – CARBON CAPTURE



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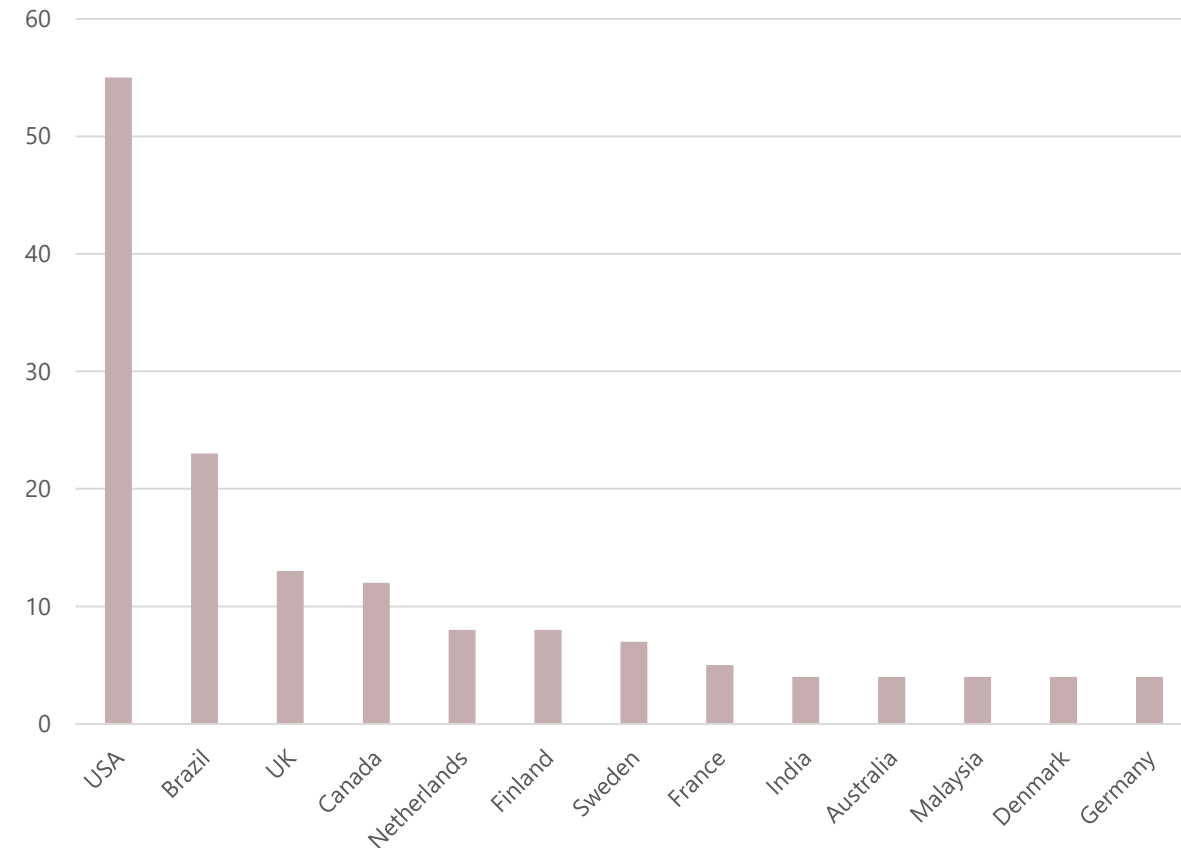
2023 AND BEYOND – CLEAN FUELS



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- Growing demand for SAF – not just from bio, residual waste can also be used
- Government support
 - Jet Zero strategy UK – July 2022. Delivering Net Zero aviation by 2050. £165 million Advanced Fuels Fund.
 - US – September 2021. To produce at least 3 billion gallons per year of SAF by 2030.
 - REFuelEU – EU level regulation to promote the use of SAF on all flights leaving EU airports. 2050 aim that SAF makes up a minimum 63% of fuel in flights.
- Headwinds face for bio based fuels largely feedstock based. An alternative is e-fuels.
 - E-fuels - are all fuels in gas or liquid form that are produced from renewable (solar or wind power, for example) or decarbonised electricity.
 - Longer term solution – e-kerosene could meet 40% of aviation energy demand.....by 2070.
 - Projects are under development already though

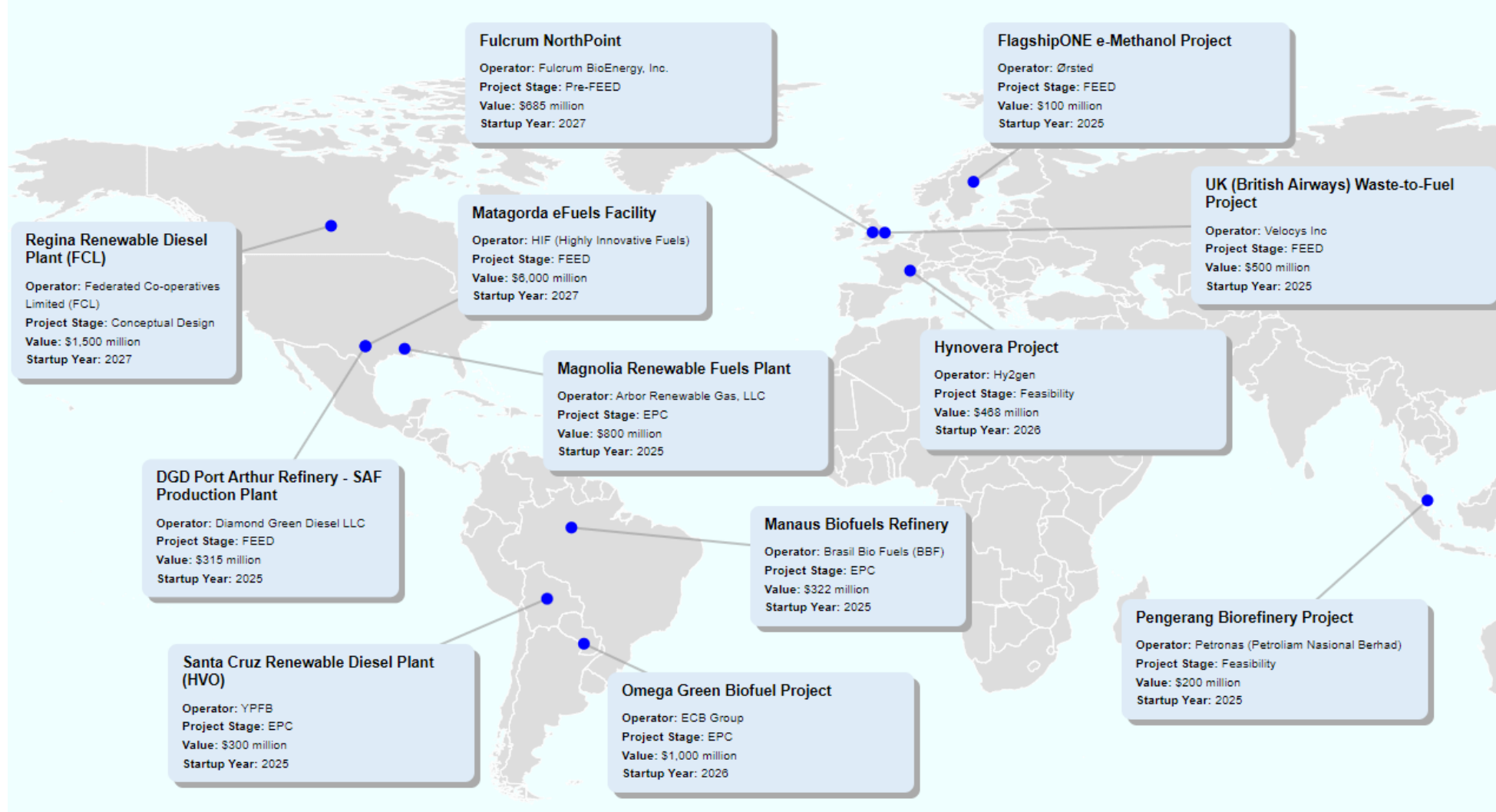
Number of projects under development - Top 15 countries



PROJECT OPPORTUNITIES – CLEAN FUELS



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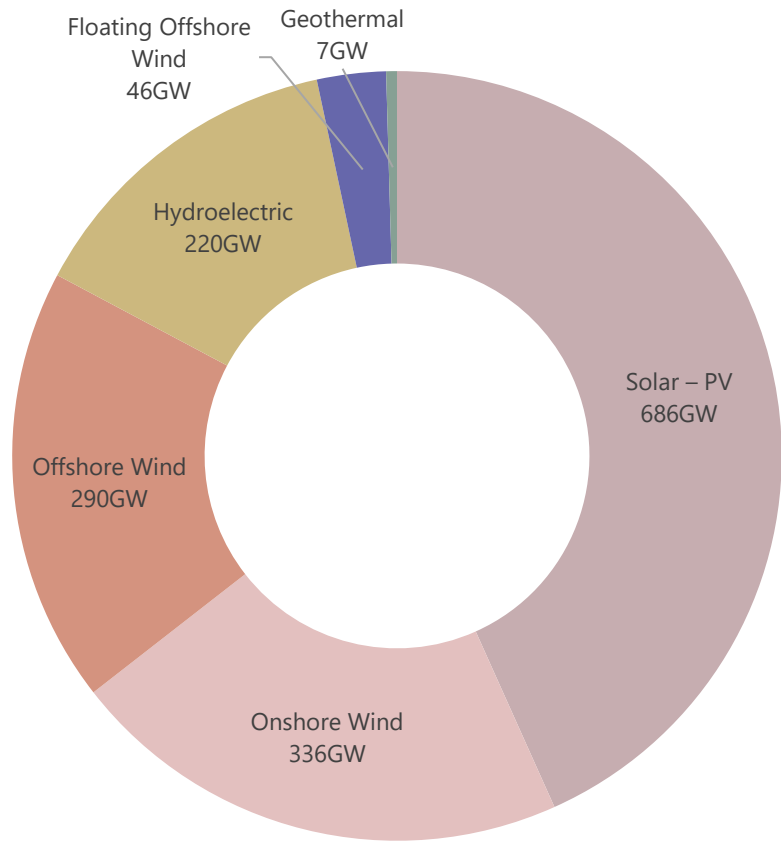


2023 AND BEYOND – RENEWABLES

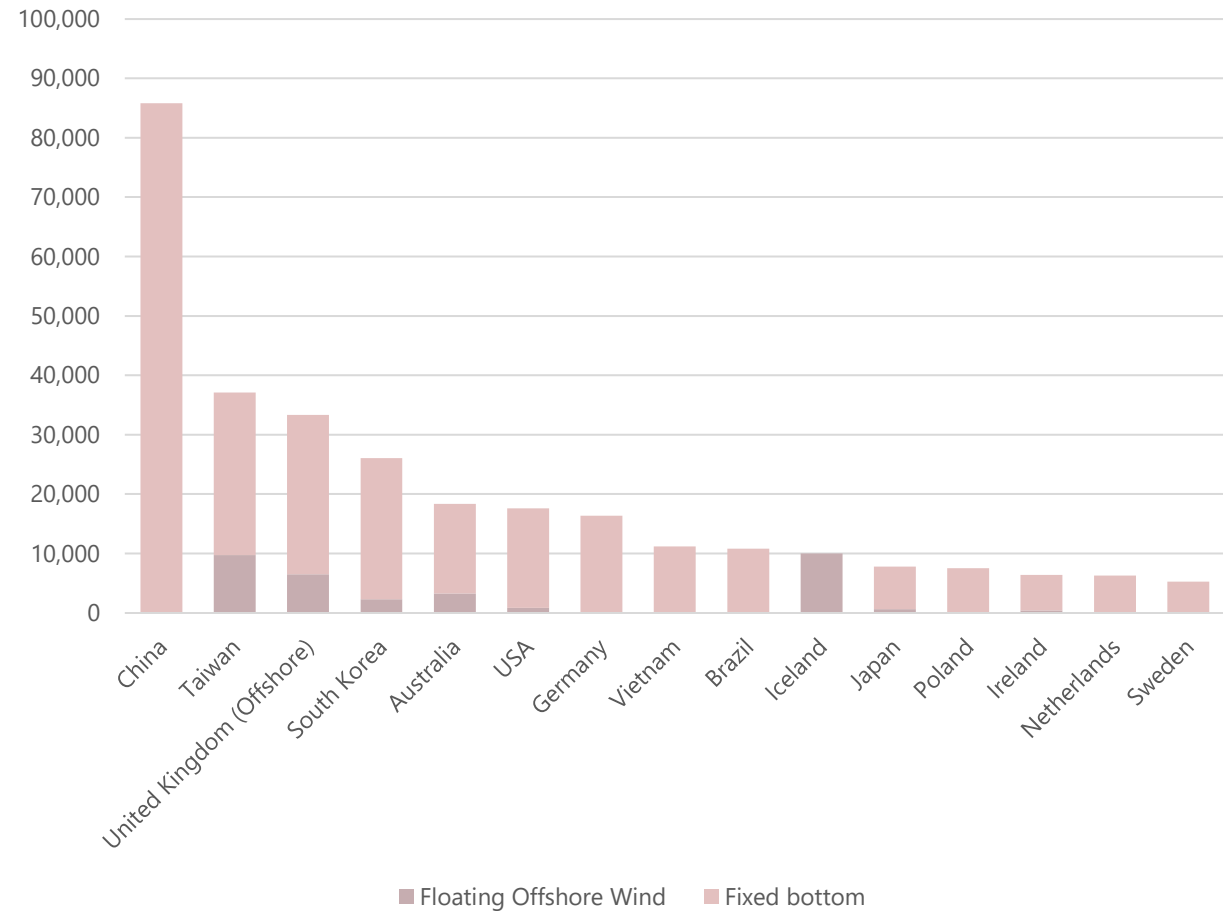


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Renewable project capacity (GW) additions up to 2028 on announced projects



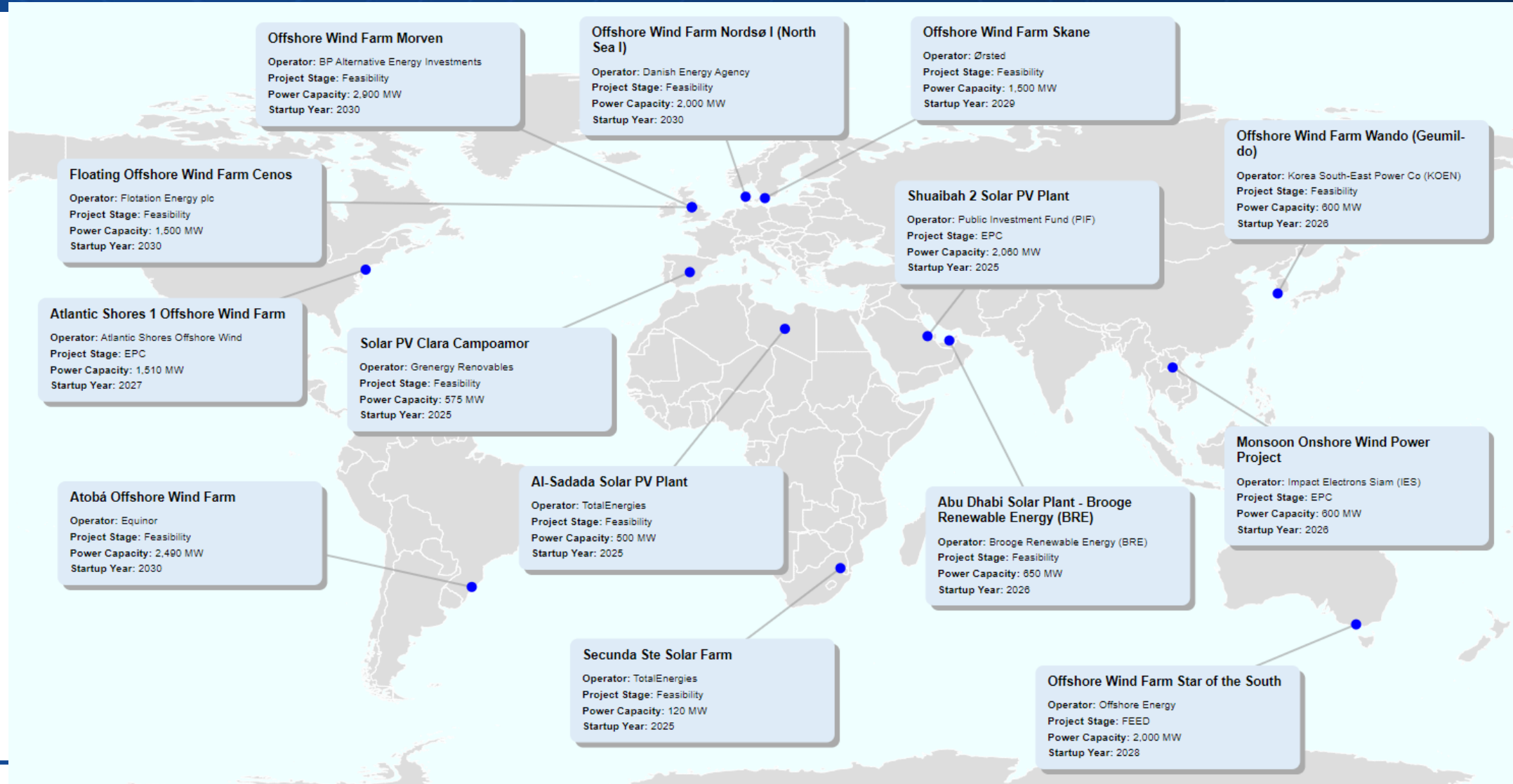
Proposed capacity (MW) additions by country up to 2028 (Offshore Wind)



PROJECT OPPORTUNITIES – RENEWABLES



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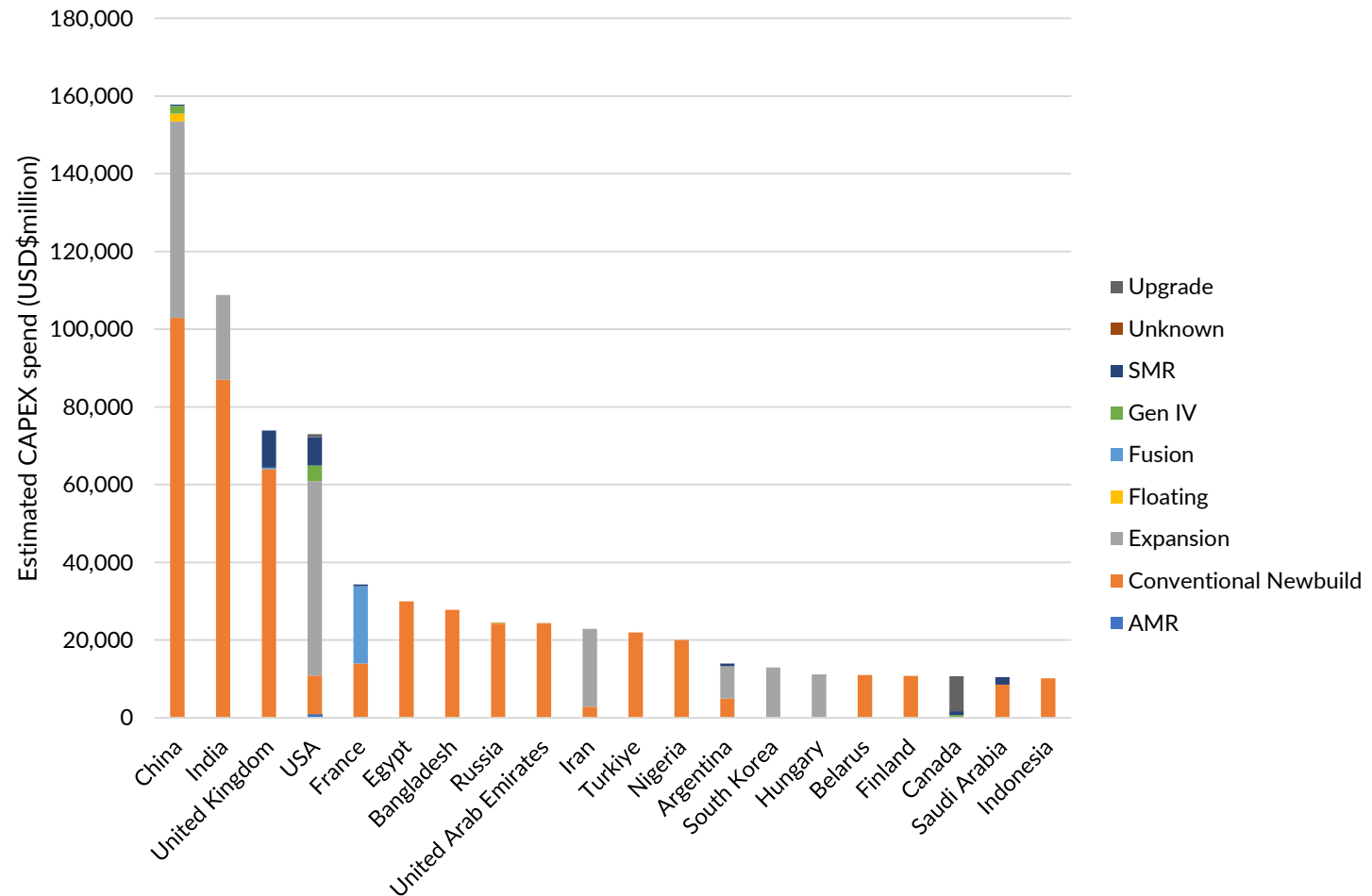




2023 and Beyond - Nuclear Newbuild

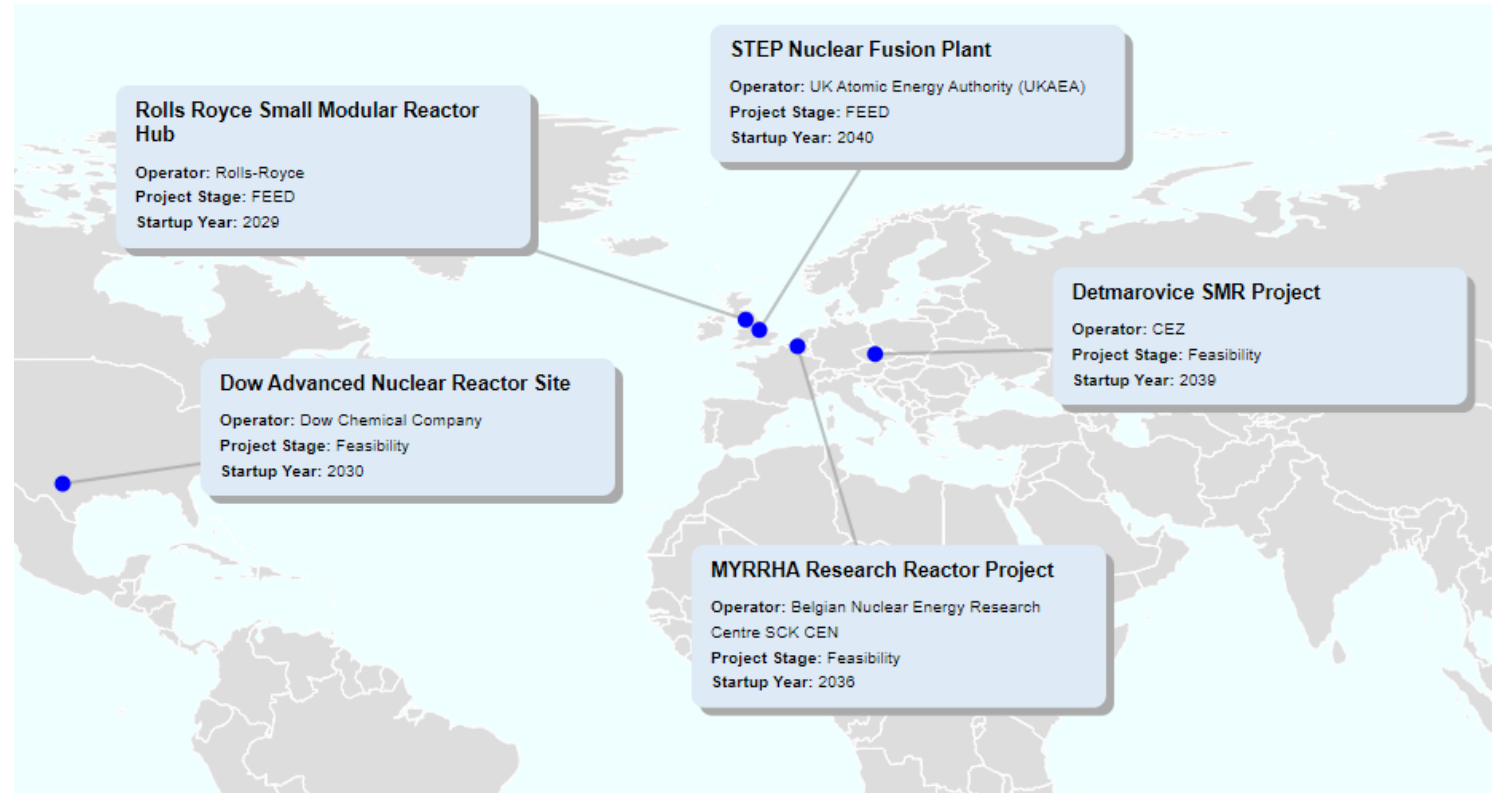
- Nuclear newbuild is having a moment in the spotlight again as a result of both energy security concerns and also a need to meet net zero targets.
- As a result of this the International Atomic Energy Agency (IAEA) pushed up its 2050 high-case projection of nuclear capacity from 792GW in 2021 to 873GW
- Since 2022, multiple countries have voiced their approval for new nuclear power such as France; some have also reversed nuclear phaseouts/downs e.g.: South Korea, Belgium, and Japan.
- China is one of the largest markets, with close to \$160 billion in CAPEX spend expected on announced projects; by the end of 2022 China had approved 10 new projects, signalling increased interest in the sector.
- United Kingdom has also seen political announcements, with a goal of up to 24GW by 2050 (three times the rate of current deployment)
 - To achieve this, eight reactors will be needed – equivalent of one reactor coming online per year rather than current pace of one per decade.

Top 20 countries for nuclear newbuild opportunities up to 2030



2023 and Beyond – SMR Technology

- SMR technology is growing in popularity with multiple countries testing variations of the technology.
- Growing markets for SMR deployment over the next decade are set to include the UK, USA, Canada, and Czech Republic.
- UK's most prominent SMR project is the Rolls Royce SMR Hub; project is currently in FEED stage with the design expected to be approved by mid-2024. This is set to be the UK's first SMR hub, with plans to install SMRs at various sites across the north of England and Wales
- The USA is further ahead in terms of SMR design and testing than the UK, in Jan 2023 the Nuclear Regulatory Commission approved NuScale's SMR design- this will be demo-ed via the Carbon Free Power Project involving six reactors which should be operational by 2030.



SUMMARY REMARKS – SUPPLY CHAIN CONSTRAINTS / OPPORTUNITIES



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Offshore Wind

- Local supply chain development
- Globally constrained market supply currently
 - Wind turbine manufacturing - In 2021 global offshore WT manufacturing capacity was 26.56GW. Over 55% in China.
 - Cables
 - Foundations
 - Vessel installation
- Readyng of port infrastructure.
- Floating offshore – synergies with oil and gas
 - Design & fabrication of foundations
 - Mooring systems
 - Floating and deepwater substations
 - Dynamic cables and cable connectors
 - Ballast material and control systems
 - Port infrastructure and vessels

Hydrogen

- Do not look at the sector as colours;
 - Production (Processing – synergies with downstream O&G)
 - Storage / Transportation – (Pipelines, shipping, tanks, compressors – synergies with midstream O&G)
 - End use – (Transportation, Power Generation)
- Bulk of equipment / services exist already
- Electrolyser scale-up needed

Carbon capture

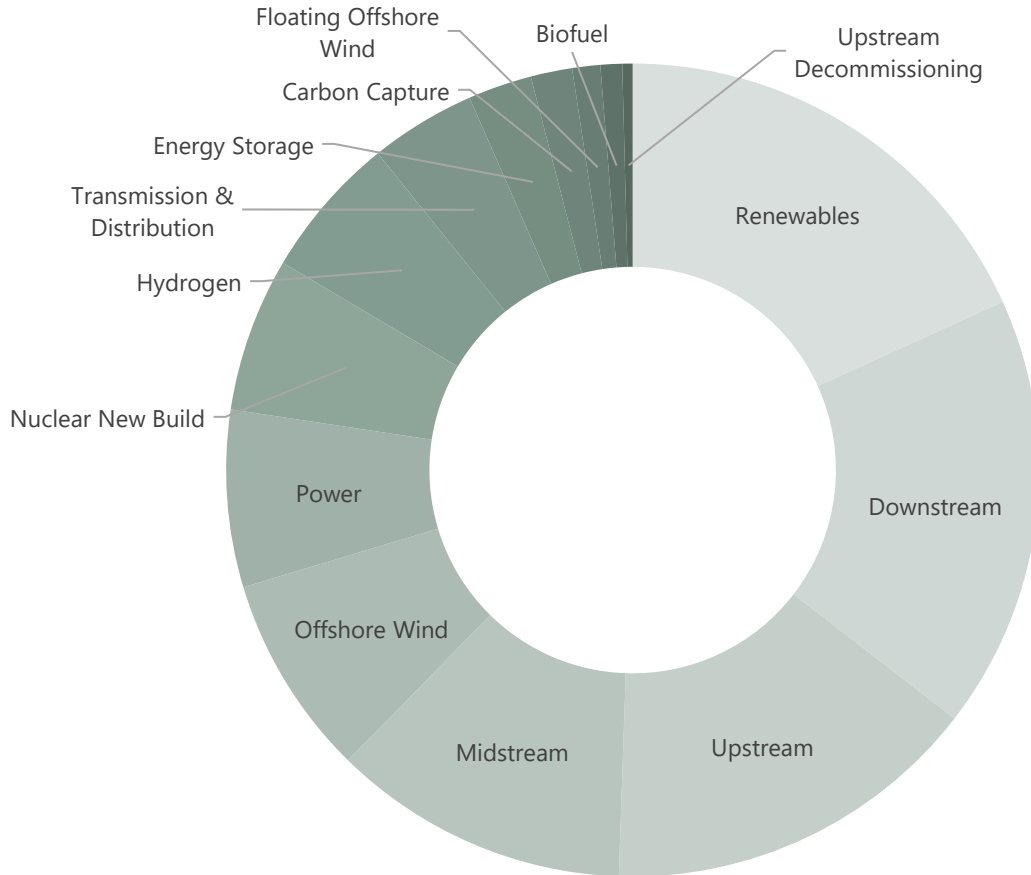
- Supply chain largely exists
 - Capture (Processing – synergies with downstream O&G)
 - Transportation – (Pipelines, shipping, tanks, compressors – synergies with midstream O&G)
 - Storage – (Reservoirs, wells, subsea equipment, monitoring – synergies with upstream O&G)
- Bulk of equipment / services exist already
- Some gaps identified globally for Absorbent Reclamation Units, Absorbent Regeneration Units, Deoxygenation Units.

SUMMARY REMARKS – NEAR/MEDIUM TERM INVESTMENT

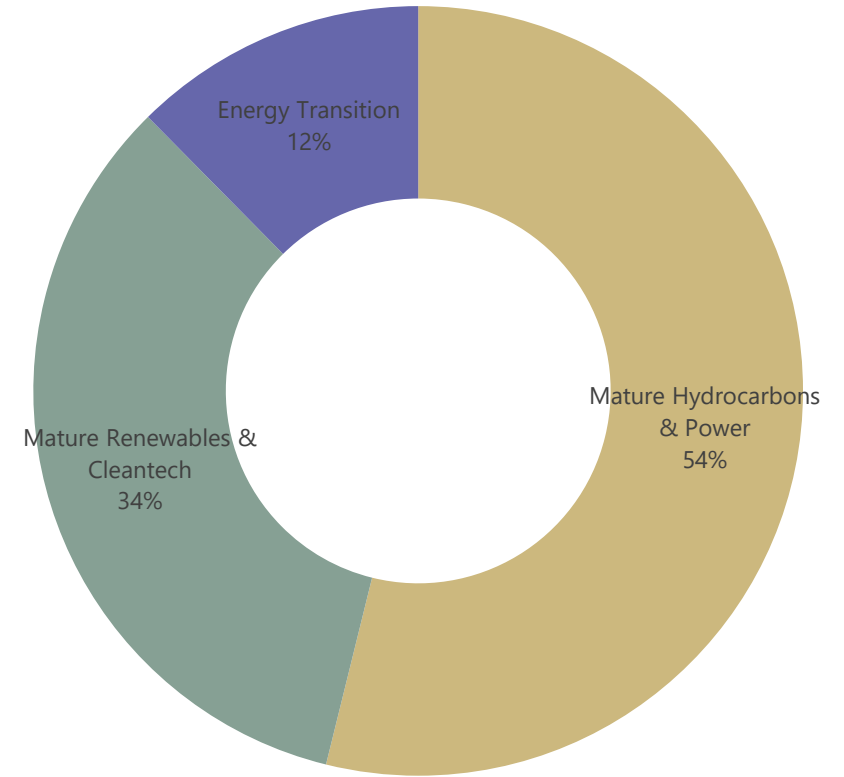


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Value of Projects Based on Commissioning Date up to 2028



Value of Projects Based on Commissioning Date up to 2028
(exc. T&D)

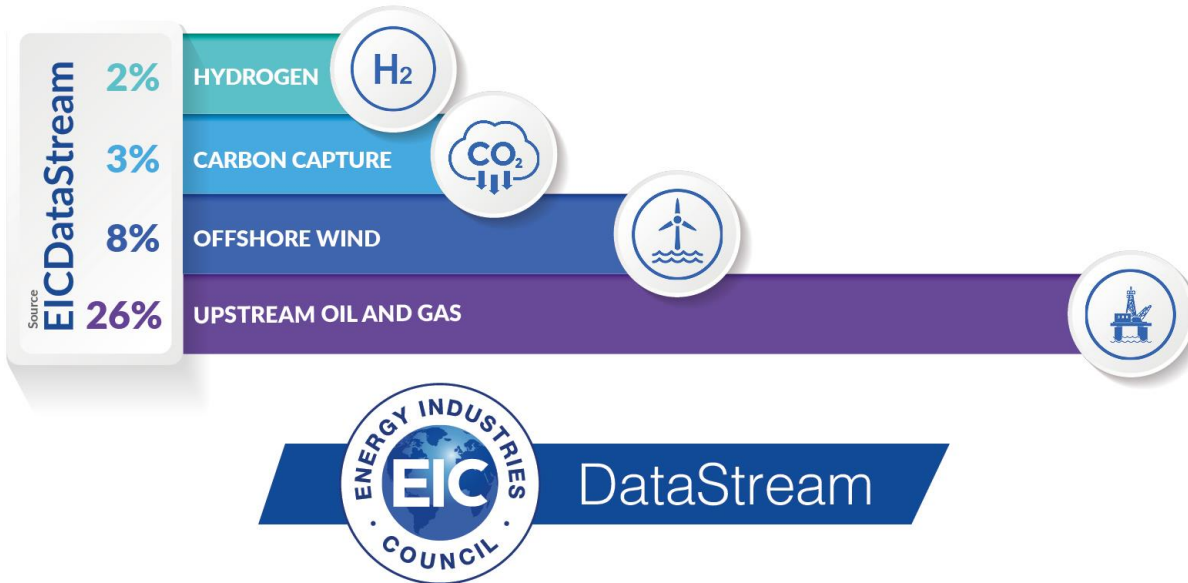


SUMMARY REMARKS – FID DATA



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2023 FID RATES



- **Are Energy Transition projects reaching the Energy Supply Chain yet?**

- FID rates tell a story (financial investment decisions). It's not great news.

- Detail below:

In descending order (sector - FID% of \$value of announced projects):

Upstream Oil & Gas - 26% of \$1.2trn

Midstream / LNG - 22% of \$1.0trn

Downstream - 13% of \$1.5trn

Biofuel - 9% of \$64bn

OffshoreWind - 8% of \$658bn

CarbonCapture - 3% of \$124bn

Hydrogen - 2% of \$445bn

FloatingOffshoreWind - 1% of \$92bn

Source - [#EICDataStream](#)

Thank you!

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Executive Director
Energy Industries Council (EIC)



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