

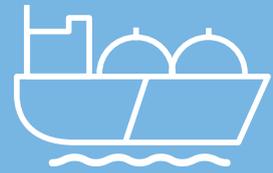
About Middle Arm

The Northern Territory Government is working to transform Middle Arm into a sustainable 'development ready' industrial precinct.

The precinct aims to capitalise on the Territory's renewable energies to grow manufacturing and value-adding jobs while supporting economic growth.

The precinct will be a master planned area with a focus on low emission hydrocarbons, hydrogen, advanced manufacturing, carbon capture and storage and minerals processing.

Sustainable outcomes and environmental protection of Darwin Harbour and surrounds are at the core of planning for the Middle Arm Sustainable Development Precinct.



What is carbon capture, utilisation and storage?

Carbon capture, utilisation and storage (CCUS) is a proven process that captures carbon dioxide emissions, preventing entry into the atmosphere. Broadly the process covers the following:

Capture:

Technical process that captures carbon dioxide in a gas or exhaust stream. The techniques of capturing carbon typically use a process requiring a catalyst or membrane to separate the carbon from a mix of other gases.

Utilisation:

Turning carbon that would otherwise be waste into a feedstock (or input) for another industry or purpose.

Storage:

Transport for permanent storage underground in stable geological formations (porous underground rock).

According to the International Energy Agency, carbon capture and storage has an important role to play in the global transition to net zero emissions.

Carbon capture, utilisation and storage at Middle Arm

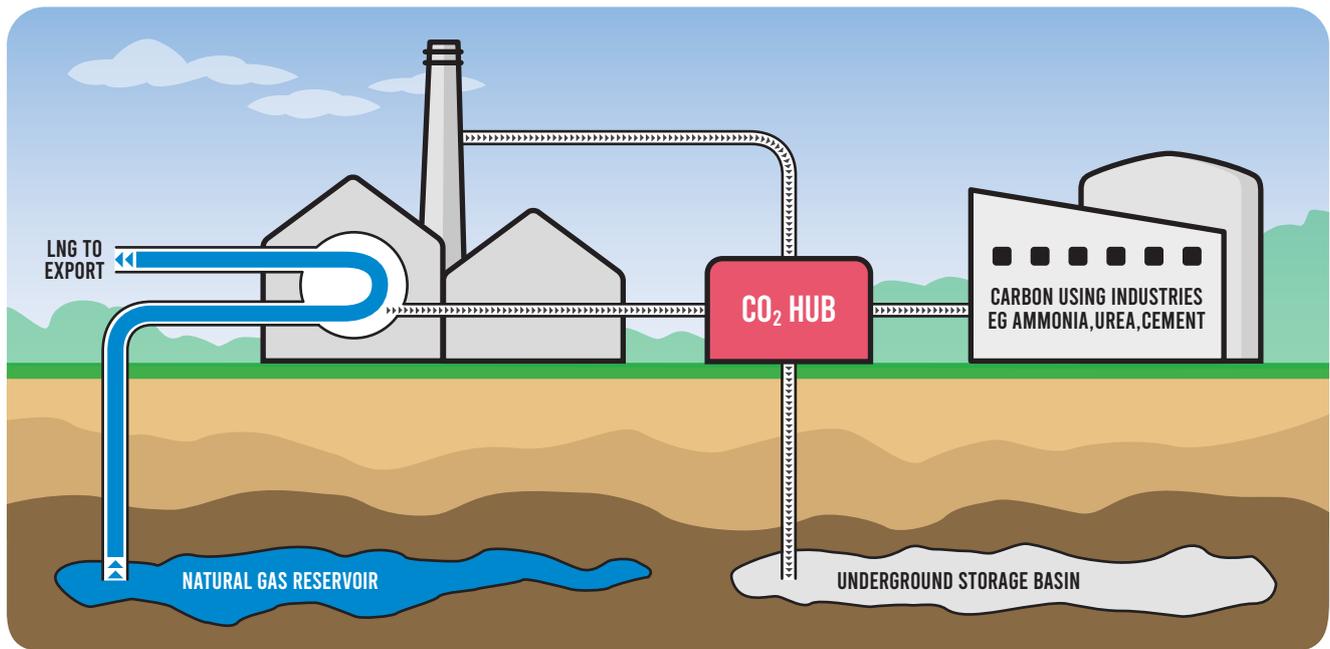
CCUS is a critical emissions reduction technology supporting clean energy transitions. The proposed hub at Middle Arm will be one of the world's largest facilities of its kind and will enable:

- existing LNG production to continue and grow with a significantly lower carbon footprint
- establishment of new low-emission hydrocarbon and hydrogen based industries.

Once carbon is captured and transported to the proposed hub at the precinct, it will either be stored or used. Storage at the precinct would entail carbon being sent via a pipeline to geological storage outside of Darwin. There will also be opportunity for industries to utilise carbon captured at Middle Arm to produce other valuable products.

An example of carbon being utilised, or reused, is using carbon to make urea, a common fertiliser. Another example is cement manufacturers developing technologies to inject carbon into their manufacturing process. This improves product performance and offsets emissions.

The Northern Territory Government in partnership with the CSIRO, industry and engineering companies are collaborating on a business case to map an accelerated pathway to establishing CCUS at Middle Arm.



▶▶▶▶▶ Natural gas ▶▶▶▶▶▶▶ Carbon dioxide

Current carbon capture and storage projects at Middle Arm

Two offshore carbon storage projects are currently proposed or underway at Middle Arm. Both projects will include capturing carbon onsite then transporting it offshore for storage.

INPEX is leading progression of the Bonaparte Carbon Capture, Utilisation and Storage (CCUS) Project in the Petrel Sub-basin. Assessments have indicated the basin has a lifetime storage capacity of 6.48 gigatonnes. This is equivalent to storing Australia's current entire yearly carbon emissions for 16 years in one basin.

Additionally, the proposed Bayu-Undan Santos-led project in the Timor Sea entered front-end engineering and design (FEED) in 2022 with the potential to store up to 10 million tonnes of carbon each year.

Successful carbon capture, utilisation and storage projects around the world

According to the International Energy Agency, CCUS facilities currently capture almost 45 megatonnes of carbon dioxide globally¹. There are around 35 commercial facilities applying CCUS to industrial processes, fuel transformation and power generation with around 300 projects in various stages of development.

The Sleipner CCS project was the world's first commercial CO₂ storage project. It commenced in 1996 in response to Norwegian Government policies². CO₂ is removed from the hydrocarbons produced at an offshore platform then pumped back into the ground. By May 2008, the project had successfully stored over 10 million tonnes of CO₂.³

Considerable resources are being dedicated to growing CCUS around the world. Here in Australia the country's 'leading carbon capture, utilisation and storage research organisation', CO2CRC, has more than 19 years of experience safely capturing, storing and monitoring CO₂⁴. As of 2022, the organisation has stored more than 95 000 tonnes of CO₂. CO2CRC owns and operates the Otway International Test Centre, a world class test facility focused on advancing CCUS technology in Australia and around the world.

1 International Energy Agency, <https://www.iea.org/fuels-and-technologies/carbon-capture-utilisation-and-storage>

2 CCS Norway, [https://ccsnorway.com/ambitious-goals/#:~:text=Since%201996-,It%20was%20in%201996%20that%20Statoil%20\(now%20Equinor\)%20commenced%20CO2,the%20Norwegian%20Government%20in%201991](https://ccsnorway.com/ambitious-goals/#:~:text=Since%201996-,It%20was%20in%201996%20that%20Statoil%20(now%20Equinor)%20commenced%20CO2,the%20Norwegian%20Government%20in%201991)

3 Carbon Capture & Sequestration Technologies at MIT, <https://sequestration.mit.edu/tools/projects/sleipner.html>

4 CO2CRC, <https://co2crc.com.au/#:~:text=CO2CRC%20is%20Australia's%20leading%20carbon,capturing%2C%20storing%20and%20monitoring%20CO2>