WE EXAMINED 5,000 CASES OF STORAGE SITE CHOICES AND DEVELOPED A SCREENING TOOL TO MAKE PAIR-WISE COMPARISON 500 TIMES FASTER. STORAGE SITE CHOICE CAN NOW BE QUICKER AND CHEAPER.

WE HAVE UNDERTAKEN SCIENTIFICALLY ACCURATE STORAGE EXPERIMENTS WITH AS LITTLE AS 130 TONNES OF CO2.

12 OUT OF 21 CCSNET ASSETS HAVE ACHIEVED FINAL BOARD APPROVAL AND ARE BEING DELIVERED TESTING IS UNDERWAY IN THE UNITED STATES ON ULTRA-THIN MEMBRANES UNDER PRE-COMBUSTION CONDITIONS. LARGE SCALE POTENTIAL OF THE NEW MATERIALS COULD PROVE FEASIBLE.

2014 15 HIGHLIGHTS
CO2CRC ACKNOWLEDGES AND APPRECIATES THE STRONG RELATIONSHIPS IT HAS WITH INDUSTRY, COMMUNITY, GOVERNMENT, RESEARCH ORGANISATIONS, AND AGENCIES IN AUSTRALIA AND AROUND THE WORLD.

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INDUSTRY
ANLEC R&D (on behalf of ACALET)
BG International (Aus) Pty Ltd
BHP Billiton Petroleum Pty Ltd
BP Developments Australia Pty Ltd
Chevron Australia
Glencore plc
INPEX Browse Ltd
Process Group
Rio Tinto
Sasol Petroleum International
Shell Development (Australia) Pty Ltd
Total Gas & Power Ventures
SAS

COMMUNITY
Landowners at the Otway Site
Moyne Shire
Nirranda South

GOVERNMENT
Australian Government: Department of Industry, Innovation and Science
Australian Government: Department of Education and Training
NSW: Department of Industry
SA: The Department for Manufacturing, Innovation, Trade, Resources and Energy (DMITRE)
Victoria: Department of Economic Development, Jobs, Transport and Resources
WA: Department of Mines and Petroleum

SUPPORTING PARTNERS AND ORGANISATIONS
BCIA
CarbonNet Project
Federation University
Australia
Global CCS Institute
SW Hub Project

RESEARCH
CSIRO
Geoscience Australia
University of Adelaide
Charles Darwin University
Curtin University
University of Melbourne
Monash University
University of NSW
University of Queensland
University of Western Australia
Institute of Geological and Nuclear Sciences (New Zealand) (GNS)
Korea Institute of Geosciences & Mineral Resources (KIGAM)
Lawrence Berkeley National Laboratory (LBNL)
Leibniz Institute
Simon Fraser University
University of Edinburgh
International Energy Agency Greenhouse Gas Program (IEAGHG)
CO2CRC has more than a decade of excellence in carbon capture and storage (CCS) research leading to knowledge and tools of this low emissions technology for our members. However, as global demand for fossil fuels is forecast to grow by 56 percent over the next 25 years and industry seeks to manage their carbon output, the push to make CCS a real option in global carbon management needs to start now.

For any global agreement on greenhouse gas reduction to be credible, and for us to stay within the United Nations mandated two degrees target, we must recognise the need for emission reductions to reflect the reality of energy demand and how that energy is derived. While increased energy efficiency, renewable energy, and the use of less carbon-intensive fuels will be necessary to reduce emissions, they cannot do it alone. The International Energy Agency estimates that carbon capture and storage could be responsible for as much as 17 per cent of the global reduction effort required in 2050.

In order for CCS to realise its potential and effectively assist in the decarbonisation of industry, additional CCS infrastructure capacity will be required over the next 20 years. This is not long for infrastructure deployment and public/private partnerships. Commercial, financial and business models will need to become more innovative and recognise the public benefits of ‘avoided costs’ to secure the necessary additional investment in CCS.

Economically viable carbon capture and storage will create enormous opportunities throughout the developing world, particularly in the Asian region which is important to Australia where coal and gas offer hope of a better life for hundreds of millions of people – in fact, more than 200 million people in India alone.

Throughout Asia hundreds of coal-fired power stations are being planned. China is building one new coal fired power plant every 7-10 days for the next 10 years, while the Philippines has announced it will build 52 with a lifespan of 35 years. If we are to meet our global CO₂ obligations CCS must be available to these countries at a reasonable price and as soon as possible.

To ensure we are best placed to present this industrial scale low emissions technology as a viable means to help meet the challenges of a carbon-constrained world, CO2CRC’s Board has established and endorsed nine 2020 Targets.

The 2020 Targets have two main themes: ensuring a strong and growing membership to support the research and development of carbon capture and storage which has been the hallmark of the CO2CRC’s success to date, and encouraging greater uptake of CCS technologies.

With this in mind, in the years to 2020, CO2CRC will continue to:

› Provide a strong investment case for existing government and private sector partners, and future partners.

› Achieve significant stakeholder engagement – including in the communities of Otway in Victoria and at major CCS projects sites around Australia.

› Be a trusted source of advice on CCS for governments, the community and organisations – and remain a trusted global partner for research and development.

The targets are ambitious and reflect our desire to enact socially beneficial, economically responsible and politically achievable greenhouse gas reduction technologies has never been greater. By meeting these targets, CO2CRC will be able to make the greatest contribution to assist Industry on carbon dioxide management.

The challenges we face are enormous; however, we have the Board, the Executive and the staff working with our partners to realise the vision of CCS ‘to build a low emissions future’. The successes we have achieved to date and the support we have received from industry, government and the communities where we operate are proof that the work we continue to undertake will have substantial benefits and must continue.

Martin Ferguson AM
Chairman, CO2CRC
A renewed commitment to greenhouse gas reduction technologies provides an opportunity to capitalise on collaborations with partners in Asia, Europe and the Americas. New carbon capture and storage test sites are being established throughout our region and CO2CRC is lending its expertise to research partners.

To 2016 and beyond, starting with this report, our story will be told more widely and more confidently as CO2CRC Limited. In December 2014 CO2CRC ceased to operate as a Cooperative Research Centre (CRC) and became a not-for-profit private company limited by guarantee, although our strong global brand remains in place.

None of our successes would have been possible without the passion of our researchers and the confidence of our stakeholders in industry and government. As an organisation with a heavy research focus, it is often forgotten that some of our greatest successes have been outside the lab. This annual report aims to show you the full breadth of our work, the global networks which support our research and the communities in which we are privileged to operate.

Most importantly, we aim to share the vision of building a low emissions future which has made CO2CRC a world leader in an essential technology of tomorrow.

Tania Constable PSM
Chief Executive Officer
We have progressed a Memorandum of Understanding with the UK CCS Research Centre which is focused on knowledge sharing, technology development and demonstration of projects.

LBNL scientists participated in a buried seismic array installation, and provided 36km of fibre optic cables that were buried alongside the geophones.

To determine residual trapping levels, Edinburgh Uni used noble gas tracer injection and recovery and independent stable oxygen isotope measurements to quantify retained CO₂ in a reservoir at the Otway Site.

We have progressed a Memorandum of Understanding with the UK CCS Research Centre which is focused on knowledge sharing, technology development and demonstration of projects.
KIGAM collaborated on a number of projects with CO2CRC both as observers and participating scientists in Stage 2B and seismic survey operations.

IEAGHG

Through 2014-15 CO2CRC researchers served in various executive roles in the IEAGHG, linking us to the broadest and largest technical perspectives relating to greenhouse gas mitigation utilising CCS.
A Social Licence to Operate has been defined by Australian social scientist Robert Boutilier “As existing when a project has the ongoing approval within the local community and other stakeholders”. At the level of an individual project the Social Licence is rooted in the beliefs, perceptions and opinions held by the local population and other stakeholders about the project. It is therefore granted by the community. It is dynamic and non-permanent because beliefs, opinions and perceptions are subject to change as new information is acquired. Hence the Social License has to be earned and then maintained.”

Communication and trust must be paramount for a Social Licence to be maintained. The Otway Site is a vital asset for our in-field research, and the Social License we have from the community has been fostered and maintained for over a decade.

Industry, government and research representatives regularly visit CO2CRC to discuss our continued success in this area. This is as crucial to our journey as the technology we are developing.
WORKING TOGETHER AT THE OTWAY FACILITY

SITE ADMINISTRATOR

Peter Dumesny

“I am responsible for the safe daily running of the CO2CRC Otway Site. I am responsible both for the welfare of anyone that comes on site, and ensuring the site operates optimally. Over the past several months I have been involved in preparing for the injection of carbon dioxide to commence in November 2015. I am always liaising with Shelly and the research team, so that we avoid delays, and minimise risk.”

RESEARCH ENGINEER

Dr Tara LaForce

“At the Otway we have a fundamental understanding of how CO₂ will behave when injected into a well understood reservoir. My role in noble gas tracer test analysis is one tool in monitoring CO₂. We work closely to ensure that we deliver research outcomes with tangible results. It is fun and rewarding working with researchers from a broad range of fields.”

LANDOWNER

Gavin Couch

“I was one of the first landowners to sign up to working with CO2CRC in 2003 and it’s been really interesting. I’ve had trucks vibrating the ground to measure CO₂ movement, as well as other types of monitoring equipment used on my land. Recently part of a large seismic array was installed in one of my paddocks which included digging trenches and burying seismic receivers, geophones and fibre optics.”

After the trenches had been filled, Gavin reseeded his land on which 400 dairy days are raised

CO2CRC OTWAY PROJECT

PROJECT DEVELOPMENT MANAGER CO2CRC

Dr Max Watson

“My role is pretty broad. I am in essence a scientific project manager and designer of research programs that engineers like Tara carry out. I ensure that research programs are delivered on time, and budget. From next year I will be Program Manager for our storage research and I will closely liaise with Shelly, the site administrators and land owners on all aspects of our CO₂ storage program.”

COMMUNITY LIAISON OFFICER

Shelly Murrell

“I am the direct contact between CO2CRC’s Otway Facility and the local community. Listening to our stakeholders, telling them about our research and how it impacts locally and its potential globally are the cornerstones of my job. I am really glad that the landowners and community feel that they are part of a practical way to tackle global emissions.”

CO2CRC ANNUAL REPORT 2014/15
STORAGE RESEARCH

IN PREPARATION FOR THE INJECTION OF 15,000 TONNES OF CO2 IN NOVEMBER 2015, THE CRC-2 WELL WAS RECOMPLETED IN FEBRUARY 2015. THE RECOMPLETION ALLOWS US TO CHOOSE BETWEEN TWO INJECTION INTERVALS AS REQUIRED.

Through 2014-15 our Storage Research Teams focused on understanding the fundamental mechanisms of geological carbon storage in saline aquifers in Australia and worldwide. Our aim is to reduce risk and improve processes in the characterisation, injection and assurance of CO2 storage sites. The Program comprised 10 major research projects and associated sub-projects that involve a range of applied research projects to develop suitable technologies and strategies for managing CO2 injection and storage.

PREPARING FOR STAGE 2C EXPERIMENTS

The Stage 2C range of experiments at the CO2CRC Otway Facility focuses on the interplay between various trapping mechanisms during CO2 migration, changes to the subsurface and stabilisation of the CO2 plume through a series of injection and monitoring experiments. While surface and well-based seismic have been demonstrated to be key storage surveillance technologies, the full capabilities and limitations of seismic will be further developed through detailed migration monitoring in 4D during the Otway Stage 2C experiment, allowing CO2CRC to grow its understanding of ‘fit-for-purpose’ monitoring.

Significant resources from across our reservoir engineering and geophysics research teams and technical inputs from Upstream Production Solutions (UPS) and Lawrence Berkeley National Laboratory (LBNL) were utilised, to finalise the injection and monitoring plans. The CO2CRC Board provided the final investment approval for the Stage 2C Project in November 2014.

In preparation for the injection of 15,000 tonnes of CO2 in November 2015, the CRC-2 well was recompleted in February 2015. The recompletion allows us to choose between two injection intervals as required.

After successful field trials of buried seismic receivers and fibre optics based seismic data acquisition technology, 920 geophones and 36km of fibre optics were installed in March 2015 to complete a high-sensitive geophysical data acquisition and surveillance set-up for the monitoring of CO2 migration and stabilisation. A 3D seismic survey was completed over the injection interval in April 2015 establishing the baseline prior to the injection. Geophysical equipment including the seismic source units and vertical seismic profiling tool were provided by the National Geosequestration Laboratory, funded under the Australian Government’s Education Investment Fund (EIF) program.

THE STAGE 2B EXTENSION PROJECT

Callide Oxyfuel Services engaged CO2CRC to perform a combined injection of around 130 tonnes of CO2 gas in various stages. The CO2 contained trace levels of impurities and noble gases, and were injected into the Paaratte Formation. Levels of impurities within CO2 will directly determine the cost of capture and storage thereby impacting on industry decisions.

CO2CRC further injected CO2 as part of a reservoir characterisation test, which was in part a repetition of the Stage 2B test conducted in 2011. The test confirms that CO2 was successfully injected into, and remains in the formation, at what residual saturation level and at what distance into the reservoir. The test further demonstrates the repeatability and accuracy of the characterisation measurements. The analysis of the data will be complete in late 2015.

This project has clearly shown that high impact research can be gained from low volume injections at the Otway Project site.

THE NSW DARLING BASIN CO2 STORAGE STUDY

CO2CRC led the NSW Darling Basin CO2 Storage Study to support the efforts of the Division of Resources & Energy, within the NSW Department of Trade and Investment, Regional Infrastructure and Services. This work helped identify and characterise a viable subsurface site within the Darling Basin to form the CO2 storage component of the integrated Delta Demonstration Project. The study was tightly linked with the NSW drilling program and involved the geological characterisation of the target area, dynamic injection and plume migration modelling, geomechanical evaluation, and geochemical analysis and modelling.

Analysis of available data indicates that the Pondie Range Trough of the Darling Basin is potentially viable for geological CO2 storage within the range 48 – 1,730 Mt. This storage potential warrants further investigation which the NSW Department of Trade and Investment, Regional Infrastructure and Services is undertaking in 2015.

Dr Matthias Raab
Storage Program Manager
SUPPORTING THE STAGE 3 PROJECT THROUGH A SUBSURFACE LABORATORY

The Otway Subsurface Laboratory will support Stage 3 of the CO2CRC Otway Project which aims to develop and test cheaper alternative CO₂ monitoring methods. Through CCSNET assets $23.5 million has been allocated to test a risk-based ‘downhole monitoring’ program at the CO2CRC Otway Project site. By monitoring between vertical boreholes across key parts of the geological storage system, downhole seismic and pressure methods for near continuous surveillance of the storage formation will be tested, providing a potentially cheaper alternative to repeat surface or marine monitoring, as well as reducing the surface monitoring footprint.

The pre-feasibility study for this experiment is completed and the feasibility study commenced. Additional co-investment for operating the Stage 3 project is required.

WHAT THE STORAGE RESEARCH TEAM AIM TO ACHIEVE IN 2015–16

1. Delivery of a detailed and approved Stage 3 storage development plan for implementation at the Otway Site.
2. First stage in the examination and the establishment of a National Research Deep Earth Facility at the Otway Site.
3. To fully align the storage research program priorities with member needs.

CO2CRC ANNUAL REPORT 2014/15
CAPTURE RESEARCH

Professor Dianne Wiley
Capture Program Manager

ONGOING EFFORTS AT COST REDUCTION ARE A MAJOR COMPONENT IN ENSURING CARBON CAPTURE AND STORAGE IS EMBRACED GLOBALLY AS PART OF THE ESSENTIAL MIX OF TECHNOLOGIES TO REDUCE CARBON EMISSIONS. CO2CRC IS PURSuing AN AMBITIOUS COST REDUCTION TARGET EXCEEDING 50 PER CENT FOR THE CAPTURE OF CO2.

The successful deployment of any low emissions technology will depend on its reliability, capacity and, most importantly, its commerciality – what does it cost in real-world conditions. This is true of wind, solar, and carbon capture and storage.

Ongoing efforts at cost reduction are a major component in ensuring carbon capture and storage is embraced globally as part of the essential mix of technologies to reduce carbon emissions. CO2CRC is pursuing an ambitious cost reduction target exceeding 50 per cent for the capture of CO2. Our Capture Research Program focuses on the science behind the development and deployment of carbon capture and storage by undertaking research activity at three distinct phases of development: basic laboratory research, pilot-scale demonstration projects and future large-scale designs. All are critical steps in developing capture technologies that are industry ready.

The objective of all projects in the capture research program is to lower the cost of CO2 capture by:

› Reducing the ‘energy penalty’ associated with operating a capture plant, and
› Improving the different capture technologies by reducing their size and/or increasing their capture efficiency.

Our solvents and engineering research teams have completed evaluation of a novel capture system called CO2CRC UNO MK 3. The approach utilises a precipitating potassium carbonate solvent system to capture 90 per cent of CO2 emissions from large-scale emission sources such as power stations (pre- and post-combustion) and other industrial sources. UNO MK 3 is suitable for retrofitting to existing emission sources as well as for new build processes. Evaluation involved analysis and simulation of the system based on data obtained from the University of Melbourne’s laboratory mini-plant, part-funded by ANLEC R&D, as well as data obtained from the pilot-scale facility co-funded by Brown Coal Innovation Australia (BCIA) in the Latrobe Valley.

Importantly this research can be applied to the development and validation of models that can then be used in the design of larger plants as illustrated in the final report submitted to BCIA in October 2014. We estimate that integration of this capture process with a power station should result in a 25 per cent reduction in the energy use for this system compared with current commercial monoethanolamine (MEA) systems.

The membrane research teams are developing new materials and systems for CO2 separation. Our patented technique for production of ultra-thin membranes uses continuous assembly of polymers (CAP) synthesis. Results in the laboratory suggest that these membranes should have the necessary combination of selectivity and permeability to be economic for large-scale implementation. Testing is underway in the United States under pre-combustion conditions to verify their ability to achieve these performances in the presence of real world impurities.

Field trials of our latest high flux hollow fibre membranes have been completed. Despite practical challenges, results indicate that further material development and good system design is likely to result in a membrane process that would be competitive for post-combustion capture applications.

The adsorbents materials and process teams have continued to refine their rapid screening tool for post-combustion capture of CO2 for Pressure Vacuum Swing Adsorption (PVSA) and thermal swing adsorption (TSA). The tool is a software program developed to quickly characterise a material suitability for CO2 adsorption based on its properties.

Further development of chabazite materials for CO2 separation from natural gas continue to deliver promising outcomes especially over zeolite 3A. Chabazite is a type of zeolite tailored to capture more CO2.

Polyethylenimine (PEI) materials have been successfully pelletised and small-scale testing of the material is underway.

Linked to our economic research, our biomass research has also considered the impact of biomass on cost of electricity and emissions reduction. It was done by investigating biomass-fired auxiliary energy sources for providing electricity and steam for carbon capture and storage at coal fired power plants and biomass-natural gas co-firing on natural gas combined cycle plants.

By attacking the challenges of carbon capture and storage from multiple angles, CO2CRC aims to not only reduce the cost of capture and storage, but develop potential auxiliary revenue streams for clients along the CO2 value chain.
WHAT THE CAPTURE RESEARCH TEAM AIM TO ACHIEVE IN 2015–16

1. We will test novel membrane and adsorbent materials developed by CO2CRC, using natural gas with high concentrations of CO₂ from our Otway Facility.

2. We will develop a test capture skid that will be miniaturised with the aim that it can be utilised in offshore locations.

3. We will further examine ways in which the costs of capture can be reduced through improved materials, reductions in energy use as well as utilisation of CO₂ as a product.

THE MEMBRANE RESEARCH TEAMS ARE DEVELOPING NEW MATERIALS AND SYSTEMS FOR CO₂ SEPARATION. OUR PATENTED TECHNIQUE FOR PRODUCTION OF ULTRA-THIN MEMBRANES USES CONTINUOUS ASSEMBLY OF POLYMERS (CAP) SYNTHESIS.
ECONOMICS RESEARCH

THE GOAL OF THE ONGOING ECONOMIC ASSESSMENT OF CARBON CAPTURE AND STORAGE TECHNOLOGIES IS TO DETERMINE THE MIX OF TOOLS TO SUBSTANTIALLY REDUCE THE COST OF ITS APPLICATION.

Proving a sound economic foundation for carbon capture and storage is essential to its widespread deployment, especially in developing economies where coal-fired power generation presents enormous economic benefits albeit with a large initial capital investment.

The goal of the ongoing economic assessment of carbon capture and storage technologies is to determine the mix of tools to substantially reduce the cost of its application. We do this by testing and refining the economics behind carbon capture and storage deployment.

In January 2015 we published a study in the International Journal of Greenhouse Gas Control which investigated various biomass auxiliary units to provide energy for CO₂ capture, evaluated the trade-offs between performance and economics of auxiliary units, and examined their economic viability under different fuel prices and incentive schemes.

In the study we examined four options for providing the energy required for CO₂ capture in retrofitted coal power plants. Of the four options, our study found a biomass fired combined heat and power (CHP) unit to be an economic option as the increase in the cost of electricity is lower than if energy to drive the capture plant is taken from the power plant itself.

We further showed in identifying cost efficient capture technologies that solvents such as potassium carbonate, operating in a packed column, utilising a solid-liquid separator, and incorporating advanced heat exchanger integration can reduce the capture cost by 40 per cent compared with the current commercial MEA solvent.

CO2CRC’s study is helping address one of the key challenges for integrating CO₂ capture units with existing power plants – sourcing efficient and clean energy for CO₂ capture and compression.

Our team completed an exhaustive assessment update of membrane systems in the paper on ‘Emerging CO₂ capture systems’ published in the special issue of the International Journal of Greenhouse Gas Control. A general and critical review of emerging CO₂ capture technologies, paying special attention to specific technologies which have undergone a substantial increase in technical and commercial readiness, was undertaken. Our paper showed that understanding and interest in capture membrane technology has grown significantly over the past decade. However, continued laboratory and field-testing is essential to progress the technology to large-scale industrial application.

We conducted a multi-criteria analysis of ways to implement carbon capture and storage at coal-fired power stations in New South Wales. The analysis indicated that the rapid upgrading of power stations to ultra-supercritical boilers (which operate at higher temperatures and greater efficiency to current technology) is preferred as it simultaneously reduces costs and emission rates. By comparison, the steady or slow implementation of carbon capture and storage balances additional emission reductions against the additional costs of carbon capture and storage.

Over the same period we investigated the effect of flow-rate, transport distance, injectivity, storage capacity and well costs on the choice between two storage sites. We analysed the outcomes of approximately 5,000 cases and developed a decision tree to enable rapid screening of pairs of sites. This approach is approximately 500 times faster than conventional optimisation methods and enables the pair-wise comparison of any number of sinks.

In isolation, these projects provide valuable insights into the competitiveness of carbon capture and storage and help direct the work of our scientific researchers but CO2CRC doesn’t work in isolation. As a leading research and development organisation our work will drive the program activities at carbon capture and storage sites around the world; in turn, we will be able to draw on their experiences to further the development of CCS and make the technology more cost-effective.

In 2015–16 and beyond we will work with our CO2CRC colleagues in capture and storage to benchmark the developing technologies and ideas to ensure that they are being progressed in ways that drive down the costs while maintaining the most stringent of standards.
WE WILL WORK WITH OUR CO2CRC PARTNERS IN CAPTURE AND STORAGE TO BENCHMARK THE DEVELOPING TECHNOLOGIES AND IDEAS TO ENSURE THAT THEY ARE BEING PROGRESSSED IN WAYS THAT DRIVE DOWN THE COSTS AND DECREASE THE TECHNICAL, ENVIRONMENTAL, SOCIAL AND ECONOMIC RISKS ASSOCIATED WITH CCS IN AUSTRALIA AND OVERSEAS.
Comprehensive greenhouse gas emissions reduction strategies require carbon capture and storage as the technology complements the energy mix of most countries. The International Energy Agency forecasts a 56 per cent increase in fossil fuel use over the next 25 years, particularly the use of coal in electricity generation throughout the developing world where coal remains cost-effective.

Recognising the opportunity and urgency to deliver global CCS solutions, the Australian Government awarded CO2CRC $51.6 million for CCS research infrastructure under the Education Investment Fund (EIF) in 2013. The project, known as CCSNET, has been designed to support CarbonNet, through which the Victorian Government is investigating a large-scale CCS network. CarbonNet will be a vital part of Australia’s emissions reduction research infrastructure requirements over the next decade.

CCSNET is a collaborative network of research infrastructure comprising laboratory upgrades and new plant equipment located at universities and national research centres in Victoria, the ACT and South Australia. Marine monitoring infrastructure is also located offshore in Gippsland, Victoria. CCSNET will build on existing research and development facilities at the CO2CRC Otway Project site in south-western Victoria and enhance its global profile as one of the premier subsurface laboratories for CCS in the world. CCSNET will also make an important contribution to accelerating capture field trials in the Latrobe Valley.

The goal of CCSNET is to deliver the infrastructure network that produces the technologies which will drive down costs and make CCS a price-competitive carbon reduction technology.

The CCSNET project became active on 2 August 2013 when the EIF Funding Agreement between CO2CRC Limited and the Commonwealth of Australia was formally executed.

PROJECT PROGRESS

CO2CRC has been working in collaboration with the University of Melbourne, Australian National University, Federation University Australia and the University of Adelaide to build laboratory-based infrastructure at these institutions, and with CSIRO to build marine monitoring infrastructure in offshore Gippsland. CO2CRC has committed to a feasibility study to build the Otway Subsurface Laboratory (OSL) at the CO2CRC Otway site.

A total of 12 of the 21 assets earmarked for CCSNET have to date achieved final approval and have advanced to procurement planning and contracting.

CCSNET CONSISTS OF 21 ASSETS ACROSS THREE SUBPROJECTS

The Australian CCS Research Laboratories Network (CCS LabNet) is a national collaborative network of 15 assets, including laboratories and capture research facilities which will undertake research relevant to all aspects of CCS, especially CO₂ containment, injectivity, capacity and monitoring. LabNet will also facilitate pilot scale testing in the Latrobe Valley to enable the development of new generation capture technologies required to reduce the cost of CO₂ capture.

The Gippsland Monitoring Network (GipNet) has three assets and will underpin research required to prepare for and design local and regional environmental monitoring regimes for CarbonNet in both onshore and offshore environments.

The Otway Subsurface Laboratory (OSL) has three assets at the CO2CRC Otway Project site in south western Victoria. The laboratory will be expanded to provide vital research for CarbonNet, including developing and testing emerging new low cost and high precision monitoring and verification technologies.
**WHAT THE CCSNET TEAM AIM TO ACHIEVE IN 2015–16**

1. Over the coming 12 months we will work with research partners to finalise the seven remaining asset proposals to ensure they meet our stringent standards.

2. Construction of infrastructure for approved LabNet assets are planned for completion, and acquisition of associated plant and equipment is expected over the same period.

3. CO2CRC will be half way through a two year feasibility study leading to a Full Investment Decision for the Otway Subsurface Laboratory (OSL).
BUSINESS MANAGEMENT AND GOVERNANCE

CO2CRC’S OFFICIAL INVOLVEMENT IN THE AUSTRALIAN GOVERNMENT’S COLLABORATIVE RESEARCH CENTRE PROGRAM FINISHED ON 31 DECEMBER 2014; HOWEVER, THE LEGAL ENTITY OF CO2CRC LIMITED CONTINUES.

In supporting the essential research focus of CO2CRC our goals are to:

› Transform CO2CRC from a collaborative research centre to a nimble and sustainable company with an innovative culture and world class governance standards

› Provide enhanced processes and systems that through their efficiency create value for our members

FINANCIAL MANAGEMENT

Over the past several months, revisions to processes have brought CO2CRC’s financial management in lines with best practice standards. Included in this process was the decision to introduce a new integrated accounting system which provides improved budgetary controls and research project financial management and reporting capabilities.

Through a focus on corporate internal controls the organisation has reaped substantial efficiency gains; in particular, financial processes with our collaborating research organisations were reviewed and re-engineered to shorten turnaround time. The result will be reflected in leaner and faster-evolving research projects.

The company’s operating budget was reviewed and decisions were taken to streamline operations and consolidate some functions in order to create a highly nimble organisation. Administrative costs of the organisation are less than 10 per cent of our total budget thereby making CO2CRC highly competitive among comparable companies.

STRATEGIC MANAGEMENT

In the first quarter of 2015 we began a discussion on the strategic direction of CO2CRC through two broadly encompassing meetings held with stakeholders in Melbourne and Perth. The meetings were highly valuable in that they helped form our 2020 Targets focusing on milestones and targets for the next five years.

As the name suggests, 2020 Targets and its implementation plans drive the strategic research and administrative direction of the organisation. This document, in which Board members and member representatives were highly engaged, was endorsed by the CO2CRC Board in 2015.

CORPORATE GOVERNANCE

In the 2014–15 financial year, a number of important Board changes took place:

› Chairman of the Board: from David Borthwick to Martin Ferguson (1 November 2014).

› CEO: from Richard Aldous to Tania Constable (19 January 2015).

› Company Secretary: from Carole Peacock to Ching Gee (11 September 2014).

› A total of six Board members retired from the Board (Alex Malahoff 21/3/15; Richard Aldous 31/12/14; David Borthwick 5/9/14; Clinton Foster 5/9/14; Anne Morillon 5/9/15; John Davis 21/3/15).

› Three new Board members were appointed in FY2014-15: James Johnson 24/11/14; Alex Wonhas 29/11/14; Timothy Walton 24/11/14.

CO2CRC has benefited from having a Board with an excellent mix of corporate and scientific experience. All Board members serve on Board Committees based on their skills and experience. Through the period the Board appointed Mark Ridley who has exceptional financial skills, qualifications and experience as our independent chair the Finance, Risk and Audit Committee.

The Program Advisory Committee’s (PAC) structure has been revised to be more in line with industry needs and delivering an industry value proposition. The PAC now has two co-chairs, an Executive Director from CSIRO and an independent industry representative from Shell Australia.

All Terms of References of the various Committees have been reviewed and approved by the Board for implementation.

LEGAL

Moving from a CRC model to a competitive and sustainable business in the longer term, CO2CRC reviewed and simplified the Constitution and Members’ Agreement. For the business to seek a broader range of opportunities both domestically and internationally it was crucial that these changes reflected our company status and structure. The new Constitution and Members’ Agreement were adopted by the Board in 2015.

CO2CRC ANNUAL REPORT 2014/15
WHAT THE BUSINESS MANAGEMENT TEAM AIM TO ACHIEVE IN 2015–16

1. Link our research project management and financial reporting systems across all research projects.

2. Examine policies and procedures for gaps or updates and ensure 80 per cent of required changes are met within the year.

3. Scope how intellectual property and research assets can be utilised to increase their value.
Martin Ferguson joined the CO2CRC as Chairman in September 2014, bringing decades of experience working with the resource sector from a government and private sector perspective.

Mr Ferguson served as the Member for Batman from 1996 to 2013 and held a variety of Shadow Ministerial portfolios including Resources and Energy.

Upon the Rudd Government’s election in December 2007, Mr Ferguson was appointed Minister for Resources and Energy, and Minister for Tourism, positions he held until March 2013.

During his time as Minister he oversaw the largest ever investments in the oil and gas sector, and the rapid expansion of the mining sector. Post politics, Mr Ferguson has accepted a number of positions in the oil and gas industry, including Group Executive in Natural Resources at Seven Group Holdings, Non-Executive Director of the BG Board, and Chairman to the APPEA Advisory Board.

Tania Constable was announced as CO2CRC CEO in November 2014; her appointment commenced in January 2015. Ms Constable was chief advisor in the Personal and Retirement Income Division of Treasury, working on tax-related matters.

Prior to her work at Treasury, she held various senior resources and energy roles in the Department of Industry. Ms Constable was the Head of Resources for more than four years. She had responsibility for policy advice to the Minister for Industry on oil and gas regulation, exploration and development, and mining activities. During this time Ms Constable also had the privilege of being the Australian Joint Commissioner and Sunrise Commissioner for Australia and Timor Leste leading joint activities on the development of the Joint Petroleum Development Area and Greater Sunrise Project.

She was awarded the Public Service Medal in 2014 for outstanding public service in the development of Australia’s liquefied natural gas and other resource and energy industries.

Tim Walton joined the CO2CRC Board in November 2014 as a research sector representative. He is currently the Director, Energy Research Initiatives, in Curtin University’s Office of Research and Development in Perth, Western Australia.

With a professional background in corporate communications, government policy and strategy, Mr Walton has worked in science administration and resources development within the Western Australian Government’s minerals and petroleum, and science and innovation portfolios.

Previously he has worked in a diverse range of areas including conservation education, natural resources management, policy and regulation, heavy industry and port logistics. Mr Walton is a board member of the Western Australian Energy Research Alliance which oversees a joint venture in offshore oil and gas research engagement between CSIRO, Curtin and the University of Western Australia. The National Geosequestration Laboratory is also managed by the Alliance. He has been a Board member of the Centre for Renewal Energy in Sustainable Transport (CREST), the Parker Centre CRC for Hydrometallurgy and the Australian Centre for Natural Gas Management.
Alex Wonhas is Executive Director, Energy and Resources at CSIRO with responsibility for a $200 million a year research and development portfolio which aims to provide science and technology solutions that will enhance the value Australia derives from its vast energy and mineral resources while enabling the transition to a lower emissions economy.

In addition to a strong research and development management background, Dr Wonhas also possesses a deep understanding of the private sector, especially in resources and energy. In his former position as a consultant at McKinsey & Company, Dr Wonhas spent several years advising national and international energy and resources companies on questions of strategy and operations.

He also currently serves on a range of energy-related advisory committees and Boards including the Australian National Low Emissions Coal Council, the Energy and Minerals Institute of the University of Western Australia, and the Federal Government’s Energy White Paper Reference Group.

James Johnson is a geologist (BSc Hons, PhD) with 30 years’ experience in mining and mineral exploration, including nine years as a Division Chief at Geoscience Australia. He managed exploration programs for gold and copper from 1997 to 2005. At Geoscience Australia, he managed the five-year, $59 million Onshore Energy Security Program from submission through program design and successful implementation. The program stimulated considerable industry investment in exploration and was instrumental in mineral discoveries.

From 2011 to early 2014 Dr Johnson managed the Australian Government’s Petroleum Precompetitive Geoscience Australia programs. He now has carriage of both the Minerals and Energy Resources programs at Geoscience Australia. He has been a member of the Board of CO2CRC since 2014.

Greg Lewin came to CO2CRC following a distinguished 35-year career with Royal Dutch Shell, culminating in his appointment as President, Shell Global Solutions International.

He is a Member of the Order of Australia, a Fellow of the Royal Academy of Engineering, a past President of the Institute of Chemical Engineers, and the current President of the World Chemical Engineering Council. He is also Chairman of Wildlife Art Museum of Australia Foundation and Leofwine, non-executive Director of Alinta Energy and Executive Director of Sapphire Global.

Reinoud Blok brings to CO2CRC more than 20 years’ experience in the oil and gas industry in a broad range of technical, commercial and financial management positions, including at Shell International, Woodside and INPEX. Currently General Manager, Greenhouse Gas with INPEX, Mr Blok is responsible for the greenhouse gas management strategy for the Ichthys LNG Project and shaping the global carbon strategy of INPEX.

He was a member of the National CCS Council, formerly the peak government advisory body for carbon capture and storage development in Australia, and is currently a member of the Leadership Roundtable for the Development of Low Emissions Technologies for Fossil Fuels. In addition to being a CO2CRC Board member, he is Chair of the Operations Committee.
2016 MILESTONES

1. CO2CRC STRATEGIC STORY LINE PUBLISHED AND ACCEPTED BY MEMBERS
2. BOARD AND STAKEHOLDER ALIGNMENT ON RESEARCH PRIORITIES
3. STAKEHOLDER MANAGEMENT PLAN AGREED AND OPERATIONALISED
4. SECTOR MEMBERSHIP INCREASED AND ONE KEY CUSTOMER SECURED IN EACH NEW TARGET SEGMENT
5. STAGE 1 RECOGNITION FOR OTWAY PROJECT AS A STRATEGIC NATIONAL LABORATORY
6. INVOLVEMENT ON TWO INTERNATIONAL PROJECTS AND TWO INTERNATIONAL SPONSORS FOR OTWAY PROJECT
7. BOARD AND COMMITTEE STRUCTURE REFLECTS HIGH SKILLS AND EXPERIENCE AND REPRESENTS BEST INTERests OF CO2CRC
8. BOARD CONFIDENCE AND TRUST OF ORGANISATIONAL STRUCTURE AND CAPACITY ALIGNED TO DELIVER AGREED 2020 RESEARCH PROGRAM
9. ACCURATE, TRANSPARENT BUDGET REPORTING AND INFORMATION TRACKING OVERHEADS AND PROJECT EXPENDITURE
2020 Outcomes

- Market Driven Technology Neutral Investment
- Delivering Practical Outcomes
- Trusted Independent Technical Verification/Source
- Significant Key Stakeholder Buy-In
- Credible Portfolio & Investable Projects
- Engagement in Key International Projects
- Secured & Sustainable Funding
The vision for CO2CRC is to develop cost-effective transitional technologies that will help Australia to decrease CO$_2$ emissions into the atmosphere from major stationary CO$_2$ sources, whilst continuing to derive benefit from its abundant fossil fuels and existing industrial base.

**MISSION**

1. To offer excellence in greenhouse gas technologies education and training.

2. To undertake outstanding research into new CO$_2$ sequestration technologies to demonstrate that CO$_2$ capture and storage is economically and environmentally sustainable.

3. To enable Australia to decrease its CO$_2$ emissions into the atmosphere, maintain the competitiveness of its industries and exports and develop new commercial (including hydrogen-based) opportunities.

4. To contribute to the resolution of a significant global environment problem through participation in International programs.