Mining, Exploration and Geoscience
Department of Regional NSW

NSW GOVERNMENT

Coal Innovation NSW Fund annual report 2021–22

regional.nsw.gov.au/meg

Published by the Department of Regional NSW

Title: Coal Innovation NSW Fund annual report 2021–22

First published: December 2022

Department reference number: RDOC22/233168

Cover image: Tiltagoona 1 well site in the Darling Basin.

Amendment schedule

Date	Version	Amendment
December 2022	1	First published

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Reducing coal emissions for the future

Coal Innovation NSW Fund

The Coal Innovation NSW Fund (the Fund) made key contributions to the research, development and demonstration of emissions-reducing technologies in during the 2021–22 financial year. Through the Fund, the NSW Government drives progress towards lower emissions by supporting the development of innovative and world-class coal emissions reduction technologies. A focus of the Fund this financial year has been sponsoring Australian research institutions to build knowledge that can be utilised to improve the commercial application of low emissions coal technologies.

Five research, development and demonstration projects are reported on this year:

- reducing emissions in the manufacture of carbon fibres
- enabling low emissions advocacy coalitions in NSW coal related sectors
- water production from capturing carbon dioxide (CO_2)
- a novel platform for highly integrated solar heat in carbon capture technology
- development and site trials of a novel pilot ventilation air methane catalytic mitigator.

This work has been extremely useful in improving the understanding of coal mine processes and identifying where emissions reduction will be most effective.

The Fund also made significant investment again in the NSW CO_2 Storage Assessment Program to identify a viable greenhouse capture storage site in NSW.

To meet the NSW Government's target of Net Zero by 2050, the Fund will need to continue to deliver funding. Research, Development and Demonstration (RD&D) funding in the next financial year will focus on demonstrating emissions reduction in NSW underground coal mines through a commercial scale pilot ventilation air methane project.

Independent advice supports the Fund

The Fund is overseen by the Deputy Premier as Minister for Regional NSW (the responsible Minister) who is supported by the independently chaired Coal Innovation NSW (CINSW), which provides expert advice and recommendations to the Minister, and Mining Exploration and Geoscience group in the Department of Regional NSW. Membership of CINSW comprises representatives from industry, NSW Government and the coal sector.

CINSW met 3 times during FY21–22 and provided advice on:

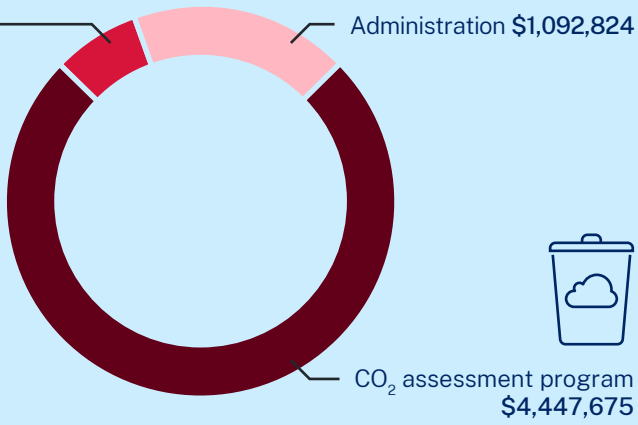
- funding projects that encourage the development of low emissions coal technologies
- policy to encourage the development and implementation of low emissions coal technologies
- opportunities for private and public sector organisations concerning interstate, national and international research projects involving low emissions coal technologies
- other matters concerning low emissions coal technologies.

The Fund supported by CINSW aims to deliver low emissions coal technologies that can reduce future coal mining emissions and continue the responsible development of NSW's coal resources.

Financial year 2021–22 snapshot

Expenditure

$6,059,000
Spent



3
Research institutions involved in projects

5
R&D Projects ongoing/pending

1
R&D Project completed

$778,080
Revenue received

$62.5 m
Funding balance end FY

World-leading research to reduce emissions

The successful research, development and demonstration of new low emissions technologies is key to reducing coal emissions. Investment from the Fund has focused on reducing emissions from coal mining and the use of coal in industries such as electricity generation, steel manufacturing and cement making.

One project was completed this year, 2 are complete and under review by CINSW and 2 are ongoing. The 2 ongoing projects are scheduled for completion next financial year.

The NSW CO_2 Storage Assessment Program remains NSW's lead carbon capture and storage program with significant planning being undertaken this financial year prior to exploration work aimed at firming up large-scale storage opportunities in central-western NSW.

Strong progress was made towards the project's purposes during FY2021–22 despite project delays caused by COVID-19.

Research, development and demonstration

Reducing emissions in the manufacture of carbon fibres

Led by University of Newcastle, R. Stanger

Purpose

Research into, and development of, low emissions coal technologies.

Description

This project is further developing a low emission industrial process to manufacture carbon fibres from coal. If coal could be substituted for polyacrylonitrile, (a petroleum-derived material currently used in the manufacture of 90 per cent of carbon fibres) it would reduce the industry's emissions by ~34 per cent (minimum estimate). It would also significantly reduce the cost of production by at least 50 per cent. Coal is uniquely placed to overcome this cost barrier but requires the extrusion process to be further developed for fibre production.

This project builds on advanced research into coal conducted at the University of Newcastle, where carbon fibres are manufactured by separating and concentrating coking coal's vitrinite component and then thermally extruding this material as it softens and becomes fluid. The extruded material is then drawn down to commercial fibre size (fractions of a millimetre in thickness) and strengthened by annealing at high temperature.

Evaluation

The project was completed in FY21–22 and is due for acceptance by CINSW early in the next financial year. Work undertaken in FY21–22 included continuous extrusion of carbon fibres, strength testing and carbonisation of fibres, a lifecycle analysis, technology roadmap and final report.

The work has proven that coal can be heated to sufficient plasticity (a soft, fluid-like state) to allow it to be drawn as a filament.

A large amount of laboratory data and results were generated that have improved the understanding of the manufacturing process. This knowledge was employed in the successful demonstration of the production of coal-based carbon fibres at the pilot scale, although not of the same quality standards as commercially produced fibres (i.e. <10 µm).

Based on the results of the study, while this technology may have some technical merit, its technical readiness level remains low and significant development is required to overcome the issues encountered to produce a commercial offering.

A 1 kW Direct Carbon Fuel Cell developed by the University of Newcastle.

Status

Committed: $753,468 (excl GST)

Commenced: January 2019

Est. Completion: Completed

Total Paid: $478,990 (excl GST)

Paid FY21–22: $0

Accrued: $274,477 (excl GST)

Enabling low emissions advocacy coalitions in NSW coal related sectors

Led by University of Melbourne, A. Martínez Arranz

Purpose

Increase public awareness and acceptance of the importance of reducing greenhouse gas emissions through the use of low emissions coal technologies.

Description

The project aims to better understand and utilise the mechanics of advocacy coalitions for low carbon technologies in coal and coal-related sectors like electricity generation and manufacturing. Policy proponents can use this knowledge to better target funding and resources for low emissions coal technologies, most notably carbon capture and storage.

Evaluation

The project is complete and is currently undergoing review by CINSW and an independent expert. Work undertaken in FY21–22 included the building of a communication strategy and its evaluation.

Following completion of the Delphi-style Forum (online) and identification of key opinion leaders during the last financial year, the project team developed a communication strategy to communicate project findings and obtain feedback, ascertain pathways towards consensus on energy futures, and help correct misconceptions.

The communication strategy was employed at 3 community sessions in November 2021 at which valuable local insights were gained based on the opinions of community members. A key insight from the project team is that the clearest consensus point amongst participants was the idea of justice (environmental, social and distributive) guiding notions of the energy transition.

Status

Committed: $418,828 (excl GST)

Commenced: January 2020

Est. Completion: Completed

Total Paid: $356,004 (excl GST)

Paid FY21–22: $95,208 (excl GST)

Accrued: $158,032 (excl GST)

Water production from capturing carbon dioxide (CO_2)

Led by CSIRO, P. Feron

Purpose

Research into, and development of, low emissions coal technologies.

Description

This project is ongoing and aims to undertake a pilot plant demonstration of a desalination process integrated with an amine-based CO_2-capture process. The project is being carried out on the post-combustion carbon capture pilot plant at Vales Point Power Station. The project will develop technology to reduce the amount of water required to cool coal-fired power plants when CO_2 capture is implemented.

Evaluation

The project is ongoing and experienced several delays in the financial year due to COVID-19 restrictions and defective equipment. Grant instalment payment was deferred due to these delays.

Work undertaken in FY21–22 included some experimental testing and gathering of data on the performance of amino-acid salt formulations in the post combustion capture (PCC) pilot plant. The project is expected to be finalised during the next financial year with the completion of 2 experimental campaigns and techno-economic evaluation.

Status

Committed: $1,347,874 (excl GST)

Commenced: January 2019

Est. Completion: FY22–23

Total Paid: $1,000,594 (excl GST)

Paid FY21–22: $0

Accrued: $274,477 (excl GST)

A novel platform for highly integrated solar heat in carbon capture technology

Led by CSIRO, D. Milani

Purpose

Research into, and development of, low emissions coal technologies.

Description

This project involves a desktop investigation of the use of a customised solar stripper (So-St) array to improve the commercial viability of carbon capture technology used by coal-fired power stations.

Evaluation

The project was completed in FY20–21 and was accepted by CINSW this financial year.

The first steps of a commercialisation pathway for solar powered post-combustion carbon capture were delivered through this project. The work comprised deep theoretical and modelling studies in 7 interconnected milestones to evaluate this novel technology, and optimise different processes, designs and sizing variables.

A number of research outputs were generated from the project including several journal articles and conference proceedings. Most notably, the article *Tailored solar field and solvent storage for direct solvent regeneration: A novel approach to solarise carbon capture technology* was published in the journal of Applied Thermal Engineering.

Status

Committed: $505,145 (excl GST)

Commenced: January 2019

Est. Completion: Completed

Total Paid: $505,145 (excl GST)

Paid FY21–22: $0

Accrued: $0

Development and site trials of a novel pilot ventilation air methane catalytic mitigator

Led by CSIRO, S. Su

Performance measure

Research into, and development of, low emissions coal technologies.

Description

This project is developing a novel pilot-scale ventilated air methane (VAM) catalytic oxidation prototype unit. CSIRO has previously successfully trialled a novel VAM mitigator (VAMMIT) at the Appin coal mine in southern NSW and this project will improve the performance and safety of this technology. VAM has proven challenging for the coal industry because the air volumes involved are large, and the methane is in low concentrations. The improvements will allow the unit to operate at lower temperatures and lower methane concentrations. The novel pilot will be trialled at the coal mine site to reduce VAM emissions and demonstrate its performance.

Evaluation

The project is ongoing and experienced several delays in the financial year due to COVID-19 restrictions. Despite this, the unit was commissioned and initial function testing completed during the financial year. The unit was continuously tested during site trials with real ventilation air (VA) over a total of approximately 36 hours. Three hot tests were completed with various VAM concentrations, including:

- diluted VA containing 0.105% CH_4
- diluted VA containing 0.15% CH_4
- undiluted VA containing 0.32-0.46% CH_4.

The results obtained have demonstrated that the catalytic VAMMIT unit is fully functional in accordance with site safety regulations. During the 36 hours of operation, the catalyst showed no signs of deterioration, and moisture in the VA had no apparent impact on the catalyst performance or stability.

The project is expected to be finalised during the next financial year.

Status

Committed: $1,496,424 (excl GST)

Commenced: January 2019

Est. Completion: FY22–23

Total Paid: $1,014,905 (excl GST)

Paid FY21–22: $0

Accrued: $0

CSIRO VAMMIT technology deployed at Illawarra Metallurgical Coal operations to reduce fugitive emissions from coal mining.

The NSW CO_2 Storage Assessment Program

Led by Mining, Exploration and Geoscience

Purpose

Research into, and development of, low emissions coal technologies.

Provide funding for the commercialisation of low emissions coal technologies.

Description

The NSW CO_2 Storage Assessment Program aims to develop carbon capture and storage opportunities by identifying large, safe carbon geosequestration sites in NSW. High-emitting industries that face inherent process difficulties in reducing emissions may benefit significantly from carbon capture and storage opportunities. The future commercialisation of any identified geosequestration sites in NSW will allow these industries to continue contributing to the NSW economy without compromising NSW's emissions reduction goals.

Gravity surveying as part of the Central Darling Seismic Survey.

Stage one of the NSW CO_2 Storage Assessment Program was jointly funded from the Commonwealth Government and Low Emission Technology Australia (LETA). To date, over $30 million has been spent on the program.

Evaluation

In FY21–22 the NSW CO_2 Storage Assessment Program focused on planning and procurement for exploration to be undertaken in the FY22–23 financial year. This involved the engagement of specialist and technical staff and site preparation works.

The data acquisition plan developed for the additional Darling Basin drilling has been designed to resolve key geological and hydrogeological uncertainties of 3 potential carbon storage sites within the Darling Basin by undertaking a comprehensive seismic survey and drilling 3 exploration wells. One well will be drilled in 3 prospective troughs; the Pondie Range, Poopelloe Lake and Yathong troughs. Each well is to be drilled to around 1,600–1,800 m depth to intersect the prospective Ravendale Formation.

Key planning activities undertaken:

- long lead items and major contracts awarded
- geological models updated and well site locations confirmed
- development of the Formation Evaluation Program
- exploration activity approvals obtained.

A Formation Evaluation Plan (FEP) Workshop was held in June 2022 with a broad range of industry experts to ensure the data acquisition strategy would meet the planned objectives. The workshop was successful with the main components of the FEP, including the wireline logging program and core analysis program, being refined and improved. New ideas were also generated that served to streamline and improve the planned data acquisition and remove duplication between planned analyses by the various research groups involved. This will reduce data acquisition and modelling costs.

A consensus view was reached by all attendees at the workshop that the data acquisition plan would satisfy the drilling program objectives.

CINSW Secretariat

Purpose

To ensure the quality and efficient administration of the CINSW Fund.

To support CINSW in providing its advice and recommendations to the Minister.

To deliver the NSW CO_2 Storage Assessment Program effectively and efficiently.

Description

The CINSW Secretariat from the Department's Mining Exploration and Geoscience group undertakes several functions in relation to the CINSW Fund and CINSW. The Secretariat manages the allocation and technical oversight of funded projects and carries out research and development projects on behalf of CINSW, most recently the NSW CO_2 Storage Assessment Program.

Evaluation

In delivering towards its purpose for FY21–22, the CINSW Secretariat:

- continued to manage current CINSW Fund projects through various administrative and governance tasks, including working with researchers towards project completion and final research reports
- conducted quarterly and stage gate assessments of research and development projects to ensure project objectives are met. The CINSW Secretariat also critically reviews final reports from researchers prior to making recommendations to CINSW
- developed plans, budgets and funding options for the Fund's future programs
- maintained dialogue with industry, state and commonwealth governments on low emissions coal technologies to support achieving the NSW Government emissions reduction targets
- provided advice to the Minister on proposed allocation from the CINSW Fund and CINSW advice
- organised and prepared papers as required for three CINSW meetings (34, 35, 36)
- provided expert and technical advice to CINSW as required
- continuing Stage 2 of the NSW CO_2 Storage Assessment Program and completing the initial and detailed planning phases to support exploration activities. This included leading an expert review of the Formation Evaluation Plan to ensure Stage 2 objectives are met efficiently and cost effectively
- designed, managed and completed a competitive Expression of Interest process to demonstrate cutting-edge technology to reduce fugitive emissions from coal mining.

Key priorities for FY22–23

Full-scale ventilation air methane abatement facility

Purpose

To provide funding for the commercialisation of low emissions coal technologies.

Description

South32 will design and construct a full-scale next generation VAM mitigation thermal reactor (termed a VAMMIT unit) with improved safety and commercial viability. Long term testing of the technology and safety system will be conducted with results summarised and presented to the NSW Government and mining industry.

CSIRO has previously successfully trialled smaller-scale VAM technology at the Appin coal mine in southern NSW. Project success at full commercial scale would encourage broader industry uptake of this technology and drive emissions reduction from the sector.

VAM thermal reactor technology works by oxidising almost all the methane (>99%) in a combustion chamber heated to approximately 1000° Celsius. At this temperature the methane is converted to water and carbon dioxide (CO_2), which has a significantly lower Global Warming Potential (GWP) than methane. A key feature of the technology is its ability to be self-sustaining as it does not need additional energy to maintain the temperature in the combustion chamber.

The project will progress under a co-funding agreement between South32 ($4.5 million) and the NSW Government under the Fund ($15 million) in 2022. The project is in its earliest stages with no construction having taken place or funding payments provided in FY2021–22.

NSW CO_2 Storage Assessment Program – Stage 2

Purpose

Research into, and development of, low emissions coal technologies.

Provide funding for the commercialisation of low emissions coal technologies.

Description

The aim of Stage 2 of the Program is to expand and strengthen understanding of the carbon dioxide storage potential of the Darling Basin in central-western NSW. Stage 2 is comprised of 2 key activities; a comprehensive seismic survey which was completed in the 2020–21 financial year, and the drilling of 3 exploration wells to be completed in financial year 2022–23.

This work will help pave the way for emissions reductions through capture and permanent storage of CO_2, supporting industries and jobs in NSW. A carbon storage solution would also support new and emerging industries such as clean hydrogen production and direct air capture.

Completion of ongoing research projects

These ongoing RD&D projects are expected to be completed in financial year 2022–23:

- development and site trials of a novel pilot ventilation air methane catalytic mitigator
- water production from capturing carbon dioxide (CO_2).

Governance

Coal Innovation NSW Fund

The Coal Innovation NSW Fund is created and allocated in accordance with the *Coal Innovation Administration Act 2008* (the Act).

The purpose of the Fund is to provide funding for:

- research into, and development of, low emissions coal technologies
- low emissions coal technology demonstration projects
- increasing public awareness and acceptance of the importance of reducing greenhouse gas emissions through the use of low emissions coal technologies
- commercialisation of low emissions coal technologies.

Coal Innovation NSW

The Act creates CINSW which is independently chaired and provides advice and recommendations to the Minister.

The functions of CINSW include:

- making recommendations to the Minister responsible for the administration of the Act
- advising the Minister and making funding recommendations on projects and other activities for the purposes of the Fund, including advice about funding priorities
- advising the Minister on policies to encourage the development and implementation of low emissions coal technologies
- making recommendations to the Minister concerning opportunities for involvement by private and public sector entities in interstate, national and international research projects involving low emissions coal technologies
- advising the Minister on other matters concerning low emissions coal technologies that the Minister may refer to CINSW.

Membership of CINSW is prescribed by the Act which sets out the membership, including:

- an independent chairperson
- two members from government
- two representatives of the NSW black coal industry
- up to 4 independent members with relevant qualifications or experience.

Coal Innovation NSW

Members

Independent Chairperson

Professor Michael Dureau
Executive Director, Warren Institute for Advanced Engineering, University of Sydney

Government members

Ms Georgina Beattie
Chief Executive Officer, Mining, Exploration and Geoscience, Regional NSW
(Replaced Mr Grant McLatchie, Executive Director Geological Survey of NSW from 28 March 2022)

Ms Rachel Parry
Deputy Secretary Energy Climate Change, Sustainability, Office of Energy and Climate Change, Department of Planning and Environment NSW
(Replaced Mr James Hay, Chief Executive, NSW Energy Corporation from 28 March 2022)

NSW black coal industry representative members

Mr Mark Jacobs
Executive General Manager, Environment and Community, Yancoal Australia Ltd
(Replaced Mr John Richards, Managing Director, The Bloomfield Group from 1 January 2022)

Mr Michael Buffier
Group Executive, Global Coal Assets, Glencore

Other members

Professor Dianne Wiley
Dean of Engineering, University of Newcastle

Dr Noel Simento
Managing Director, Australian National Low Emissions Coal R&D

Mr Greg Everett
Chief Executive, Delta Electricity

Deputies of members

Mr David Frith
Director Policy, NSW Minerals Council
Deputy to NSW black coal industry representative members

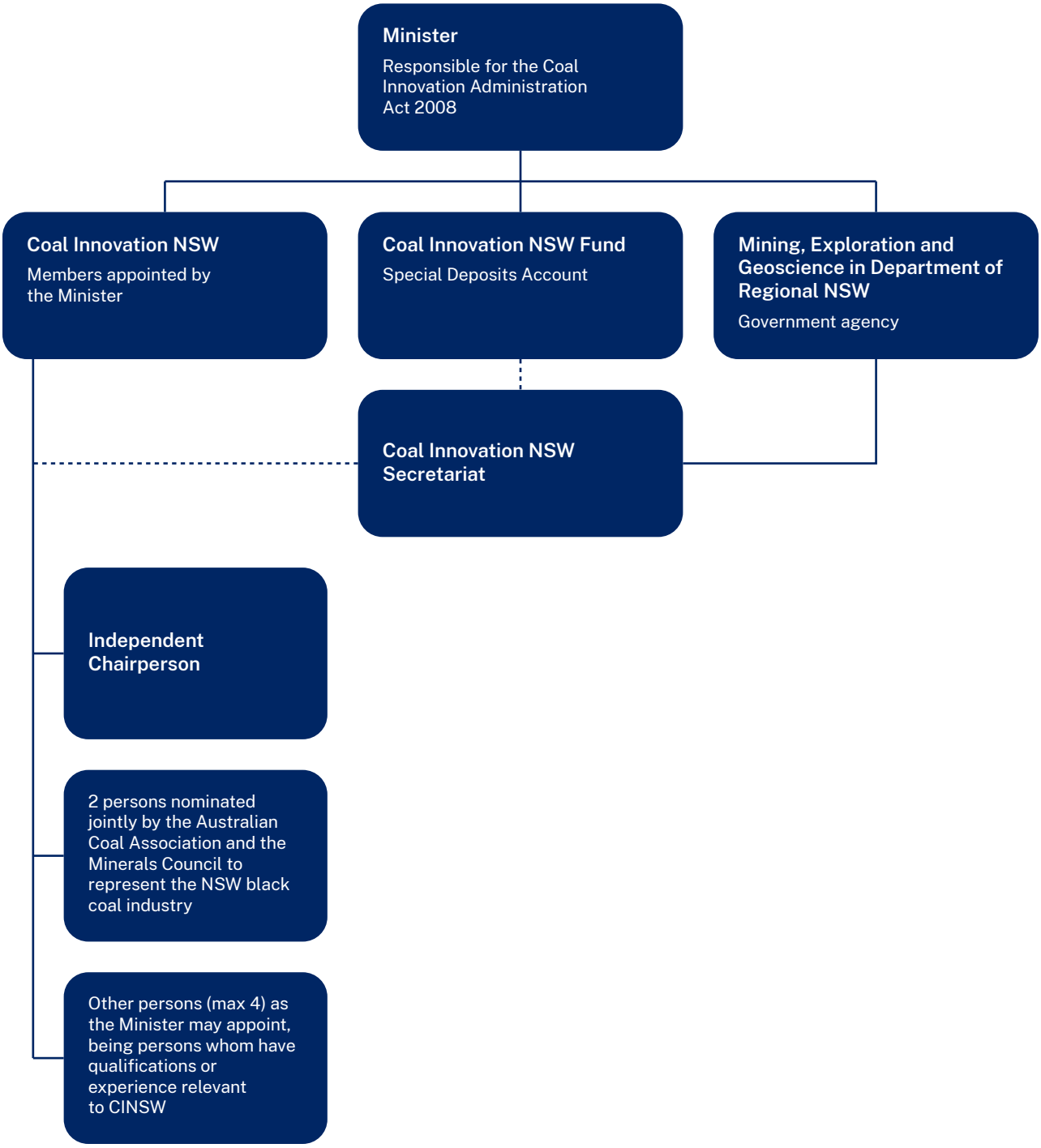
Meetings

There were three CINSW meetings held in FY2021–22.

Meeting attendance

Meeting 34 – 5 July 2021	Meeting 35 – 1 November 2021	Meeting 36 – 28 March 2022
Members		
Professor Michael Dureau, Chairperson	Professor Michael Dureau, Chairperson	Dr Noel Simento, Acting Chairperson
Dr Noel Simento – Independent	Dr Noel Simento – Independent	–
Mr Greg Everett – Independent	Mr Greg Everett – Independent	Mr Anthony Callen – Independent on behalf of Mr Greg Everett
Professor Dianne Wiley – Independent	Professor Dianne Wiley – Independent	Professor Dianne Wiley – Independent
Mr John Richards – Coal Industry	Mr John Richards – Coal Industry	Mr Mark Jacobs – Coal Industry
Mr Michael Buffier – Coal Industry	Mr Michael Buffier – Coal Industry	Mr David Frith – Deputy member, Coal Industry on behalf of Mr Buffier
Mr James Hay – Government (partial attendance)	Ms Kate Wilson – Government on behalf of Mr James Hay	Ms Rachel Parry – Government
Ms Kate Wilson – Government on behalf of Mr James Hay (partial)	–	–
Mr Grant McLatchie – Government on behalf of Dr Chris Yates	Mr Grant McLatchie – Government	Ms Georgina Beattie – Government
Observers		
Mr David Frith, Director Policy, NSW Minerals Council (Deputy to Mr Jacobs and Mr Buffier)	Mr David Frith, Director Policy, NSW Minerals Council (Deputy to Mr Jacobs and Mr Buffier)	Mr Tony Linnane, Executive Director Strategy, Performance & Industry Development, DRNSW
Ms Pamela Box, Senior Policy Officer Department of Treasury	Ms Pamela Box, Senior Policy Officer Department of Treasury	Ms Bronwyn Isaac, Principal Policy Officer DPE Treasury
Ms Caroline Dobson, Executive Coordinator Department of Treasury	–	Mr Grant McLatchie, Executive Director Geological Survey of DRNSW
Mr Robert Hynes, Principal Scientist Net Zero Department of Environment and Heritage	Mr Robert Hynes, Principal Scientist Net Zero Department of Environment and Heritage	Mr Robert Hynes, Principal Scientist Net Zero Department of Environment and Heritage
Secretariat		
Mr Tully Mathews, Manager	Mr Tully Mathews, Manager	Mr Tully Mathews, Manager
Mr James Knight, Senior Project Officer	Mr James Knight, Senior Project Officer	Mr James Knight, Senior Project Officer
Mr Lewis Brent, Project Officer	Mr Lewis Brent, Project Officer	Mr Lewis Brent, Project Officer
Ms Madeleine Kendall, Assistant Project Officer	–	Mr Harris Khan, Senior Geoscientist

Governance structure



Risk management

CINSW operates under a governance framework to manage risks associated with the use and administration of the Fund. All activities of CINSW are carried out under the *Coal Innovation Administration Act 2008* which clearly sets out the functions of CINSW and its powers.

The 2 key documents of the governance framework are the Code of Conduct for Members of CINSW and the CINSW Grants Administration Policy. Risk is further managed on a program and project basis through hazard identification and risk registers.

The Code of Conduct sets out specific requirements for personal and professional behaviour, communications, handling of government and sensitive information, fraudulent and corrupt behaviour, conflicts of interest, gifts, use of public resources and record keeping. All members of CINSW are required to agree to abide by the Code.

CINSW members are also required to familiarise themselves with their responsibilities under the:

- *Government Sector Employment Act 2013*
- *Independent Commission Against Corruption Act 1988*
- *Public Interest Disclosures Act 1994*
- NSW Government Boards and Committees Guidelines (2013)

The Grants Administration Policy provides a framework for the administration of CINSW grants and outlines the systems and processes used when administering grants. The policy includes a number of key principles which apply to the entire life cycle of a grants program and cover:

- robust planning and design
- collaboration and partnership
- proportionality
- outcome orientation
- achieving value with public money
- governance and accountability
- probity and transparency.

The policy also sets out the roles and responsibilities of the Minister, CINSW, Technical Working Groups and MEG in the administration of the Fund. A key control of the policy is that the Minister is required to approve all grant expenditures.

Each grant program also has specific guidelines developed. ‘Program Administrative Guidelines’ provide specific details of eligibility requirements and the selection criteria and framework for assessing applications. Risk assessment and control implementation is conducted in relation to each round of grants and is consistent with the Department’s Risk Management Framework.

Financial information for FY21–22

Income

Interest

Interest earnings of $112,663.

This was deposited directly into the Fund's bank account. The interest was calculated on the daily balance of the bank account and paid at the cash rate, on a monthly basis, using the Westpac Interest Apportionment Service.

Grants and contributions

First ($235,403) and second ($430,014) project instalments were received, totalling $665,417. Payments are part of a Funding Deed with Low Emissions Technology Australia (LETA) for the NSW CO_2 Storage Assessment Program. LETA is contributing up to $8.3 m towards the project.

A refund of $238 was received from the University of Newcastle after an independent financial audit showed not all funds granted had been expended to complete the project.

Summary

Description	Value ($) excl GST
Interest	112,663
Grants and contributions	665,417
Total income	**778,080**

Expenditure

Total expenditure from the Fund was $6,059,000.

NSW CO_2 Storage Assessment Program

Expenditure focussed on planning and preparation activities and purchase of long lead items to support exploration activities.

Reducing emissions in the manufacture of carbon fibres

Payment for completion of milestone 5 (Carbonisation on continuous heating line at Carbon Nexus, Deakin University), milestone 6 (life cycle analysis), milestone 7 (technology road map) and a final report.

Enabling low emissions advocacy coalitions in NSW coal-related sectors

Payment for completion of milestone 5 (identification of KOLs), milestone 6 (Conduct of Delphi forum), milestone 7 (Building of communication strategy), Milestone 8 (Evaluation of communication strategy) and a final report.

CINSW Expenses

Remuneration of the CINSW Chairperson.

Fund and CINSW administration

Expenditure incurred to administer the Fund and support CINSW. This includes the CINSW Secretariat (salaries, costs, travel, staff development), legal fees, telecommunications, office supplies and contracts supporting the administration of the Fund.

Audit fees

Independent annual financial audit and governance audit.

Summary

Description	Value ($) excl GST
NSW CO_2 Storage Assessment Program	4,447,675
Reducing emissions in the manufacture of carbon fibres	274,478
Enabling low emissions advocacy coalitions in NSW coal related sectors	158,033
CINSW expenses	20,000
Fund and CINSW administration	1,092,824
Audit fees	65,990
Total	**6,059,000**

Totals

Extract from the CINSW financial statement	Value ($) excl GST
Opening balance as of 1 July 2020 (credit)	67,733,000
Interest and other revenue	778,080
Total	68,511,080
Less expenditure	6,059,000
Total on 30 June 2022 (credit)	**62,452,080**

Financial reports

Coal Innovation NSW Fund
Statement by the Chief Executive Officer
for the year ended 30 June 2022

I declare, on behalf of the Coal Innovation NSW Fund (the Fund) that in my opinion:

1. The accompanying financial report provides details of the transactions of the Fund for the year ended 30 June 2022;
2. The financial report has been prepared as a special purpose financial report in accordance with the basis of preparation described in Note 1(b); and
3. The accompanying financial report presents fairly the net assets of the Fund as at 30 June 2022 and of its income and expenditure for the year ended on that date.

Further, I am not aware of any circumstances which would render any particulars included in the financial report to be misleading or inaccurate.

Georgina Beattie
CEO, Mining, Exploration and Geoscience
Department of Regional NSW

Date: 30 November 2022

Coal Innovation NSW Fund
Statement of income and expenditure
for the year ended 30 June 2022

	Notes	Actual 2022 $'000	Actual 2021 $'000
Revenue			
Grants and Contributions	1(c)	665	-
Interest revenue	1(c)	113	110
Total revenue		778	110
Expenses			
Auditor's remuneration - audit of financial report		28	27
Research and development grants	1(d)	5,229	2,796
Professional expenses		139	26
Salaries and wages (including recreation leave)		454	460
Superannuation		43	42
Payroll tax and fringe benefits tax		23	24
Other operating expense		12	24
Legal fees		109	-
Travel		15	14
Training		7	2
Total expenses		**6,059**	**3,415**
Net result		**(5,281)**	**(3,305)**

The accompanying notes form part of the financial report.

Coal Innovation NSW Fund
Statement of net assets
as at 30 June 2022

	Actual 2022 $'000	Actual 2021 $'000
ASSETS		
Current assets		
Cash and cash equivalents	64,770	69,742
Accrued income	430	-
Prepaid expense	101	155
Other receivables	25	50
Total current assets	**65,326**	**69,947**
Total assets	**65,326**	**69,947**
LIABILITIES		
Current liabilities		
Accrued expenses	2,852	551
Payable to Department of Regional NSW	22	1,663
Total current liabilities	**2,874**	**2,214**
Total liabilities	**2,874**	**2,214**
Net assets	**62,452**	**67,733**

The accompanying notes form part of the financial report.

1. Summary of significant accounting policies.

(a) Reporting entity

The Coal Innovation NSW Fund (the Fund) is a not-for-profit fund, and the Fund does not have a cash generating unit.

The Fund has been established and is governed under the *Coal Innovation Administration Act 2008 (the Act)*. Part 2 Section 4 of the Act establishes the Fund as a special deposits account.

The financial report has been prepared on the basis that the Fund is not a reporting entity under the Australian Accounting Standards. The financial report for the Fund is therefore a special purpose financial report with the financial period being from 1 July 2021 to 30 June 2022.

This financial report for the year ended 30 June 2022 has been authorised for issue by the Chief Executive Officer, Division of Mining, Exploration and Geoscience, Department of Regional NSW (DRNSW), on the date the accompanying Statement by the CEO was signed.

Key activities

Part 2 Section 5 of the Act establishes the purpose of the Fund as follows:

a) to provide funding for research into, and development of low emissions coal technologies,
b) to provide funding to demonstrate low emissions coal technologies,
c) to provide funding to increase public awareness and acceptance of the importance of reducing greenhouse gas emissions through the use of low emissions coal technologies, and
d) to provide funding for the commercialisation of low emissions coal technologies.

Funding sources for the Fund

Part 2 Section 6 of the Act states that:

1) There is payable into the Fund:
   a) all money advanced by the Treasurer to the Fund, and
   b) all money appropriated by the Parliament for the purposes of the Fund, and
   c) the proceeds of the investment of money in the Fund, and
   d) all money directed or authorised to be paid into the Fund by or under this or any other Act or law, and
   e) all money received for voluntary contributions to the Fund made by any person or body.
2) A voluntary contribution to the Fund may be made on the condition that the contribution is to be used only for a specified purpose

Payments out of the Fund

Part 2 Section 7 of the Act states that:

1) There is payable from the Fund:
   a) payments approved by the Minister for the purpose of the Fund, and
   b) administrative expenses incurred in relation to the Fund or Coal Innovation NSW (CINSW), and
   c) payments directed or authorised to be paid from the Fund by or under this or any other Act or law.

Any money paid into the Fund on the condition that it is to be used only for a specified purpose, including any proceeds of the investment of that money in the Fund, is only payable from the Fund for the specified purpose and a proportionate share of the administrative expenses payable from the Fund.

(b) Basis of preparation

This financial report is a special purpose financial report that has been prepared in order to account for the transactions of the Fund under the Act.

This financial report has been prepared in accordance with the significant accounting policies disclosed below. Such accounting policies are consistent with the previous period unless stated otherwise.

The statement of net assets and the statement of income and expenditure have been prepared on an accruals basis and based on historic costs and do not take into account changing money values or, except where specifically stated, current valuations of non-current assets.

All amounts are rounded to the nearest one thousand dollars and are expressed in Australian currency

(c) Income recognition

Income is measured at the fair value of the consideration or contribution received or receivable. Additional comments regarding the accounting policies for the recognition of income are discussed below.

Interest Revenue

Interest income is recognised using the effective interest rate method. The effective interest rate is the rate that exactly discounts the estimated future cash receipts over the expected life of the financial instrument or a shorter period, where appropriate, to the net carrying amount of the financial asset.

(d) Research and development grants

Research and development grants relate to payments to grantees for research projects aligned with the purpose of the Fund, these research and development activities engage contractors to conduct work for site preparation, drilling, engineering, project management research activities and peer review of research results. This activity is classified as being in the research phase for the project and no expenses have been capitalised. An asset will not be recognised until clear and quantifiable future benefit is established. However, there is acknowledgement that any grant is from the Fund and any future economic benefits (assets) arising out of it may belong to NSW Government and/or the research partner.

(e) Accounting for the Goods and Services Tax (GST)

Income, expenses and assets are recognised net of the amount of GST, except that the:

- amount of GST incurred by the Fund as a purchaser that is not recoverable from the Australian Taxation Office is recognised as part of an asset's cost of acquisition or as part of an item of expense and
- receivables and payables are stated with the amount of GST included.

(f) Receivables

Trade receivables and other receivables that have fixed or determinable payments that are not quoted in an active market are classified as receivables. Receivables are measured at amortised cost using the effective interest method, less any impairment. Changes are recognised in the net result for the year when impaired, derecognised or though the amortisation process.

Short-term receivables with no stated interest rate are measured at the original invoice amount unless the effect of discounting is material.

1. Summary of significant accounting policies (continued)

(g) Payables

Payables represent liabilities for goods and services provided to the Fund and other amounts. Short-term payables with no stated interest rate are measured at the original invoice amount where the effect of discounting is immaterial.

(h) Personnel services

The Fund does not have any employees and received administrative, secretarial support and operational assistance from DRNSW during the year. The Fund had an arrangement with the Department to reimburse the Departments for personnel services expenses and other costs incurred on behalf of the Fund.

2. Cash receipts and payments

	Actual 2022 $'000	Actual 2021 $'000
Opening cash balance	**69,742**	**72,454**
Cash receipts:		
The Fund is authorised to receive amounts in accordance with Section 6 of the Act.		
(1) (a) the proceeds of the investment of money in the Fund	113	110
(b) all money directed or authorised to be paid into the Fund by or under this or any other Act or Law	235	-
BAS receipt	25	16
Cash payments:		
Payments from the Fund are in accordance with Section 7 of the Act.		
(1) (a) payments approved by the Minister for the purpose of the Fund	(4,654)	(2,244)
(b) administrative expenses incurred in relation to the Fund or CINSW	(691)	(594)
Closing cash balance	**64,770**	**69,742**

3. Events after the reporting period

There are no events that would impact on the state of affairs of the Fund or have a material impact on the financial statements.

End of audited financial report.

Independent audit report

CINSW spent $65,990 on audit fees, which was split between an annual financial audit and governance audit.

Annual financial audit

The *Public Finance and Audit Act* 1983 mandates the Auditor-General audit the Coal Innovation NSW Fund as it is a Special Deposits Account. The audited financial report is included in Section D of this report and comprises a statement of net assets, comprehensive income and associated note disclosures.

Governance audit

Deloitte Touché Tohmatsu (Deloitte) conducted an audit on governance of the Coal Innovation NSW Fund from April–June 2022. The draft audit report is currently under review. The draft audit report did not identify any opportunities for improvement based on the findings of the audit.

A seismic vehicle acquiring data as part of the Central Darling Seismic Survey.

Appendix 1

Summary of grant allocations from Fund

Project title	Organisation	Funding committed (excl GST)	Funding paid (excl GST)	Status
Permanent large-scale CO_2 Storage by Mineral Carbonation in NSW	University of Newcastle – Mineral Carbonation International	$3,040,000	$3,040,000	Complete Jun 2013 – Aug 2021
Greenhouse Gas Abatement Facility Demonstration	Centennial Mandalong Pty Ltd	$2,200,000	$2,196,526	Discontinued Mar 2011 – Apr 2019
Advanced aqueous ammonia-based carbon capture technology	CSIRO	$2,000,000	$2,000,000	Complete Jan 2017 – Feb 2020
Development of a 1 kW Modular Direct Carbon Fuel Cell Demonstration Plant	University of Newcastle	$1,643,001	$1,642,768	Complete Jun 2017 – Aug 2021
Further development of an aqueous ammonia process for post-combustion capture of CO_2 in the NSW power sector	CSIRO	$1,300,000	$1,582,000	Complete Feb 2011 – Feb 2015
Rotating Liquid Sheet Contactor pilot scale testing project	CSIRO	$1,274,045	$1,274,045	Complete Jan 2017 – Apr 2019
Membrane Gas-Solvent Contactor demonstration project	$C0_2$CRC	$1,216,900	$1,259,473	Complete Dec 2016 – Aug 2019
Ventilation air methane catalytic mitigator	CSIRO	$1,496,424	$1,014,905	Ongoing Commenced Jan 2019
300-200 MW ultra supercritical hybrid solar/coal R&D pathway study	Toshiba	$946,500	$946,500	Complete Jan 2019 – Apr 2021
Third generation membrane material development	University of New South Wales	$862,803	$862,803	Complete Jan 2017 – Apr 2019
Water production from CO_2 capture	CSIRO	$1,347,874	$855,495	Ongoing Commenced Jan 2019
A novel chemical looping-based air separation technology for oxy-fuel combustion of coal	University of Newcastle Priority Research Centre for Energy	$886,618	$851,296	Complete Dec 2010 – May 2014
Aerosol formation pathways in liquid absorption-based CO_2 capture process	CSIRO	$687,252	$687,252	Complete Jan 2017 – Feb 2021
Managing clean Coal Technology project risk: The role of public awareness	University of Newcastle	$618,930	$655,795	Complete Dec 2010 – Jul 2013

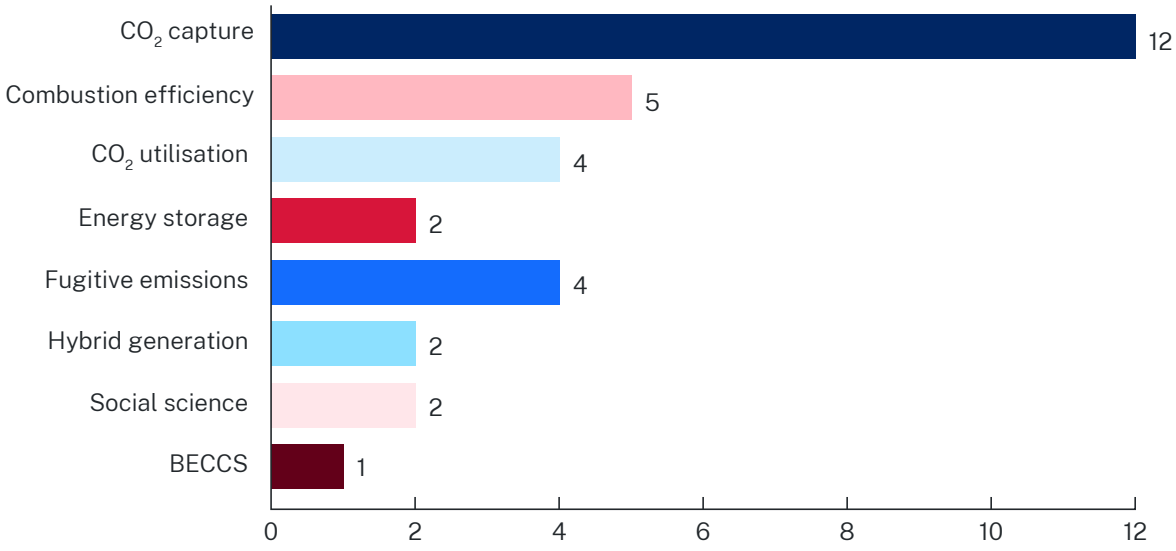
Project title	Organisation	Funding committed (excl GST)	Funding paid (excl GST)	Status
Site trials of novel CO_2 capture technology at Delta Electricity	CSIRO	$613,711	$613,795	Complete Feb 2011 – Feb 2015
Energy harvesting from a CO_2 capture process	CSIRO	$578,991	$578,991	Complete Jan 2017 – Feb 2019
Development and optimization of the Direct Carbon Fuel Cell	University of Newcastle	$608,719	$564,738	Complete Dec 2010 – Aug 2016
A novel platform for highly integrated solar heat in carbon capture technology	CSIRO	$505,145	$505,145	Complete Jan 2019 – Sep 2021
Low emission coal in the manufacture carbon fibres	University of Newcastle	$753,468	$478,990	Complete (awaiting final invoice) Jan 2019 – Mar 2022
Battery storage system at Vales Point Power Station	Sunset Power International Pty Ltd (trading as Delta Electricity)	$460,000	$460,000	Complete Jan 2019 – Jul 2020
Combining Redox Energy Storage with coal-fired power generation	University of Newcastle	$383,663	$383,933	Complete Jan 2017 – Feb 2019
Reduction in GHG emissions in steel production	CO_2CRC	$387,550	$379,326	Complete Jan 2019 – Sep 2020
Low emissions advocacy coalitions	University of Melbourne	$418,828	$260,796	Complete (awaiting final approval and invoice) Commenced Sep 2019
Harvesting energy with CO_2 utilisation – a feasibility study	CSIRO	$154,923	$154,923	Complete Jan 2019 – Dec 2020
Retrofitting calcium carbonate looping to an existing cement plant for CO_2 capture: A techno-economic feasibility study	CSIRO	$100,000	$100,000	Complete Jan 2019 – May 2020
An in-depth assessment of geothermal power generation for NSW coal-fired power plants	University of Newcastle	$99,165	$99,165	Complete Jan 2019 – Dec 2019
Feasibility assessment of bioenergy carbon capture and storage (BECCS) deployment with municipal solid waste (MSW) co-combustion at NSW coal power plants	University of Sydney	$96,630	$96,631	Complete Jan 2019 – Jul 2020
Optimal design of solar photovoltaic and concentrated solar power system for coal-fired power plants in NSW	University Technology Sydney	$96,390	$96,390	Complete Jan 2019 – Jun 2020
Deployment of Silica gels for improved CO_2 containment and risk mitigation	University of New South Wales	$90,000	$71,756	Complete Jan 2019 – May 2021

Project title	Organisation	Funding committed (excl GST)	Funding paid (excl GST)	Status
Enhanced fugitive emissions drainage from open cut coal mines	CSIRO	$1,00,000	$39,451	Discontinued Feb 2011 – Dec 2012
Demonstration of Ultra Clean Coal in a Diesel Engine	UCC Energy	$2,581,000	$38,174	Discontinued Feb 2011 – Nov 2013
Full-scale ventilation air methane abatement facility	South 32	$15,000,000		Ongoing Commenced Apr 2022

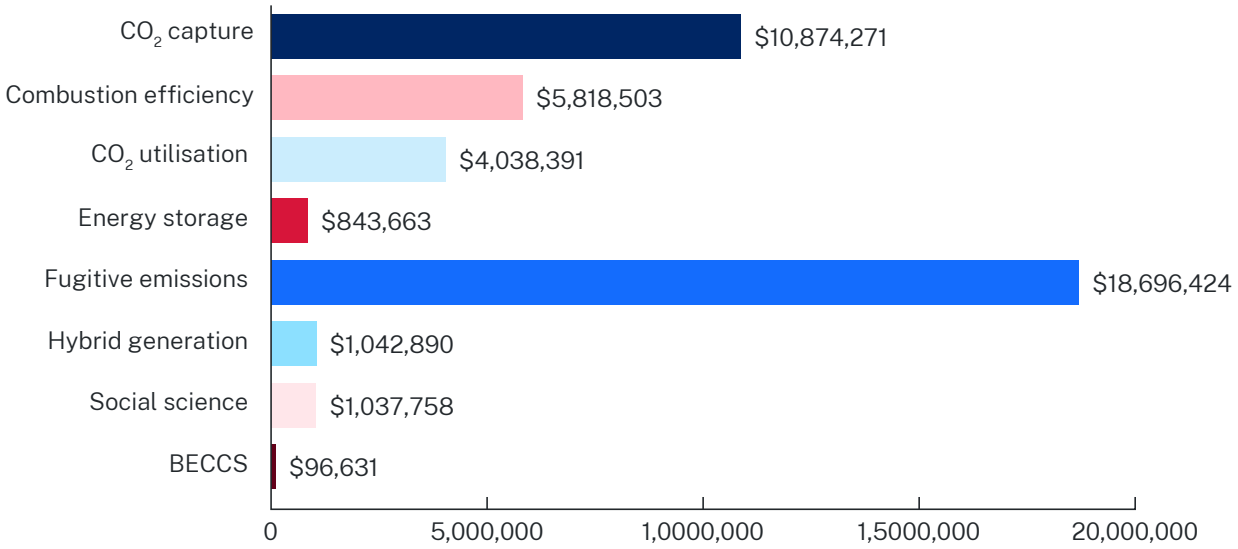
Drilling operations at the Mena Murtee well in the Darling basin.

Appendix 2

Grant allocations by technology (number of projects)



Grant allocations by technology (amount)



CSIRO VAMMIT technology deployed at Illawarra Metallurgical Coal operations to reduce fugitive emissions from coal mining.

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