

# Key elements of the CO2CRC approach

In approaching the question of how to make a major contribution towards Australia's goal of decreasing greenhouse gas emissions, the following elements were important:

- ◆ recognition of the opportunity for geological sequestration in Australia (1998);
- ◆ proving (by 2002) that CCS was not a "niche opportunity" but a major option for Australia to sequester its stationary emissions (50% of Australia's total emissions);
- ◆ broadening the range of skills to include chemical engineering, economics and related skills (in 2003) to the issue of how to capture CO<sub>2</sub> from flue gases;
- ◆ demonstrating CO<sub>2</sub> storage technologies at a commercially significant scale under Australian conditions, through the CO2CRC Otway Project;
- ◆ informing the community of the relevance of CO2CRC technology to climate change at the local, state, national and international levels;
- ◆ providing commercial CCS services through CO2CRC Technologies Pty Ltd to Government and Industry in Australia and internationally; and
- ◆ CO2CRC and its cooperating organisations have placed Australia in a leading position in the development and demonstration of CCS.

## CO2CRC Participants

### Core Research Participants



### Core Industry & Government Participants



### Supporting Participants

Department of Resources, Energy and Tourism - AusIndustry | The Department of Environment, Water, Heritage and the Arts | CANSYD | Meiji University | The Process Group | University of Queensland | Newcastle University

Support is also received from the United States Department of Energy, the Alberta Research Council, and Lawrence Berkeley National Laboratory.

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# MAKING DEEP CUTS IN CO<sub>2</sub> EMISSIONS CO2CRC & the Otway Project



## Innovation in Research Development & Demonstration

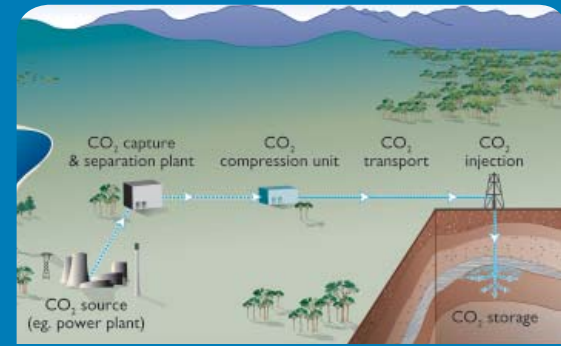


# Summary

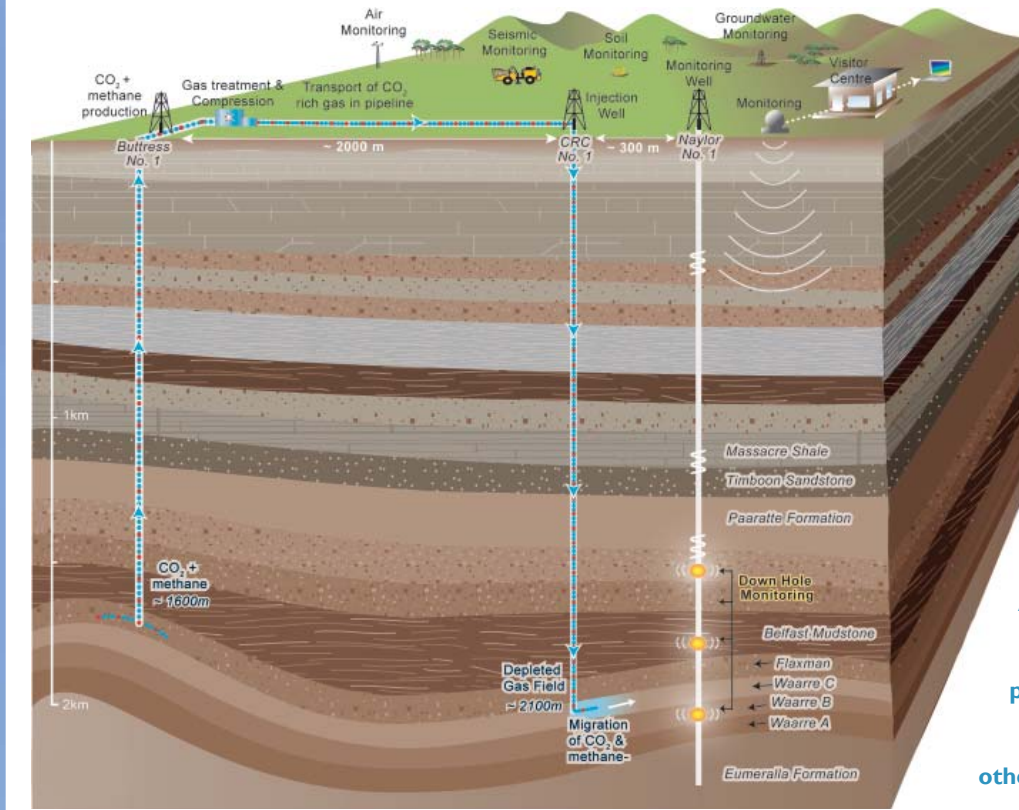
The Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC - and its predecessor the Australian Petroleum CRC) has been working on carbon capture and storage (CCS) since 1998 and has taken the concept from a fringe idea to one that is now a vital component of government and industry greenhouse policy nationally and internationally.

CCS involves capturing carbon dioxide that would otherwise be emitted to the atmosphere, compressing it, transporting it to a suitable site, and injecting it into deep geological formations where it will be trapped for thousands or millions of years.

CO2CRC has capture demonstration projects under development at Hazelwood and Loy Yang. In the area of storage, the CO2CRC Otway Project is an Australian first and a world-leading greenhouse gas technology project, which will geologically store 100,000 tonnes of CO<sub>2</sub>, at a depth of 2km in south-western Victoria.



Simplified overview of the carbon capture and storage process



A schematic overview of the CO2CRC Otway Project. Lessons learned from the project, particularly from the comprehensive monitoring program, will be adopted by other geosequestration projects around the world.

## What has CO2CRC achieved?

- CO2CRC has Australia's first demonstration of geological storage underway and is leading two other projects to demonstrate CO<sub>2</sub> capture.
- CO2CRC has demonstrated that CCS has great potential for enabling Australia to make deep emission cuts from major stationary sources, such as power stations.
- The CRC has influenced government policy, leading to various national and international initiatives (by industry and government) including proposals for other demonstration projects.
- Proposals for several billion dollars worth of clean energy developments in Victoria, WA, NSW and Qld have been put forward based on CO2CRC findings.
- Research by CO2CRC has informed the regulatory process to license geological storage of CO<sub>2</sub>.
- Internationally, CO2CRC has made significant contributions to the development of the Intergovernmental Panel on Climate Change (IPCC) position on CCS, and the IPCC Special Volume on CCS.

*'CO2CRC has embarked on arguably the most ambitious single CRC project (Otway Project), a project of national and international significance, which could not have occurred without the CRC's existence'*  
Third Year Review Panel

*'The project makes extensive use of many aspects of the CRC program, acting as something of an integrator for the storage side of the program in particular [and] provides a framework within which the research undertaken within the CRC can be put into practice.'*

Third Year Review Panel

- This early work provided the basis for establishing CO2CRC in 2003, as a world leading program for CCS.
- CO2CRC has developed a range of innovations - reservoir modelling, risk analysis, complex monitoring instrumentation - of great relevance to industrial, commercial and public good issues.
- In 2004, CO2CRC recognised that the Otway area in Western Victoria provided an exceptional opportunity to demonstrate geological storage technologies at a commercially significant scale.
- The CO2CRC Otway Project is one of the most innovative earth science projects ever undertaken in Australia and one of the most comprehensive in the world to demonstrate CCS.



Drilling of the CRC-I Well, the site of injection for Australia's first demonstration of geosequestration.

## What was the innovation?

- The initial CRC innovation (in 1998) was the recognition that geological storage of CO<sub>2</sub> could be applicable to Australia because of its geology.
- Using the skill base of the Petroleum CRC, the GEODISC project showed that Australia had great potential for geological storage of CO<sub>2</sub>.

*'The [Otway Project] will be a major contribution to the national science program, helping to develop the science, technology and expertise required for a geosequestration program in Australia [and] will serve the needs of international end-users. [The project] occupies a unique position in the spectrum of world-wide pilot and demonstration project [and] will be the largest and longest duration non-commercial pilot and demonstration project to date.'*

Third Year Review Panel

## Impact and value of CO2CRC R&D

- Major impact on government policy as reflected by:
  - government uptake of CO2CRC technology concepts through the Federal Government's \$500 million Clean Energy Program and in excess of \$600 million of State Government initiatives;
  - the Federal Government's likely decision to proceed with the world's first offshore CCS licencing, based on CO2CRC's findings that a number of offshore basins offered exceptional opportunities for geological storage; and
  - direct influence of the CO2CRC Otway Project on the evolving regulatory regime being developed for geosequestration.
- Major impact on industry strategy as reflected by:
  - direct industry involvement in the Operating Company established for the CO2CRC Otway Project, thereby providing industry with an understanding of regulatory, legal, liability, risk and technical issues;
  - the opportunity to test and demonstrate technologies and processes prior to commercial deployment; and
  - the uptake of CO2CRC technology concepts in industry-driven CCS demonstration projects, worth more than A\$2 billion.
- Major public benefit by providing:
  - the potential to store large quantities of CO<sub>2</sub> from Australia's major stationary emission sources (up to 300 million tonnes of CO<sub>2</sub> emissions a year);
  - public confidence in the ability to monitor and verify subsurface geological sequestration of CO<sub>2</sub>; and
  - critical input into major global CCS programs.
- The environmental and policy value of the project to the Government decision to place a price on carbon. Adoption of CCS will provide deep cuts in emissions and an economic benefit through cost-effective mitigation.
- Already CO2CRC has significant national and international earnings from its expertise. Its innovative approach has positioned Australia to be a key player in the rapidly growing global CCS industry.