



Emerging Areas Brownbag Series

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# Global CCUS Development Trend

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# Fundamental question: *What is the role of CCUS?*

General approach to reach net zero:

= ~~Avoid~~

– Reduce

- Large stationary emitters (power, steel, cement, fertilizer etc.); data centre & AI
- Large mobile emitters (shipping onboard capture)
- Challenge: emitter stickiness

– Remove

- Direct air capture and storage/utilization (DAC-S or DAC-U)
- Bioenergy with carbon capture and storage (BECCS )

## Organisational capacity readiness for CCUS deployment

- **Government:** Specific authorities on CCS policy formulation and regulatory oversight.
- **Corporate**
  - Oil/gas company: new energy arm being established with CCS as a business growth area
  - Power/steel/cement: CCS projects portfolio under carbon management unit; significant expertise gaps
  - Finance: debt finance products being designed/offered
  - Insurance: commercial offering available
  - Data centres: low carbon dispatchable power sourcing team
- **Technology:** commercially available though much room for efficiency improvement and cost reductions
  - Capture
  - Compression
  - Transport
  - Storage
  - Monitoring, measurement and verification(MMV)
- **Multilateral?**

For multilateral ??

- An advocator
- Capacity builder
- Dot connector
- Low-rate finance provider

# Carbon dioxide removal (CDR)

- Direct air capture

- Remove legacy CO<sub>2</sub> emissions from air
- Significant support from
  - Voluntary market, >US\$1000/tonne
  - Compulsory market , e.g. US 45Q US\$180/tonne, California LCFS
- Challenge
  - Very dilute CO<sub>2</sub> stream (419.3 ppm in 2023, NOAA) => high costs
  - Availability of renewable/nuclear energy
  - Availability of storage facility/resources: Cooper Basin(AUS), Texas(USA), Alberta(CA), Arun(Indonesia)
  - Commercial frameworks
  - Financing: nature of the business
- Technology landscape rapidly evolving: solvent and sorbent
- Integration with renewable fuels of non-biological origin (RFNBOs): e-LNG, e-methanol, e-diesel etc.

- BECCS

- Sustainability
- Scalability
- Commodity or liability



# Key features: sources & sink mismatch; transboundary CCS

## China

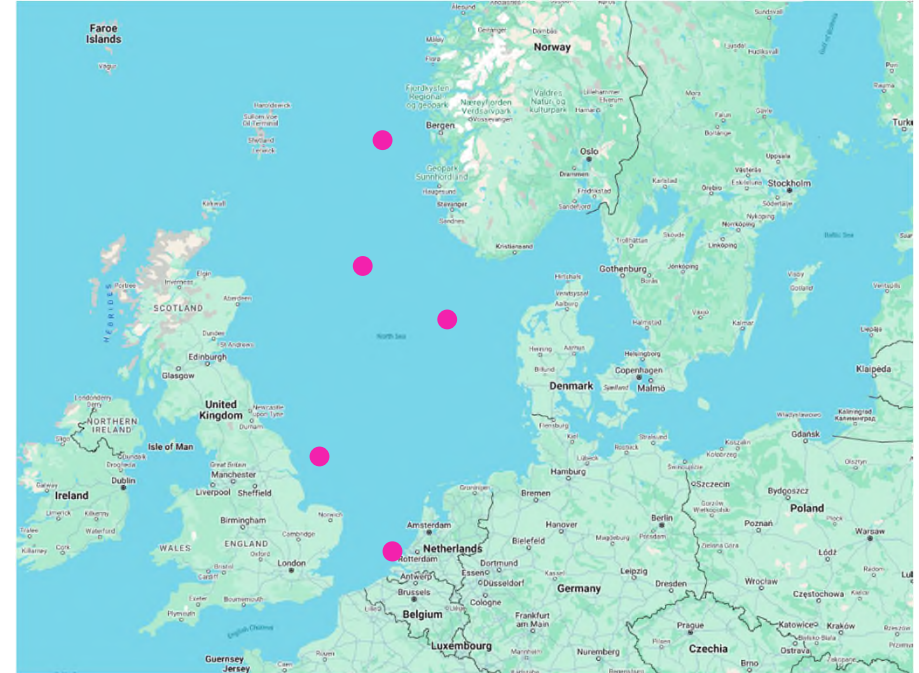
- A significant portion of China's emissions originates from Eastern China, where iron & steel, petrochemical, fertilizer industries are concentrated along the coastal areas.
- Large onshore storage potential volumes in Western China.
- Offshore storage may be more promising due to distance from population and geological storage potentials.

## Southeast Asia

- Most storage are offshore.
- Early mover projects need government support or PSC
- Various transboundary joint studies/MOUs to store CO<sub>2</sub> from Japan/Korea/Singapore
- Transboundary CCS more feasible due to finance support from developed countries

## Europe

- Most storage are offshore
- A variety of business models : UK, Norway, the Netherlands
- European Commission plans for CO<sub>2</sub> transport regulatory package



Example offshore storage locations in the North Sea

# CCS can generate large volume carbon credits

ASX / Media Release

**Santos**

8 February 2022

## Santos announces booking of CO<sub>2</sub> storage capacity

Santos today announced a booking of 100 million tonnes of CO<sub>2</sub> storage resource in the Cooper Basin in South Australia.

This represents a subset of the total prospective storage resource in the Cooper Basin and follows the final investment decision on the 1.7 million tonne per annum Moomba carbon capture and storage (CCS) project in November 2021.

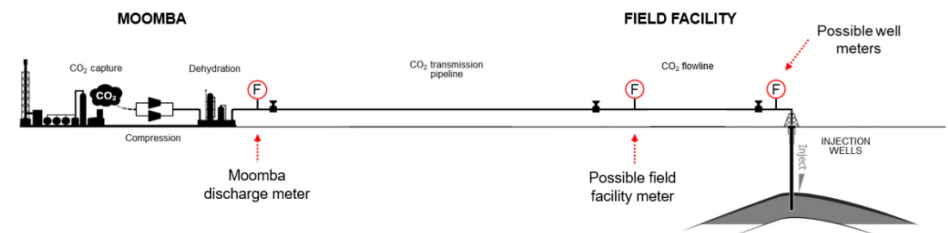
Santos believes this is the first booking in the world in accordance with the CO<sub>2</sub> Storage Resource Management System (SRMS) sponsored by the Society of Petroleum Engineers.

Santos Managing Director and Chief Executive Officer Kevin Gallagher said today's announcement of storage capacity in the Cooper Basin is a significant step in Santos' decarbonisation pathway and carbon storage hub strategy.

"CCS is a critical technology to achieve the world's emission reduction goals and we only have to look at current carbon prices to see how valuable 100 million tonnes of storage is," Mr Gallagher said.

"Santos sees CO<sub>2</sub> storage capacity as a strategic competitive advantage in evolving cleaner energy, clean fuels and carbon markets. This globally significant carbon storage capacity booking is another tangible example of Santos leading the way in establishing the foundations to support the energy transition."

The announcement forms part of the release of Santos' Annual Reserves Statement. Proved plus probable (2P) reserves increased by 80 per cent to 1,676 million barrels of oil equivalent (mmbbl) at the end of 2021, primarily due to the final investment decision on the Barossa project and the Oil Search merger.



## Key Elements

- Carbon market: Australia Carbon Credit Units
- CO<sub>2</sub> source: Cleaner energy production
- Technology: Carbon capture and storage



**Baker Hughes** 