# Mining, Exploration and Geoscience Department of Regional NSW





# Coal Innovation NSW Fund annual report 2022–23

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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 (RD&D) of emissions-reducing technologies in during the 2022–23 financial year (FY). Through the Fund, the NSW Government drives progress to reduce emissions by supporting innovative and world-class emissions reduction technologies.

The key focus for the Fund for this financial year was the drilling of 3 exploration wells in western New South Wales (NSW) as part of the NSW CO<sub>2</sub> Storage Assessment Program (the Program). The Program aims to identify a viable greenhouse capture storage site in NSW and support the NSW Government to achieve the goal of Net Zero by 2050.

The Fund has continued to sponsor Australian research institutions and industry to build knowledge to improve the commercial application of low emissions technologies. In particular, the Ventilation Air Methane (VAM) Abatement Demonstration Project, led by South32, moved from the pre-feasibility stage to the feasibility stage.

Five RD&D projects were progressed 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<sub>2</sub>)
- · development and site trials of a novel pilot ventilation air methane catalytic mitigator
- VAM Abatement Demonstration Project.

These projects have provided excellent insight into opportunities as NSW continues to decarbonise.

### Independent advice supports the Fund

The Fund is overseen by the Minister for Natural Resources. Coal Innovation NSW (CINSW) provided independent expert advice to the Minister on expenditure from the Fund. Membership of CINSW comprises independent representatives from industry and the NSW Government.

CINSW met 4 times during FY 2022-23 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.

## Financial year 2022–23 snapshot



# World-leading research to reduce emissions

RD&D of new low emissions technologies is key to reducing 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.

Five RD&D projects were progressed this year. Two projects were finalised and accepted by CINSW, one is complete and under review by CINSW, and 2 are ongoing.

The NSW CO<sub>2</sub> Storage Assessment Program remains NSW's lead carbon capture and storage program. Significant work was undertaken this financial year. Three exploration wells were successfully drilled in the Darling Basin of Western NSW. Initial core and data analyses is ongoing with the exploration work aimed at firming up large-scale storage opportunities in central-western NSW.

The VAM Abatement Demonstration Project is a key pillar of the Australian coal mining industry's objective to reduce fugitive emissions from underground coal mining. CINSW has invested to design and construct a full-scale next generation VAM mitigation thermal reactor (termed a VAMMIT unit) with improved safety and commercial viability 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.



# Research, development and demonstration

# NSW CO<sub>2</sub> Storage Assessment Program

Led by Mining, Exploration and Geoscience

### Purpose

To quantify the carbon storage potential of regional NSW.

### Description

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

Stage 1 of the NSW CO<sub>2</sub> Storage Assessment Program was jointly funded from the Commonwealth Government and Low Emission Technology Australia (LETA). Stage 2 builds on the promising results of Stage 1 of the Program, which identified multiple porous sandstone reservoirs in the Darling Basin with the potential to store 555 million tonnes of CO<sub>2</sub>.



Stage 2 drilling operations in the Darling Basin.

Stage 2 of the Program encompasses a comprehensive seismic survey and exploration drilling program. Exploration work aims to address key knowledge gaps in the geological structure, stratigraphy, reservoir and seal properties, and hydrogeology of 3 sub-basins in the Darling Basin.

### Evaluation

In FY 2022–23 the Program focused on finalising the planning and procurement for, and completion of, 3 exploration wells in western NSW. Drilling commenced in September 2022 and was completed in February 2023. Drilling operations were successfully completed in accordance with the Stage 2 Project Plan.

An extensive amount of core was recovered from the Coona Coona wells (intersecting the Pondie Range and Poopelloe Lake troughs), and comprehensive wireline logging programs were completed in the top and bottom sections of all 3 wells. Preliminary analysis of data indicates that NSW has at least one large underground reservoir in the Pondie Range/Poopelloe Lake Trough capable of securely storing industrial-scale volumes of captured CO<sub>2</sub>. Preliminary results from a second site suggest that there may be a prospective CO<sub>2</sub> storage reservoir in the Yathong Trough, although more detailed analysis of the well logs and sidewall cores is required before this can be more confidentially asserted.

Consequently, all 3 exploration wells have been cased and suspended for future well testing. Analysis of the data acquired is ongoing and should be completed in FY 2023–24.

### Reducing emissions in the manufacture of carbon fibres

Led by University of Newcastle, R. Stanger

### Purpose

To reduce emissions from the production of carbon fibres.

### Description

This project investigated 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% of carbon fibres), it would reduce the emissions from manufacture by ~34% (minimum estimate). It would also significantly reduce the cost of production by at least 50%.

This project builds on advanced research into coal conducted by the University of Newcastle. Carbon fibres were manufactured by separating and concentrating vitrinite from coking coal and then thermally extruding this material as it softens and becomes fluid. The extruded material was then drawn down to commercial fibre size (fractions of a millimetre in thickness) and strengthened by annealing at high temperature. Coal is uniquely placed to overcome this cost barrier but requires the extrusion process to be further developed for commercial fibre production.

### **Evaluation**

The project was completed in FY 2021–22 and accepted by CINSW early in FY 2022–23.

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. <10um).

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

Estimated completion: completed

Total paid: \$717,535 (excl GST) Paid FY 2022-23: \$238,544 (excl GST) Accrued: \$0

### Enabling low emissions advocacy coalitions in NSW coalrelated sectors

Led by University of Melbourne, A. Martínez Arranz

### Purpose

To 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 was completed in FY 2021-22 and accepted by CINSW early in FY 2022-23.

The project involved the use of sophisticated data analysis techniques and survey methods to obtain valuable insights into the low-emissions advocacy coalitions operating in the NSW energy space.

The project culminated in a communication strategy to disseminate project findings and obtain feedback, ascertain pathways towards consensus on energy futures, and help correct misconceptions amongst research participants. A key insight from the communication strategy is that the clearest consensus point amongst participants was the idea of justice (environmental, social and distributive) guiding notions of the energy transition.

The project also resulted in a number of recommendations to enable broader low-emissions advocacy coalitions in NSW:

- rebuild trust with local communities and more diverse voices
- better education around technologies related to coal, notably carbon capture and storage
- intimately associating coal technologies with renewable energy developments (e.g. coking coal for renewable energy needs)
- emphasising the long-term and international significance of carbon capture and storage research that may be funded by Australia
- investment in a platform to build future consensus, cooperation and collaboration.

### Status

Committed: \$418,828 (excl GST)Total paid: \$411,215 (excl GST)Commenced: January 2020Paid FY 2022-23: \$55,211 (excl GST)Estimated completion: completedAccrued: \$0

# Water production from capturing CO<sub>2</sub>

### Led by CSIRO, P. Feron

### Purpose

To improve the commercial viability of the post-combustion capture (PCC) process by reducing the water requirement.

### Description

This project involved pilot plant demonstration of a desalination process integrated with an amine-based  $CO_2$ -capture process. The project was carried out on the post-combustion carbon capture pilot plant at Vales Point Power Station. The project investigated the integration of forward osmosis technology into the PCC process to provide additional water for a coal-fired power plant with  $CO_2$  capture.

### Evaluation

The project was completed in FY 2022–23 and will be assessed by CINSW early in the next financial year.

Work undertaken in FY 2022–23 included the finalisation of experimental testing of the performance of aminoacid salt formulations in the PCC pilot plant at Vales Point Power Station. Integration of a forward osmosis membrane module within the PCC process was successfully demonstrated at pilot scale. Amino-acid salts were the best performing absorption liquid when used with a flat sheet membrane. While water recovery via membrane distillation at the absorber was demonstrated in the laboratory, it was not progressed to the Vales Point PCC plant due to concerns around the performance of the membrane at that scale.

The technology displayed some technical merit; however, its technical readiness level remains low and significant development is required to produce a commercial offering.

### Status

Committed: \$1,347,874 (excl GST) Commenced: January 2019 Estimated completion: completed Total paid: \$1,000,594 (excl GST)
Paid FY 2022-23: \$0
Accrued: \$347,280 (excl GST)



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

Led by CSIRO, S. Su

### Purpose

To reduce fugitive emissions from coal mining.

### Description

This project is developing a novel pilot-scale VAM catalytic oxidation prototype. 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 methane is present in low concentrations. The improvements arising from this project 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 expected to be finalised during the next financial year. Project work conducted this financial year focussed on finalising the initial experimental campaign before upgrading the pilot plant to include a larger-capacity blower and variable speed drive. These upgrades will increase the ventilation air (VA) flow rate from 0.67 to 2 Nm<sup>3</sup>/s.

Design of the final site trials to investigate the effect of increasing the VA flow rate on the performance of the VAMMIT were also finalised.

### Status

 Committed: \$1,496,424 (excl GST)
 Total paid: \$1,106,697 (excl GST)

 Commenced: January 2019
 Paid FY 2022-23: \$91,792 (excl GST)

 Estimated completion: FY 2023-24
 Accrued: \$165,287 (excl GST)

## Ventilation Air Methane Abatement Demonstration Project

Led by South32

### Purpose

To reduce fugitive emissions from underground coal mining.

### Description

South32 will design and construct a full-scale next generation 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 1,000°C. At this temperature the methane is converted to water and  $CO_2$ , which has a significantly lower global warming potential 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 is co-funded by South32 and the NSW Government.

### **Evaluation**

In FY 2022–23, the VAM Abatement Demonstration Project successfully completed its pre-feasibility study and progressed to the feasibility stage. The pre-feasibility study was conducted in 3 main stages: option analysis, engineering design, and execution planning.

The pre-feasibility option analysis focussed on selecting the best VAM abatement technology to use, and where at South32's Appin coal mine it would be deployed. CSIRO's thermal VAMMIT was selected due to its high probability of success at a commercial scale, as it was thought to be less technically complicated and more cost-effective to scale than other technologies considered.

Mechanical, electrical, geotechnical and project engineers visited 3 sites with South32 personnel to assess and compare each location. Considerations included VA flow rate, methane concentration, ease of access, distance to operations centre, civil work required, and environmental considerations. A particular vent shaft was selected as the preferred location to deploy the VAMMIT unit as it had a higher average concentration of methane, excellent reliability of VA flow from the vent shaft, and ease of operability during testing.

Engineering design focussed on practical considerations such as the layout rational, subsurface conditions and service connections. Engineering design addressed 4 sections: VAM ducting system, VAMMIT unit design, natural gas supply, and balance of plant design. The project scope and engineering design also considered risk management, regulatory approvals and stakeholder management.

The last stage of the pre-feasibility study focussed on the considerations for the planning and execution of installing the VAMMIT units at the Appin mine. This will be managed by a project team within South32, supported by engineering resources from the engineering service providers. The 3 main contract packages that South32 will look to engage are: VAMMIT unit design and supply; civil and structural, mechanical and piping works; and electrical instrumentation and control.

The feasibility stage of the project has commenced and is expected to be completed within the next financial year.

# **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<sub>2</sub> Storage Assessment Program effectively and efficiently.

### Description

The CINSW Secretariat from the Department of Regional NSW, 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, including the NSW CO<sub>2</sub> Storage Assessment Program.

### Evaluation

In FY 2022-23, 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 4 CINSW meetings (37, 38, 39 and 40)
- provided expert and technical advice to CINSW as required
- continued to deliver Stage 2 of the NSW CO<sub>2</sub> Storage Assessment Program, successfully drilling 3 exploration wells in western NSW. This included the rehabilitation of drill sites and management of initial core analyses and formation evaluation.
- oversaw commencement of the VAM Abatement Demonstration Project, led by South32, to demonstrate cutting-edge technology to reduce fugitive emissions from coal mining.

# Key priorities for FY 2022–23

### Ventilation Air Methane Abatement Demonstration Project

### Purpose

To reduce fugitive emissions from underground coal mining.

### Description

South32 will design and construct a full-scale next generation 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. Project success at full commercial scale would encourage broader industry uptake of this technology and drive emissions reduction from the sector.

The project progressed from the pre-feasibility to the feasibility stage in the financial year. Finalisation of the feasibility is expected to be the main focus of the next financial year, including more detailed engineering design and procurement of the main goods and services to construct the VAMMIT unit at South32's Appin coal mine.

## NSW CO<sub>2</sub> Storage Assessment Program – Stage 2

### Purpose

To quantify the carbon storage potential of regional NSW.

### Description

The aim of Stage 2 of the Program is to expand and strengthen understanding of the CO<sub>2</sub> 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 FY 2020–21, and the drilling of 3 exploration wells which was completed in FY 2022–23.

Work proposed for next financial year will include analysing core obtained from each exploration well, and undertaking formation evaluation to better understand the prospectivity of the Darling Basin as a potential carbon sequestration site for NSW.

This work will help pave the way for emissions reductions through capture and permanent storage of CO<sub>2</sub>, 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

Development and site trials of a novel pilot ventilation air methane catalytic mitigator is expected to be completed in FY 2023–24.

# 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 Coal Innovation NSW, an advisory council 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
- 2 members from government
- 2 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** Warren Centre for Advanced Engineering, University of Sydney

### Government members

**Ms Georgina Beattie** Chief Executive Officer, Mining, Exploration and Geoscience, Regional NSW

**Ms Rachel Parry** Deputy Secretary Energy Climate Change, Sustainability, Office of Energy and Climate Change, Department of Planning and Environment NSW Note: Ms Parry has retired from CINSW and recruitment to replace the role has commenced.

### NSW black coal industry representative members

**Mr Mark Jacobs** Executive General Manager, Environment and Community, Yancoal Australia Ltd

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 Note: Mr Everett has retired from CINSW.

### Deputies of members

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

# Meetings

There were 4 CINSW meetings held in FY 2022-23.

### Meeting attendance

Meeting 37 – 18 Jul 2022	Meeting 38 – 14 Nov 2022	Meeting 39 – 28 Feb 2023	Meeting 40 – 23 May 2023
Members			
Professor Michael Dureau, Chairperson	Professor Michael Dureau, Chairperson	Professor Michael Dureau, Chairperson	Professor Michael Dureau, Chairperson
Dr Noel Simento – Independent	-	Dr Noel Simento – Independent	-
Mr Anthony Callen – Independent on behalf of Mr Greg Everett	Mr Justin Flood – Independent on behalf of Mr Greg Everett	Mr Greg Everett – Independent	Mr Greg Everett – Independent
Professor Dianne Wiley – Independent	Professor Dianne Wiley – Independent	Professor Dianne Wiley – Independent	Professor Dianne Wiley – Independent
Mr Mark Jacobs – Coal industry	Mr Mark Jacobs – Coal industry	Mr Mark Jacobs – Coal industry	Mr Mark Jacobs – Coal industry
Mr David Frith – Deputy member, Coal industry on behalf of Mr Buffier	Mr David Frith – Deputy member, Coal industry on behalf of Mr Buffier	Mr Mick Buffier – Coal industry	Mr Mick Buffier – Coal industry
Ms Rachel Parry – Government	Ms Rachel Parry – Government	Ms Rachel Parry – Government	Mr Andrew Lewis – Government member on behalf of Ms Parry
Ms Georgina Beattie – Government	Ms Georgina Beattie – Government	Ms Georgina Beattie – Government	Ms Georgina Beattie – Government
Guest presenters			
Dr Rohan Stanger, Research Fellow University of Newcastle	Dr Alfonso Arranz, Research Fellow University of Melbourne	Mr Josh Rogers, Project Manager South32	Mr Josh Rogers, Project Manager South32
-	Mr Josh Rogers, Project Manager South32	-	-
-	Ms Sandy Tickell, Group Manager Carbon Planning and Abatement, Glencore	-	-

Meeting 37 – 18 Jul 2022	Meeting 38 – 14 Nov 2022	Meeting 39 – 28 Feb 2023	Meeting 40 – 23 May 2023
Observers			
Mr Grant McLatchie, Executive Director Geological Survey of NSW, Department of Regional NSW (DRNSW)	Mr Grant McLatchie, Executive Director Geological Survey of NSW, DRNSW	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 and Industry Development, DRNSW	Ms Bronwyn Isaac, Principal Policy Officer, NSW Treasury	Ms Bronwyn Isaac, Principal Policy Officer, NSW Treasury	Mr Grant McLatchie, Executive Director Geological Survey of NSW, DRNSW
Mr Robert Hynes, Principal Scientist Net Zero, NSW Department of Environment and Heritage	Mr Marwan El-Chamy, Group Director Strategy and Coordination, DRNSW	Mr Robert Hynes, Principal Scientist Net Zero, NSW Department of Environment and Heritage	Ms Bronwyn Isaac, Principal Policy Officer, NSW Treasury
Ms Bronwyn Isaac, Principal Policy Officer, NSW Treasury	Ms Kaydy Pinetown, Senior Scientist Net Zero, NSW Department of Environment and Heritage	Mr Marwan El-Chamy, Group Director Strategy and Coordination, DRNSW	Mr Robert Hynes, Principal Scientist Net Zero, NSW Department of Environment and Heritage
Dr Kate Wilson, Economic and Insights, NSW Department of Planning and Environment	-	Ms Erin Harwood, Senior Project Officer Programs, NSW Treasury	-
Mr Rob Thomson, Head of Emissions Intensity Reduction Programs, NSW Treasury	-	-	-
Ms Yvonne Scorgie, Technical Director Decarbonisation and Climate Risk, NSW Treasury	-	-	-
Secretariat			
Mr Tully Mathews, Manager	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	Mr Lewis Brent, Project Officer	Mr Harris Khan, Senior Geoscientist
Mr Harris Khan, Senior Geoscientist	Mr Harris Khan, Senior Geoscientist	Mr Harris Khan, Senior Geoscientist	Ms Madeleine Kendell Assistant Project Officer
Ms Madeleine Kendell, Assistant Project Officer	Ms Madeleine Kendell, Assistant Project Officer	-	-

# 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 Mining, Exploration and Geoscience 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 FY 2022–23

### Income

### Interest

Interest earnings of \$1,636,953.

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, contributions and other revenue

Grants, contributions and other revenue received totalled \$6,107,137.

Third, fourth and fifth project instalments (\$1,296,036 each), along with an advanced contingency payment (\$1,809,399), were received, totalling \$5,697,507 for the NSW CO<sub>2</sub> Storage Assessment Program. Payments are part of a funding deed with LETA. LETA is contributing up to \$8.3 m towards the project.

Other contributions and revenue included a payment from Geoscience Australia to undertake mass spectroscopy at one of the exploration wells, unwinding of foreign currency hedges, and the sale of leftover equipment following the completion of drilling.

### Summary

Description	Value (\$) excl GST
Interest	1,636,953
Grants and contributions	6,170,137
Total income	7,807,090

### Expenditure

Total expenditure from the Fund was \$27,226,454. Note that the CINSW Fund operates on an accrual accounting system and thus only includes expenses incurred in FY 2022–23.

### NSW CO<sub>2</sub> Storage Assessment Program

Expenditure focussed on the drilling of 3 exploration wells in western NSW, and rehabilitation activities at each drill site.

### 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 (Lifecycle analysis), milestone 7 (Technology road map) and a final report. This payment was accrued in FY 2021–22 and is not expenditure for this financial year.

### Enabling low emissions advocacy coalitions in NSW coal-related sectors

Payment for the final report and completion of the project. This payment was accrued in FY 2021–22 and is not expenditure for this financial year.

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

Payment for completion of milestone 5 (Commissioning and function tests).

### VAM Abatement Demonstration Project

Payment for the completion of milestone 1 (Technology and site selection, and approvals) and milestone 2 (Engineering) of the pre-feasibility study stage of the project.

### **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 <sub>2</sub> Storage Assessment Program	24,605,379
Reducing emissions in the manufacture of carbon fibres	0
Enabling low emissions advocacy coalitions in NSW coal-related sectors	0
Development and site trials of a novel pilot ventilation air methane catalytic mitigator	257,079
VAM Abatement Demonstration Project	1,089,000
CINSW expenses	20,000
Fund and CINSW administration	1,225,856
Audit fees	29,140
Total	27,226,454

### Totals

Extract from the CINSW financial statement	Value (\$) excl GST
Opening balance as of 1 July 2022 (credit)	62,452,183
Interest and other revenue	7,807,090
Total	70,259,273
Less expenditure	27,226,454
Total on 30 June 2023 (credit)	43,032,819

# **Financial reports**

### Coal Innovation NSW Fund Statement by the Chief Executive Officer

for the year ended 30 June 2023

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 2023;
- 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 2023 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: 11 December 2023

### Coal Innovation NSW Fund Statement of income and expenditure

for the year ended 30 June 2023

	Notes	2023 \$'000	2022 \$'000
Revenue	Notes	<b>\$ 555</b>	Ψ 000
Grants and Contributions	1(c)	5.697	665
Interest revenue	1(c)	1.637	113
Other revenue		474	_
Total revenue	-	7,808	778
Expenses			
Auditor's remuneration - audit of financial report		29	28
Research and development grants	1(d)	25,951	5,229
Professional expenses		41	139
Salaries and wages (including recreation leave)		665	454
Superannuation		66	43
Payroll tax and fringe benefits tax		40	23
Occupancy		60	-
Other operating expense		106	19
Legal fees		36	109
Travel		232	15
Total expenses	-	27,226	6,059
Net result	-	(19,418)	(5,281)

The accompanying notes form part of the financial report.

	Notes	2023 \$'000	2022 \$'000
ASSETS		,	• • • • •
Current assets			
Cash and cash equivalents	2	45,406	64,770
Accrued income		-	430
Prepaid expense	_	44	101
Other receivables		3	25
Total current assets		45,453	65,326
Total assets	_	45,453	65,326
LIABILITIES Current liabilities			
Pavable to Department of Regional NSW	1 (a)	2.419	2.874
Total current liabilities	(3)	2,419	2,874
Total liabilities		2,419	2,874
Net assets	_	43,034	62,452

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 2022 to 30 June 2023.

This financial report for the year ended 30 June 2023 has been authorised for issue by the Chief Executive Officer, Division of Mining, Exploration and Geoscience, Department of Regional NSW (the Department), on the date the accompanying Statement by the Chief Executive Officer 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.
- 2) 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.

### 1. Summary of significant accounting policies (continued)

### (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 to Department of Regional NSW

The Fund is not a separate legal entity and therefore operates under the Department. All purchase orders and invoices are in the name of the Department. All suppliers are therefore paid by the Department, and the Fund reimburses the Department for these costs. The payable at year end represents the amount the Department has paid on behalf of the Fund. 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 the Department during the year. The Fund had an arrangement with the Department to reimburse the Department for personnel services expenses and other costs incurred on behalf of the Fund.

### 2. Cash receipts and payments

	2023 \$'000	2022 \$'000
Opening cash balance	64,770	69,742
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	6,624	113
(b) all money directed or authorised to be paid into the Fund by or under this		
or any other Act or Law	1,637	235
BAS receipt	2	25
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	(26,392)	(4,654)
(b) administrative expenses incurred in relation to the Fund or CINSW	(1,235)	(691)
Closing cash balance	45,406	64,770

### 3. Events after the reporting period

On 19 September 2023 NSW State Government announced the budget for the financial year 2023-24. It was announced that the funding for projects not yet committed will be reprioritised within Government. As per the Treasury and Legislation Act 2023 assented on 27 September 2023, an amount of \$17 million will be transferred from Coal Innovation NSW Fund to the Consolidated Fund. Committed projects will continue to be funded by the Coal Innovation NSW Fund, and there is sufficient budget and resources to see them through to completion.

There are no other 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 \$29,140 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 independent auditor's report is included in Appendix 3 and contains the Auditor-General's opinion on the financial report.



# Appendix 1

# Summary of grant allocations from Fund

Project title	Organisation	Funding committed (excl GST)	Funding paid (excl GST)	Status
Permanent large-scale CO <sub>2</sub> 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 <sub>2</sub> 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	C02CRC	\$1,216,900	\$1,259,473	Complete Dec 2016 – Aug 2019
Ventilation air methane catalytic mitigator	CSIRO	\$1,496,424	\$1,106,697	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 <sub>2</sub> capture	CSIRO	\$1,347,874	\$1,000,594	Complete 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 <sub>2</sub> 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
Site trials of novel CO <sub>2</sub> capture technology at Delta Electricity	CSIRO	\$613,711	\$613,795	Complete Feb 2011 – Feb 2015

Project title	Organisation	Funding committed (excl GST)	Funding paid (excl GST)	Status
Energy harvesting from a CO <sub>2</sub> 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	\$717,535	Complete 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	CO2CRC	\$387,550	\$379,326	Complete Jan 2019 – Sep 2020
Low emissions advocacy coalitions	University of Melbourne	\$418,828	\$411,215	Complete Commenced Sep 2019
Harvesting energy with CO <sub>2</sub> 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 <sub>2</sub> 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 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 <sub>2</sub> containment and risk mitigation	University of New South Wales	\$90,000	\$71,756	Complete Jan 2019 – May 2021
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	South32	\$15,000,000	\$871,000	Ongoing Commenced Apr 2022

# Appendix 2

# Grant allocations by technology (number of projects)



## Grant allocations by technology (amount)



Note: graphs include all grant allocations 2008-present.

# Appendix 3



### INDEPENDENT AUDITOR'S REPORT

### **Coal Innovation NSW Fund**

To the:

- Treasurer of New South Wales (the Treasurer)
- Minister for Natural Resources (the Minister)

### Opinion

I have audited the accompanying financial report of Coal Innovation NSW Fund (the Fund), which comprises the Statement by the Chief Executive Officer, the Statement of Income and Expenditure for the year ended 30 June 2023, the Statement of Net Assets as at 30 June 2023, and notes comprising a Statement of Significant Accounting Policies, and other explanatory information.

In my opinion, the financial report presents fairly the net assets of the Fund as at 30 June 2023, and of the financial transactions of the Fund in accordance with the basis of accounting described in Note 1 to the financial report.

My opinion should be read in conjunction with the rest of this report.

### **Basis for Opinion**

I conducted my audit in accordance with Australian Auditing Standards. My responsibilities under the standards are described in the 'Auditor's Responsibilities for the Audit of the Financial Report' section of my report.

I am independent of the Fund in accordance with the requirements of the:

- Australian Auditing Standards
- Accounting Professional and Ethical Standards Board's APES 110 'Code of Ethics for Professional Accountants (including Independence Standards)' (APES 110).

Parliament promotes independence by ensuring the Auditor-General and the Audit Office of New South Wales are not compromised in their roles by:

- providing that only Parliament, and not the executive government, can remove an Auditor-General
- mandating the Auditor-General as auditor of public sector agencies
- precluding the Auditor-General from providing non-audit services.

I have fulfilled my other ethical responsibilities in accordance with APES 110.

I believe the audit evidence I have obtained is sufficient and appropriate to provide a basis for my audit opinion.

Level 19, Darling Park Tower 2, 201 Sussex Street, Sydney NSW 2000

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### Emphasis of Matter - Basis of Accounting and Restriction on Distribution

Without modifying my opinion, I draw attention to Note 1 to the financial report, which describes the basis of accounting. The financial report has been prepared for the purpose of fulfilling the Funds' financial reporting obligations requested by the Treasurer's delegate. As a result, the financial report may not be suitable for another purpose. My report is intended solely for the Chief Executive Officer, the Minister and the Treasurer, and should not be distributed to any other parties.

### Chief Executive Officer's Responsibilities for the Financial Report

The Chief Executive Officer is responsible for the preparation and fair presentation of the financial report in accordance with the basis of accounting described in Note 1 to the financial report. The Chief Executive Officer's responsibility also includes such internal control as the Chief Executive Officer determines is necessary to enable the preparation and fair presentation of the financial report that is free from material misstatement, whether due to fraud or error. The Chief Executive Officer has determined that the accounting policies described in Note 1 are appropriate for the purpose of fulfilling the Fund's annual financial reporting obligations requested by the Treasurer's delegate.

In preparing the financial report, the Chief Executive Officer is responsible for assessing the Fund's ability to continue as a going concern, disclosing as applicable, matters related to going concern and using the going concern basis of accounting.

### Auditor's Responsibilities for the Audit of the Financial Report

My objectives are to:

- obtain reasonable assurance about whether the financial report as a whole is free from material misstatement, whether due to fraud or error
- issue an Independent Auditor's Report including my opinion.

Reasonable assurance is a high level of assurance, but does not guarantee an audit conducted in accordance with Australian Auditing Standards will always detect material misstatements. Misstatements can arise from fraud or error. Misstatements are considered material if, individually or in aggregate, they could reasonably be expected to influence the economic decisions users take based on the financial report.

A description of my responsibilities for the audit of the financial report is located at the Auditing and Assurance Standards Board website at: <a href="http://www.auasb.gov.au/auditors\_responsibilities/ar4.pdf">www.auasb.gov.au/auditors\_responsibilities/ar4.pdf</a>. The description forms part of my auditor's report.

The scope of my audit does not include, nor provide assurance:

- that the Fund carried out its activities effectively, efficiently and economically
- financial report about the security and controls over the electronic publication of the audited financial report on any website where it may be presented
- about any other information which may have been hyperlinked to/from the financial report.

Min Lee Director, Financial Audit

Delegate of the Auditor-General for New South Wales

12 December 2023 SYDNEY

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

(Def

Coal Innovation NSW E: ccs.info@regional.nsw.gov.au W: regional.nsw.gov.au/meg

