



PROJECT SNAPSHOT

COMPLETED PROJECT

ZEROGEN: CARBON CAPTURE: INTEGRATED GASIFICATION COMBINED CYCLE CARBON STORAGE ASSESSMENT: NORTHERN DENISON TROUGH

An understanding of the feasibility of different CO₂ capture technologies and their integration with geological storage enables funding of those projects most likely to succeed.

The COAL21 Fund has invested in a number of feasibility projects aimed at better understanding carbon capture and storage technologies, including this one led by ZeroGen.

PURPOSE

The purpose of this project was to assess one of three CO₂ capture technologies – Integrated Gasification Combined Cycle (IGCC) with carbon capture and storage (CCS) – which at the time of the project was thought to be the most promising.

Potential benefits included:

- greater power generation efficiency than conventional pulverised fuel (PF), coal-fired technology
- ability to operate efficiently with lower quality fuel compared with PF technology
- CO₂ extracted at pressure, reducing downstream compression requirements.

The project also assessed two regions for their geological storage potential.

ACHIEVEMENTS AND FINDINGS

The project completed a pre-feasibility study for an IGCC power station with CO₂ capture integrated with CO₂ storage in Queensland – the first study to undertake such a comprehensive and rigorous approach to the design of an IGCC with CCS facility.

The project found that:

- ① IGCC with CO₂ capture is technically feasible for deployment in Queensland.
- ② Capital costs were higher than expected, far higher than indicated by earlier published studies.
- ③ IGCC with CO₂ capture requires a completely new power station as well as new capture components, so is highly capital intensive for a first-of-a-kind plant.

This project concluded that IGCC with CCS is technically feasible, but its capital costs cannot be justified for electricity generation alone.

IGCC can be configured to produce multiple, high-value products such as liquid fuels, chemicals and fertilisers as well as electricity and may have application in the future.

In view of these findings, the COAL21 Fund now considers PCC and oxyfuel as the primary CO₂ capture options for the foreseeable future.

The project also examined two regions in Queensland – Northern Denison Trough between the towns of Emerald, Blackwater and Springsure, and the Surat Basin near the town of Wandoan – to assess their geological storage potential.

The program for the Northern Denison Trough included significant exploration involving the drilling and testing of 12 exploration wells.

The Surat program involved a desktop analysis of existing exploration data which concluded that:

- ① The Northern Denison Trough does not have suitable reservoir properties for large scale geological storage of CO₂.
- ② The Surat Basin shows significant promise, but further assessment – underway through the University of Queensland and CTSCo Carbon Storage Assessment projects – is required to increase confidence.
- ③ Significant investment is needed to evaluate whether suitable industrial-scale storage is available, well in advance of any major investment in capture plant.
- ④ Earlier storage evaluation methodologies which had been used to identify high-grade storage areas were inappropriate.

When the COAL21 Fund was established, very little was known about Queensland's geological storage potential. This project, and others examining storage opportunities in Queensland, conducted valuable screening studies which have eliminated those regions with little or no prospectivity, allowing further work to focus on regions with good prospectivity.



TIMING

The project commenced in 2008 and ran for two years until 2010. It finished earlier than expected due to its finding that while IGCC with CCS is technically feasible, it is too costly given the requirement to build both the power station as well as the capture components at full scale.

PROCESS

This was a ground-breaking study because there were only four IGCC power stations in the world at the time and none had CCS fitted.

This study focused on regions in reasonable proximity to existing coal-fired power stations. Other regions (Galilee Basin, Eromanga Basin) may also offer large geological storage potential but are further afield, yet to be explored and were not considered suitable for storage demonstration in the medium term. However, they are of great interest for commercial-scale storage in the longer term.

The concept of a Surat Basin Storage Hub is being considered by interested parties.

MORE INFORMATION

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