State of Play of CCS in Australia

A regulator's perspective

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South Australia

Japan CCS Forum October 2025

SOUTH AUSTRALIA

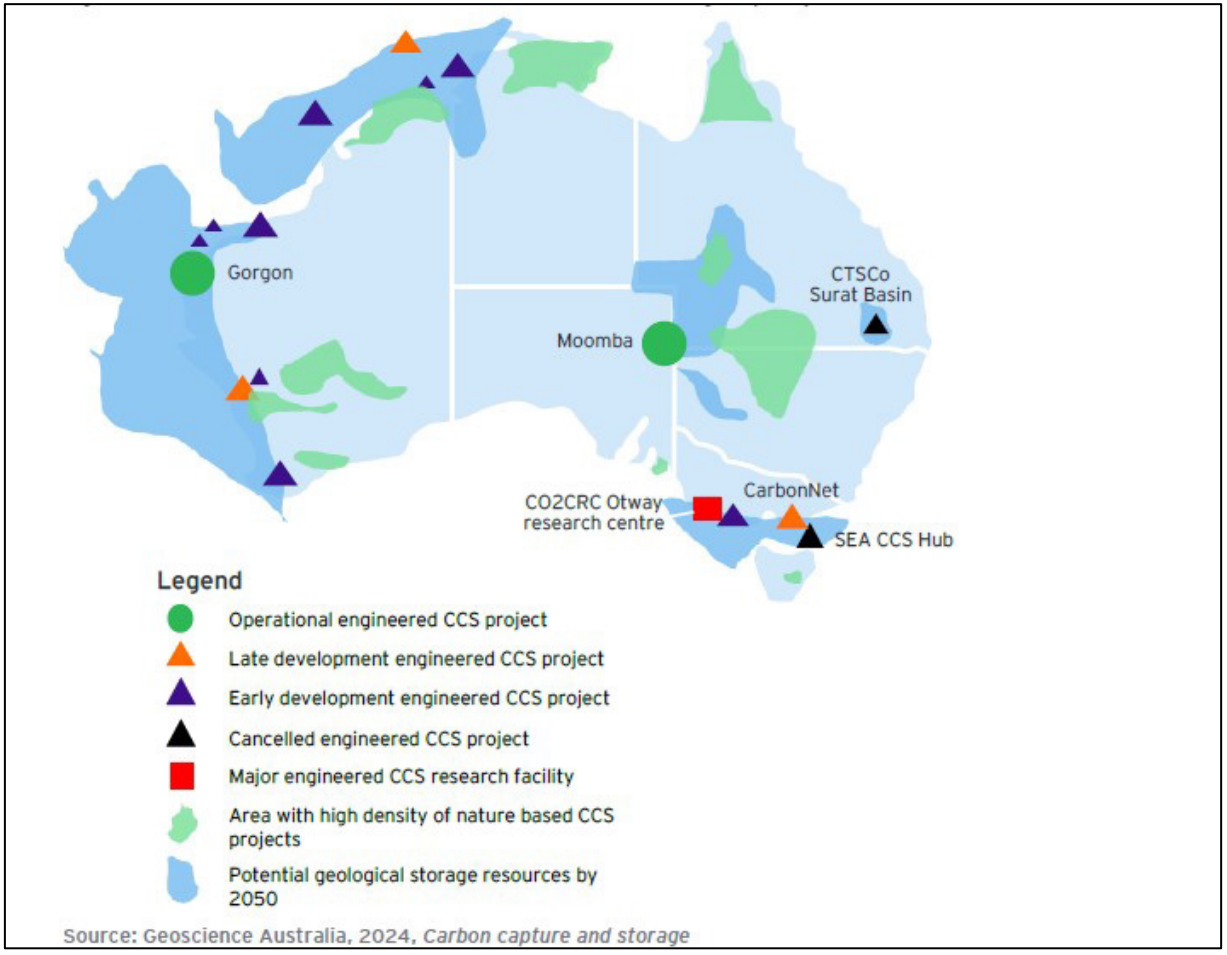
Government of South Australia

Department for Energy and Mining

Content

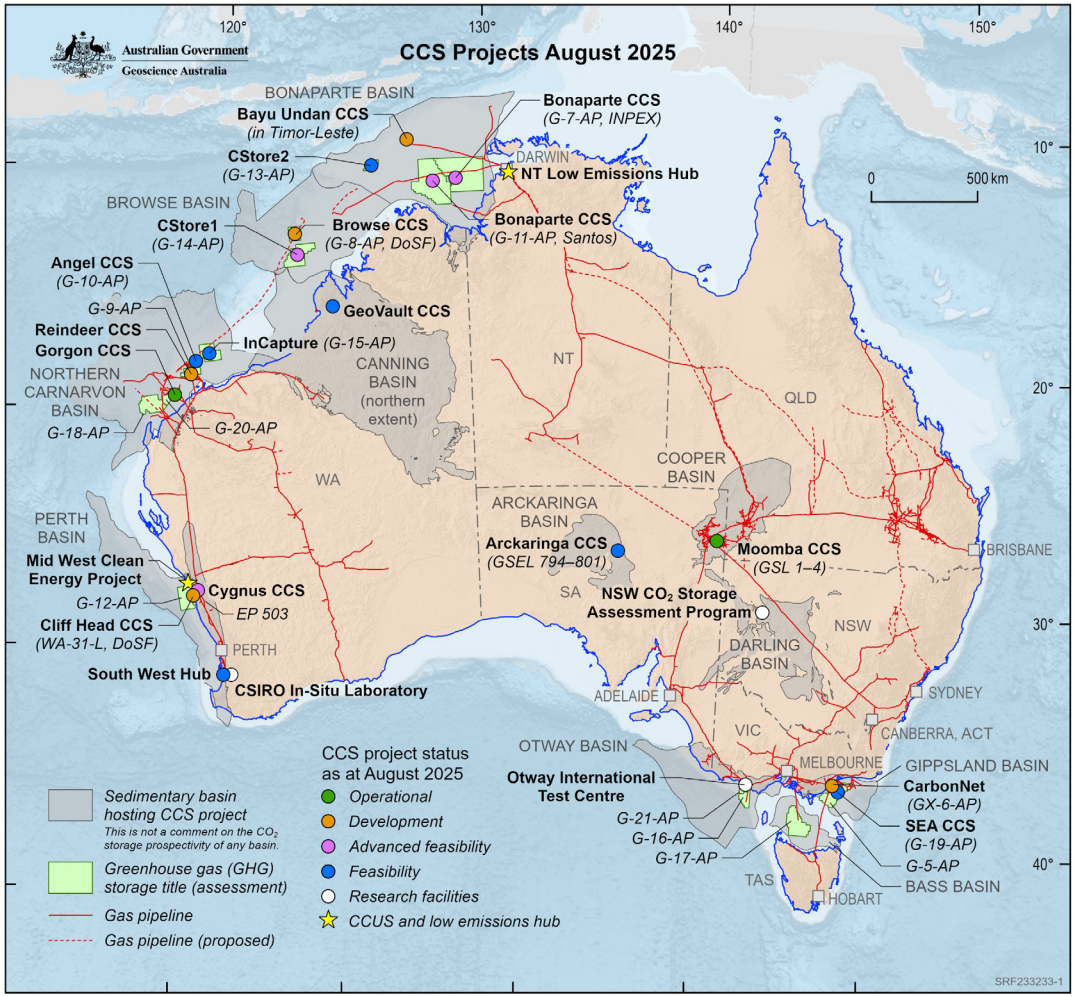
- Status of CCS interest in Australia
- Background on CCS legislation in Australia;
- Example of CCS project regulated under such legislation;
- Role of regulation for community confidence in CCS:
  - Monitoring & Verification;
  - Transparency – publish and explain M&V results
- Important technical challenges with CCS; and
- Where to from here with commercial CCS deployment.

CCS Operations in Australia



Source: Geoscience Australia, 2024, *Carbon capture and storage*

CCS Operations in Australia

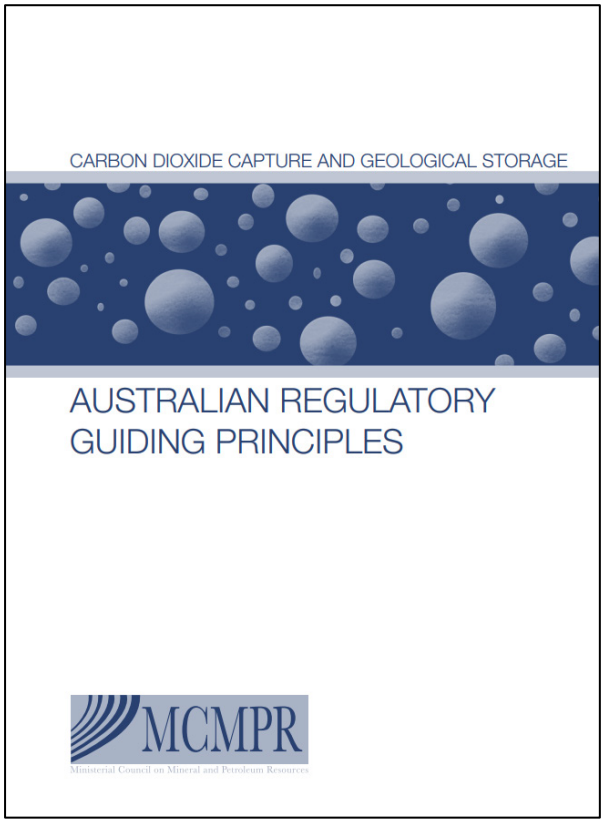


On 12 June 2024, the Queensland Government banned all greenhouse gas (GHG) storage and injection activities in Queensland's Great Artesian Basin (GAB).
Pipelines routes from the GPInfo petroleum database.
DoSF: Declaration of an identified Greenhouse Gas Storage Formation.

Effective CCS Legislation – historical context

In 2005 COAG/MCMPR published guiding regulatory principles for CCS, calling for:

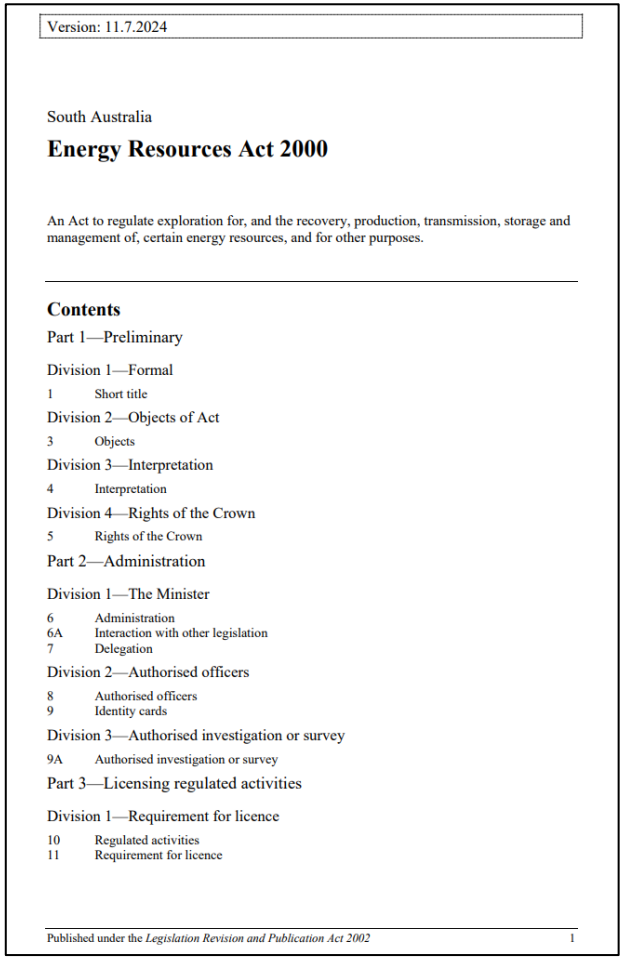
- Effective resource access and property rights
  - *Secure CCS storage rights – industry investment certainty*
- Nationally consistent assessment and approval processes
  - *Risk based regulation – Process Safety Management framework*
- Effective Monitoring and Verification
  - *Demonstrate CCS is working*
- Long term liability post closure
  - *Once secure storage is demonstrated – liability reverts to state*



Example: Regulatory Framework

- South Australian *Energy Resources Act 2000* covers all CCS stages - established in 2009 in response to the 2005 COAG/MCMPR guiding regulatory principles
- Why regulate CCS:

1. Underground resources in Australia belong to the Crown – including the pore space for CCS.
2. Licensing – secure rights and tenure
3. Environmental assessment –
   a) focussing on risks and objectives to address those risks Moomba CCS Project EIR and Moomba CCS SEO
   b) early stakeholder engagement
   c) adoption of relevant and recognised standards
4. Efficient and effective approvals and surveillance
5. Effective and transparent Monitoring and Verification Monitoring and Verification Plan
6. Rental payments for use of pore space
7. Minimise risks of long-term liability



Version: 11.7.2024

South Australia

Energy Resources Act 2000

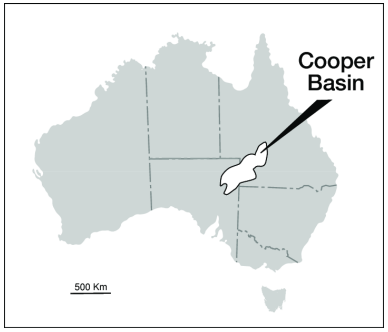
An Act to regulate exploration for, and the recovery, production, transmission, storage and management of, certain energy resources, and for other purposes.

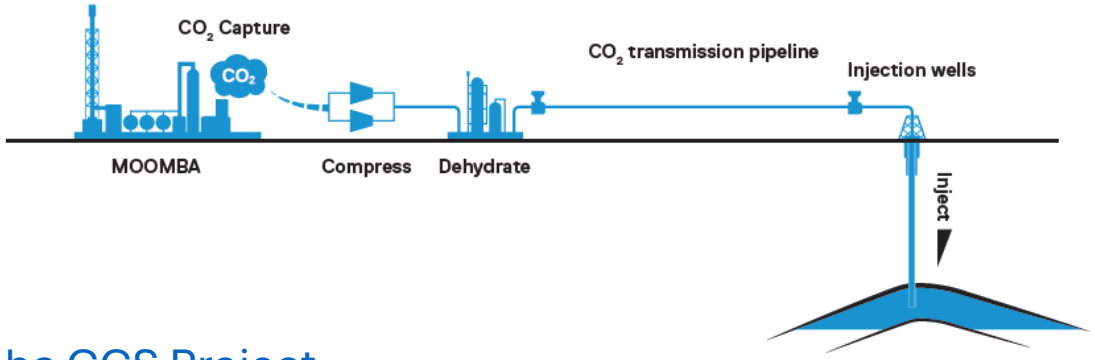
Contents

Published under the *Legislation Revision and Publication Act 2002* 1

Moomba Carbon Capture and Storage Project

- First phase operational since 30 September 2024.
- Current injection of 1.7 Mtpa CO_2 from Moomba processing plant to depleted fields.
- 1.7 Mtpa represents approximately **7% of South Australia's total emissions**.
- Future phases target injection of 20 Mtpa from other local and international sources.
- Direct air capture trials planned at Moomba.

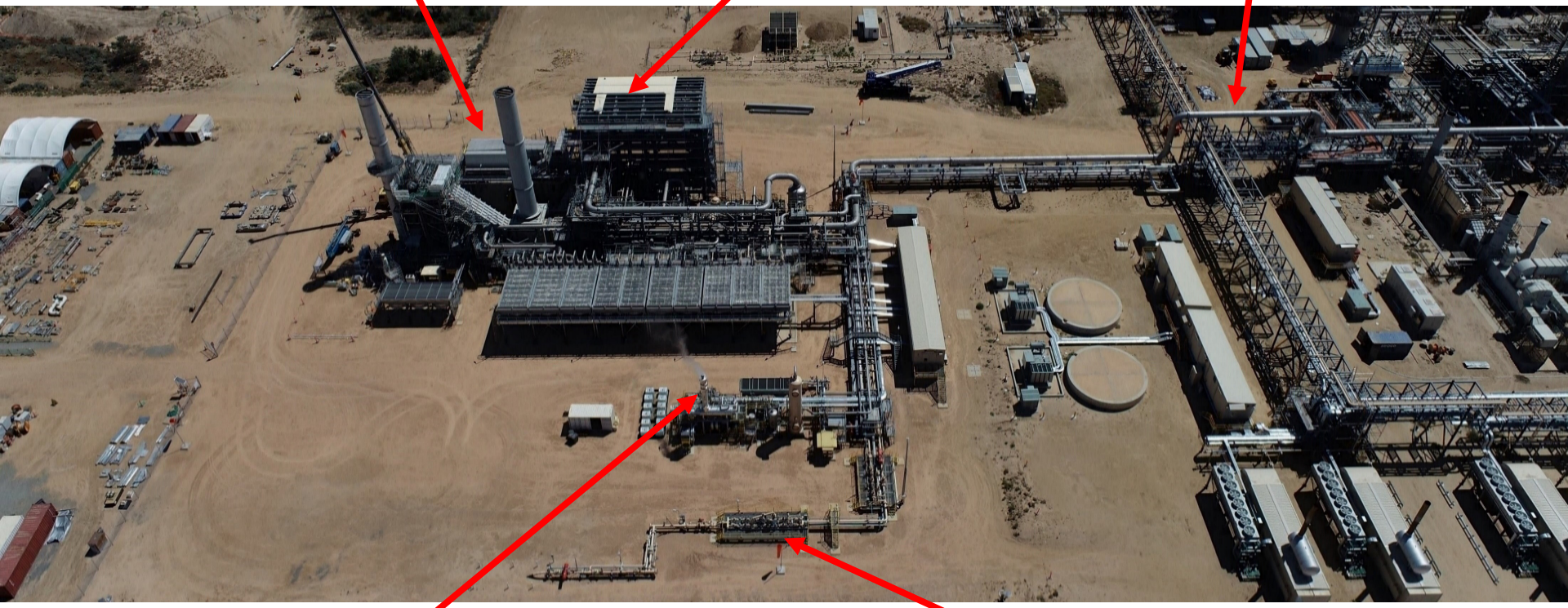




Phase 1 animation – Moomba CCS Project

Source: Santos Ltd.

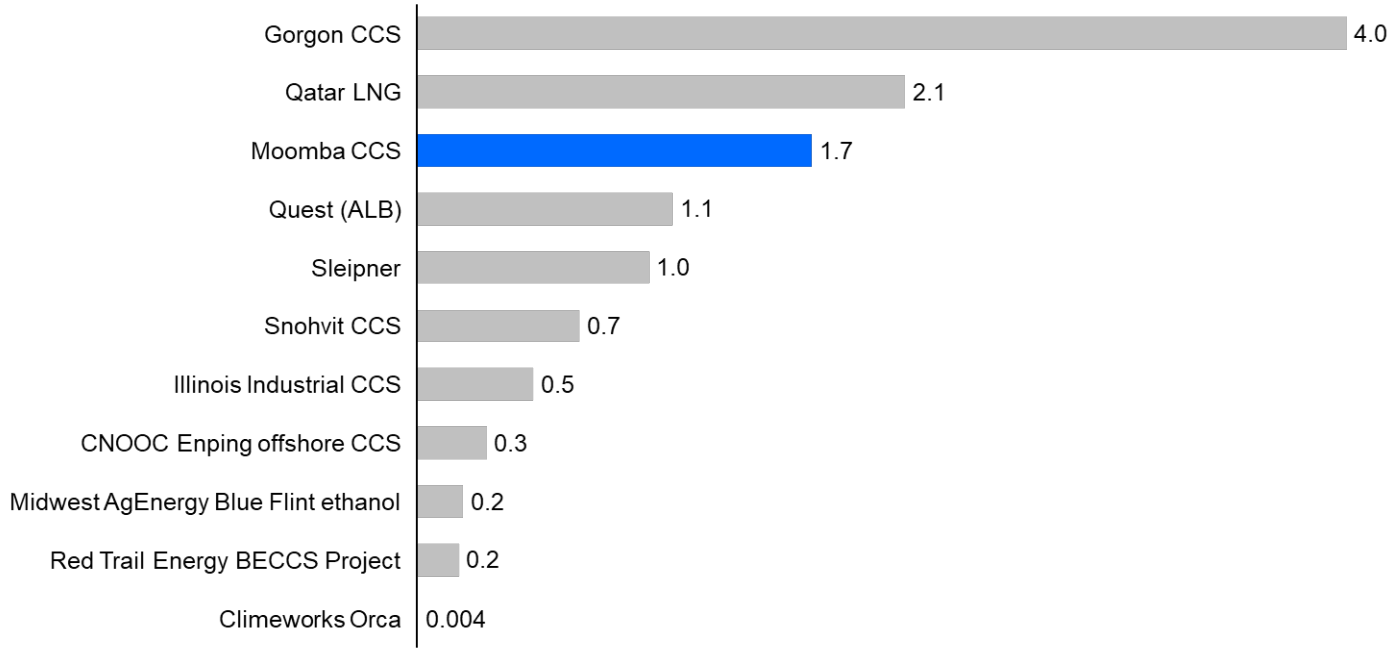
Moomba CCS Facility



Source: Santos Ltd.

CCS Facilities Globally

Announced capacity of dedicated storage CCS projects mtpa, IEA database



https://www.iea.org/data-and-statistics/data-product/ccus-projects-database, accessed 16th July 2024 by Santos Ltd.

Moomba CCS Environmental Approval

- Objective/Risk based approach

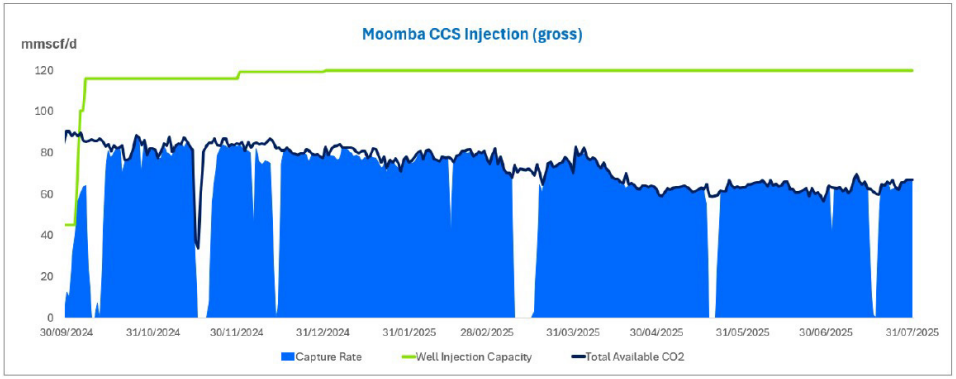
- Environmental Impact Report (EIR)
  - Addresses all environment risks (natural/social/economic) and how risks will be managed to ALARP. – Moomba CCS Project EIR

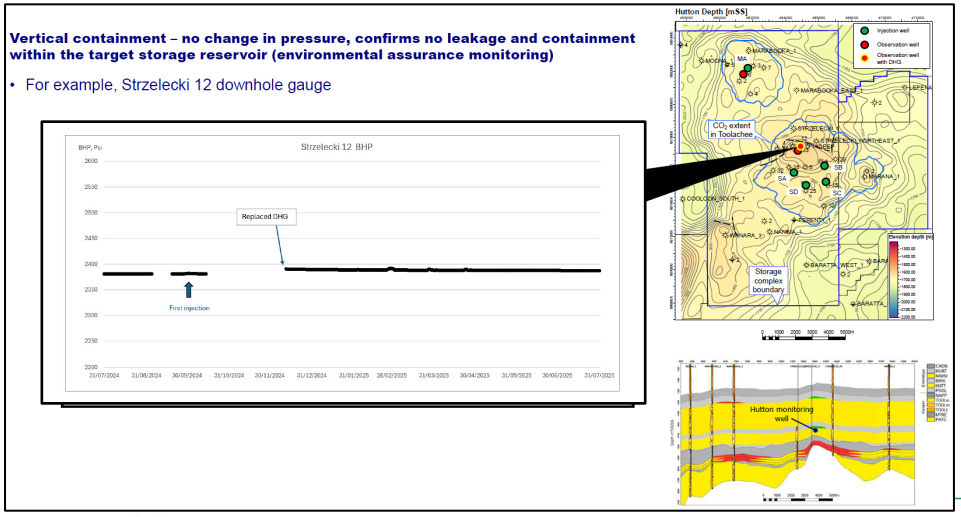
- Statement of Environmental Objectives (SEO)
  - Prepared on the basis of addressing relevant risks detailed in the EIR:
    - Environmental objectives to be achieved
    - Assessment criteria to measure objectives
    - Gazette – activity and location specific regulation
    - Moomba CCS SEO
    - Key SEO requirement: approved public Monitoring and Verification Plan

MOOMBA MONITORING AND VERIFICATION PLAN

https://www.energymining.sa.gov.au/industry/energy-resources/regulation/projects-of-public-interest/cooper-basin-carbon-storage

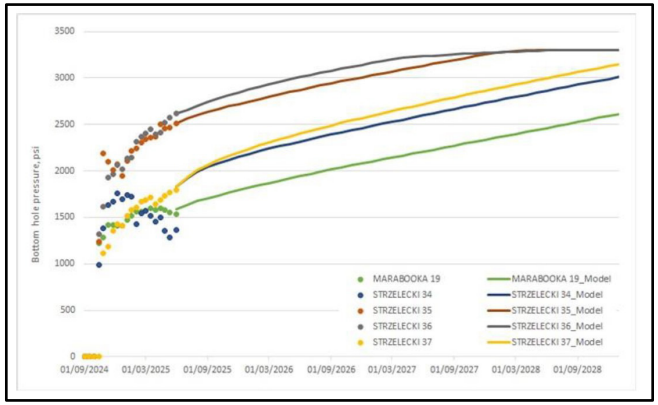
- Establish community confidence in CCS by proving that CCS works – tell and show the world why CCS projects are proving to be successful e.g. Gorgon and Moomba – sell the wins!



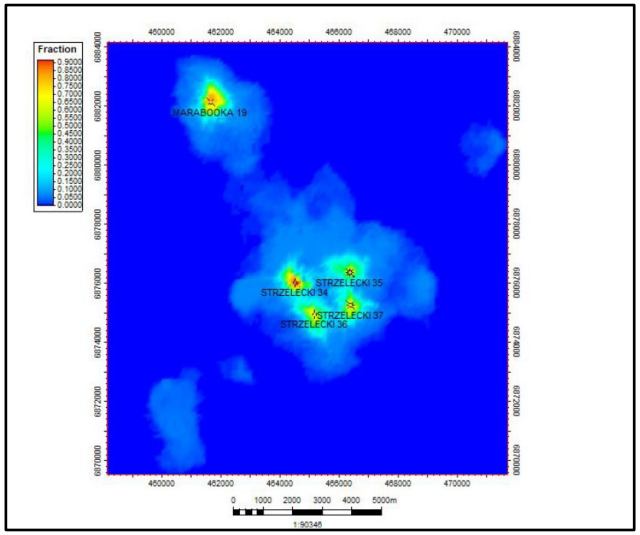


Source: Moomba M&V Plan and Reports

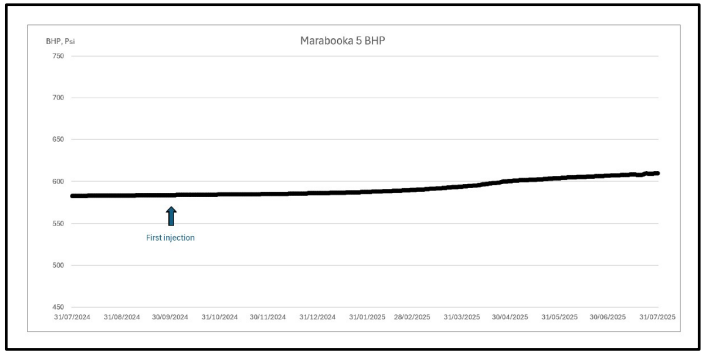
BHP Actual vs Modelled



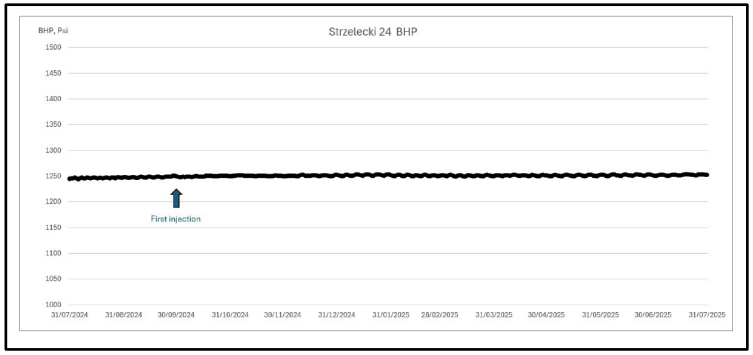
1 Million Tonne Injection Modelled



BHP Closest Monitoring Well



BHP Furtherst Monitoring Well



Important technical CCS matters

- Above all, objective is to maintain greater than 95% CCS network availability – community confidence
- Understand the underground geology and hydrodynamic behaviour of CO_2 plume
- Understand CO_2 phase behaviour (gas vs dense phase) for a particular CO_2 Stream specification
- Know your CO_2 stream specification/composition – establish what impurities are present
- Impurities affect phase behaviour – in turn can lead to uncontrollable corrosion
- Expected phases of operation, pressure and temperature variations due to:
  - Start-ups: – incl. commissioning
  - Shut-downs: planned and unplanned
  - Depressurisation events: planned and unplanned
- Material selection and dehydration: addressing corrosion risks – don't forget what happened at Gorgon!

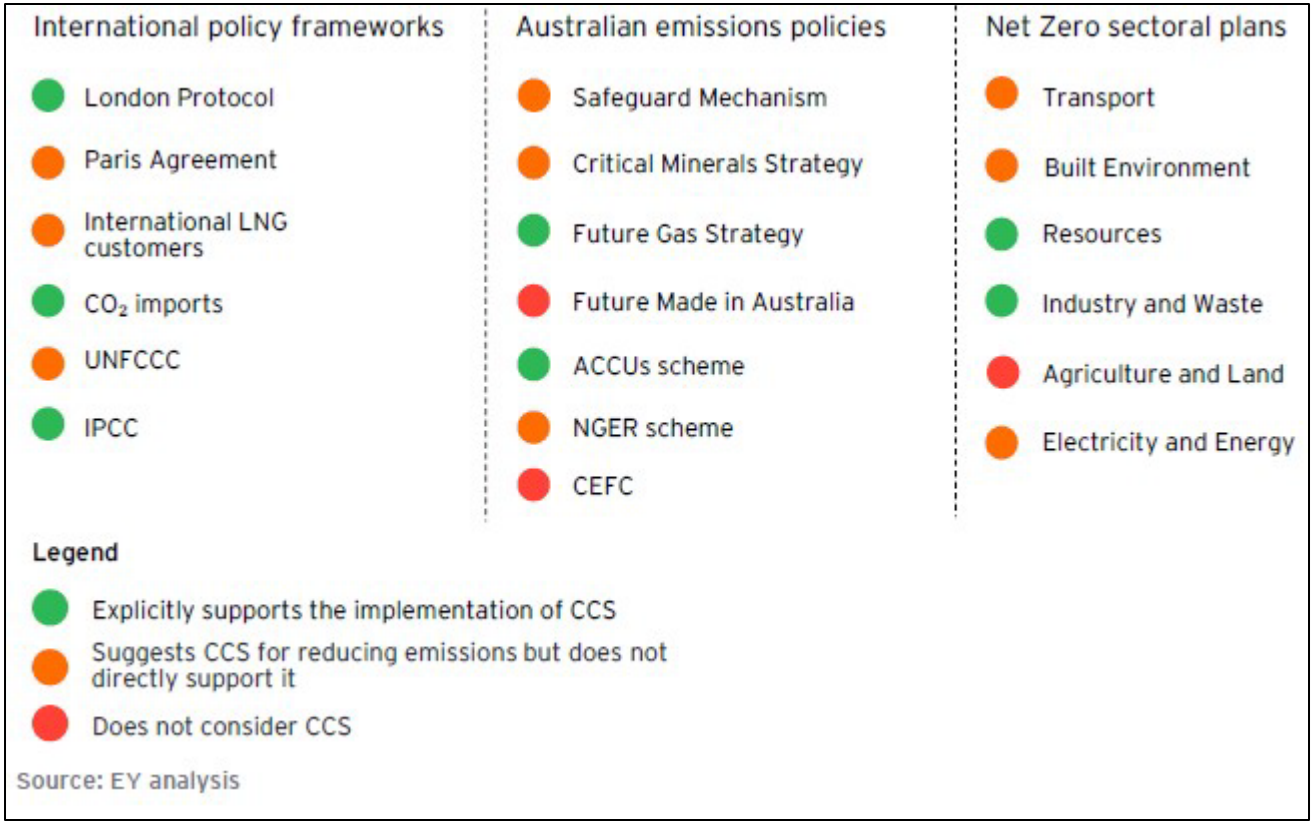
Source: Experience and ISO/TR 27925

Where to from here for CCS?

Some observations to progress CCS:

- Above all: must have consistent federal government CO_2 abatement policy, best to be technologically agnostic – don't pick winners – allow all technologies to serve their purpose
- Remove potential policy barriers to CCS deployment
- Best achieved through an effective financial incentive framework – e.g. ACCUs/carbon price/effective safe-guard mechanism?
- Recognise and acknowledge that CCS is "**a**" CO_2 abatement technology not "**the**" abatement technology
- Won't be long before narrative moves from "net-zero" to "net-negative" – hence importance of CCS
- Efficient, effective and practical regulation premised on:
    - Continuing development and implementation of best practice CCS standards including (M&V)

Some Policy observations to progress CCS:



Source: LETA Report: The Economic Potential for CCS in Australia's Eastern States

Some observations to progress CCS:

- Need economies of scale: establish CCS hubs – adjacent to point sources – e.g. steel/cement/power plants
- Viable Ship transport – Australia has potential to become Asia's CCS hub!
- Regional hub maybe? Australia/Indonesia/Malaysia work together?
- Government/industry partnerships
  – particularly for key infrastructure (SA Government CCUS Infrastructure Report)
- Establish community confidence in CCS by proving that CCS works – tell and show the world why Gorgon and Moomba CCS projects are proving to be successful – sell the wins!

South Australian Import Opportunity

Three Local Clusters and Global Import Opportunity

The analysis considers three phases with three clusters of industry generating CO_2 as well as global import scenario. The phases are generally independent and the program can be modified to capitalise on the best-for-state opportunities.

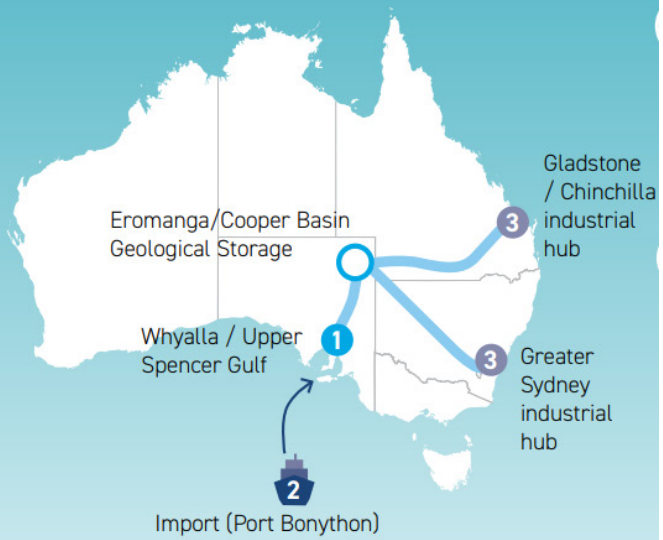
Phase 1 – Upper Spencer Gulf / Whyalla Cluster - A CCUS hub is developed at Whyalla in the Upper Spencer Gulf, with infrastructure development occurring entirely within SA to maximise state economic activity. A pipeline is constructed for the transport of CO_2 to the storage location.

Phase 2 – Global Importation – Development of CCUS import infrastructure, with CO_2 imports occurring via Port Bonython from trade partners such as Japan and South Korea. Additional pipeline infrastructure supports the transport of CO_2 for storage.

Phase 3 – Greater Sydney & Gladstone/ Chinchilla Clusters - QLD and NSW CCUS hubs are implemented with an interstate pipeline for the transport of CO_2 into SA for storage.

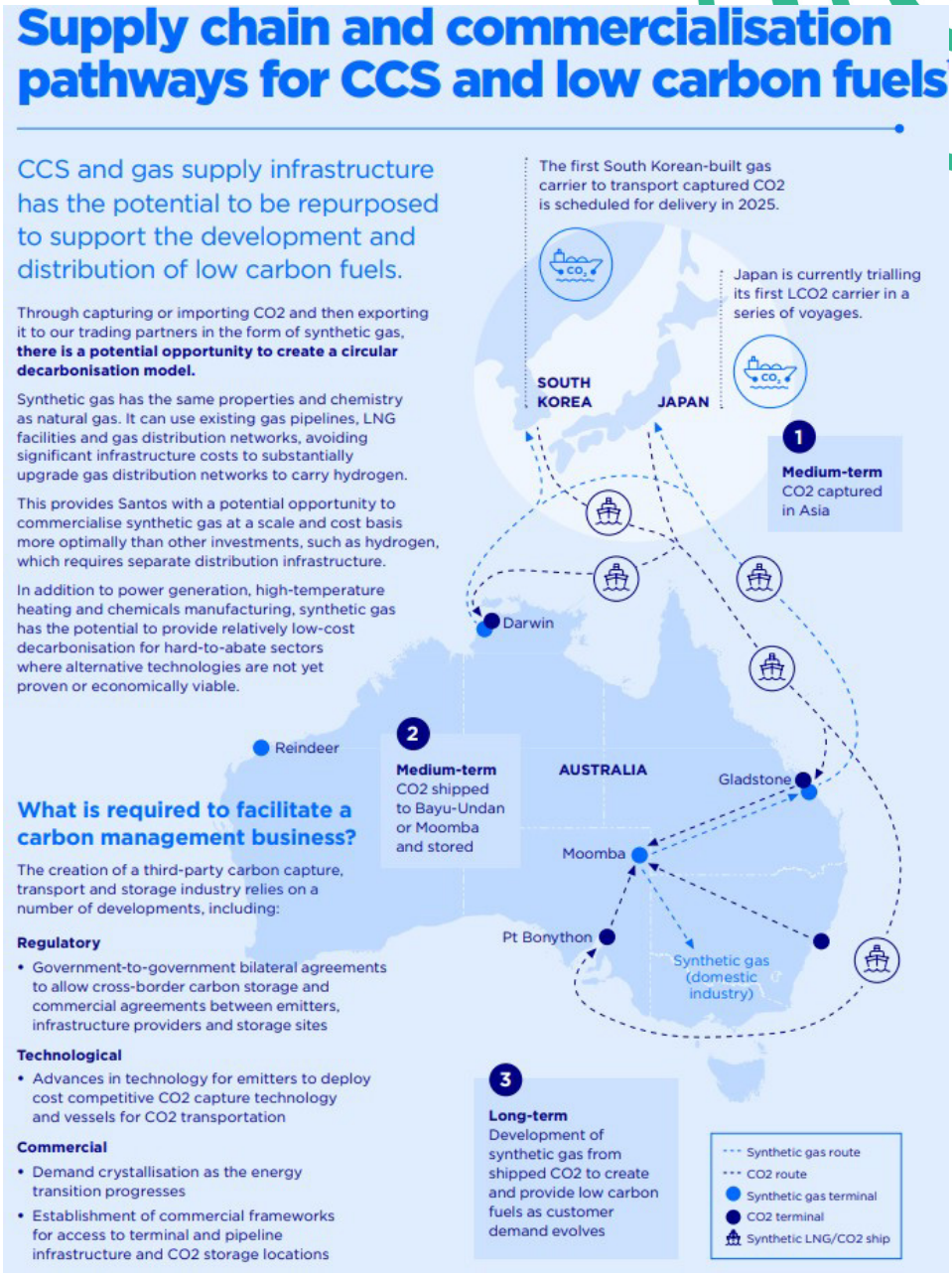
Next Steps

ISA undertook this study to understand the potential establishment of a CCUS industry in SA and the ability to address local, national and international opportunities. This study indicates that a range of opportunities exist for SA and presents one potential scenario for infrastructure and partnerships. The next steps will further explore the opportunities and feasibility of CCUS for SA.



Source: [Infrastructure SA, CCUS Infrastructure and National Supply Chain Study]

Commercialisation Pathways for CCS in Australia



Source: Santos Climate Transition Action Plan | Santos | Santos

Scenarios to commercialise CCS in Australia

Conditions	Moderate growth	Accelerated deployment	Sequestration nation
How CCS might develop on the east coast	Gradual expansion of CCS in industrial clusters	Coordinated efforts and investments enable widespread CCS adoption across industries and regions, lowering barriers for smaller-scale facilities	CCS becomes a cornerstone of Australia's decarbonisation strategy, supported by strong policy alignment, advanced technologies, and significant investment, positioning Australia as a global leader in CCS
How CCS could support industries on the east coast	Steady adoption in select industrial clusters in Victoria, with minimal expansion into other regions or industries	CCS technologies deployed at scale across states, with an emerging storage as a service and H_2-CCS industry	Industrial onshoring, decarbonisation of metallurgical coal mining through VAM CCS, and development of a domestic hydrogen sector increases the demand for CCS
Minimal scale thresholds for facilities which can afford to access CCS	Very large facilities producing around 1 $MtCO_2$ per year	Large facilities producing around 0.5 $MtCO_2$ per year	Medium-large facilities producing around 0.25 $MtCO_2$ per year
Regulatory conditions	Few changes from current settings	Supportive – Carbon storage permitted in Queensland from 2035	Supportive – Carbon storage permitted in Queensland from 2030

Source: EY analysis

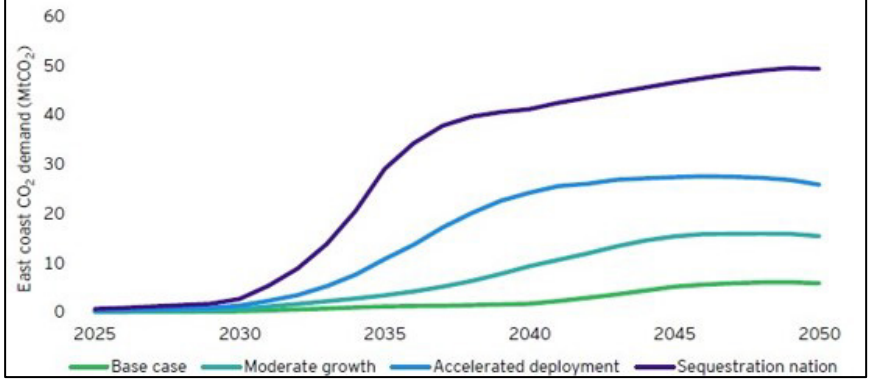
Note: These scenarios aim to explore the potential of CCS on Australia's east coast and were developed for the purpose of this study only.

Under the high growth 'Sequestration Nation' scenario where the right mix of regulatory, technology, and commercial settings are introduced, CCS deployment along the east coast could rapidly accelerate to 50 $MtCO_2$ in 2050.

A fully networked CCS industry along the east coast could increase economic activity by around $66 billion and support an additional 15,250 jobs over the coming decades.

Such a scenario would require a significant but achievable scale up in common-use infrastructure, reductions in upfront capital and ongoing costs, particularly for emerging technologies such as direct air capture, and effective coordination across government and industry.

Figure 1: Potential east coast demand for CCS under each scenario



Source: LETA Report: The Economic Potential for CCS in Australia's Eastern States

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