Otway Basin Pilot Project, Victoria, Australia

P J Cook[1] and S Sharma[1,2]

Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC), GPO Box 463, Canberra ACT 2601, Australia www.co2crc.com.au

BACKGROUND

Fifty two per cent of Australia's greenhouse gas emissions are from major stationary sources such as power stations. A further 17 per cent is emitted from industrial sources. Carbon capture and storage technology that can capture these emissions and store them safely underground.

The Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC) is undertaking research into the capture of CO_2 (using solvents, membranes, swing absorption and other techniques) and it has a major program of research into CO_2 storage in a variety of geological settings. CO2CRC has also embarked on the Otway Basin Pilot Project (OBPP) to demonstrate monitoring and verification and storage options at an industrially significant scale under Australian conditions. This will involve the geological storage of up to 100,000 tonnes of CO_2 in the Otway Basin in Western Victoria.

SITE SELECTION

The CO2CRC has completed an Australia- wide scoping study in order to identify Australia's overall storage resource. More than 100 regions were assessed, of which approximately two thirds were considered likely to contain viable storage opportunities.

The challenge now is to turn that storage resource into technically, economically and environmentally viable storage sites. Recent regional characterisation has focused on key areas within close proximity of major stationary emission sources such as the Latrobe Valley and within basins in central and south-east Queensland and in the Sydney area.

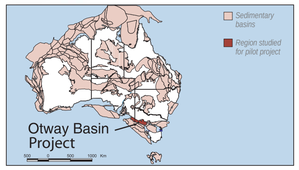

Figure 1: A number of basins were considered as part of the due-diligence effort to identify the pilot site.

In 2004, an opportunity was identified in the Otway Basin to research and demonstrate CCS at a commercially significant scale.

The onshore Otway Basin has many naturally occurring CO_2 accumulations and a number of depleted gas fields in close proximity. The basin sequence contains a range of sandstones, reservoir systems bearing gas and groundwater and a number of seals. It was decided to initially focus the storage research on the Waarre formation, which is separated from the much shallower aquifers by a thick seal – the Belfast Mudstone.

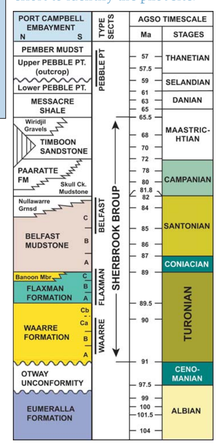

Figure 2: The storage formation (Cretaceous Waarre Sandstone) is overlain with seals (such as the Belfast Mudstone) that prevent the upward movement of CO_2.

THE OTWAY BASIN PILOT PROJECT

CO2CRC Pilot Project Ltd (CPPL) has been established to act as the operator of the demonstration project on behalf of the CO2CRC Joint Venture. CPPL is the owner and holder of two petroleum tenements and the operator of the CO_2 gas well, the pipeline and the injection activities.

The OBPP is a A$30 million (US$25m) project involving production, compression, transportation, injection and monitoring. The production of a CO_2- rich gas will be from the existing Buttress No-1, which was drilled in 2002. The particulates and free liquids will be removed from the gas prior to compression and transportation.

The design flow- rate of Buttress No-1 through the compression system is 3 MMscf per day, and this will be transported over 2 km through a pipeline.

The injection of this gas will be via a new well, CRC No-1. The CO_2 will be injected into the Late Cretaceous Waarre C Sandstone formation at a depth of 2100 m. This formation is overlain by a regional seal. The design injection-rate is 3 MMscf per day and breakthrough (ie. arrival of the CO_2 at the monitoring well) is expected between 6 to 9 months after injection. The migration of the stored CO_2 will be monitored using a comprehensive atmospheric, geophysical and geochemical monitoring program, using the Naylor No-1.

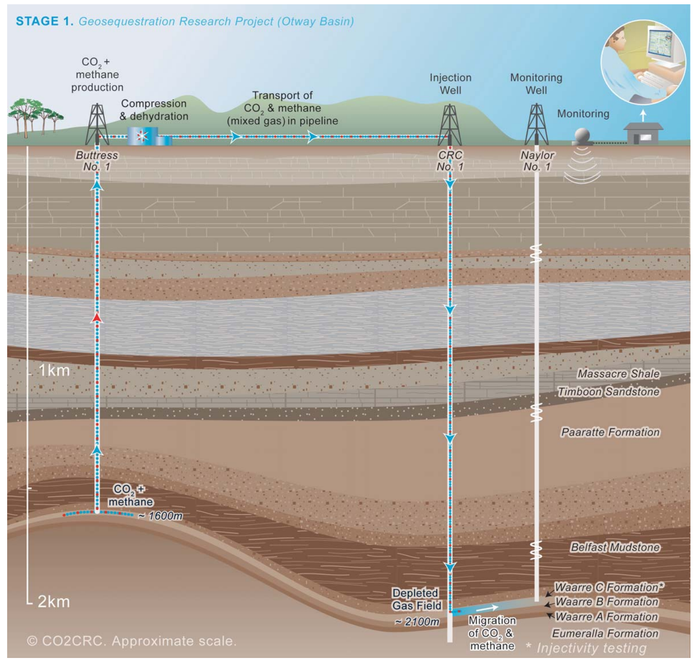

Figure 3: Conceptual representation of the Otway Basin Pilot Project.

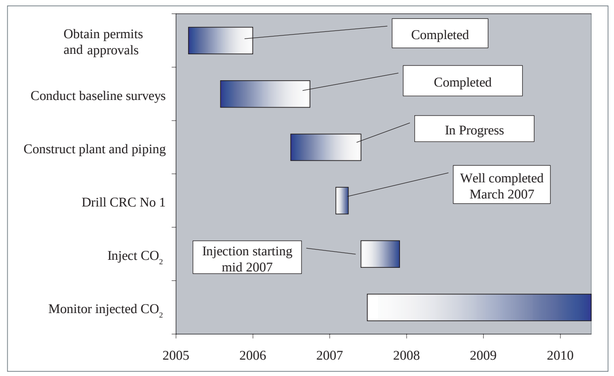

Figure 4: OBBP proposed timeline.

CPPL has worked extensively with Victorian Government State departments to obtain the necessary permits and approvals for the project. Baseline surveys have been conducted to characterise the geological formation and CO_2 background concentrations.

The injection plant and the injection well are currently under construction. Injection of CO_2 is expected to begin mid 2007, and the injected CO_2 will be monitored for a number of years. Closure of this stage of the project is anticipated in 2010, Stage 2, involving a new phase of injection and monitoring, is under consideration.

GEOLOGICAL CHARACTERISATION

The storage site has been very comprehensively characterises using a range of techniques aimed at understanding the:

- geological structure, properties and heterogeneities;
- orientation and stress distribution in the bounding faults and the potential for leakage;
- behaviour of the injected CO_2 in the Waarre C Formation; and,
- sensitivities of different modelling techniques and responses.

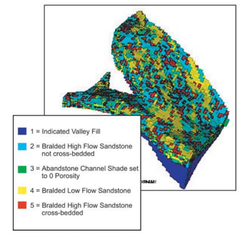

Figure 5: Geological model of the Naylor field.

Depth-converted faults and horizons were used as the framework for the development of a reservoir model and the interpreted depositional model.

MONITORING AND VERIFICATION

A primary aim of the project is monitoring and verification to demonstrate that injected CO_2 remains contained in the storage formation and verify performance predictions.

An extensive monitoring and verification program will be conducted throughout the injection phase and will continue for several years afterwards, in order to verify the long-term behaviour of the CO_2 in the subsurface. Baseline data has already been collected from existing monitoring of the site.

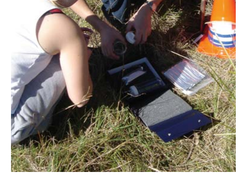

Figure 6: CO2CRC researchers setting up equipment for baseline soil gas sampling in the pilot project area.

The project will include a suite of monitoring and verification activities by CO2CRC research bodies, the Lawrence Berkeley National Laboratory, the Alberta Research Council, and other international collaborators. The range of monitoring techniques will include subsurface, near surface and atmospheric technologies, including some that will be deployed for the first time anywhere in the world.

COMMUNICATING WITH THE COMMUNITY

Communicating with the community in the pilot project region is another key project activity. The aim of this consultative process is to develop trust in the CO2CRC and confidence in its research program and operational activities.

The consultation process involves two-way communication, encourages comment and input from landholders and places an emphasis on transparency. The consultative activities include: community meetings, direct-mail (newsletters and flyers), face-to-face meetings with landholders, and responding to information requests by telephone and email.

Advertising and the placement of articles and interviews in the local media complement the two-way communication activities.

An important communication activity is the demonstration to the community of the CO2CRC monitoring program. The purpose of the program, which is funded by the Australian Government through the Australian Greenhouse Office, is to show the community, government at all levels and industry that CO2CRC's computer models, which predict the behaviour of the CO_2 during all phases of the project, are correct.

ACKNOWLEDGEMENTS

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Affiliation 1- CO2CRC; 2- Schlumberger.

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