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CARBON CAPTURE & STORAGE, CARBON CAPTURE & UTILISATION

UNFCCC MITIGATION WORK PROGRAMME

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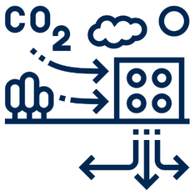
GLOBAL CCS INSTITUTE

CCS AND REACHING NET-ZERO

Achieving deep decarbonisation in hard-to-abate industry.

Enabling the production of low-carbon hydrogen at scale.

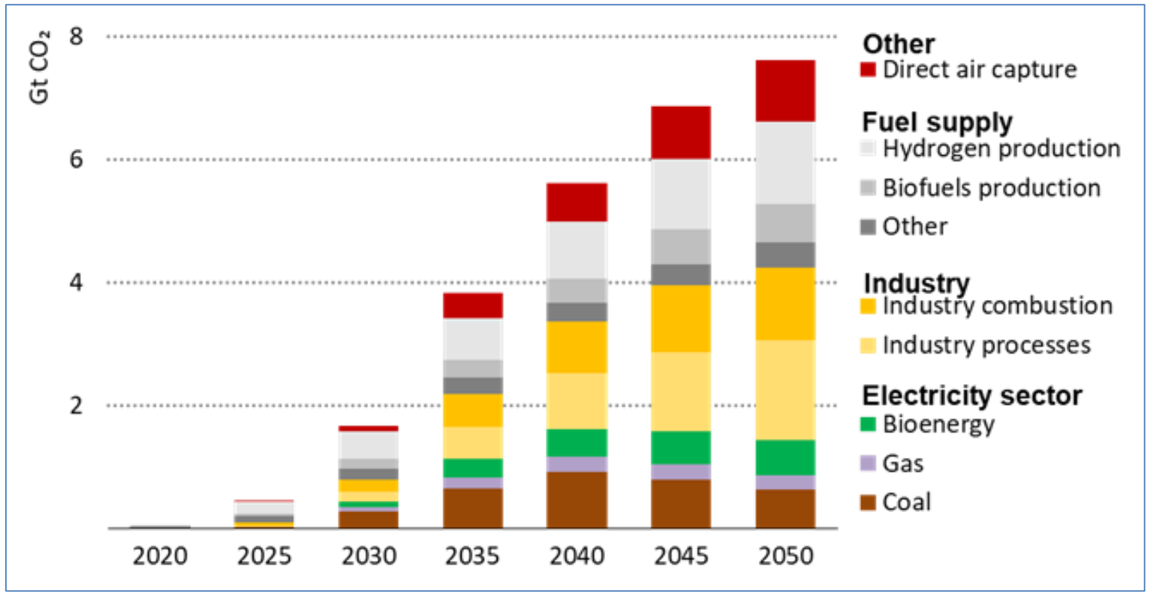
Providing low carbon dispatchable power.



Delivering negative emissions.

GIGATONNE SCALE DEPLOYMENT REQUIRED

- In the IPCC Special Report on 1.5˚C, three of the four pathways depicted involve major use of CCS and all four involve significant CDR.
- According to these three pathways, somewhere between 350 and 1200 gigatonnes of CO_2 will need to be captured and stored within this century.
- In IEA's NZE Scenario, 7.6 gigatonnes of CO_2 needs to be captured per year from diverse sources by 2050, including 2.4 gigatonnes from BECCS and DAC.
- In the NZE scenario CCUS is increasingly important for industry and fuel supply – power-CCUS only 20% in 2050.



Source: IEA Net-Zero Emissions Scenario

GLOBAL STATUS OF CCS

- CCS has been operating safely since the 1970's.
- Currently there are 37 commercial facilities with the capacity to capture and store 50 million tons of CO_2 per year.There are more than 200 commercial facilities in the development pipeline, with a cumulative capacity of 0.3 gigatons per year.
- CCS has been applied to a wide range of sectors, including ethanol, fertilizer, hydrogen and steel production, gas processing, and power generation.
- Very long durability (thousands of years) of geological storage combined with the ability to measure and monitor emission reductions are making CCS increasingly attractive for emitters as well as the finance sector.
- There is enough global storage capacity; IPCC SYR says : "The technical geological storage capacity is estimated to be on the order of 1000 $GtCO_2$, which is more than the CO_2 storage requirements through 2100 to limit global warming to 1.5°C"
- While most CCS is associated with enhanced oil recovery today, we are seeing a shift toward durable geologic storage.

ECONOMICS OF CCS DEPLOYMENT

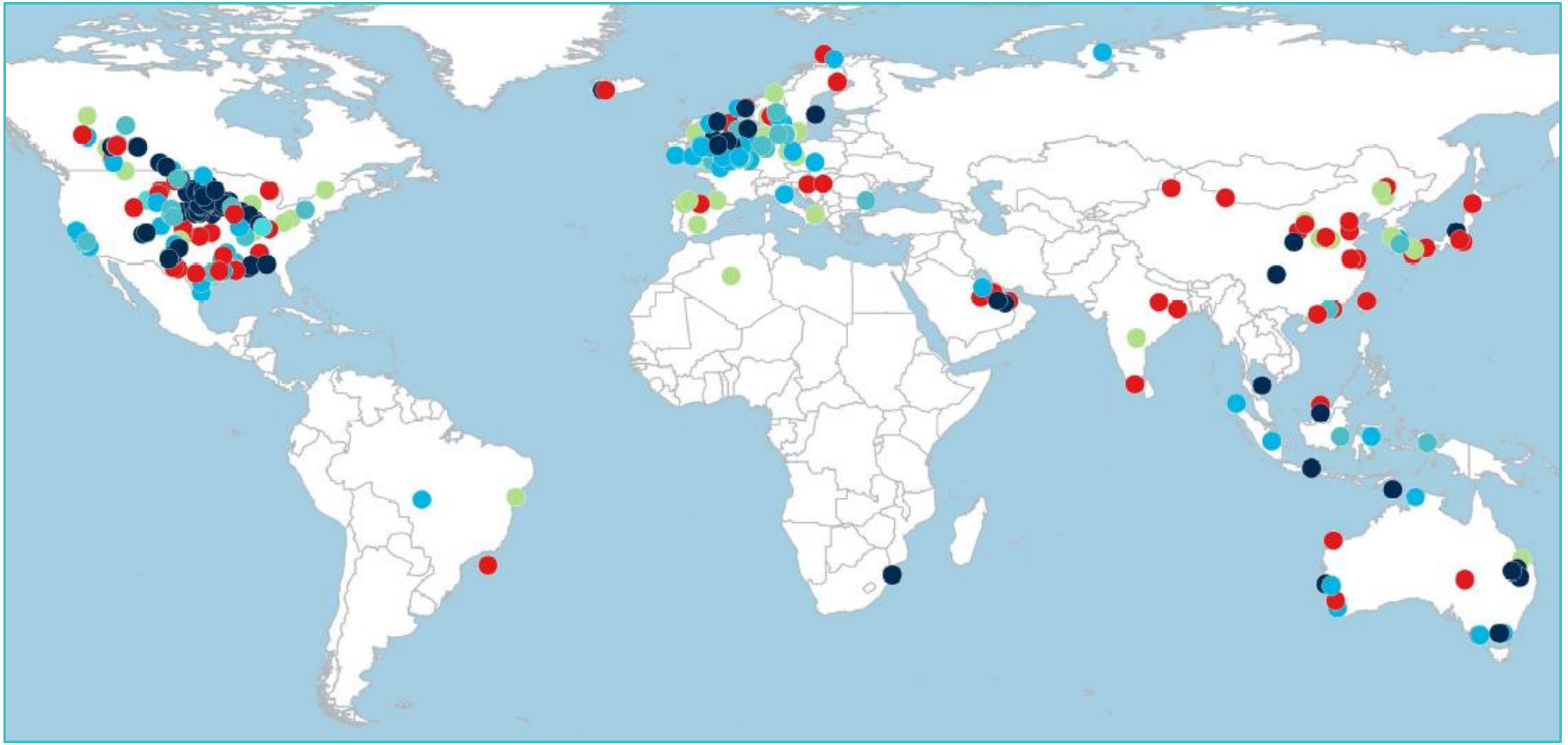
- To reach net-zero emissions all decarbonisation options are needed.
- CCS plays an important role in reducing emissions to net-zero and limiting the overall system cost of decarbonisation.
- There is a range of costs depending on the sector where CCS is applied, broadly ranging between $20/ton and $150/ton; there is no singular cost of CCS. In many applications the cost of applying CCS is lower than alternatives.
- In the CCS value chain capture is often the highest cost component, determined by the concentration of CO_2 in the flue gas stream. Costs come down with deployment though economies of scale and learning by doing.
- Sharing infrastructure through hub and cluster business models reduces cost of CO_2 transport and storage. There is a global trend towards developing larger hubs, connected to shared infrastructure with permanent geological storage for climate mitigation.

CCS DEVELOPMENTS AROUND THE WORLD

- **EUROPE**
  - CCUS in Net-Zero Industry Act; EC developing CCUS strategy.
  - The EU, through the Innovation Fund, to invest in 11 CCS and CCU projects (and counting)
  - Netherlands, Denmark, the UK are progressing their CCS policies and projects.
- **NORTH AMERICA**
  - The US leads globally with project and policy development.
  - In Canada, CCUS Strategy under development and CCUS investment tax credit in federal budget.
- **MENA**
  - 3 facilities in operation in the region, equivalent to ~10% of global capture capacity.
  - Ambition and momentum going into COP28.
- **APAC**
  - China’s first 1 Mtpa CCUS facility started operations in 2022, with several other large projects now in construction or in development.
  - Project progress in Malaysia, Indonesia, and Australia

CCS AROUND THE WORLD

Accessed from GCCSI CO_2RE Database, May 2023



Commercial and Pilot/Demonstration CCS Facilities

Operational or In Construction **Advanced Development** **Early Development** **Completed** **Announced**

WHAT IS NEEDED GLOBALLY?

- Define the role of CCS and carbon dioxide removal in meeting national climate strategies and plans, set and communicate targets.
- Create a long-term, high value on the storage of CO_2.
- Support the identification and appraisal of geological storage resources.
- Develop specific CCS laws and regulations.
- Identify opportunities for CCS networks and facilitate the establishment of transport and storage infrastructure.
- Enable investment in CCS through appropriate policy and market mechanisms.
- Global information sharing and capacity building.

THANK YOU

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