Community Newsletter

Feature stories

CO2CRC

Building a low emissions future

Message from the CEO

Global momentum for CCUS is growing as governments and international energy and resource companies take action to meet long-term global emissions targets.

Consideration of hydrogen as a growing source of energy has gained traction. ‘Clean’ (no emissions) hydrogen can be made using electricity from renewables to split water into hydrogen and oxygen. It can also be made cleanly from coal and gas when coupled with carbon capture and storage technology. Currently, almost all the world’s hydrogen is produced from gas and coal. Over the next twenty years, hydrogen production from fossil fuels with CCS will be needed to produce hydrogen at the scale required to meet global supply needs.

The last 12 months have seen new and renewed commitments to emissions reduction across the globe, with all highlighting the need for CCUS and hydrogen:

- The U.S has recommitted to the Paris Agreement and extended tax credit support to CCUS
- The Australian government released its Technology Investment Roadmap identifying CCUS and hydrogen as priority technologies.
- The UK government released its ten- point plan for “Powering our net zero future” under which the UK aims to be capturing and storing 10Mt of CO_2 a year and producing 5GW of hydrogen by 2030. It also recently released its Industrial Decarbonisation Strategy dedicating £171 million towards hydrogen and carbon capture and storage (CCS) projects.
- Europe’s Innovation Fund, will provide around EUR 10 billion of support over 2020-2030 for the commercial demonstration of innovative low-carbon technologies, including CCUS.

It is clear that CCUS and hydrogen will play a significant role in achieving net zero ambitions globally. Australia is well placed to be a world leader in both CCUS and Hydrogen.

The Hydrogen Energy Supply Chain (HESC) pilot project, led by J-Power, recently commenced operations in the Latrobe Valley and Port of Hastings, achieving its first hydrogen production. CO2CRC is proud to play a part in the HESC Project and many other Australian project development efforts. Through our world class Otway International Test Centre, we aim to be at the forefront of delivering the technology solutions to help advance more Australian CCUS projects and a growing hydrogen industry.

We thank the community of south-western Victoria for your continuing support in keeping CO2CRC at the cutting edge of globally and nationally significant science and technology.

David Byers
Chief Executive Officer

The Status of Carbon Capture, Utilisation and Storage in Australia

Looking specifically at Australia, the adoption of carbon capture, utilisation and storage (CCUS) as an emissions reduction technology has made good progress over the past 12 months. The commencement of operations of the Gorgon CO_2 Injection Project, a commercial-scale storage project and prioritisation of CCUS by the Australian Government are positive signs.

Victoria’s flagship CCS project, CarbonNet, has confirmed the viability of the Pelican storage site in Bass Strait by successfully drilling and investigating an appraisal well. It has now submitted applications to the State and Federal Governments for the approval of the geological storage location.

Elsewhere in Australia, CCUS is already reducing carbon dioxide emissions. The Chevron-led Gorgon project, one of the world’s largest liquified natural gas projects, located on Western Australia’s Barrow Island began storing some of the 14% naturally occurring carbon dioxide contained in its offshore gas fields in the Dupuy formation. Since August 2019, 4 million tonnes of carbon dioxide has been permanently stored beneath Barrow Island. Over the project’s 40-year operating life, Chevron plans to store 100 million tonnes of CO_2 in this storage zone.

The Federal Government has identified CCUS as a priority low emissions technology in its Technology Investment Roadmap and launched a $50 million CCUS Development Fund to reduce the technical and commercial barriers to deploying CCUS. Policymakers hope that Australia will emerge as a leader in carbon storage, leveraging natural advantages such as globally recognised geological formations.

CO2CRC is contributing to the achievement of the Federal Government’s long-term stretch cost goal for carbon capture and storage of under $20 a tonne for carbon dioxide compression, transport, and storage through its research at the Otway International Test Centre.

In response to these signs of increased support for CCUS, several Australian corporations are investigating the incorporation of the technology into their operations.

For example, Santos recently injected 100 tonnes of CO_2 into a depleted gas reservoir in the Cooper Basin as the final field trial for its Moomba CCS Project. The Cooper Basin is an established source of natural gas, and Santos has plans for further expansion of gas projects in the area. The Moomba CCS project benefits from both its proximity to gas projects, and to suitable geological sites for carbon storage.

CO2CRC is proud to provide technical support to several corporations in their CCS investigations. With that in mind, we have formed CO2Tech, a multi-disciplinary technical consultancy company that will provide advisory and project management services across the CCUS value chain.

The Otway National Research Facility becomes the Otway International Test Centre

In acknowledgement of the world-leading research being conducted at the Nirranda South CO2CRC Site, The Hon Dan Tehan MP Member for Wannon travelled to The Centre on November 24 last year to commemorate the renaming of the facility to The Otway International Test Centre.

"The Otway International Test Centre provides businesses and universities the facilities to run experiments that further our knowledge of carbon capture, utilisation and storage," Mr Tehan said.

Mr Martin Ferguson AM, Chairman of CO2CRC commented that "CO2CRC's Otway Facility has been the centrepiece of CCUS technology advancement in Australia over the past 15 years – developing national R&D capabilities and informing policy and regulatory settings.

"The decision by CO2CRC to rename the facility to the Otway International Test Centre caps off the successful completion of a major infrastructure investment program which was funded by industry, the Victorian Government and the Federal Department of Education, Skills and Employment's Education Infrastructure Fund (EIF).

"We believe the new name for the facility, is a truer reflection of its global significance in CCUS technology validation and will mark Australia's enhanced capability to partner with world leading researchers and international industry to develop technologies to advance the deployment of CCUS.

"The Otway International Test Centre will be the cornerstone of CO2CRC's continued progress in advancing CCUS technologies and allow future users to demonstrate and validate CCUS technologies at a realistic scale, furthering the commercialisation of CCUS technologies and techniques," he said.

"CO2CRC is already a trusted technical focal point for the CCUS community in Australia and internationally. Through the Otway International Test Centre, CO2CRC will extend its reach with major international researchers and companies and seek further collaborations and investments. Clean (no emissions) hydrogen produced from gas or coal, with carbon emissions captured and geologically stored, is also integral to realising Australia's ambition to become a hydrogen superpower.

Coal Innovation New South Wales Visit

In February, scientists from Coal Innovation New South Wales visited CO2CRC's Otway International Test Centre. The scientists were interested in learning more about CO2CRC's technologies and site assessment methods at its internationally recognised research centre to assist them in the development of a potential carbon dioxide storage area in New South Wales' Darling Basin.

The visitors were particularly interested in the Stage 3 well based fibre optics, a technology which is currently being evaluated for its use in seismic monitoring of a storage site in combination with Surface Orbital Vibrators. They were also interested in CO2CRC's sophisticated modelling to assist in the identification and development of suitable carbon dioxide storage sites.

"Our visitors were impressed by the amount of valuable research CO2CRC has been able to undertake at its Nirranda South Site particularly when considering the Centre's light environmental footprint on the surrounding farmland." Dr Max Watson CO2CRC Technology Development Manager said.

CINSW visitors learn about the Subsurface Orbital Vibrators at the OITC and how they can reduce the environmental footprint of monitoring stored CO_2

Monitoring Stored Carbon Dioxide Using Subsurface Pressure Measurements

From November 2020, an additional 10,000 tonnes of CO_2 rich gas from the Buttress-1 well has been progressively injected and safely stored in the subsurface beneath the Otway International Test Centre. Gas injection will continue until mid-April. Several innovative and cost-effective techniques are being trialled to monitor the CO_2 plume.

One of the methods being explored is pressure tomography, an active pressure technique which shows great potential in the development of lower cost monitoring solutions suitable to the offshore environment.

In a world first, CO2CRC has field trialled pressure tomography on a plume of stored CO_2 to demonstrate the technique's ability to detect and image a plume's distribution. With downhole pressure gauges acquiring data continuously, the pressure data obtained from each survey performed is being analysed to produce an image of the CO_2 plume in the subsurface. CO2CRC's research partner, CSIRO, developed the methodology for this innovative technique. One of the key benefits for industry is that the acquisition of pressure data is already done routinely with durable low-cost instruments in onshore and offshore environments. It therefore provides a novel, low-risk monitoring option, which can be readily applied to existing wells.

Pressure tomography involves the injection of fluid (in this case a weak brine) into a subsurface well, creating a minor pressure pulse which moves through the storage formation. The movement of this pulse through the reservoir is tracked at the nearby recently installed monitoring wells – CRC 4,5,6 and 7. The strength of the pulse and the time it takes to reach each well, gives information about the reservoir fluids (brine, CO_2) and the physical properties of the storage formation. Through sequential injections at each well and by monitoring the pressure response at each well, a 'tomographic image' of the storage formation is built.

A baseline must first be established to provide an understanding of how the pressure pulse moves through the reservoir without CO_2 present. Further water injections, after CO_2 injection, pick up the differences in these properties which can be used to map the location of the CO_2 plume. The quality of imaging obtained depends on the signal-to-noise ratio of the pressure measurements, the geometrical arrangement and number of wells, and the extent to which variations in permeability affect how the pressure pulse travels through the formation.

Four sets of water injections have already been completed - creating an accurate baseline prior to the CO_2 injection and again after the storage of approximately 4,400 and 9,500 tonnes of gas. This provides a better understanding of the effectiveness of the technology in locating and tracking this very small amount of stored gas. Data analysis by CSIRO to date shows promising results. A further pressure survey will be undertaken after the Project's final stage of CO_2 injection and storage.

Stage 3 Operations Nearing Completion

While scientists will continue modelling and analysing Stage 3 data and preparing publications over the next 12 months, the operational component of the most extensive research project to have taken place at the CO2CRC Otway International Test Centre is nearing completion.

CO2CRC's traditional land seismic survey for Stage 3 was successfully completed in March 2021. This was the final in a series of three surveys conducted as part of the project. CO2CRC's initial baseline seismic survey for Stage 3 was completed in April 2020 with a portion of survey performed by the Curtin University science team directing operations remotely due to border closures in Western Australia. Despite careful planning, in early January, COVID again caused our scientists to remain in WA. CO2CRC was once more able to engage a local Vibroseis driver and support staff to complete the survey.

"The quality of the data we have obtained from our Stage 3 seismic surveys has been very good. Running the surveys with temporary staff with our geophysicists working remotely certainly has presented an extra challenge. However, it has provided us with the opportunity to demonstrate that we are able to operate remotely while still delivering the comparative seismic images we needed, said Paul Barraclough, CO2CRC Stage 3 and Otway International Test Centre Operations Manager.

"During the surveys, the vibrations from the vibroseis truck move through the subsurface at different rates depending on the density of the rock, gas or water they encounter in the ground. These are then reflected back towards the surface and received by the well based fibre optic cable in our CRC-4,5,6 and 7 monitoring wells. The permanent SOV's installed around the injection site function in the same way but are immune to the issues of weather and ground condition and are designed to operate remotely on a programmed schedule. As such, the SOV provides a viable alternative which is effective, can be used on-demand and has a smaller environmental impact.

CO2CRC thanks farmers on land surrounding the Centre for providing us with access to enable the seismic surveys to take place and for their cooperation in the installation of Surface Orbital Vibrators at the site.

Otway International Test Centre Community Reference Group Meeting

Wednesday, 21 April 2021
12 noon

Knowledge Hub, CO2CRC Otway International Test Centre, Brumby's Lane Nirranda South

Join us for lunch followed by a meeting on the recent and planned activities at our Otway International Test Centre including celebration of the successful completion of the operational stage of our Stage 3 Research Project.

All Welcome.

Please call our Community Liaison Officer Shelly Murrell on 0458 462 063 for more information or to RSVP for catering purposes.

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