CO2CRC Limited
ABN 56 117 183 516
p: +61 (0)3 8595 9600
e: info@co2crc.com.au
www.co2crc.com.au

L3, 289 Wellington Parade South
East Melbourne, Victoria 3002
PO Box 24121, Melbourne
Victoria 3001

02 May 2024

Committee Secretary
Senate Standing Committees on Environment and Communications
PO Box 6100
Parliament House
Canberra, ACT 2600

Dear Committee Secretary,

Re: *Inquiry into Glencore's proposed carbon capture and storage project.*

Please find CO2CRC's submission to the Senate Standing Committee Environment and Communications Inquiry into Glencore's proposed carbon capture and storage project in the Surat Basin, Queensland.

The CTSCo project is linked to the Millmerran coal-fired power station, a facility that emits ~5 million tonnes of CO_2 per annum. A successful pilot could bring forward other CCS projects that could support a reduction in emissions across Australia's fleet of coal-fired power stations which emit a total of ~123 Mtpa of CO_2 (as of February 2024) and lead the way in supporting other hard-to-abate sectors to reduce their emissions.

It is important that discussion on the benefits and impacts of carbon capture and storage is grounded in fact and sound science. It is to be hoped that this Inquiry will be a forum that enables this. By background, CO2CRC is a not-for-profit research organisation that has been investigating Carbon Capture, Utilisation, and Storage (CCUS) for twenty years. CO2CRC develops and trials next-generation, low-emission technologies in commercially relevant, first-of-a-kind demonstrations.

Our portfolio is developed in line with industry and consistent with government policies and priorities, which enables collaboration and financial efficiencies to trial the new low-emission technologies. CO2CRC works with national and international discipline leaders, manages inter-disciplinary and inter-institutional research projects, and has well-established, decade-long relationships and strong international brand recognition. We also have an outstanding health and safety record. The organisation has an internationally recognised track record of safely delivering complex demonstration projects within a well-established governance structure.

As an independent organisation, CO2CRC considers the progression of carbon capture and storage projects in Australia to be essential, but within the context of Australia's world-class regulatory frameworks. Carbon capture and storage will yield significant environmental and economic benefits to Australia.

Yours sincerely,

Dr Matthias Raab
Chief Executive Officer

Submission by CO2CRC to the "Inquiry into Glencore's proposed carbon capture and storage project"

Submission Summary

Carbon capture and storage (**CCS**) is a safe, proven and increasingly cost-effective technology that can deliver large-scale reductions in emissions for a wide range of industries. Critically, CCS is not only necessary but essential. Indeed, the Intergovernmental Panel on Climate Change (**IPCC**, reference below) recently stated that there is no pathway to net zero, which involves increased energy usage globally and does not rely critically upon the greatly accelerated rollout of CCS. The CCS industry is responding robustly to the challenge of net zero globally and within Australia to the mandated 43% reduction target by 2030.

Internationally, there has been a surge in CCS projects, with 312 projects in construction and development in 2023 – a 57% increase on 2022's 199 projects. CCS's importance is globally recognised and is being facilitated by rapidly streamlining regulations and government support[1].

Domestically, there are approximately 17 CCS[2] projects. However, approvals for these projects are time-sensitive and dependent upon an appropriate and supportive domestic environment.

CTSCo intends to demonstrate carbon capture in a pilot scale project from the Millmerran coal-fired power station, a facility that emits ~5 million tonnes per annum (**Mtpa**) of CO_2[3]. The project will retrofit post-combustion carbon capture, transportation of CO_2 and the safe, permanent, storage of 330,000 tonnes of CO_2 over three years in the Surat basin.

A robust and proven CCS program could, in turn, support a reduction in emissions across Australia's fleet of coal-fired power stations that emit a total of ~123 Mtpa of CO_2e (as of February 2024[4]) and lead the way in supporting other hard-to-abate sectors to reduce their emissions.

This would be a pioneering trial that would generate important real data to establish the practicality of CO_2 projects in Australian basins within and around the Great Artesian Basin (**GAB**) and may help define the role of CCS in Australia in meeting its energy and climate objectives.

Supporting Information

CCS in Australia: Safe, Reliable, Necessary and Urgent

According to the IPCC Working Group III's (**WGIII**) Contribution to the Sixth Assessment Report (**AR6**; 2022), carbon capture and storage are key if the global emissions reduction targets are to be met. In fact, AR6

[1] Global State of CCS 2023: Scaling up through 2030. Global CCS Institute. November 2023.
[2] CO2CRC's internal analysis. March 2024.
[3] Electricity sector emissions and generation data 2022–23 | Clean Energy Regulator (cer.gov.au)
[4] Clean Energy Regulator's: Greenhouse and energy information by designated generation facility 2022-23. February 2024.

notes that no scenario involving the future increased use of energy globally does not require CCS to meet the agreed global emission goals.

Even with the most optimistic deployment schedules of renewable energy, annual storage rates using CCS will need to be 3 gigatons, nearly 75 times the current storage levels. Other IPCC scenarios require even greater amounts of CCS-related CO_2 storage. Relatively conservative estimates undertaken by the Oil and Gas Climate Initiative (**OGCI**) and the Global Carbon Capture and Storage Institute (**GCCSI**) suggest that the existing global CCS storage capacity of approximately 39 million tonnes per annum (2018) will need to be increased approximately 100 times, to 3.8 Gt per annum to meet 2040 Paris Agreement targets.

As of November 2023, the total capacity of CCS projects in development globally was over 350 Mtpa of CO_2, an increase of 102% over the preceding 12 months (GCCSI annual report 2023). Most of these projects are situated in either North America or Europe, where a range of financial incentives and encouraging policy settings are driving and accelerating the CCS project rollout.

CTSCo, CCS and the energy transition

The CTSCo pilot program intends to capture CO_2 from the Millmerran coal-fired power station (currently emitting ~5 Mtpa CO_2), transport the CO_2, and safely and permanently store 110,000 tonnes per annum of CO_2 for 3 years in the Precipice Formation of the Surat Basin.

Onshore CCS has been conducted safely by CO2CRC, amongst others; CO2CRC has injected over >95,000 tonnes of CO_2 without negative impacts. Moreover, the data obtained from the actual safe injection and monitoring of subsurface CO_2 plumes far exceeds the benefits of modelling alone.

Carbon capture and storage technology has been successfully deployed in relation to coal-fired power generation. For instance, the Boundary Dam coal-fired power station in Canada has stored over 4 million tonnes of CO_2 since it began operations in 2014[5]. This technology will have a critical function in supporting emissions abatement in a range of sectors, including electricity (Figure 1) in the future. The first step with such projects is typically a modest pilot program, like that proposed by CTSCo.

To achieve climate objectives, policymakers must tackle emissions from both operational coal-fired power plants and those currently under construction. The International Energy Agency (**IEA**) states that existing government policies project a decrease of around 40% in CO_2 emissions from the existing global coal-powered fleet by 2040. Despite this reduction, annual global emissions for coal-powered electricity generation[6] are still projected to amount to 6 $GtCO_2$ per year by that time. Furthermore, the commencement of significant expansions in coal-fired capacity, principally in Asia, underscores the formidable challenge[7].

[5] Boundary Dam Carbon Capture Project (saskpower.com)
[6] Why carbon capture technologies are important – The role of CCUS in low-carbon power systems – Analysis - IEA
[7] Boom and Bust Coal 2024 - Global Energy Monitor

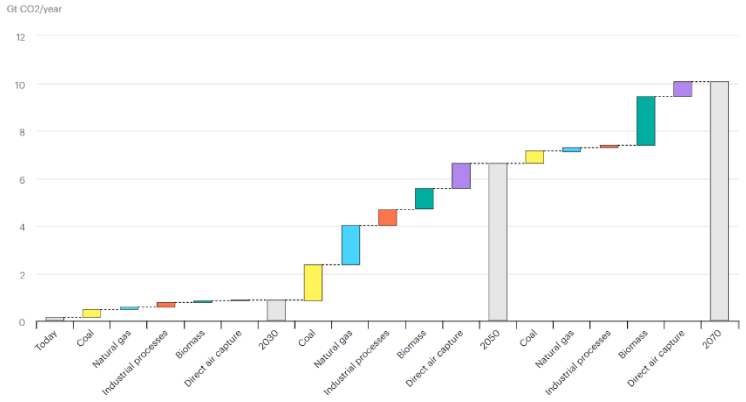

Figure 1 IEA waterfall chart graph describing the role of CCS in emissions abatement in the power generation sector along Sustainable Development pathways.

In the IEA's Sustainable Development Scenario[8], coal-fired power equipped with CCS progressively becomes essential for ensuring secure, sustainable, and cost-effective power systems around the world.

Australia has a goal of phasing out coal-fired power by achieving 82% renewable energy generation by 2030[9] (which will also require attendant energy-firming solutions). Coal-fired power stations produce ~47% of Australia's electricity[10] and emit ~123 Mtpa of CO_2, or over 25% of Australia's total emissions[11], which demonstrates the scale of the task at hand.

This planned phase-out is not without uncertainty[12]. Public resistance to the renewable's requisite transmission infrastructure[13], supply chain constraints[14] and uncertain regulatory approvals[15] has seen fewer than required renewable energy projects being brought to the final investment decision[16]. This delay in renewables roll-out may lead to the prolonged utilisation of some coal-fired power stations. An example is, the actions taken by the New South Wales government regarding the continuance of the Eraring power station[17] due to electricity reliability gaps brought on by an absence of investment in generation, storage, and transmission.

A delayed renewable roll-out will result in extended use of fossil fuels for electricity generation to supply demand, and subsequently, emissions will remain higher than desired for longer. In this instance, it is critical to have CCS technologies and projects primed to facilitate emissions reduction and support Australia's energy needs.

---

[8] CCUS in the transition to net-zero emissions – CCUS in Clean Energy Transitions – Analysis - IEA
[9] National Statement – COP28 | Ministers (dcceew.gov.au)
[10] Australian electricity generation - fuel mix | energy.gov.au
[11] Australia's emissions projections 2023. Department of Climate Change, Energy, Environment and Water. November 2023.
[12] 2024-Key-Themes-Global-Energy-Economy-in-2024.pdf (oxfordenergy.org)
[13] Farmers battle prospect of high-voltage electricity lines on properties as expert's alternative plan rejected - ABC News
[14] Renewable-energy development: Disrupted supply chains | McKinsey
[15] Port of Hastings offshore wind farm terminal construction blocked by Tanya Plibersek (smh.com.au)
[16] Taxpayers to subsidise renewable energy projects as government concedes Australia set to miss targets - ABC News
[17] AEMO | AEMO issues NEM reliability update

Should the renewable roll-out accelerate and meet hoped-for targets, gas-fired power generation will also have an important firming role to stabilise the energy systems; this could also operate together with post-combustion carbon capture and storage, as demonstrated by CTSCo, to further reduce emissions.

CCS and the CTSCo project should be considered a positive step towards underwriting the near- and short-term stability of the National Energy Market (**NEM**) by fossil fuels while also achieving emissions reduction goals in all renewable development scenarios.

Not only this, but pioneering studies such as that proposed by CTSCo will be vital to paving the way for other hard-to-abate sectors to reduce emissions whilst maintaining sovereign production capabilities and supporting the advancement of other low-carbon future fuels that may be dependent upon CCS (e.g. bioenergy and hydrogen).

In summary, CCS is critical to electricity stability and emissions reduction in all renewable roll-out cases and a key enabler for maintaining sovereign capabilities in manufacturing and future fuels.

Conclusions

The CTSCo pilot project represents a crucial step forward in exploring the potential for successful carbon sequestration within the context of the Great Artesian Basin.

By injecting a modest amount of CO_2 over a limited time frame, the project's impacts are anticipated to be insignificant, very localised and will leave no lasting effects on the GAB, as supported by the Department of Climate Change, Energy, Environment and Water's "Not Controlled Action" decision.

However, the significance of the project lies in the invaluable insights it will provide and meaningful, practical data that will be derived from the injection, sampling, and monitoring of the stored CO_2 in the aquifer.

The pilot program promises to enhance our understanding of the potential impacts of carbon sequestration on basins influenced by the GAB, benefiting proponents as well as State and Federal regulators alike. This enhanced understanding holds the potential to shape the role of CCS in supporting Australia's energy and climate objectives within these vital basins, paving the way for more informed and sustainable decision-making in the future. As such, the data provided will provide an essential component of the future assessments of the impacts of CCS in this region.

Conclusion

CCS is an essential and urgent priority that is accepted as a critical component of national and global emissions reduction strategies.

CCS is safe, reliable and necessary, industry has a pipeline of projects awaiting approval, there is bi-partisan support for the technology and the risks are very low, are likely to be very localised, are quantifiable and are manageable. The demonstration of capture from coal-fired power stations, combined with the safe permanent storage of CO_2, is critical to the required emissions reduction strategies to reach Net Zero and

will pave the way for other sectors to follow suit. This is critical in supporting Australia's energy reliability, sovereign manufacturing, and emissions reduction targets.