

The Carbon Capture and Geological Storage (Geosequestration) Industry in Queensland

Report to the Great Artesian Basin Advisory Committee
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Brisbane, Queensland, Australia

SITUATION SUMMARY:

Around the world, there is a growing interest in Carbon Capture and Storage (CCS). CCS involves capturing carbon dioxide from point sources and injecting it deep underground in geological formations. CCS is a technology able to make deep cuts in greenhouse gas emissions while still using fossil fuels and much of today's energy infrastructure.

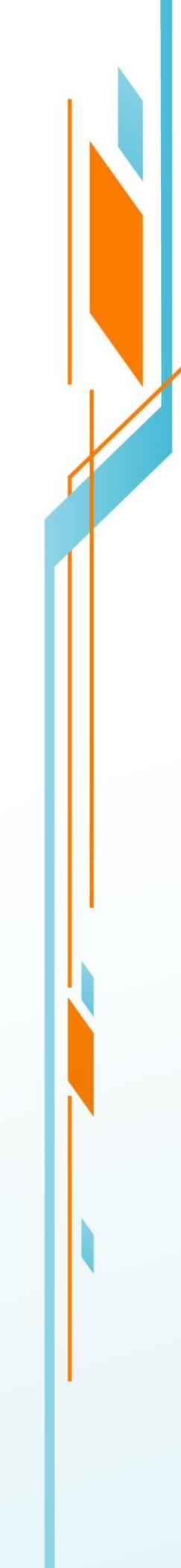
The *International Energy Agency* describes CCS as "a promising technology for carbon abatement". In its Special Report on Carbon Dioxide Capture and Storage, the *Intergovernmental Panel on Climate Change* said that CCS "has the potential to reduce overall (greenhouse gas) mitigation costs and increase flexibility in achieving greenhouse gas emission reductions". The IPCC concluded that CCS was among the technologies with the greatest potential to reduce emissions from electricity generation, and the cement, ammonia, and iron manufacturing industries. It also found that attempts to stabilise greenhouse gas concentrations in the atmosphere increased the importance of technologies such as CCS.

CCS should not replace taking actions that increase energy efficiency. The use of renewables or other less-carbon-intensive forms of energy should be maximized. Every opportunity to reduce emissions to meet the challenge of minimising global climate change should be taken. Nevertheless, modelling shows that widespread use of carbon capture and storage would result in atmospheric carbon dioxide least 100 parts per million lower than would otherwise be the case.

Background: [Carbon capture and storage in geological formations](#)

There are various ways to capture and store carbon dioxide. Biological processes can be used to bind CO₂ into stable forms:

- Farm forestry: bio capture where the carbon is bound into biomass.
- Algal stripping: carbon dioxide-rich exhaust gases are bubbled through waste water ponds that contain oil-producing algae. The algae strip the carbon from the gas stream and produce oils that can be processed into plastics or fuels.
- Technologies are also being developed that use chemicals to capture and sequester CO₂.



Storing carbon in underground formations involves:

- capturing the carbon as carbon dioxide,
- transporting the CO₂ to the point of storage, and
- storing the gas by injecting it into the targeted underground formation.

Carbon can be captured before or after combustion. Before combustion, the carbon dioxide is trapped before the fuel is burned. In post-combustion capture, the CO₂ is separated out of the exhaust gases after the fuel is burned.

The gas is then transported through pipelines from the site of generation - fossil fuel-fired power stations, heavy industry- to the suitable underground formations.

Formations good for carbon storage can include: un-minable coal beds, saline aquifers, and depleted oil and gas reservoirs.

Regulatory framework for CCS: Australian federal government and Queensland government legislation

Australian Government

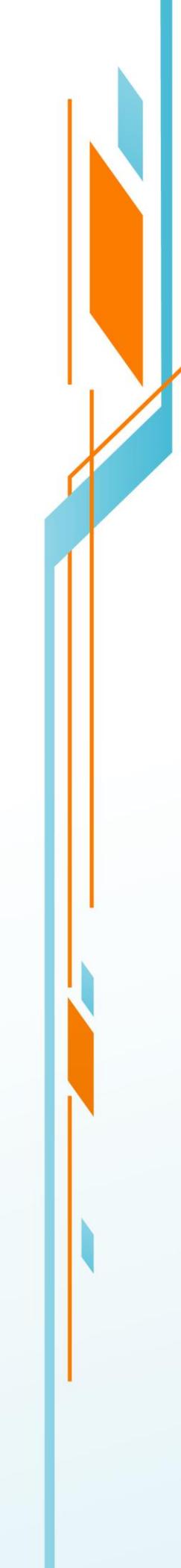
The Australian Government is looking at many ways to help Australia reduce its greenhouse gas emissions. Carbon capture and storage in underground formations is one of them.

The *Commonwealth Offshore Petroleum Act 2006 (OPA)* provides access and property rights for CCS projects in Australian offshore waters. The act provides project developers with the certainty required to commit to major low emission energy projects involving CCS. It also establishes an effective regulatory framework to ensure that projects meet health, safety and environmental requirements.

The OPA was identified as the most appropriate vehicle to implement a CCS access regime due to the co-existence of the petroleum and CCS industries, the need to establish determinable rights between both industries, and the similarities in the technologies used by both industries.

The legislation incorporates a licensing framework broadly similar to the existing regime for petroleum activities but including CCS-specific assessment permits, holding leases and injection licences.

As the first step in the process of providing these access and property rights, the then Minister for Resources and Energy, the Hon Martin Ferguson AM MP, announced on 27 March 2009 the release of ten offshore areas for the exploration of greenhouse gas storage areas.



The release areas are located in the following basins:

- Gippsland Basin;
- Torquay Sub-basin;
- Otway Basin;
- Vlaming Sub-basin; and
- Petrel Sub-basin.

Queensland Government

In Queensland, the *Greenhouse Gas Storage Act 2009* (the GHG Act) provides a framework to allow:

- exploration for underground storage reservoirs for permanent storage of greenhouse gases (carbon dioxide), and for
- storage of greenhouse gases to take place.

The GHG Act was introduced to encourage research and development of greenhouse gas (GHG) capture and storage technologies in Queensland. The Government considers CCS an important option for reducing carbon dioxide emissions from the burning of coal while alternative energy sources are developed.