

SUBMISSION: NSW EPA CLIMATE CHANGE POLICY AND ACTION PLAN

3 November 2022

Lock the Gate Alliance thanks the NSW EPA for an opportunity to provide input on the 'Climate Change Policy' and 'Action Plan 2022 - 2025'.

We would like to begin by acknowledging why there is an opportunity to lodge a submission on the EPA's draft climate policies and programs. In August 2021, a group of survivors of the horrific Black Summer bushfires - supported by the EDO - took a landmark climate case to the NSW Land & Environment Court and won. For the first time, an Australian court allowed evidence on climate change to be heard in a case involving an alleged failure by a government agency – the NSW EPA - to perform a statutory duty. For the first time, an Australian Court ordered a government to take meaningful action on climate change.

Whilst, the focus of our submission is on the large and growing problem in NSW of Scope 1 and 2 GHGs emissions attributable to coal mining, we would also like to take this opportunity to draw the NSW EPA's attention to the problem of fossil gas use in NSW and the need to develop a roadmap to wean NSW off gas.

Gas decarbonisation roadmap for NSW

The gas industry is responsible for about [19% of Australia's GHG emissions](#). To get to net zero requires that natural gas must be replaced by low-emissions technologies. A [2021 study by Northmore Gordon](#) and [companion report from the Climate Council](#) illustrates a pathway for NSW to reduce its gas consumption by 25% within 5 years, 70% in 10-15 years, and entirely eliminate gas use by 2050.

Rapidly phasing out the use of gas will be good for our health, our climate and our bank balances. [Analysis by Rewiring Australia](#) demonstrates that NSW families could be saving \$5,000 per year by replacing their cars with electric vehicles, switching natural gas heating systems to electric heat pumps, and generating electricity with solar from their rooftops.

Many organisations in NSW are calling on the NSW Government to electrify homes, small business and industry and to develop a gas decarbonisation roadmap. A gas decarbonisation roadmap is a policy measure supported by the CWA of NSW, every Council in NSW (Local Government NSW Special Conference 2022) and NSW Labor at their state conference in October 2022.

We note that at [Budget Estimates on 22 Aug 2022](#) (pg 89), Justin Field MP asked Rachel Parry, Deputy Secretary, Energy, Climate Change and Sustainability, Office of Energy and Climate Change, NSW Treasury, the following question:

JUSTIN FIELD: “Victoria is moving to develop a plan to move away from gas used in homes and businesses. Is there any plan for New South Wales to adopt a similar strategy—to start to wean our businesses and households off gas, an increasingly expensive energy source?”

RACHEL PARRY: “Thanks for your question, Mr Field. No, at this point there is not.”

The Australian Energy Regulator says the “overarching mandate to reduce carbon emissions by 2050 requires that natural gas, as a fossil fuel, must be replaced by low-emissions technologies.”¹ The Victorian Government has published a Gas Substitution Roadmap which aims to halve gas demand by 2030. In 2020, the ACT Government set a clear policy direction to “phase out fossil-fuel-gas in the ACT by 2045 at the latest”.

NSW must follow suit to reduce GHG emissions from fossil gas combustion and protect NSW consumers from high gas prices by developing a plan to wean the NSW economy off gas.

Policy recommendations

Fossil gas

The NSW EPA should support the urgent development of a **gas decarbonisation roadmap**.

Scope 1 and 2 coal mine GHGs

The EPA must urgently licence methane and CO₂ emissions, and require all coal mines and gas projects to progressively reduce emissions via Environment Protection Licences (EPLs). Mines using grid energy should be required to switch to 100% renewable energy by no later than 2024. By 2030, all technically avoidable methane emissions should be eliminated and mining vehicle fleets should be either electrified, or powered by low or zero carbon fuels.

1. **Monitoring, reporting and verification:** Citing Australian Government data, the NSW Treasurer and Minister for Energy said Scope 1 and 2 GHGs from coal mining in NSW in 2019-20 were 18.6 Mt CO₂-e. It is not clear if the NSW Government has a complete data set for GHG emissions from all individual coal mines in NSW (operational, non-operational, closed or under rehabilitation). This data is required in order for NSW to monitor the impact of GHG abatement measures.

In addition, uncertainties around coal mine methane volumes globally are enormous, with the possibility that they tally at double the accepted estimate. We need more accurate measurement in order to design effective policies to address the issue. The NSW should lead a whole-of government effort to ensure this occurs.

¹ AER, November 2021, ‘Regulating gas pipelines under uncertainty - Information paper’.

2. **Conduct an urgent review of regulatory failure:** an urgent review is required to determine why coal mine consent conditions are having only a very limited impact on Scope 1 and 2 emissions.
 3. **Clarify what GHG reduction or minimisation measures the NSW Government considers to be viable and then require operating coal mines to implement them.**
 - a. Deliver on the IEA goal of elimination of technically avoidable methane emissions by 2030.
 - b. Eliminate Scope 2 emissions by requiring coal miners to use renewable energy. Scope 2 emissions are the consequence of purchasing grid electricity, the majority of which is produced by burning coal. Requiring projects to source renewable energy would totally eliminate these emissions.
 - c. Develop a pathway and targets for the coal industry to transition its vehicle fleet from diesel to electric or low / zero carbon fuels.
 4. **Require accurate and transparent reporting:** At least 15 coal mines do not report their GHGs at all to the NSW Government at present. Annual Review Guidelines must require all coal mines to report publicly on their GHG emissions by source (e.g. diesel, fugitives and electricity), changes in emissions by source from year to year and to what extent any changes are attributable to GHG reduction or minimisation measures imposed by conditions of consent or measures voluntarily implemented.
 5. **NSW EPA to regulate fugitive emissions:** the NSW EPA should start regulating fugitive emissions (which comprise about about 9% of NSW's GHG emissions) from coal and gas developments via Environment Protection Licences. Under the 'current policy scenario' in the 'NSW Greenhouse Gas Emission Projections, 2021–2050', fugitive emissions from coal mines (open cut and underground) are projected to reduce by 13% from 11.63 Mt CO₂-e in 2020 to 10.1 Mt CO₂-e by 2030. We note that the Australian Government wants to reduce methane by at least 30% by 2030, whilst climate scientists have a much higher ambition.
- The IEA - in their recently released [Net Zero by 2050](#) report - are calling for the "elimination of all technically avoidable methane emissions by 2030". The IEA models a 75% fall in methane emissions from fossil fuels between 2020 and 2030 as result of "a concerted global effort to deploy all available reduction measures and technologies".
6. **High-emitting mines that are unable to rapidly abate GHGs, should be incentivised to close first.**
 7. **Develop a strategy to dramatically reduce emissions from closed coal mines, abandoned coal mines and coal mines in 'care and maintenance'**

8. Rather than acting as a neutral observer on global heating during the whole-of-government assessment of new coal and gas projects in NSW, the NSW EPA should make submissions asserting its own independent view on the incompatibility of new fossil fuel projects with a safe climate for NSW.
9. EPA to refuse the grant of EPLs for methane or CO₂ for new coal mines or gasfields that are simply going to lead to increases in emissions.

Scope 1 and 2 coal mining GHGs in NSW: 2022

A global problem

In October 2021, [the IEA published a report](#) calling for a dramatic cut in emissions from the production of coal, finding that “[f]rom a climate perspective, it matters which coal operations carry on and which are retired” because there is a wide variation in the methane intensity of coal production with the worst-performing coal mines emitting as much as 100 times more methane than the best performing.

Summary - a problem here in NSW

The process of *mining* coal in NSW releases large amounts of fugitive methane emissions, diesel emissions and emissions from the generation of the electricity used to power coal mines.

The current regulatory system that purports to minimise Scope 1 and 2 GHGs from coal mines in NSW is not fit for purpose. It features a hands-off, light-touch approach, with patchy reporting of Scope 1 and 2 coal mine emissions to the NSW Government (at least 15 coal mines don't report their GHGs at all to the NSW Government). There is an absence of guidelines and standards for mitigation measures and offsets for coal mines. Conditions of consent are most-often vague and legally unenforceable. Over the last five years, no coal mine in NSW has been prosecuted for breaching GHG conditions of consent.

The Mining SEPP requires that GHG emissions from coal mining in NSW “*are minimised to the greatest extent practicable*”. A major problem arises however, when consent authorities translate this into specific language in coal-mine Development Consents. When this occurs, we typically end up with a cookie-cutter condition that reads: “*The Proponent shall implement all reasonable and feasible measures to minimise the release of greenhouse gas emissions from the site to the satisfaction of the Planning Secretary*” (Appin / Bulli Seams Development Consent).

Generic requirements that coal mines implement ‘reasonable and feasible’ measures to reduce or minimise GHG emissions are failing to produce meaningful emissions reductions. Reasonable and feasible measures such as the use of renewable energy to avoid Scope 2 electricity emissions are routinely dismissed or deferred. Coal mines routinely pass ‘Independent Environment Audits’ based not on whether they are *reducing* emissions, but instead on whether vaguely defined and ineffective measures are being implemented.

70% of facilities emitting 100,000 t CO₂-e or more in NSW are coal mines

In 2020-21, [33 facilities in NSW reported emitting more than 100,000 t CO₂-e](#) of GHG emissions to the Clean Energy Regulator.² These are the largest emitting facilities in NSW (excluding electricity generation). Of these 33 facilities, **24 (~70%) were coal mines**, with remainder being facilities incl. Port Kembla Steelworks, the Tomago Aluminium smelter and Boral's cement works.

Emissions intensity rising at many coal mines despite claims that all 'reasonable and feasible' measures are being implemented

As at October 2022, the GHG emissions intensity per tonne of run-of-mine (ROM) coal mined was rising at 14 coal mines in NSW that publicly report their data. This is occurring despite those mines claiming to be implementing all 'reasonable and feasible' measures to reduce or minimise emissions.

14% of all emissions in NSW

Scope 1 and 2 GHGs from coal mining in NSW in 2019-20 were **18.6 Mt CO₂-e³** (~14% of all of NSW's GHG inventory).⁴

Scope 1 coal mine emissions - NSW

Scope 1 emissions from all coal mines in NSW (operational and non-operational) were 19.1, 17.9, 17.1, 15.2 and 15.1 Mt CO₂-e in 2015-16, 2016-17, 2017-18, 2018-19 and 2019-20 respectively.⁵

Scope 2 coal mine emissions - NSW

In 2019-20, coal mining in NSW used 3.1% of all of NSW's electricity (3.5 Mt CO₂-e of the 18.6 Mt CO₂-e in NSW attributable to coal mining was released offsite at power stations to power coal mines)⁶, a slight increase from 3.0% of total electricity consumption in NSW in 2018-19.⁷

Scope 2 emissions from all coal mines in New South Wales were published by the Australian Government in June 2022 to be 3.6, 3.5, 3.4, 3.5 and 3.5 million tonnes of carbon dioxide

² The largest Scope 1 GHG emitting facilities in Australia (excluding the electricity sector) are covered by the Australian Government's Safeguard Mechanism. Facilities that emit more than 100,000 t CO₂-e per annum are required to report to the Clean Energy Regulator.

³ NSW Legislative Council, QUESTIONS AND ANSWERS No. 809 FRIDAY 19 AUGUST 2022, pg 16, 9330 ENERGY—GREENHOUSE GAS EMISSIONS FROM COAL MINES—Mr Justin Field to the Minister for Finance, and Minister for Employee Relations representing the Treasurer, and Minister for Energy—, <https://www.parliament.nsw.gov.au/hp/housepaper/28717/QuestionsAndAnswers-LC-809-20220819-Revised.pdf>

⁴ NSW's GHG emissions were 132.4 Mt CO₂-e in 2020, <https://www.dcceew.gov.au/climate-change/publications/national-greenhouse-accounts-2020/state-and-territory-greenhouse-gas-inventories-annual-emissions>

⁵ NSW Parliament, Aug 2022, QON 9330, 9330 - Energy - GREENHOUSE GAS EMISSIONS FROM COAL MINES, <https://www.parliament.nsw.gov.au/lc/papers/pages/qanda-tracking-details.aspx?pk=92760>

⁶ QON 9335, Justin Field, 29/07/2022, ELECTRICITY USE BY MINING, <https://www.parliament.nsw.gov.au/lc/papers/Pages/qa-by-member.aspx?pk=2223>

⁷ Response to Justin Field MLC's QONs, 5 May 2021, <https://www.parliament.nsw.gov.au/hp/housepaper/17745/QuestionsAndAnswers-LC-491-20210505-Proof.pdf>

equivalent (CO₂-e) emissions for the last five inventory years (2015-16, 2016-17, 2017-18, 2018-19 and 2019-20) respectively.⁸

85 coal mines in NSW

Of 85 coal mines in NSW, 40 are operational, 29 are in the 'closure phase', 13 are 'suspended' and only 3 have been completely rehabilitated

Total number of coal mines in NSW	85
Operational	40
Closure phase	29
Suspended	13
Coal mines closed and rehabilitated to a 'safe and stable environment'	3

Note: 'Suspended' means that there is currently no coal production being undertaken on site. However, rehabilitation obligations remain in force. 'Closure phase' means that coal production has ceased permanently and works are currently underway to fulfill rehabilitation obligations.

A regulatory mess

In January 2022 - in their whole-of-government assessment of the Narrabri Underground coal mine Stage 3 proposal - NSW DPE assessed the NSW system for regulating direct GHG emissions from coal mining in NSW and found that *"there are still a range of uncertainties about the specific application of the various policies to individual SSD applications under the EP&A Act, including:*

- *Impacts: there is no clear methodology to assess the relative scale (or associated consequences) of emissions in a consistent manner, nor are there any definitions of different levels of emissions (e.g. low, moderate or high);*
- *Standards: there are no performance criteria or limits provided (e.g. maximum annual or total emissions) for any development types (e.g. coal mines, power stations, or industrial facilities), nor is there any clear timeline to measure any ratcheting down (e.g. a plan for staged reductions in fugitive emissions);*
- *Mitigation measures: there is no clear guidance on how to assess potential mitigation or abatement measures (e.g. what measures are considered 'reasonable and feasible' or 'best practice'), both for current and future activities; and*
- *Offsets: there is no guidance on whether offsets should be required for a particular development (e.g. trigger levels based on predicted unabated emissions), nor any methodology to calculate the quantum or type of offsets that may be warranted.*⁹

⁸ NSW Parliament, Aug 2022, QON 9330, 9330 - Energy - GREENHOUSE GAS EMISSIONS FROM COAL MINES, <https://www.parliament.nsw.gov.au/lc/papers/pages/qanda-tracking-details.aspx?pk=92760>

⁹ NSW DPE, January 2022, Narrabri Underground Mine Stage 3 Extension Project (SSD 10269) | Assessment Report , pg 55

When Professor Ian Lowe examined conditions of consent for coal and gas projects approved by the NSW IPC, he found it unlikely that they would produce “any significant measurable mitigation” of their Scope 1 and 2 emissions.¹⁰

Does it matter if NSW’s coal mine emissions abate either: a) only slowly, at a pace driven by coal-industry self interest; or b) not at all?

Former Chief Scientist of Australia, Professor Penny Sackett recently provided expert evidence to the NSW IPC as a submission on the recently approved Mt Pleasant Optimisation Project:

“the effects of climate change – which are caused by anthropogenic GHG emissions – are already serious; more than that, they are in fact dangerous. Furthermore, some of these effects are already irreversible and more will become so with even relatively small amounts of additional warming beyond that of 1.5°C, which is already locked in.

Every tonne of GHG emission leads to (more) dangerous warming. It is not possible to know which amount, from which source, will precipitate environmental subsystems, including those in NSW, to tip irreversibly. In this context, the Precautionary Principle certainly applies.”¹¹

In the context of abatement of Scope 1 and 2 emissions from coal mining in NSW, Lock the Gate interprets Professor Sackett’s evidence as emphasising the urgency of all viable abatement happening as quickly as possible. Every tonne of GHG abatement counts. There is no time to waste.

Scope 1 and Scope 2 emissions linked to rate of production: higher rates of production result in an increase in emissions (Yancoal)

Yancoal’s ESG report found that across their coal mining operations in Australia:

- Scope 1 and 2 increased 8% in 2021
- Emissions are inherently linked to their rate of production: over 2021, total run of mine (ROM) coal production increased by 7%, whilst total Scope 1 and Scope 2 increased by 8%.
- “the main contributor was increased fugitive emissions from ventilation”

This report is significant, as it emphasises that approvals to increase production, will result in an increase in emissions.

“The majority of the Company’s Scope 1 emissions relate to fugitive emissions from mining and combustion of fuel. Scope 2 emissions stem from the consumption of purchased electricity. Overall, on an operational control basis, Yancoal’s total Scope

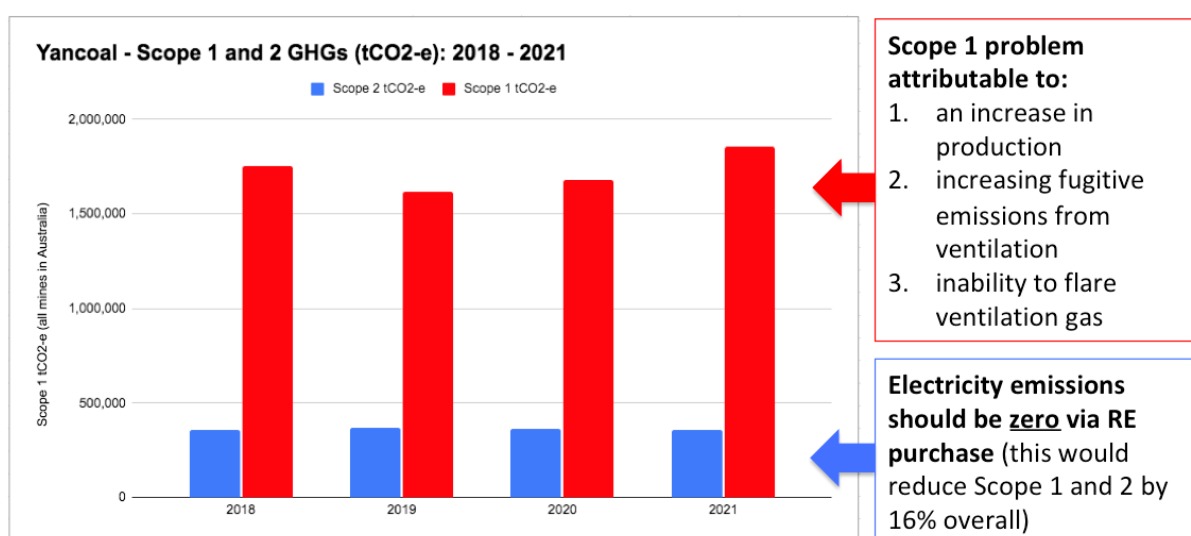
¹⁰ Emissions from recently approved fossil fuel projects in New South Wales, Emeritus Professor Ian Lowe AO FTSE, July 2021, https://www.lockthegate.org.au/expert_analysis_mining_greenhouse_emissions

¹¹ Dr Penny Sackett, Distinguished Honorary Professor, ANU Institute for Climate, Energy and Disaster Solutions, 14 July 2022, ‘Expert Report Regarding the Greenhouse Gas and Climate Implications of the proposed Mt Pleasant Optimisation Project (SSD - 10418)’, pg 115

1 and Scope 2 greenhouse gas (GHG) emissions for the period ended 30 June 2021 totalled 2,213,876 tCO₂-e, which represents an 8% increase from the previous year.

Our Scope 1 and Scope 2 emissions are inherently linked to our rate of production, with a higher rate of production typically resulting in an increase in emissions. Over 2021, total run of mine (ROM) coal production increased by 7%. The overall total increase was principally driven by a 97% increase in Ashton's total Scope 1 and Scope 2 emissions.

The site experienced a record year of production, with a 40% increase in ROM production. This accounted for some of the increase, however the main contributor was increased fugitive emissions from ventilation, driven by an increased emissions factor for methane (global warming potential increased from 25 to 28), and the inability to flare ventilation gas during the period. Scope 2 emissions from electricity consumption decreased by 2% which is a positive year-on-year result.”¹²



Source: Lock the Gate infographic derived from data from Yancoal's ESG Report 2021

Key questions for the NSW EPA

Broadly speaking, there are three categories of Scope 1 and 2 GHG emissions in NSW from coal mining which require urgent attention: fugitive methane emissions, diesel emissions and emissions from the generation of the electricity.

The Net Zero policy questions for the NSW EPA are:

1. Does anyone know what each of the 85-odd coal mines in NSW emit in Scope 1 and GHGs per annum?

¹² Yancoal, ESG Report 2021, pg 36,
<https://www.yancoal.com.au/content/Document/2021%20ESG%20Report.pdf>

2. Is the monitoring and reporting information reliable? Has it been verified by measurements from the ground, air and/or space?
3. Why have feeble attempts to control Scope 1 and 2 emissions from coal mines in NSW under conditions set under the EP&A Act failed?
4. How soon can the NSW EPA and the NSW Government move to directly regulate methane and carbon dioxide emissions under the POEO Act?
5. What 'reasonable and feasible' measures exist which coal mines are already implementing?
6. What 'reasonable and feasible' measures exist which coal mines are NOT already implementing?
7. What 'reasonable and feasible' measures could be fast-tracked by the NSW Government?
8. What needs to happen to get coal mine emissions to Net Zero ASAP?
9. Who should pay for abatement? Taxpayers, or coal miners reporting record profits?
10. Does NSW have a plan to deal with methane emissions from coal mines in care and maintenance, closing, closed and abandoned? If not, why not?

REPORTING

Reporting of fugitive emissions unreliable - likely double those reported to the CER

As Professor Penny Sackett noted - citing evidence from Ember and the IEA - in her expert submission to the NSW IPC on the Dendrobium Mine Extension Project:

*"there is evidence, including from the IEA, that fugitive emissions from Australian coal mining is larger than reported, so that it is possible that fugitive methane emissions from coal in NSW may be considerably higher ... In particular, the IEA estimates that Australian coal mines emitted 1754 Mt of methane in 2021, compared to 898 Mt reported in the National Greenhouse Gas Inventory (NGGI) for 2019, almost twice as much."*¹³

¹³ Professor Penny Sackett, 10 June 2022, Expert Report Regarding the Greenhouse Gas and Climate Implications of the proposed Dendrobium Mine Extension Project (SSI - 33143123), pg 98

No reporting to NSW Government (15 coal mines)

An August 2022 claim by the NSW Minister for Planning that coal mine Annual Reviews in NSW provide an annual report on GHG mitigation measures implemented and a summary of GHG emissions for that year is incorrect.

Coal Mines which do **NOT** report GHG emissions to the NSW Government (as at October 2022):

1. Austar Coal Mine (Yancoal). In care and maintenance phase from 4 March 2021.
2. Bloomfield (Bloomfield Group)
3. Cullen Valley Mine. In care and maintenance from 2013.
4. Dartbrook (Australian Pacific Coal). No GHG reporting to NSW Gov't. Significant emitter. They reported 112,089 t CO₂-e Scope 1 GHGs in 2019-20 to the CER.
5. Liddell (Glencore). We know their emissions are significant as they reported 168,540 t CO₂-e to the CER on 2020-21.
6. Metropolitan Coal (Peabody). They are a significant emitter. 401,341 t CO₂-e Scope 1 GHGs reported to the CER in 2020-21.
7. Mount Thorley Warkworth (Yancoal). No GHG data in their [MTW 2021 Annual Review](#). IN a group-wide ESG Report 2021, Yancoal reported that Scope 1 and 2 increased 8% in 2021.
8. Muswellbrook Coal (Idemitsu): their consent expires 31 December 2022
9. Rix's Creek Mine (Bloomfield Group): No data on GHGs in either their 2020 or 2021 ARs. On 5 Oct 2021, the CER REFUSED Lock the Gate access to their GHG data.
10. Russell Vale Colliery (Wollongong Resources)
11. Stratford (Yancoal)
12. Tarrawonga Coal Mine (Whitehaven)
13. United Wambo (Peabody, Glencore, CFMMEU)
14. Werris Creek Mine (Whitehaven)
15. Wongawilli (Wollongong Resources)

Reporting errors: Peabody (Wambo)

Peabody Energy repeatedly submitted incorrect greenhouse gas emissions reports to the Clean Energy Regulator (CER), prompting questions about the reliability of national climate data based on company assessments. The CER found Peabody had a history of filing inaccurate reports required under the National Greenhouse and Energy Reporting Act due to calculation errors, poor record-keeping and inconsistent data collection and analysis. The mistakes were in both directions, leading to significant under- and over-reporting of emissions from the underground Wambo coal mine in NSW. The total error was large – when added up, out by more than 51% of the total emissions from the site.¹⁴

¹⁴ Adam Morton, The Guardian, 31 Jan 2022, Australian regulator finds large-scale emissions misreporting by coalminer Peabody, <https://www.theguardian.com/environment/2022/jan/31/australian-regulator-finds-large-scale-emissions-misreporting-by-coalminer-peabody>

Reporting errors: Wollongong Resources (Russell Vale)

In February 2022, Illawarra locals called for independent monitoring after Wollongong Coal figures showed its greenhouse emissions more than doubled over a year - at a time when the mine was not operating. The doubling of emissions reported to the CER turned out to be incorrect. Wollongong Coal later blamed an equipment error.

In correspondence dated 9 December 2021, Richard Sheehan, Group Environmental Manager for Wollongong Coal confirmed the error, explaining:

“the root cause of the increase in emissions during this period has been tracked to a specific period at one of the vent shafts and is reasonably suspected to be as a result of equipment errors that impacted on the data measurement. Further to this period the GHG emissions have been observed to return to lower levels in the 2020/2021 reporting period.

Note that all emissions are monitored closely using calibrated equipment and an externally contracted ventilation specialist in addition to being included in the annual NGER emission reporting to the CER.”

Here's how the Illawarra Mercury reported the story:

“[t]he errors do not appear to have been picked up by the Regulator, or by the Department of Planning, Industry and Environment which approved the miner's [Air Quality and Greenhouse Gas Management Plan](#). The miner's figures were published in that plan as part of the miner's expansion application, referenced as being reported to the Clean Energy Regulator (CER).

They show a jump in Scope 1 and 2 emissions at Russell Vale from about 65,000 tonnes in 2019-2019 to about 190,000 tonnes in 2019-2020. These are estimates as the graph does not include the actual figures. No explanation was given for the leap.”

EXPANSION OF COAL MINING MAKING THE PROBLEM WORSE

26 new or expanded fossil fuel projects approved in NSW since Paris Agreement

New coal and gas approvals in NSW are making the problem worse. **Since the Paris Agreement was signed in 2016, the NSW Government has approved 26 new or expanded fossil fuel projects.**¹⁵

- The single largest new coal development since the Paris Agreement – the massive Mt Pleasant Optimisation Project in the Hunter Valley - was approved in September

¹⁵ Calculated by adding Narrabri Underground Stage 3, Mount Pleasant Optimisation and Wongawilli MOD 2 to ACF's analysis: ACF, December 2021, The NSW Independent Planning Commission's contribution to global greenhouse gas emissions, https://d3n8a8pro7vhmx.cloudfront.net/auscon/pages/19889/attachments/original/1643946316/ACF_IPC_research.pdf?1643946316

2022. This Project will add ~16Mt CO₂-e in Scope 1 and 2 emissions to the NSW inventory over its lifetime.

- The Narrabri Underground Stage 3 mine won approval in April 2022 with an abatement plan that promises <1% mitigation of predicted Scope 1 emissions. These emissions - after proposed abatement - are predicted to be huge: [Narrabri mine expansion would make it dirtiest thermal coalmine in Australia, environmentalists say.](#)

The total Scope 1, Scope 2 and Scope 3 emissions of the 26 approved projects - if all projects are built and operate until the dates allowed by their development consents - would be approximately **4.5 billion tonnes of CO₂-e**.¹⁶ Whilst this submission does not focus on Scope 3 emissions from coal exports, these are obviously highly-significant and have the same impact on the NSW environment and climate as they do on the rest of world's environment and climate.

A note on how these figures were calculated

Analysis by the Australian Conservation Foundation completed in December 2021 found that since the Paris Agreement entered into force on 4 November 2016, the Independent Planning Commission (IPC) of New South Wales and its predecessor, the Planning Assessment Commission approved 23 new coal and gas projects.¹⁷

Total Scope 1, Scope 2 and Scope 3 emissions of the 23 approved projects is at least 3,190,782,573 tonnes of CO₂-e or approximately 3.2 billion tonnes of CO₂-e.

Since the ACF's review, a further 3 coal projects have been approved:

1. Narrabri Underground Stage 3 was approved in April 2022 (479.6 Mt CO₂-e)¹⁸
2. Wongawilli Coal Mine - MOD 2 was approved in April 2022 (7.8 Mt CO₂-e)¹⁹
3. Mount Pleasant Optimisation Project was approved in September 2022 (876.2 Mt CO₂-e)²⁰

Note: Wongawilli Coal Mine - MOD 2 was approved by NSW DPE, not the NSW IPC

¹⁶ Calculated by adding Narrabri Underground Stage 3, Mount Pleasant Optimisation and Wongawilli MOD 2 to ACF's analysis: ACF, December 2021, The NSW Independent Planning Commission's contribution to global greenhouse gas emissions, https://d3n8a8pro7vnm.cloudfront.net/auscon/pages/19889/attachments/original/1643946316/ACF_IPC_research.pdf?1643946316

¹⁷ ACF, 21 December 2021, The NSW Independent Planning Commission's contribution to global greenhouse gas emissions, https://d3n8a8pro7vnm.cloudfront.net/auscon/pages/19889/attachments/original/1643946316/ACF_IPC_research.pdf?1643946316

¹⁸ NSW IPC, Narrabri Underground Stage 3 Extension Project Statement of Reasons, 1 April 2022, pg 29, https://www.ipcn.nsw.gov.au/resources/pac/media/files/pac/projects/2021/12/narrabri-underground-mine-stage-3-extension-project-ssd-10269/determination/220401-narrabri-underground-mine-stage-3-extension-project_statement-of-reasons.pdf

¹⁹ Wollongong Coal, 2 December 2021, Re: Wongawilli Coal Mine (MP 09_0161 Mod 2) Request for additional information, <https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=RFI-32147558%2120211201T232649.448%20GMT>

²⁰ NSW IPC, 6 September 2022, Mount Pleasant Optimisation Project SSD 10418 Statement of Reasons, <https://www.ipcn.nsw.gov.au/resources/pac/media/files/pac/projects/2022/05/mt-pleasant-optimisation-project-ssd-10418/determination/220906-mount-pleasant-optimisation-project-ssd-10418--statement-of-reasons.pdf>

GHGs getting coal out of the ground are set to rise

According to Reputex, “[b]y 2030, industrial emissions covered by the Safeguard Mechanism are projected to grow to over one-third of national emissions (34%) under current policy.”²¹ These facilities - including coal mine emissions - are projected to overtake the electricity sector as Australia’s largest emitting policy segment in the early 2020s.

Scope 1 GHGs predicted to grow at many coal mines as mines grow larger, depth of mining increases and as mothballed mines resume production

Any expansion of coal mining requires larger volumes of material (eg overburden and coal) to be moved, which requires more diesel fuel to be combusted by the vehicles doing the hauling. As mines expand, this often requires coal to be trucked longer distances to coal handling and preparation plants. Disturbing more coal also releases more methane. For an explanation of why mining deeper seams produces more methane, and why in the future, as coal mines get deeper, methane emissions will likely increase, see Kholod, N. et al. (2020).²²

Lock the Gate has not had capacity to comprehensively review all expansion and forward mining plans. Of the mines we have looked at, fugitive methane emissions are projected to increase (often substantially) at the following coal mines (See Table 1 and Table 2 below for more detail and references):

1. **Dartbrook:** emissions predicted to roughly double due to a plan to bring this mine out of care and maintenance and back into production
2. **Narrabri U/ground Stage 3:** Stage 3 (2022 to 2044) annual Scope 1 GHG emissions are estimated to average 1.36 Mt CO₂-e (triple current emissions)
3. **Mount Pleasant Optimisation:** March 2022 fugitive emission estimates show a large increase in emissions from 2035 onward. Professor Penny Sackett believes that these estimates are likely to be “larger than the value reported by the Applicant, by factors of at least two to three”.
4. **Boggabri MOD 8 - Increase in depth of mining:** Emissions are predicted to triple at Boggabri if MOD 8 is approved (Scope 1 and 2 GHGs have averaged about 0.2 Mt CO₂-e per year).²³ From 2022 to 2042, MOD 8 Scope 1 and 2 GHGs are estimated to average 0.69 Mt CO₂-e per year (more than triple current emissions).
5. **Hunter Valley Operations:** No estimate is available yet for Scope 1 and 2 GHGs for the new expansion project, however they plan to mine deeper seams which generally results in greater methane emissions. Last year (2020-21) fugitive emissions

²¹ Reputex Energy | The economic impact of the ALP’s Powering Australia Plan, pg 21, https://keystone-alp.s3-ap-southeast-2.amazonaws.com/prod/61a966013f3c53001f975016-REPUTEX_The%20economic%20impact%20of%20the%20ALP's%20Powering%20Australia%20Plan_Summary%20Report.pdf

²² Kholod, N. et al. (2020) Global methane emissions from coal mining to continue growing even with declining coal production. Journal of Cleaner Production, 256, 120489. Accessed at: <https://www.sciencedirect.com/science/article/pii/S0959652620305369?via%3Dihub>

²³ For references, see submission to NSW DPE, Nic Clyde, Sept 2021, <https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SUB-27803820%2120210909T014908.694%20GMT>

increased by 22% to 301,800 t CO₂-e. HVO says that “[i]ncreasing fugitive emissions is due to new coal seam gas estimates as the mine exposes deeper coal seams.”

6. **Mt Arthur:** BHP is pursuing a 4-year extension of the mine from 2026 to 2030. At the current operation, “[f]ugitive emissions are expected to continue increasing over time as mining progresses into areas with higher insitu methane contents.”²⁴
7. **Dendrobium:** South32 propose to extend mining at Dendrobium until 2028 and are ‘evaluating potential options’ to extend beyond 2028. Their last Dendrobium Extension project (now withdrawn), proposed to triple Scope 1 emissions. Scope 1 and 2 GHGs at the mine grew ~25% last year from 241,910 t CO₂-e in 2019/20 to 301,640 t CO₂-e in 2020/21. Professor Sackett’s analysis of the last Extension project concluded that “[i]f the Project is approved, it will continue to emit additional methane long after the mine is closed” and that “in principle, these emissions will continue indefinitely.”²⁵
8. **Moolarben Coal Complex OC3 Extension Project:** Yancoal are yet to lodge an EIS for their proposed 10-yr expansion. Cumulative Scope 1 and 2 emissions have increased at the existing Moolarben mine - year on year - for the last 4 years in a row.
9. **Chain Valley Consolidation:** Delta has proposed a Project which would provide for underground mining within the Eastern Mining Area and the extension of the life of mine to 2029.²⁶ Their [2021 Annual Review - Chain Valley Colliery](#), puts Scope 1 emissions in 2020-21 at 447,364 to CO₂-e. These very significant emissions **do not** appear in the CER’s 2020-21 Safeguard facilities data. The latest AR states that “[m]ethane levels in the Fassifern seam of approximately 2 – 4 m³/t is not at a level that allows pre or post gas drainage, and as such all methane from the mining operations are ventilated via the main fans at Summerland Point.” The AR goes on to state that “there are no plans to install pre or post gas drainage infrastructure at this time.”

Table 1: Coal expansions approved Oct 2021 - Oct 2022 (Scope 1 and 2 impacts)

Mine	Scope 1 and 2 GHG comment	Impact of approved expansion on Scope 1 and 2 GHGs
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²⁴ BHP, Mt Arthur Annual Review FY21 Amended Final, Pg 43, https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=MP09_0062%2120211105T001432.140%20GMT

²⁵ Professor Penny Sackett, 10 June 2022, Expert Report Regarding the Greenhouse Gas and Climate Implications of the proposed Dendrobium Mine Extension Project (SSI - 33143123), pgs 35 and 106

²⁶ Delta Coal, Umwelt, Scoping Report, March 2021, <https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=PDA-11834985%2120210331T224325.666%20GMT>

Dartbrook	<p>A 5-yr extension to extract up to 6 Mtpa ROM coal at Dartbrook was approved in December 2021. With the mine currently in care and maintenance, average annual emissions are ~100,000 t CO₂-e.²⁷ When mining recommences at the end of 2023, Scope 1 and 2 emissions will grow to ~228,664 t CO₂-e (Scope 1 and 2) per annum until end 2027.²⁸</p> <p>AQC hope to take "first coal" in the mine's new life by the end of 2023.²⁹</p> <p>The mine has been in care and maintenance since 2006. Lock the Gate has not determined the extent of Scope 1 and 2 emissions over the last 16 years. We do know however, that ~300,000 t CO₂-e in Scope 1 and 2 GHG was emitted just over the last three years whilst the mine was producing zero coal and paying zero royalties (93,801 t CO₂-e in 2020/21, 112,055 t CO₂-e in 2019/20 and 104,260 t CO₂-e in 2018/19).³⁰ Methane was the main contributor to total emissions.</p>	Emissions predicted to double
Narrabri U/ground Stage 3	<p>Stage 3 was approved in April 2022. Scope 1 greenhouse gas emissions for the 2020 – 2021 NGERS reporting period were 384,304 t CO₂-e.³¹</p> <p>Across the life of the Stage 3 Project (2022 to 2044), total annual Scope 1 GHG emissions are estimated to average 1.36 Mt CO₂-e (more than triple current emissions).³²</p>	Emissions predicted to triple

²⁷ DARTBROOK MINE ANNUAL REVIEW 2021 for Australian Pacific Coal, 31 March 2022, <http://www.aqcltd.com/site/pdf/1eaa70c6-e90d-4f7f-855c-d7ceb6f48948/2021-Annual-Review.pdf>

²⁸ Dartbrook Mine Modification 7, Updated Response to Contentions, Sparke Helmore Lawyers, October 2021, 'Table 5 Estimated Greenhouse Gas Emissions', pg 25, <https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=DA231-07-2000-MOD-7%2120220315T055029.494%20GMT>

²⁹ ABC Upper Hunter, Amelia Bernasconi, 15 Sep 2022, Australian Pacific Coal plans to reopen controversial Upper Hunter mine, Dartbrook next year, <https://www.abc.net.au/news/2022-09-15/australia-pacific-coal-upper-hunter-dartbrook-mine-to-reopen/101441900>

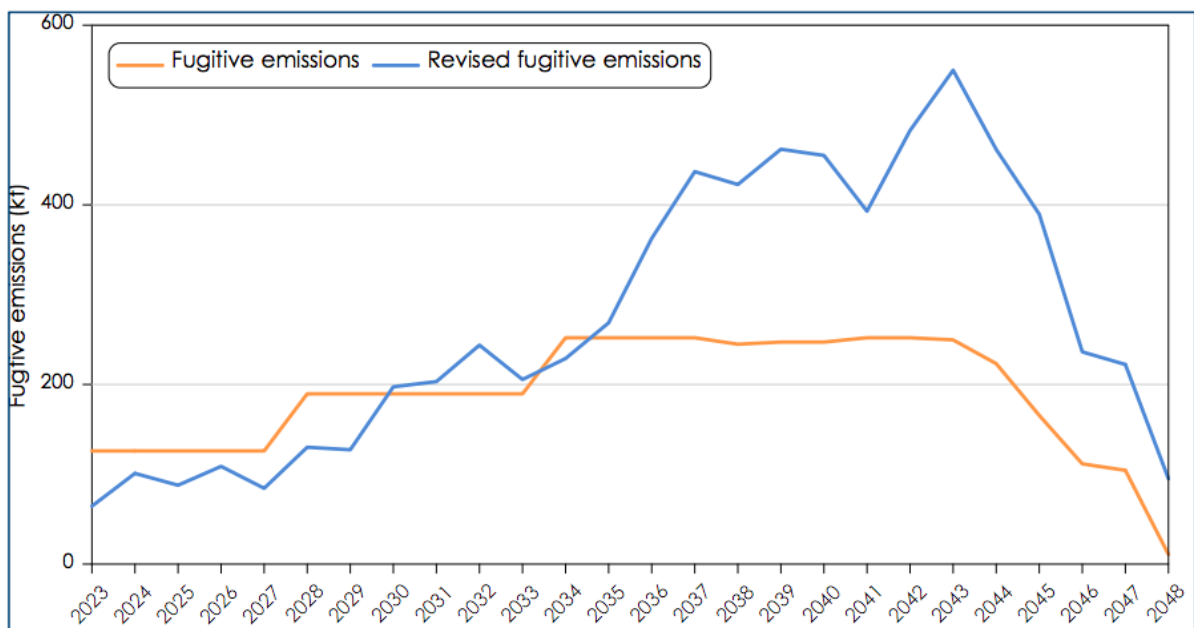
³⁰ DARTBROOK MINE ANNUAL REVIEW 2021 for Australian Pacific Coal, 31 March 2022, <http://www.aqcltd.com/site/pdf/1eaa70c6-e90d-4f7f-855c-d7ceb6f48948/2021-Annual-Review.pdf>

³¹ Whitehaven Coal, NARRABRI MINE 2021 ANNUAL REVIEW, pg 24, <https://whitehavencoal.com.au/Documentations/Narrabri%20Mine/Environmental%20Management,%20Monitoring%20&%20Compliance/Annual%20Reviews/NAR-Annual%20Review%202021.pdf>

³² NSW DPE, January 2022, Narrabri Underground Stage 3 Assessment Report, point 340, <https://www.ipcn.nsw.gov.au/resources/pac/media/files/pac/projects/2021/12/narrabri-underground-mine-stage-3-extension-project-ssd-10269/departement-of-planning-and-environment-assessment-report/narrabri-stage-3--assessment-report.pdf>

Mount Pleasant Optimisation	<p>A major expansion was approved in September 2022 (doubling approved annual coal production and providing for an extension of mining by 22 years to 2048).</p> <p>Former Chief Scientist of Australia Dr Penny Sackett determined that reasonable estimates for total fugitive methane emissions from the Project over its projected lifetime range are likely to be “larger than the value reported by the Applicant, by factors of at least two to three”.³³</p>	<p>Fugitive emissions projected to steadily increase over next 20 years.</p> <p>March 2022 fugitive emission estimates show a large increase in emissions from 2035 onward.</p>
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Figure 1: Comparison of fugitive emission estimates - Mount Pleasant Optimisation



Source: Todoroski Air Sciences (30 March 2022)³⁴

Snapshot of new projects and their impact on NSW's GHG inventory

The Resources and Energy Major Projects (REMP) publication is an annual review of major resources and energy projects in Australia published by the Australian Government's Department of Industry, Science and Resources (DISR). The December 2021 '[Resources and energy major projects: 2021](#)' lists 24 new coal projects.

Lock the Gate's Table 2 below looks a little different as different criteria are used to distinguish 'new' from 'approved' projects (eg DISR's list includes some 'approved' but not yet built projects on their list). Below is but a snapshot of only *some* of the new (but not yet

³³ Dr Penny D Sackett, 14 July 2022, Expert Report Regarding the Greenhouse Gas and Climate Implications of the proposed Mt Pleasant Optimisation Project (SSD - 10418), pg 38

³⁴ Todoroski Air Sciences (30 March 2022), Mount Pleasant Optimisation Project Greenhouse Gas Assessment – Attachment 2 to MACH Energy's response to Departmental Queries concerning Greenhouse gases, <https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=RFI-33918228%2120220331T072811.751%20GMT>

approved) projects that have serious backing from their proponents and which - if built - will result in large additions to NSW's GHG inventory.

Table 2: Proposed coal expansions as at 25 October 2022 (Scope 1 and 2 impacts)

Mine	Scope 1 and 2 GHG comment	Impact of approved expansion on Scope 1 and 2 GHGs
Boggabri MOD 8 - Increase in depth of mining	<p>Idemitsu have proposed a modification to their Boggabri Coal Mine to mine an extra 61.6 Mt coal to be recovered over an extra 6 years.</p> <p>Idemitsu claim that MOD 8 Scope 1 and 2 GHG emissions will be “essentially equivalent” to current operations, but the GHG Assessment reveals that on average, emissions will more than triple.</p> <p>Scope 1 and 2 emissions at the mine over the last five years have averaged about 0.2 Mt CO₂-e per year.³⁵ The GHG Assessment of MOD 8 (pg 57) says that over the lifetime of the project, “from 2022 to 2042, the Scope 1 and 2 emissions are estimated to average 0.69 Mt CO₂-e per year.” This Project is currently at the Response to submissions (RTS) phase.</p>	<p>Emissions predicted to triple at Boggabri</p>
Hunter Valley Operations Continuation	<p>Yancoal and Glencore are proposing an enormous expansion of their Hunter Valley Operations coal mine. The proposal is for a “[c]ontinuation of mining at the HVO North open cut coal mining complex until 2050, including extension of approved mining areas” and for the “mining of deeper coal seams”.³⁶</p> <p>As this project is at ‘Prepare EIS’ stage, we do not yet have an estimate of Scope 1 and 2 emissions. What we do know however, is that emissions intensity has increased year on year for the last three years in a row.</p>	<p>No estimate is available yet for Scope 1 and 2 GHGs for the new project, however they plan to mine deeper seams which generally results in greater methane emissions.</p> <p>Fugitive emissions at the existing mine are increasing.</p>

³⁵ For references, see submission to NSW DPE, Nic Clyde, Sept 2021, <https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SUB-27803820%2120210909T014908.694%20GMT>

³⁶ NSW DPE, HVO North Open Cut Coal Continuation Project, <https://www.planningportal.nsw.gov.au/major-projects/projects/hvo-north-open-cut-coal-continuation-project>

	<p>We also know from HVO's most recent Annual Review that fugitive emissions increased by 22% last year from 247,320 t CO₂-e in 2019-20 to 301,800 t CO₂-e in 2020-21. HVO says that "[i]ncreasing fugitive emissions is due to new coal seam gas estimates as the mine exposes deeper coal seams."³⁷</p> <p>"The Project aims to optimise ROM coal production from HVO by mining largely within the extents of HVO's tenements and mining deeper seams at HVO North over an extended mine life of 25 years."³⁸</p>	
Mt Arthur / Hunter Valley Energy Coal (BHP)	<p>Although BHP have abandoned their plan to extend this mine out to the 2040s, they still propose to extend the mine's life by 4 years from 2026 to 2030.</p> <p>Scope 1 emissions at Mt Arthur have increased year on year for the last 4 years in a row. Diesel emissions have been steadily growing (fuel combustion constitutes the bulk of emissions at Mt Arthur Coal, accounting for 90 per cent of scope 1 emissions).</p> <p>Fugitive emissions are also projected to keep growing: "Fugitive emissions are expected to continue increasing over time as mining progresses into areas with higher insitu methane contents."³⁹</p>	Fugitive emissions are expected to continue increasing over time as mining progresses into areas with higher methane contents.
Dendrobium	<p>South32 propose to extend mining at Dendrobium until 2028 and are 'evaluating potential options' to extend beyond 2028. Their last Dendrobium Extension project (now withdrawn), proposed to triple Scope 1 emissions. We note that Scope 1 and 2 emissions at the mine grew ~25% last year from 241,910 t CO₂-e in 2019/20 to 301,640 t CO₂-e in 2020/21.</p>	<p>No new project proposal yet, BUT ...</p> <p>Their last extension project proposed to triple Scope 1 emissions.</p>

³⁷ Hunter Valley Operations Annual Environmental Review 2021, pg 77, <https://insite.hvo.com.au/document-library/reports-annual-hvo>

³⁸ HVO Continuation Project Scoping Report, December 2020, pg 11, <https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-11826621%2120201218T052218.275%20GMT>

³⁹ BHP, Mt Arthur Annual Review FY21 Amended Final, Pg 43, https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=MP09_0062%2120211105T001432.140%20GMT

	<p>Professor Sackett's analysis of this proposal concluded that "[i]f the Project is approved, it will continue to emit additional methane long after the mine is closed."</p> <p>Professor Sackett also stated that post-mining, "some fugitive gas will continue to escape" and that "in principle, these emissions will continue indefinitely."⁴⁰</p>	<p>Scope 1 and 2 emissions at the mine grew ~25%.</p>
<p>Moolarben Coal Complex OC3 Extension Project</p>	<p>Yancoal / MCO is preparing an EIS to extend open cut mining further south for ~10 years of mining (from 2026 to 2036), which would occur in parallel with existing operations (OC4). Yancoal have not been reporting fugitive emissions in their Annual Reviews, however we know from a Nov 2021 modification application that: "In the 2020-2021 reporting period, fugitive emissions from underground operations at the Moolarben Coal Complex resulted in 0.2 Mt carbon dioxide equivalent (CO₂-e) of methane emissions."⁴¹ Scope 1 emissions reported to the Clean Energy Regulator, 2020-21 Safeguard facilities data reporting for Moolarben Coal Mine (Open Cut & Underground) were 164,989 t CO₂-e.</p> <p>Cumulative Scope 1 and 2 emissions have increased at Moolarben - year on year - for the last 4 years in a row.</p>	<p>No EIS for a 10-yr expansion yet, BUT</p> <p>Cumulative Scope 1 and 2 emissions have increased at Moolarben - year on year - for the last 4 years in a row.</p>
<p>Chain Valley</p>	<p>Delta has proposed a Project which would provide for underground mining within the Eastern Mining Area and the extension of the life of mine to 2029.⁴² The 2021 Annual Review - Chain Valley Colliery, puts Scope 1 emissions in 2020-21 at 447,364 t CO₂-e. These very significant emissions do not appear in the CER's 2020-21 Safeguard facilities data. The latest AR states</p>	<p>Anomalies with reporting.</p> <p>Huge fugitive emissions.</p>

⁴⁰ Professor Penny Sackett, 10 June 2022, Expert Report Regarding the Greenhouse Gas and Climate Implications of the proposed Dendrobium Mine Extension Project (SSI - 33143123), pgs 35 and 106

⁴¹ Moolarben Coal Complex UG2 Modification, Modification Report, 24 Nov 2021, Pg 53, https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=MP08_0135-MOD-4%2120211124T222922.900%20GMT

⁴² Delta Coal, Umwelt, Scoping Report, March 2021, https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=PDA-11834_985%2120210331T224325.666%20GMT

	that “[m]ethane levels in the Fassifern seam of approximately 2 – 4 m3/t is not at a level that allows pre or post gas drainage, and as such all methane from the mining operations are ventilated via the main fans at Summerland Point.” The AR goes on to state that “there are no plans to install pre or post gas drainage infrastructure at this time.”	No plan at all for meaningful abatement.
Russell Vale	Wollongong Resources told the ABC in August 2022 that they “are in the process of submitting another extension for another five or 10 years”. ⁴³ As Wollongong Resources has not yet submitted a Scoping Report or an EIS, we do not know what the GHG implications will be. We are similarly in the dark about the current GHG performance of the mine as Wollongong Resources do not report their GHG emissions to the NSW Government. Lock the Gate attempted to FOI Scope 1 emissions information from the Clean Energy Regulator but this request was refused.	The current mining operation does not report GHG data to the NSW Government.
Glendell Continued Operations	<p>The Glendell COP was refused consent on 28 October 2022. NSW DPE had recommended approval. Had the project been approved, annual average Scope 1 and 2 GHGs were predicted to more than double compared to current operations.</p> <p>In 2020/21, total Scope 1 and Scope 2 emissions produced at Glendell were 121,454 t CO₂-e⁴⁴.</p> <p>Glencore’s ‘Glendell COP’ coal mine expansion would have added another 6.9 Mt CO₂-e in lifetime Scope 1 and 2 emissions to NSW’s GHG inventory at an average of about 270,000 t CO₂-e per annum.⁴⁵</p>	Emissions were predicted to double at Glendell

⁴³ Wollongong Resources eyes Russell Vale coal mine extension after South32 shelves Dendrobium plan, ABC Illawarra / By Ainslie Drewitt-Smith and Kelly Fuller, 26 Aug 2022, <https://www.abc.net.au/news/2022-08-26/wollongong-resources-plans-further-extension-of-russell-vale/10137498>

⁴⁴ Glencore, ANNUAL REVIEW, 1 January 2021 – 31 December 2021, https://www.glencore.com.au/rest/api/v1/documents/f348bbba3ccd2196ec245d91cd8719bb/220721%202021_A%20ANNUAL%20REVIEW_FINAL.pdf

⁴⁵ Glencore, 21 January 2022, letter to the NSW IPC regarding Updated GHG Emissions, <https://www.ipcn.nsw.gov.au/resources/pac/media/files/pac/projects/2022/02/glendell-continued-operations-project-ssd-9349/correspondence/departement/220330indpe-responses-to-ipc-questions-on-noticeredacted.pdf>. N.B. the Annual Scope 1 figure is from page 63 of the DPE, Glendell Continued Operations Project (SSD 9349) | Assessment Report. The Annual Scope 2 estimate is from the EIS GHG study.

	An increase to an annual average of about 270,000 t CO ₂ -e represents more than a doubling of Scope 1 and 2 emissions.	
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REGULATION NOT FIT FOR PURPOSE

Despite comprising about 14% of NSW's GHG inventory, there is very little pressure from government at either state or federal level to drive down Scope 1 and 2 emissions from coal mining. At a federal level, no coal mines in NSW were required to purchase carbon offsets in 2020/21 to offset their GHG emissions under the Safeguard Mechanism, as all coal mines reported emissions below their baselines.

In NSW, the Department of Planning conceded in February 2022 in their assessment of GHG emissions at the Narrabri Underground Stage 3 coal project, that *"there is no clear guidance on how to assess potential mitigation or abatement measures (e.g. what measures are considered 'reasonable and feasible' or 'best practice'), both for current and future activities"*.⁴⁶

A hoax: 'strict' conditions not very strict

NSW DPE claim that the NSW Government *"enforces strict conditions on mining companies to ensure Scope 1 and Scope 2 emissions are minimised throughout the mine's life cycle"*⁴⁷, but in practice, this is not true.

Conditioning of coal projects to avoid or minimise GHG emissions is ineffective

- Historically, NSW DPE has routinely recommended conditions of consent which did not require specific, measurable minimisation of GHG emissions. This has begun to change, but these changes will only apply to new projects approved from about 2022 onwards. The bulk of NSW coal mines are not required to implement and report on specific, measurable minimisation of GHG emissions.
- Mount Pleasant - new standard for GHG reporting (Sept 2022)**
 - The Development Consent (220906) for the Mount Pleasant Optimisation Project SSD 10418, Condition D11(e), Annual Review (recommended by DPE and adopted by the NSW IPC), requires MPOP to include an addendum report on Scope 1 and 2 GHGs, which reports:
 - "annual methane and annual total CO₂ emissions (both categorised by source);*

⁴⁶ NSW DPE, January 2022, Narrabri Underground Mine Stage 3 Extension Project (SSD 10269) | Assessment Report , pg 55

⁴⁷ Defunct NSW coal mine belches 1 million tonnes of CO₂ without penalty, Peter Hannam, August 12, 2021, <https://www.smh.com.au/environment/climate-change/defunct-nsw-coal-mine-belches-1-million-tonnes-of-co2-without-penalty-20210811-p58huv.html>

- *overall emissions benchmarked against representative industry sectors and the predictions in the EIS, and performance measures set in condition B36 and/or under condition B34; and*
- *measures undertaken to minimise Scope 1 and Scope 2 GHGs, including actions taken under condition B34 and estimated reductions in CO₂-e as a result of measures implemented.”⁴⁸*
- The NSW IPC has largely failed to impose conditions of consent that ensure that direct greenhouse gas emissions are minimised “to the greatest extent practicable,” as required by s14 (1) (c) of the *State Environmental Planning Policy (Mining Petroleum Production and Extractive Industries) 2007*.
- Neither the Minister for Planning nor NSW DPE appear to know if actual GHG reductions are occurring as a result of the implementation of GHG management plans at coal mines in NSW.

On 14 April 2021, Minister Stokes was asked (Q 5409) if the government tracks “actual greenhouse gas emissions reductions, per annum” achieved by the implementation of GHG management plans at coal mines in NSW. The Minister sought to deflect attention from an inability to answer this question by referring to reporting to the Australian Government, the preparation of GHG Management Plans by coal mines and reporting in Annual Reviews. As this report demonstrates however, cumulatively, none of this adds up to the NSW government being able to determine the level of emissions reduction occurring (if any) as a result of conditions of consent.

The Minister responded with the following information on 5 May 2021:

- coal mines are required to document “commitments” in Air Quality and Greenhouse Gas Management Plans;
- each mine is required to report on the implementation of these commitments in their Annual Reviews;
- GHG emissions from each coal mine are reported annually to the Commonwealth Clean Energy Regulator (CER)⁴⁹;
- The CER plans to develop “a new Corporate Emissions Reduction Transparency Report to help NGER reporters show how they are meeting their emissions reduction goals”.
- When Professor Lowe examined eight major new coal and gas projects approved by the NSW IPC in July 2021, only 0.3Mt of the 89Mt of new Scope 1 and 2 emissions predicted was assessed as being subject to measurable targets and not even this target is legally enforceable or required as a condition of consent (this is a commitment by SIMEC at Tahmoor South to purchase 48,000 MWh per year of

⁴⁸ 220906 Mount Pleasant Optimisation Project SSD 10418 Development Consent, <https://www.ipcn.nsw.gov.au/resources/pac/media/files/pac/projects/2022/05/mt-pleasant-optimisation-project-ssd-10418/determination/220906-mount-pleasant-optimisation-project-ssd-10418--development-consent.pdf>

⁴⁹ Annual emissions data is publicly available on the Clean Energy Regulator’s website, however, the data is provided on each corporation, rather than by each individual mine.

electricity from Molong Solar Farm to offset GHGEs).⁵⁰

- No coal mines currently operating in NSW are *required* to offset predicted Scope 1 or 2 GHG emissions under the conditions of their respective development consents.
- As at May 2021, no coal mine in NSW was *voluntarily* offsetting their Scope 1 or Scope 2 emissions.

Scope 1 fugitive emissions

- In 2020, fugitive emissions from coal mines in NSW in 2020 were **11.63 Mt CO₂-e**
 - Fugitive emissions - underground coal mines: 9.660 Mt CO₂-e in 2020
 - Fugitive emissions - open cut coal mines: 1.970 Mt CO₂-e in 2020.⁵¹
- Under the 'current policy scenario' in the 'NSW Greenhouse Gas Emission Projections, 2021–2050', fugitive emissions from coal mines (open cut and underground) are projected to reduce by 13% from 11.63 Mt CO₂-e in 2020 to 10.1 Mt CO₂-e by 2030.

We note that the Australian Government wants to reduce methane by at least 30% by 2030, whilst the IEA and climate scientists have a much higher ambition.

- As at October 2022, many coal mines in NSW do not report Scope 1 fugitive emissions to the NSW Government.
- Of the coal mines that do report to the NSW Government, Scope 1 fugitive emissions **increased** over the last two years for which Annual Review data is available at 5 mines: Airly Colliery, Ashton, Hunter Valley Operations, Mt Arthur and Newstan.
 - No breakdown of Scope 1 emissions was provided in the Annual Reviews for the following 4 mines, BUT they also reported an **increase** in Scope 1 emissions over the last two years, which very likely represents an increase primarily in fugitive (rather than diesel) Scope 1 emissions. These mines are: Angus Place Colliery, Mandalong, Ravensworth East Open Cut, Mount Pleasant Operations.
- Methane emissions from underground coal mines in NSW are the most significant coal-mine GHG issue. Ventilation air methane (VAM) emissions are the largest component of these emissions. VAM abatement systems could manage this problem.

⁵⁰ In a letter to DPIE dated 9 April 2021, SIMEC state: "GFG has executed a Power Purchase Agreement for 15 MW capacity from the Molong Solar Farm to offset GHGE, providing 48,000 MWh per year of electricity." The conditions of consent do not appear to require this PPA to be implemented. Condition B19. (c) requires SIMEC to "ensure that the development does not exceed the Scope 1 and 2 GHG emissions in Appendix 9, based on a 3 year rolling average". Appendix 9 of the consent allows a maximum of 20,549,599 t CO₂-e. If implemented, the purchase of electricity from the Molong Solar Farm would reduce the total Scope 1 and 2 GHGE of the Project from 20,549,599 t CO₂-e to 20,249,599 t CO₂-e.

⁵¹ NSW Greenhouse Gas Emission Projections, 2021–2050, SEED - The Central Resource for Sharing and Enabling Environmental Data in NSW, 'Data - Emissions by Sector' tab, <https://datasets.seed.nsw.gov.au/dataset/nsw-projected-greenhouse-gas-emissions-from-2021-to-2050/resource/cd9423e5-219d-4250-bf6c-ece875f7097e>

The NSW government has failed to date to clarify the availability and viability of VAM abatement systems.

- The NSW Department of Planning, during their assessment of the Tahmoor South Project in April 2021, stated that: "[Commercial systems to treat VAM are available but are currently high cost ...](#)" In July 2022, Justin Field MLC sought to clarify this, asking the Minister for Planning if any systems to abate ventilation air methane (VAM) from underground coal mines are commercially available? In August 2022, the Minister replied: "[No, these systems are not yet commercially available.](#)"
- High-impact measures such as Ventilation Air Methane abatement are not being implemented at particularly gassy mines such as Bulli Seam Operations for reasons which do not appear to meet the 'reasonable and feasible' test set out in development consents. Typically companies - even those making substantial profits - declare 'capital constraints' and defer implementation. In their FY20 Annual Review, South32 declared that "[a]ll study work relating to the introduction of VAM abatement technology has been placed on hold ahead of commencing pre-feasibility studies due to capital constraints." A demonstration project is now going ahead, but only after the NSW Government committed to paying 75% of the costs (\$15M). Lock the Gate notes that surging prices for aluminium and metallurgical coal resulted in South32 declaring a \$3.87 billion annual profit in August 2022.⁵²

The coal industry in NSW is dragging its feet on VAM abatement. Industry - not government - determines when and if pilot projects go ahead.

Methane from closed and abandoned mines is a growing problem

In her submission on the Dendrobium Extension Project, Professor Sackett noted that an "oft overlooked aspect of continued and increased coal mining" is the emissions produced after coal mines are closed or abandoned. Professor Sackett states:

*"Recent work shows that methane emissions from the growing population of abandoned mines will increase faster than those from active ones. By considering the number, size and depth of coal mines, the type of coal, the rate of abandonment, and end-stage measures (such as whether mine is flooded), it has been estimated that abandoned mine methane accounted for 17% of total global coal mining emissions in 2010. These emissions will grow in time, and will do so faster if coal mining development increases rather than declines. If the Project is approved, it will continue to emit additional methane long after the mine is closed."*⁵³

⁵² Peter Milne, SMH, August 25, 2022, 'Surging prices sweep South32 to bumper profit', <https://www.smh.com.au/business/companies/surging-prices-sweep-south32-to-bumper-profit-20220825-p5bcm.html>

⁵³ Professor Penny Sackett, 10 June 2022, Expert Report Regarding the Greenhouse Gas and Climate Implications of the proposed Dendrobium Mine Extension Project (SSI - 33143123), pg 106 (315)

Scope 2 electricity emissions - no improvement over last 5 years

- In 2019-20, coal mining in NSW used 3.1% of all of NSW's electricity (3.5 Mt CO₂-e was released offsite at power stations to power coal mines)⁵⁴, a slight *increase* from 3.0% of total electricity consumption in NSW in 2018-19.⁵⁵
- **There has been zero net improvement in total Scope 2 GHG emissions attributable to coal mining in NSW over the last 5 years:** Scope 2 emissions from all coal mines in NSW were published by the Australian Government in June 2022 to be 3.6, 3.5, 3.4, 3.5 and 3.5 million tonnes of carbon dioxide equivalent (CO₂-e) emissions for the last five inventory years (2015-16, 2016-17, 2017-18, 2018-19 and 2019-20) respectively.
- Many coal mines in NSW do not report Scope 2 emissions to the NSW Government. Of those that do, **Scope 2 emissions increased over the last two years for which Annual Review data is available at 11 mines:** Ashton, Bulli Seams, Chain Valley, Clarence Colliery, Liddell, Maules Creek*, Moolarben, Mt Arthur, Ravensworth Underground, Ulan and Wilpinjong.

**WHC now claims to be buying renewable energy, however it still reported an increase in Scope 2 emissions in its most recent Annual Review.*

- renewable energy is 'in general' considered a 'reasonable and feasible' mitigation measure, but the NSW Government is not collecting any data on which mines are implementing this measure.
 - The NSW Minister for Planning has confirmed that all 40 operating coal mines in NSW buy grid energy and says that 100% renewable energy is - "*in general*" - a 'reasonable and feasible' abatement measure.
 - That said, in August 2022, the NSW Treasurer and Minister for Energy was unable to answer the following questions: a) how many coal mines in NSW currently buy renewable energy through the electricity grid?; b) how many coal mines in NSW currently generate renewable energy to power some or all of their own operations?; and c) what percentage of electricity requirements for coal mines currently operating in NSW comes from renewable energy generated by the mine?

The response supplied to [QON 9335 - Energy - ELECTRICITY USE BY MINING](#) was: "*There is no data available.*"

⁵⁴ QON 9335, Justin Field, 29/07/2022, ELECTRICITY USE BY MINING, <https://www.parliament.nsw.gov.au/lc/papers/Pages/ga-by-member.aspx?pk=2223>

⁵⁵ Response to Justin Field MLC's QONs, 5 May 2021, <https://www.parliament.nsw.gov.au/hp/housepaper/17745/QuestionsAndAnswers-LC-491-20210505-Proof.pdf>

Box 2: Case study - Dendrobium (South32)

The Dendrobium Extension - withdrawn by South32 in August 2022 - planned to triple Scope 1 emissions. This mining project was not just supported by the NSW government; it was granted State Significant Infrastructure status (a first for any coal mine in NSW). When withdrawing this project, South32 announced that they still propose to “extend mining activities until 2028 and are evaluating potential options to extend mine life beyond this time”.⁵⁶ Scope 1 emissions from proposed extensions have not been estimated.

NSW DPE’s Director of Climate and Atmospheric Science made the following comments about South32’s Dendrobium Mine Extension Project (now withdrawn). South32:

- “ruled out combustion of drainage gas”
- “ruled out destruction of ventilation air methane (VAM)”
- “dismisses offsetting emissions unless required by legislation”, and
- failed to estimate emissions “from the mine when decommissioned”.
- “did not provide emissions from the mine when decommissioned. This is a significant oversight and must be corrected by the Proponent.”⁵⁷

The same advice also determined that:

- Destruction of ventilation air methane (VAM) may be possible pending the outcomes of the Appin Mine VAM demonstration plant. The associated development of infrastructure required to implement VAM abatement at Dendrobium would be subject to separate assessment and approval – hence this option was not considered further for the Project. The Proponent also cited the low probability of VAM abatement technologies being available within the short mining life of the domain.

Lock the Gate notes that Scope 1 and 2 emissions at the current Dendrobium mine grew ~25% last year from 241,910 t CO₂-e in 2019/20 to 301,640 t CO₂-e in 2020/21.

POLICY AND LAW IN NSW

The Mining SEPP: GHGs minimised to the greatest extent practicable

S14 (1) (c) of the State Environmental Planning Policy (Mining Petroleum Production and Extractive Industries) 2007 requires that GHG emissions are minimised “to the greatest extent practicable”.

“Before granting consent ... the consent authority must consider whether or not the consent should be issued subject to conditions aimed at ensuring that the

⁵⁶ South32, Dendrobium Mine Extension Project update, 23 August 2022, <https://www.south32.net/our-business/australia/illawarra-metallurgical-coal/dendrobium-mine>

⁵⁷ NSW DPE, 10 June 2022, Advice in relation to Dendrobium Extension Project Greenhouse Gas Emissions,

development is undertaken in an environmentally responsible manner, including conditions to ensure ...

(c) that greenhouse gas emissions are minimised to the greatest extent practicable.”⁵⁸

Development consents

Section 4.17 of the EP & A Act provides the power to impose a condition on a development Consent. Virtually all coal mines in NSW have a condition in their Consent similar to this one, for the highest-emitting coal mine in NSW - South32’s Bulli Seams / Appin mine:

“The Proponent shall implement all reasonable and feasible measures to minimise the release of greenhouse gas emissions from the site to the satisfaction of the Planning Secretary.”⁵⁹

Current NSW government policy is to continue “coal exploration, extraction and export”

Current NSW government policy direction is unambiguously to double down on *growing* the problem. As the NSW Independent Planning Commission put it bluntly when they approved the enormous Mt Pleasant coal expansion in September 2022 (doubling capacity to make this one of the biggest coal mines in NSW): *“The current strategic direction of the NSW government, as set out in its policies, seeks to continue coal exploration, extraction and export.”⁶⁰*

Strategic Statement On Coal Exploration And Mining

The NSW Government’s 2020 Strategic Statement On Coal Exploration And Mining In NSW states that the NSW Government will work to *“reduce the greenhouse gas emissions directly associated with coal mining in NSW (fugitive emissions)”*.

A May 2021 NSW Treasury paper makes the common sense finding that to meet NSW’s Net Zero commitment, meaningful action on GHG emissions from coal mining is required:

“Combined, GHG emissions from coal mining, electricity generation, and private motor vehicles constitute more than half of all New South Wales GHG emissions, meaning transition in these three sectors will constitute a key component of this commitment.”⁶¹

⁵⁸ State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 under the Environmental Planning and Assessment Act 1979,

<https://legislation.nsw.gov.au/view/html/inforce/current/epi-2007-0065>

⁵⁹ Bulli Seam Operations Project, Consolidated Consent, April 2022,

https://www.south32.net/docs/default-source/appin-mine-ventilation-approval-documents/bulli-seam-operations-consolidated-consent---april-2022.pdf?sfvrsn=c2cbfa59_4

⁶⁰ NSW Independent Planning Commission, Mount Pleasant Optimisation Project SSD 10418 Statement of Reasons, 06.09.2022, pg 26,

<https://www.ipcn.nsw.gov.au/resources/pac/media/files/pac/projects/2022/05/mt-pleasant-optimisation-project-ssd-10418/determination/220906-mount-pleasant-optimisation-project-ssd-10418--statement-of-reasons.pdf>

⁶¹ The sensitivity of the NSW economic and fiscal outlook to global coal demand and the broader energy transition for the 2021 NSW Intergenerational Report, NSW Treasury, May 2021,

REASONABLE AND FEASIBLE

Legal definition of 'reasonable and feasible' measures

As legally defined in standard conditions of consent, 'feasible' "means what is possible and practical in the circumstances". Reasonable "means applying judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and the nature and extent of potential improvements."

No Guideline on 'reasonable and feasible' measures

In July 2022, the following question was put to the NSW Minister for Planning by Justin Field MLC:

In January 2022, the Department of Planning and Environment found that "there is no clear guidance on how to assess potential mitigation or abatement measures (e.g. 'what measures are considered 'reasonable and feasible' or 'best practice'), both for current and future activities". Every coal mine operating in New South Wales is required to implement all 'reasonable and feasible' mitigation measures. Given that there is no agreement within the Government about what a 'reasonable and feasible' measure is:

(a) How does the Government know if coal mines are implementing all 'reasonable and feasible' Green House Gas (GHG) mitigation measures?

In August 2022, an answer to this question was provided to the NSW Parliament on behalf of the NSW Minister for Planning:

"Greenhouse gas management measures are described in each of the individual site's Air Quality and Greenhouse Gas Management Plans which are reviewed and approved by the Department. Annual Reviews are also prepared by each site and provide a summary of the measures applied in the reporting period and the level of emissions over that reporting period. These documents are all publicly available on the proponent's website."⁶²

Cost of climate damage per tonne attributable to coal mine Scope 1 and 2 GHGs

In order for the community to form a view about what a reasonable carbon abatement cost to a coal mine per tonne of CO₂-e might be, it is necessary to establish what the cost of climate damage is per tonne of CO₂-e emitted. Former Chief Scientist for Australia Professor Penny Sackett suggests that the social cost of carbon provides an appropriate guide. Professor

https://www.treasury.nsw.gov.au/sites/default/files/2021-05/2021_igr_ttrp_-_the_sensitivity_of_the_nsw_economic_and_fiscal_outlook_to_global_coal_demand_and_the_broader_energy_transition_for_the_2021_nsw_intergenerational_report.pdf

⁶² 9318 - Planning - REASONABLE AND FEASIBLE ACTIONS TO REDUCE GREENHOUSE GAS EMISSIONS, Field, Justin to the Minister for Women, Minister for Regional Health, and Minister for Mental Health representing the Minister for Planning, and Minister for Homes, <https://www.parliament.nsw.gov.au/lc/papers/pages/qanda-tracking-details.aspx?pk=92748>

Sackett says that the “[s]ocial Cost of Carbon is the value of the net damage caused to society by adding a tonne of CO₂ into the atmosphere”.

“A 2018 survey of the scientific literature yielded a median global Social Cost of Carbon of 417 USD per tCO₂, with a ‘reasonable’ (66% confidence) range of 177–805 USD. It is important to note that a large amount of research on increasing climate change costs is yet to be factored into these studies. Converting the median value of 417 USD per tCO₂ in 2018 to Australian dollars in 2022 (adjusting for inflation) yields 600 AUD per tCO₂ for the Social Cost of Carbon.

This value is actually a substantial underestimate since the research cited does not take into account costs associated with adaptation and mitigation to climate change, biodiversity loss, cultural loss, climate effects with very long-term consequences (sea level rise and ocean acidification) and long-term restructuring of the economy. Most importantly, such estimates ignore the possibility of crossing tipping points in the climate system, in which case the social costs would be unthinkable and incalculable.”⁶³

One of Australia’s most prominent economists - Nicki Hutley - says that the social cost of carbon (SCC), sometimes referred to as the ‘damage cost’ estimate, is considered perhaps “the single-most important economic concept in the economics of climate change.”⁶⁴

18.6 Mt CO₂-e of Scope 1 and 2 emissions in NSW attributable to mining coal in NSW (in just one year of mining) multiplied by a social cost of carbon of \$600 per tonne generates an estimate of \$11.2 billion in climate damages globally. The NSW EPA needs to bear this in mind when the NSW coal industry complains about spending money to abate or avoid emissions here in NSW.

How does Glencore decide what’s ‘reasonable and feasible’?

“Prioritising Energy and GHG Management Controls To prioritise the implementation of energy and greenhouse gas management controls, technical review and marginal cost of abatement are used to evaluate the controls through the AFE process where applicable. Options and alternatives are documented, Net Present Value (NPV) calculations should be completed over the useful life of the option and include capital expenditure, operational expenditure and forecast savings / revenue and where technically feasible, (i.e. significant technical barriers to implementation might exist that prevent the selection of the alternative) and energy and greenhouse gas savings (tCO₂-e) estimated if appropriate.”⁶⁵

⁶³ Expert Report to the NSW IPC on the Greenhouse Gas and Climate Implications of the Narrabri Underground Mine Stage 3 Extension, Dr Penny D Sackett, Distinguished Honorary Professor, ANU Institute for Climate, Energy and Disaster Solutions, 23 February 2022

⁶⁴ A Social Cost of Carbon for the ASCT, DRAFT Prepared for the ACT Government By Nicki Hutley, Rovingstone Advisory Pty Ltd 18 March 2021,

https://www.environment.act.gov.au/_data/assets/pdf_file/0006/1864896/a-social-cost-of-carbon-in-the-act.pdf

⁶⁵ [Ulan Coal Air Quality and Greenhouse Gas Management Plan, 20210111](#), pg 33

Barriers to actions: Low internal rates of return, negative net-present values, or long-payback times

“T]additional export sectors may utilise internal opportunities to reduce emissions - such as energy efficiency, renewable energy, the deployment of carbon capture and storage and other industry specific technologies and processes, such as Ventilation Air Methane (VAM) oxidation - but may be less likely to invest in abatement projects that are calculated to have low internal rates of return, negative net-present values, or long-payback times (without public financing support). These sectors may therefore utilise the least-cost combination of internal abatement opportunities (supported by the NRF) and external offsets to meet their annual emissions reduction obligations.”⁶⁶

Hume Coal's proposal

In the June 2021 assessment of Hume Coal's proposal, NSW DPIE set what it considers to be a new benchmark for “mitigation and offsetting measures,” describing these as consistent with best or leading practice for coal mining projects in NSW”.

288. Mitigation measures proposed to be implemented by Hume Coal for the reduction of Scope 1, 2 and 3 GHG emissions include the following (where practicable):

- *Scope 1 measures:*
 - ***use of battery-electric powered vehicles for surface activities and underground personnel transport;***
 - *use of fuel-efficient locomotive engines and systems;*
 - *reduction of engine idling times; and*
 - *routine servicing and maintenance;*
- *Scope 2 measures:*
 - ***procure power supply from renewable energy sources where possible; and***
 - ***establish solar power cells and storage batteries to power administration buildings on site;***

*289. Hume Coal has also committed to **offsetting all fugitive (Scope 1) GHG emissions through tree planting** on Hume Coal owned land. Hume Coal anticipates that this would equate to some 1ha to 2ha of tree plantings per year, with the plantings targeting revegetation along watercourses.*

290. The Department is satisfied that Hume Coal's mitigation and offsetting measures are consistent with best or leading practice for coal mining projects in NSW.⁶⁷

⁶⁶ RepuTex Energy, 3 December 2021, The economic impact of the ALP's Powering Australia Plan, pg 23, https://www.reputex.com/wp-content/uploads/2021/12/REPUTEX_The-economic-impact-of-the-ALPs-Powering-Australia-Plan_Summary-Report-1221-2.pdf

⁶⁷ NSW DPE, June 2021, Hume Coal and Berrima Rail Projects (SSDs 7171 & 7172) | Assessment Report, <https://www.ipcn.nsw.gov.au/resources/pac/media/files/pac/projects/2021/06/hume-coal-project/referral-from-the-department-of-planning-industry-and-environment/assessment-report.pdf>

Emission reduction measures for underground coal mines

Through industry experience and involvement with several decarbonisation projects **Palaris has developed a database of emission reduction measures (ERM) specific to Scope 1 and Scope 2 emissions for underground coal mines (March 2022).**⁶⁸ The emission reduction measures are described below:

Scope 1 Reduction Measures

i. Pre-draining of the target mining seam

This allows for controlled capture of high purity gas prior to mining that can be reticulated for treatment or utilisation.

ii. Pre-draining of adjacent seams (above and below the target seam)

Allows for controlled capture of higher purity gas (and potentially higher volume) prior to mining that can be reticulated for treatment or utilisation. This has the potential to reduce the longwall gas emissions during extraction reporting to the ventilation stream.

iii. Use of a post-drainage gas capture system for longwall extraction

Allows to capture gas emissions resulting from longwall mining as the strata is relaxed and gas is released from other coal seams and strata. Gas purity can be compromised as ventilation air is more likely to be introduced to the gas reticulating system.

iv. Increase of post drainage capture efficiency (PDCE)

Once a system is in place, and the gas sources and fracture mechanisms of the longwall strata are understood, this can be achieved through the use of targeted gas drainage holes or increased hole density. The technical viability of this option varies from mine to mine, particularly in areas where a surface based drainage system is not possible.

v. Gas capture from sealed goaf areas

Capturing gas from the goaf environment in the active mining area and legacy areas prevents it from being released to the atmosphere through the ventilation stream and it allows for the gas to be treated and/or utilised. It has been found that this component of emissions can be as little as ~10 – 20% for newer mines and up to ~ 60% of the total ventilation emissions, for more established mines with a large legacy footprint. This abatement option requires studies to identify viability at each individual site, as the goaf environment may not be of a suitable concentration to allow capture and reticulation.

vi. Use of a vacuum extraction plant

To maintain effective suction on the underground gas pipe range to ensure the underground gas is safely extracted to the surface where it can then be utilised or destructed.

vii. Flaring of gas captured

Either using fixed or mobile flares. The function of a flare is to destruct the methane (CH₄)

⁶⁸ Palaris, March 2022, GHG Calculation and Mitigation Measures Peer Review (Dendrobium Extension, (pg 51 onwards), <https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSI-33143123%2120220427T061040.580%20GMT>

captured as part of the gas drainage process (pre and/or post drainage). This method of gas destruction is commonly used throughout Australian mines. Typically, suppliers aim for 99.7% destruction of all CH₄.

viii. Electricity generation using a gas fired power station

The function of a gas fired power station is to convert the methane extracted from the mine into electricity and potentially offset electricity costs where possible. Specially designed gas gensets are available in numerous capacities to accommodate the predicted amount of the gas feed throughout the mine life.

ix. Gas Separation and Enrichment Technology

Potential application in low CH₄ environments. It involves the extraction of a portion of gas out of the gas pipeline, removing most or all the carbon dioxide (CO₂), and injecting high purity gas back into the main pipeline downstream to increase the overall CH₄ concentration and allowing the gas to be treated and/or utilised. These technologies include Pressure Swing Absorption, Amine Gas Sweetening and Membrane Separation Technology. None of these technologies are currently being used in the Australian underground coal industry.

x. VAM Abatement Technology

The potential application of ventilation air methane (VAM) abatement technology in Australia is more difficult than gas drainage and gas destruction technologies due to the infancy of the technology, higher relative capital costs and large land requirement. The current technology involves an exothermic oxidation of low concentrations of CH₄ to form CO₂ and water vapour. There are currently no active commercial applications of VAM technology in underground coal mines within Australia.

xi. Use of Bio-diesel or Alternative Low Carbon Fuel Options

Biofuels are said to be carbon-neutral because the carbon dioxide that is absorbed by the plants is equal to the carbon dioxide that is released when the fuel is burned. This means it does not release any additional carbon dioxide into the atmosphere (as is reflected in the emission factors in the NGA document). The use of biofuels would require a study to ensure compatibility with the mining equipment.

Flaring of captured methane (underground mines)

Flaring of captured methane is common at underground mines where methane concentrations are >30% (it is “uncommon”, but not impossible to flare at methane concentrations <30%). A few mines capture a portion of their methane and then burn it to generate electricity (eg Tahmoor). There are various ways to increase the abatement impact of methane drainage and capture depending on site-specific factors.

VAM (Ventilation Air Emissions)

“[t]here is a need for broader deployment of Ventilation Air Methane (VAM) abatement technologies given VAM is the largest source of coal mine fugitive emissions.”⁶⁹

⁶⁹ Correspondence with Lock the Gate.

VAM is a big problem

Fugitive emissions from coal mining account for about 9% of NSW's greenhouse gas emissions. Most of these emissions are from underground coal mines in the form of VAM. The Dept Regional NSW's, [Coal Innovation website](#) says that "[a]pproximately 50-85 per cent of coal mining methane, a potent GHG, is emitted to the atmosphere through mine ventilation air, depending on mine site specifications."

Mining, Exploration and Geoscience, Department of Regional NSW (MEG) considers VAM abatement a key target to drive substantial emissions reduction from our mining industry to help achieve our Net Zero by 2050 goal. When announcing \$15M in funding for a South 32 project to design and construct a "full-scale next generation VAM mitigation thermal reactor (termed a VAMMIT unit)" at Appin, MEG stated that the project "aims to overcome challenges of abating VAM emissions and encourage uptake of this technology at the gassiest NSW coal mines."⁷⁰

No VAM systems operating anywhere in Australia

In October 2021, Palaris found that there are currently no active applications of VAM technology in underground coal mines within Australia.⁷¹ Palaris say that the application of ventilation air methane (VAM) abatement technology in Australia is more difficult than gas drainage and gas destruction technologies due to the infancy of the technology, higher relative capital costs and large land requirement.

Commercially available in Australia? Maybe. Maybe not.

In July 2022, Justin Field MLC asked the Minister for Planning if any systems to abate ventilation air methane (VAM) from underground coal mines are commercially available? In August 2022, the Minister replied: ["No, these systems are not yet commercially available."](#)

The NSW Department of Planning, during their assessment of the Tahmoor South Project in April 2021, contradicted the Minister, stating: ["Commercial systems to treat VAM are available but are currently high cost ..."](#)

- **APPIN:** The CEO of Chief Executive Officer of Mining, Exploration and Geoscience | Department of Regional NSW, advised that construction of a demonstration facility at Appin will commence in 2024 after detailed engineering and project approval phases. The Commissioning and testing phase of this project will occur across 2024 and 2025. The CSIRO VAM technology they plan to demonstrate "is expected to abate

⁷⁰

<https://www.regional.nsw.gov.au/meg/industry-support/coal-innovation/fugitive-methane-emissions-from-coal-mines>

⁷¹ Palaris (for Whitehaven Coal), NARRABRI UNDERGROUND MINE STAGE 3 EXTENSION PROJECT GREENHOUSE GAS BENCHMARKING, 14 Oct 2021,

<https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=RFI-28578842%2120211015T030000.474%20GMT>

>96% of methane emissions. Importantly, this project will trial a second commercial scale VAM abatement to demonstrate the technology can be scaled to process all emissions from a mine ventilation system. This establishes a pathway for South32 and other coal mines to implement this technology across their entire operation. MEG will publish emissions reduction achieved, data on operating efficiencies of the VAM technology and techno-economic assessment in their final report. The Project will cost about \$19.5M, with \$15M being provided by the NSW Gov't and \$4.5M by South32.

- **TAHMOOR SOUTH:** Due to being a gassy mine, Ventilation Air Methane (VAM) is by far the main contributor to Scope 1 emissions, being 18.7 Mt CO₂-e of a total of 19.3 Mt CO₂-e (around 97 per cent). SIMEC claimed in April 2021 that commercial systems to treat VAM “are available but are currently high cost”. This was [confirmed by NSW DPE in April 2021](#). SIMEC estimated that it would cost around \$100 million to develop and operate a VAM treatment system which, SIMEC argued, would make their project financially unviable.

At the time of assessment, the EDO's client pointed out the cost of purchasing Australian Carbon Credit Units (ACCUs) to offset equivalent emissions at \$15.74 or more would be \$294M. If it is 'reasonable and feasible' for Australian taxpayers to buy abatement at a cost of \$15.74 or more per tonne, why wasn't it 'reasonable and feasible' for SIMEC to pay a third (or less) of this cost to abate their VAM emissions at \$5.35 per tonne (\$5.35 x 18.7Mt CO₂-e = \$100M)?

Findings on VAM systems from the [Palaris study \(Oct 2021\) commissioned by Whitehaven Coal](#) as part of the IPC assessment of Narrabri Underground Stage 3.

- “There are currently no active applications of VAM technology in underground coal mines within Australia.”⁷²
- barriers to adoption and deployment of the VAM technology include relatively higher initial capital cost, higher operating costs in both absolute and per CO₂-e tonne abated terms, and large land requirements (perhaps 2/3rds of a football field).
- While other VAM abatement technologies such as the CSIRO based VAMCAT and VAMIT have been trialled at pilot scale in NSW, the Vocsidizer™ Regenerative Thermal Oxidizer (RTO) by Megtec/Durr is currently the most developmentally advanced VAM treatment equipment.
- WestVAMP was the world's first commercial demonstration of Mine Ventilation Air Methane with energy recovery. Up to 20% of the total mine ventilation air was captured via ducting placed over one mine fan evase. The total capital cost of the plant, inclusive of all steam plant and equipment, was in the order of AUD \$30 M. According to WHC's Oct 2021 study for N/Underground, “Until decommissioning due to the extinction of West Cliff Bulli seam coal resources in 2017, the West VAMP plant routinely produced in excess of 40,000 MWh of electricity and reduced emissions by over 200,000 tonnes CO₂-e annually (Kallstrand, 2019). Key to the

⁷² NARRABRI UNDERGROUND MINE STAGE 3 EXTENSION PROJECT GREENHOUSE GAS BENCHMARKING, 14 Oct 2021, <https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=RFI-28578842%2120211015T030000.474%20GMT>

success of the facility, over more than 10 years of safe operation, was the ability to carefully control the fuel gas concentration to Vocsidizer units. This was achieved using either additional higher concentration drainage gas when the VAM concentration was lower than 0.5%, or additional dilution fresh air when the VAM concentration was above 0.9%.”

Fugitive abatement at open cut coal mines

It’s technically possible to pre-drain and combust mine waste gas from open cut mines - such as Mangoola - however, coal companies and their consultants typically claim that “the capital and operational costs required to extract gas from the low gas environment makes the mitigation measure economically not feasible.”⁷³

BHP told the AFR in June 2022 that fugitive emissions from its open-cut mines are “quite a challenge for us and also may end up being that kind of residual component of emissions where we may utilise high-quality offsets in the longer term on that journey to net zero”.⁷⁴

Diesel emissions

The 44 cent per litre Fuel Tax Credit for coal mines is a disincentive to electrify

The ongoing subsidy from the Australian Government for coal miners of 44 cents per litre for diesel fuel used on mine sites acts as a disincentive for coal miners to electrify.

Biodiesel

Lock the Gate Alliance is not endorsing the use of biodiesel in this submission. We include some content about this, as use of the product was suggested by Whitehaven Coal as an abatement measure (see below).

Biofuels considered by some to be carbon-neutral

Biofuels are said by some to be carbon-neutral because the carbon dioxide that is absorbed by the plants is equal to the carbon dioxide that is released when the fuel is burned. In theory, this means burning biodiesel does not release any additional carbon dioxide into the atmosphere.

Coal miners promise to investigate biodiesel: no evidence they are using it

Whitehaven Coal, in their [Maules Creek Air Quality & Greenhouse Gas Management Plan](#), commit to ‘investigate biodiesel use and where possible source from local and sustainable agricultural resources’ (Maules Creek AQ and GHG Management Plan, 2020).

Lock the Gate is not aware of any coal mines that actually source and use biodiesel at present.

⁷³ Pg 20,
<https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-8642%2120190705T025715.653%20GMT>

⁷⁴ AFR, Peter Ker, Resources reporter, Jun 15, 2022, BHP warns offsets may be the only option for fugitive coal emissions

Biodiesel is commercially available to coal mines does not appear to be in use

In July 2022, Justin Field MLC asked the NSW Minister for Planning (QON 9324):

(1) Are supplies of biodiesel commercially available to coal mines in New South Wales?

(2) Do any coal mines in New South Wales use biodiesel to power vehicles used on mine sites?

(a) If so, please list which mines use biodiesel?

The NSW Minister for Planning confirmed that *“Biodiesel is commercially available to coal mines in New South Wales, particularly as biodiesel blended products.”*⁷⁵ The Minister was unable to clarify whether any mines are using biodiesel.

The same question was put to the Deputy Premier and Minister for Regional NSW. The response was:

*The Department is unable to answer this question, as the mine safety regulator remit does not extend to tracking the type and availability of diesel fuels used at mines. The Department does not require coal mining businesses to hold this information.*⁷⁶

Electric vehicles

Electric vehicles: not in use underground or for heavy haulage

As at 19 August 2022, the NSW Minister for Planning advises:

*Coal mine sites in New South Wales do not currently use electric vehicles for heavy vehicle haulage and extraction due to the downtime associated with battery charging. In addition, EVs are not currently certified for use in hazardous areas, such as underground coal mines. There is a current ACARP project underway to develop explosion protected batteries and drive systems for use in underground coal mines.*⁷⁷

Electric vehicles: ‘reasonable and feasible’ for surface activities

In June 2021, Hume Coal considered that battery-electric powered vehicles for surface activities and underground personnel transport was a ‘reasonable and feasible measure to reduce diesel emissions at their proposed mine.

Justin Field MLC asked the NSW Minister for Planning:

“Is the use of battery-electric powered vehicles for surface activities and underground personnel transport considered a reasonable and feasible abatement measure?”

⁷⁵ 9324 - Planning - BIO-DIESEL USE IN COAL MINES,

<https://www.parliament.nsw.gov.au/lc/papers/pages/qanda-tracking-details.aspx?pk=92754>

⁷⁶ <https://www.parliament.nsw.gov.au/lc/papers/pages/qanda-tracking-details.aspx?pk=92757>

⁷⁷ QON 9318 - Planning - REASONABLE AND FEASIBLE ACTIONS TO REDUCE GREENHOUSE GAS EMISSIONS, <https://www.parliament.nsw.gov.au/lc/papers/pages/qanda-tracking-details.aspx?pk=92748>

The Minister asked DPE's Climate and Atmospheric Science (CAS) Branch to reply:

*"The limited use of battery-electric powered vehicles for surface activities was proposed by Hume Coal and considered to be reasonable and feasible for that development. Whether this measure is reasonable and feasible for other sites in NSW needs to be assessed and determined on a case-by-case basis."*⁷⁸

This is what Glencore say about diesel emissions in their '[Pathway to net zero 2021 progress report](#)'

Diesel is one of the largest contributors to our Scope 1 emissions. We have identified three pathways to address this:

- In the near-term, we will consider deploying existing fleet electrification technologies at our large open-pit operations that are connected to national grids already utilising renewable energy sources.*
- In the medium to longer term, our planning of mining fleet replacement will align with the expected arrival of new technology equipment not currently commercially available, such as battery electric or hydrogen fuel cell haul trucks. We anticipate these technologies becoming available before the end of this decade.*
- In collaboration with our peers and equipment manufacturers through the ICMM, we continued to work to promote operational and technological innovation required to reduce emissions. The programme is working to accelerate the development of zero-emission mining equipment and ultimately aims to enable mining operations to adopt zero emission surface mining fleet by 2040.*

In February 2022, [mining engineer and consultant Dr Peter Harrop told the ABC](#) that hydrogen would "replace diesel in heavy industry in the next 10 years". He said that miners are moving too slowly, choosing to wait until current equipment wore out before upgrading: "all the equipment is there ... just buy it! Hitachi has big battery electric excavators, Liebherr in Germany has concrete trucks that are battery electric, Caterpillar and Komatsu are doing superb work, and Sandvik of Sweden has a complete range for deep mines."

Battery electric trucks and vehicles

BHP, Rio Tinto and Vale's [Charge on Innovation Challenge](#) website (2021) says that whilst "there are no large battery electric haul trucks used in mines today" ... battery electric trucks will be ready for mine site trials within the next few years".

⁷⁸ Justin Field, QON 9318 - Planning - REASONABLE AND FEASIBLE ACTIONS TO REDUCE GREENHOUSE GAS EMISSION, <https://www.parliament.nsw.gov.au/lc/papers/pages/qanda-tracking-details.aspx?pk=92748>

BHP's sustainability vice president [Fiona Wild said in June 2022](#) that the company was working with vehicle manufacturers to ensure a substitute for diesel-powered trucks was available by the time a big replacement of its mining fleet was due later this decade.

Yancoal: electric 220 tonne trucks ready for trial in next few years

"Yancoal has joined with other mining companies in the global 'Charge On Innovation Challenge' to develop concepts for large-scale haul truck electrification systems to reduce the consumption of diesel fuel and significantly cut emissions from surface mine operations. The potential to electrify haul trucks, and the decarbonisation that would result, is a significant issue for Yancoal, given that around 36% of our total scope 1 emissions are generated by the consumption of diesel across our operations.

The initiative aims to tap into expertise across various industries to address the challenges of electrification of 220 tonne haul trucks, such as: battery technology constraints; the amount of energy that can be efficiently carried on board a truck; and unproductive charging solutions. It is anticipated that battery electric trucks and associated charging infrastructure could be ready for mine site trials within the next few years. At this stage of the process, a list of preferred technology solutions has been compiled, and the next step is to assess the requirements for potential accelerated commercialisation of these solutions."⁷⁹

BME / 3ME - Tomago

Hunter Valley equipment company BME is retrofitting diesel-powered underground mining machines with batteries and hopes to be manufacturing the vehicles in the Hunter within five years. As at May 2022, [BME, through its partner 3ME Technology](#), is working with government regulators in NSW and Queensland on having their battery-powered vehicles certified for use in underground coal.

Electricity emissions - NSW coal mines (Scope 2)

Background

As at August 2022, the NSW Treasurer and Minister for Energy says all 40 operating coal mines buy grid energy.

In August 2022, the NSW Treasurer and Minister for Energy was unable to answer the questions below.

- how many coal mines in NSW currently buy renewable energy through the electricity grid?
- how many coal mines in New South Wales currently generate renewable energy to power some or all of their own operations?
- what percentage of electricity requirements for coal mines currently operating in New South Wales comes from renewable energy generated by the mine?⁸⁰

⁷⁹ Yancoal Australia, 2021 ESG Report

⁸⁰ QON 9335 - Energy - ELECTRICITY USE BY MINING, Aug 2022, Field, Justin to the Minister for Finance, and Minister for Employee Relations representing the Treasurer, and Minister for Energy, <https://www.parliament.nsw.gov.au/lc/papers/pages/qanda-tracking-details.aspx?pk=92765>. Answer received on 19 August 2022 and published in [Questions & Answers Paper No. 809](#)

The response supplied to [QON 9335 - Energy - ELECTRICITY USE BY MINING](#) was:

“There is no data available.”

Renewable energy ‘reasonable and feasible’?

NSW IPC says ‘yes’

In their 6 September 2022 decision to approve the massive Mount Pleasant Optimisation Project, the NSW IPC required the Applicant to:

“Minimise GHG emissions by using electricity generated by renewable or carbon neutral energy sources where reasonable and feasible as required by condition B36 imposed by the Commission.”⁸¹

Minister for Planning says ‘in general, yes’

In July 2022, the NSW Minister for Planning was asked:

Does the Government consider the purchase of 100 per cent renewable energy to be a ‘reasonable and feasible’ abatement measure for electricity that coal mine operators’ source through the electricity grid?

In August 2022, this reply was provided:

In general, yes, however the reliance on renewable energy needs to be considered on a case-by-case basis. This may not be considered reasonable and feasible for all operations and needs to be determined based on the outcomes of a cost-benefit analysis.⁸²

In regard to the recently refused Glendell COP project, the Minister stated that (if approved) Glencore would have to demonstrate “the use of electricity generated by renewable or carbon neutral energy sources, or justification [in it’s Annual Review] as to why it is not considered to be reasonable and feasible.”

NSW Gov’t: 100% renewable energy is - “in general” - a ‘reasonable and feasible’ abatement measure, however:

- It “may not be considered reasonable and feasible for all operations and needs to be determined based on the outcomes of a cost-benefit analysis.”

⁸¹ 220906 Mount Pleasant Optimisation Project SSD 10418 Development Consent, <https://www.ipcn.nsw.gov.au/resources/pac/media/files/pac/projects/2022/05/mt-pleasant-optimisation-project-ssd-10418/determination/220906-mount-pleasant-optimisation-project-ssd-10418--development-consent.pdf>

⁸² QON 9318 - Planning - REASONABLE AND FEASIBLE ACTIONS TO REDUCE GREENHOUSE GAS EMISSIONS

- “if the cost or availability of purchasing renewable energy inhibited production at a mine site, it would not be considered reasonable and/or feasible.”

Does anyone believe that one of the wealthiest industries in Australia cannot afford renewable electricity?

The Clean Energy Council advised in their ‘[Clean Energy Australia Report 2022](#)’ that since “2017, there have been at least 110 corporate power purchase agreements (PPAs) negotiated, contracting over 4 GW of renewable energy generation.” This is clearly an option for coal miners in NSW.

A March 2022 Palaris review of coal mine mitigation measures mentioned ‘Power purchase agreements (PPA)’.

“Under a Corporate PPA, electricity buyers agree to buy power and/or Large Generation Certificates from a renewable energy project (currently solar or wind farms) at a fixed price over a longer-term. Reporting for use of renewable electricity is not required.”⁸³

- **BHP’s 5-yr deal to supply 50% RE to QLD coal mines:** In September 2020, CleanCo and BHP entered into a five-year deal whereby CleanCo will provide BHP with electricity primarily from renewable sources sufficient to provide half the power BHP requires for its coal mines in Queensland. Prior to this arrangement, BHP sourced 100% of electricity supply from the largely coal-fired Queensland grid. BHP estimates there will be an overall reduction of 1.7 million tonnes in carbon equivalent emissions between 1 January 2021, when the supply agreement kicks in, and 2025.⁸⁴
- **Solar PPA to partially reduce emissions - Tahmoor Coal:** GFG claims to have executed a Power Purchase Agreement for 15 MW capacity from the Molong Solar Farm to offset GHGE, providing 48,000 MWh per year of electricity. In terms of CO₂-e, the Molong Solar Farm would offset approximately 300,000 t CO₂-e, based on the forecast carbon intensity of the NSW grid over the 10-year Project life. The purchase of electricity from the Molong Solar Farm would therefore effectively reduce the total Scope 1 and 2 GHGE of the Project from 20,549,599 t CO₂-e to 20,249,599 t CO₂-e.⁸⁵
- **Maxwell Underground’s 25 MW solar**
Maxwell Solar Pty Ltd (Maxwell Solar), a wholly owned subsidiary of Malabar Coal Ltd, proposes to develop a new 25 megawatt (MW) solar project approximately 10 kilometres (km) southeast of Muswellbrook in the Muswellbrook Local Government Area. The Project was approved in August 2020. The project is located on a

⁸³ Palaris, March 2022, GHG Calculation and Mitigation Measures Peer Review (Dendrobium Extension, (pg 51 onwards),
<https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSI-33143123%2120220427T061040.580%20GMT>

⁸⁴ CleanCo, BHP strike deal to ‘substantially reduce greenhouse gas emissions’
21 September 2020,
<https://www.lawyersweekly.com.au/biglaw/29498-cleanco-bhp-strike-deal-to-substantially-reduce-greenhouse-gas-emissions>

⁸⁵ Letter from SIMEC to DPIE, 9 April 2021

rehabilitated overburden emplacement area associated with the former Drayton coal mine, which ceased operations in December 2017 and is now known as Maxwell Infrastructure.⁸⁶

- **Whitehaven Coal's carbon neutral electricity supply:** Whitehaven Coal's CEO [Paul Flynn told the NSW IPC's Narrabri Underground Stage 3 panel](#) on 4 February 2022, that at "the back end of 2021 we commenced carbon neutral electricity supply across the entirety of our operations". "In FY22 we contracted with AGL to provide 100% carbon neutral electricity across the business."⁸⁷

We note that Whitehaven Coal's Annual Review for their Narrabri Mine (completed 10 June 2022) makes no mention of a carbon neutral electricity supply. If this statement is correct, we would expect Scope 2 emissions reported for 2022 to be zero. WHC say their GHG emissions reported in their Sustainability Report 2022 "do not account for our purchases of certified carbon neutral electricity as they are calculated on the NGER methodology."

Offsets

In January 2022 - in their Narrabri Underground Stage 3 assessment report - NSW DPE stated that "there is no guidance on whether offsets should be required for a particular development (e.g. trigger levels based on predicted unabated emissions), nor any methodology to calculate the quantum or type of offsets that may be warranted."

In [May 2021, the NSW Minister for Planning and Public Spaces advised](#) that "[t]here are no coal mines currently operating in NSW which are required to offset Scope 1 and 2 greenhouse gas emissions under the conditions of their respective development consents."

This has now changed, at least at one mine. [Wongawilli Colliery's development consent](#) (April 2022), requires Wollongong Resources to "reduce or offset greenhouse gas emissions by four per cent per year from 2022 to 2027".

In June 2021, Hume Coal committed to offset - via onsite tree planting - 100% of fugitive emissions that it said could not be avoided or mitigated.

⁸⁶ NSW DPE, August 2020, Assessment Report, <https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-9820%2120200827T225726.654%20GMT>

⁸⁷ WHC Sustainability Report 2022, <https://whitehavencoal.com.au/wp-content/uploads/2022/09/Whitehaven-Coal-Sustainability-Report-2022.pdf>

Appendix 1

Glencore's coal mines in NSW: Scope 1 and 2 emissions (Aug 2022)

Glencore is failing to implement all 'reasonable and feasible' measures

Total Scope 1 and 2 emissions

- In the last FY, Glencore was responsible for emitting **3,143,638 t-CO₂e** of Scope 1 and 2 GHG emissions to extract and process coal in NSW (this is almost double the ACT's entire emissions in 2020-21 of 1,685,000 t-CO₂-e).

N.B. At a national level, Glencore are at 19th place on Australia's list of top corporate GHG emitters at ~5.65 Mt CO₂-e of Scope 1 emissions and 1.74 Mt CO₂-e of Scope 2 emissions in 2020-21.⁸⁸

Scope 2 electricity emissions

- By purchasing 100% renewable energy immediately to power its 10 coal mines in NSW, Glencore could reduce Scope 2 emissions to zero.
- A 100% renewable energy buy would reduce direct emissions (total Scope 1 and 2 emissions) at the groups' 10 NSW coal mines by ~14% (~441,548 t CO₂-e per annum). This measure alone, would abate ~3,532,384 t CO₂-e between now and 2030 if implemented across Glencore's portfolio of coal mines in NSW.
- Weirdly, Mt Owen / Glendell claim in their GHG plan that their Scope 2 emissions are "not under the direct operational control of MGO".
- Scope 2 electricity emissions should really be quite simple to abate by buying 100% renewable energy through the grid. There is no evidence that Glencore has or is considering the purchase of renewable energy. We note that NSW DPE - in the proposed Condition B34 for the Glendell COP - would require the new Project to "[m]inimise CO₂-e emissions by using electricity generated by renewable or carbon neutral energy sources where reasonable and feasible."
- One of Australia's most prominent economists - Nicki Hutley - says that the social cost of carbon (SCC), sometimes referred to as the 'damage cost' estimate, is considered perhaps "the single-most important economic concept in the economics of climate change." Professor Penny Sackett found earlier this year that the Social Cost of Carbon should be valued at about \$600 AUD per tCO₂. Using this valuation puts the cost of the damage that Glencore is inflicting annually by failing to buy 100% RE at 441,548 t CO₂-e x \$600 = **\$264,928,800**.

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<https://www.cleanenergyregulator.gov.au/NGER/National%20greenhouse%20and%20energy%20reporting%20data/Corporate%20emissions%20and%20energy%20data/corporate-emissions-and-energy-data-2020-21>

Diesel emissions

- Electrification of light vehicles or use of biodiesel may meet the 'reasonable and feasible' test, however there does not appear to be any evidence that either of these options is currently being considered by Glencore at their coal mines in NSW.
- In their 'Pathway to net zero 2021 progress report', Glencore pledge that in "the near-term, we will consider deploying existing fleet electrification technologies at our large open-pit operations that are connected to national grids already utilising renewable energy sources."

VAM systems not being considered

- In Glencore's [methane emissions fact sheet](#) (Sydney, 6 July 2022), Glencore ask: "What are we doing to reduce emissions?" They answer this question by stating that "[e]ach of our operations continues to look at ways to reduce emissions."
- At Glencore's Ulan mine, Glencore state that **"It may be technically possible to install a thermal flow reversal reactor (TFRR) to oxidise low methane concentrations in the air flow exhausted from the underground ventilation system**, however, an equivalent investment at a gassy site would generate a better greenhouse gas control outcome for GCAA and the environment."
- Despite Glencore's assessment that this technology could provide significant mitigation at a "gassy site", there is no evidence at all that Glencore are considering installing this system at any of their gassy sites.

Reporting

- Glencore failed to publish any information about GHG emissions or the performance of mitigation measures at Liddell in the [Liddell Annual Review 2021](#).

More than 300,000 t CO2-e emitted last year from 2 mothballed mines

- Last FY, Bulga Underground Operations emitted 147,323 t CO2-e and Ravensworth Underground emitted 160,904 t CO2-e in Scope 1 and 2 emissions (308,227 t CO2-e in total). As neither mine produced any coal, zero royalty revenue flowed to NSW. The social cost of these carbon emissions would be valued at **\$184,936,200**.

	FY2020/21				
	Total Scope 1 and 2 emissions (tCO ₂ -e)	Electricity emissions (tCO ₂ -e)	Diesel emissions (tCO ₂ -e)	Fugitive emissions (tCO ₂ -e)	ROM coal mined
Bulga Open Cut	411,711	42,369	204,334	165,008	10,986,664
Bulga Underground	147,323	51	0	147,272	0
Hunter Valley Operations	658,090	94,930	261,300	301,800	14,410,000
Integra Underground	597,193	43,984	2,707	550,411	3,042,365
Liddell	190,000	20000*	no data	no data	4,986,000
Mangoola	135,015	37,044	91,030	6,941	8,028,889
Mt Owen	193,949	34,065	118,504	41,380	7,780,000
Glendell	121,846	1,945	92,660	26,440	3,300,000
Ravensworth Underground	160,904	4,911	0	155,993	0
Ravensworth Open Cut	334,894	10,690	no data	no data	12,863,000
Ulan	192,713	151,559	no data	no data	12,511,000
	3,143,638	421,548	?	?	77,907,918

How does Glencore decide what's 'reasonable and feasible'?

"Prioritising Energy and GHG Management Controls To prioritise the implementation of energy and greenhouse gas management controls, technical review and marginal cost of abatement are used to evaluate the controls through the AFE process where applicable. Options and alternatives are documented, Net Present Value (NPV) calculations should be completed over the useful life of the option and include capital expenditure, operational expenditure and forecast savings / revenue and where technically feasible, (i.e. significant technical barriers to implementation might exist that prevent the selection of the alternative) and energy and greenhouse gas savings (tCO₂-e) estimated if appropriate."⁸⁹

Bulga Open Cut

Summary

- No evidence that renewable energy being considered or purchased to lower Scope 2 emissions
- No indication that biofuels or electrification of vehicles under consideration to improve diesel emissions
- Overall there was an improvement in emissions intensity, although the latest annual review for this mine does not attribute the improvement to mitigation measures. This improvement occurred as fugitive emissions were reduced as a result of mining coal in "areas of the mine which have lower gas zones compared to the 2019/2020 period".

"Overall, there was a decrease in Bulga Open Cut emissions of approximately 30% when compared to the 2019/2020 reporting period. The majority of the decrease is attributable to fugitive emissions from ROM coal. Over the 2020/2021 period Bulga mined coal in areas of the mine which have lower gas zones compared to the 2019/2020 period."

[Bulga Coal Annual Review 2021](#)

⁸⁹ [Ulan Coal Air Quality and Greenhouse Gas Management Plan, 20210111](#), pg 33

	2018/19	2019/20	2020/21
Bulga Open Cut			
Scope 1 (tCO ₂ -e)	650,813	534,707	369,342
Scope 1 diesel	210,690	219,659	204,334
Scope 1 fugitive (post mining)	440,123	315,048	165,008
Scope 2 (tCO ₂ -e) - electricity from grid	64,321	51,323	42,369
Total (Scope 1 and 2)	715,134	586,030	411,711
ROM coal production(t)	12,200,000	10,064,175	10,986,664
Emissions intensity per t ROM coal	0.059	0.058	0.037

Bulga Underground Operations

Bulga Underground Operations produced 696,347 t CO₂-e over the last three years with zero ROM coal production (mining ceased in 2018).

“Emissions from Bulga Underground Operations were approximately 31% lower during 2020/2021 when compared to the previous reporting period. This is due to the cessation of Bulga Underground mining in 2018 which has resulted in a continued reduction in flaring and dissipation of gases.” - [Bulga Coal Annual Review 2021](#)

	2018/19	2019/20	2020/21
Bulga Underground (ceased mining in 2018)			
Scope 1 (tCO ₂ -e)	335,494	212,798	147,272
Scope 1 "decommissioned mine"	123,766	70,765	53,738
Scope 1 fugitive (coal extraction, flaring, electricity generation)	211,722	142,027	93,528
Scope 2 (tCO ₂ -e) - electricity from grid	328	350	51
Total (Scope 1 and 2)	335,876	213,148	147,323
ROM coal production	0	0	0
Emissions intensity per t ROM coal	N/A	N/A	N/A

“Bulga Coal use both pre-mining and post-mining gas drainage. Pre-mining drainage wells extract methane and carbon dioxide from the coal seams which is piped to the 9 Megawatt (MW) gas fired power station and Pre-drainage Flaring Facility where it is burned and converted to carbon dioxide. Post-mining drainage methane and carbon dioxide is extracted from the mined out goaf and is sent to the Post-drainage Flaring Facility for combustion of the methane. This conversion of coal seam methane gas to carbon dioxide gas and water substantially reduces greenhouse gas emissions from the Bulga Underground Operations. Methane and carbon dioxide levels are measured in the gas drainage operations. The gas drainage operations have monitoring at the gas wells, flaring facilities and the 9 MW power station.”

Hunter Valley Operations

This is a JV, with majority ownership by Yancoal (51%) / Glencore (49%) which is independently managed on behalf of the JV partners.

Summary

- No evidence that renewable energy being considered or purchased to lower Scope 2 emissions
- Fugitive emissions are increasing “as the mine exposes deeper coal seams” in a context where ROM coal production is decreasing
- No indication that biofuels or electrification of vehicles under consideration to improve diesel emissions
- Emissions intensity has increased year on year for the last three years in a row
- “Increasing fugitive emissions is due to new coal seam gas estimates as the mine exposes deeper coal seams.”⁹⁰

“Total emissions in 2021/2022 reporting year decreased slightly from the previous reporting year. This is largely reflected by a reduction in fuel usage emissions and electricity consumption. Increasing fugitive emissions is due to new coal seam gas estimates as the mine exposes deeper coal seams.”⁹⁰

	2018/19	2019/20	2020/21
Hunter Valley Operations			
Scope 1 (tCO ₂ -e)	574,870	562,450	563,100
scope 1 fuel	312,240	315,130	261,300
scope 1 fugitive	262,670	247,320	301,800
Scope 2 (tCO ₂ -e)	112,660	111,920	94,930
Total (Scope 1 and 2)	687,530	674,370	658,090
ROM coal production	18,050,000	16,830,000	14,410,000
Emissions intensity per t ROM coal	0.038	0.040	0.046

Integra Underground

Summary

- No evidence that renewable energy being considered or purchased to lower Scope 2 emissions.
- Despite 447,159 t CO₂-e of methane being vented to the atmosphere in 2021, there is no evidence at all in the latest Annual Review or the [2021 AQGHG management plan](#) that Glencore is assessing or considering installing a VAM abatement system
- Overall, emissions intensity has improved. There is no explanation for this in the AR, however it may be attributable to increased gas extraction from 24,073,177 m³ in 2018/19 to 29,735,855 m³ in 2020/21

“The methane emitted from Integra Underground is discharged via goaf gas drainage boreholes to either the Glennie’s Creek Power Station, the flare site on Forest Road or through mine ventilation. A number of goaf gas drainage boreholes are connected to the Glennie’s Creek Power Station, which utilises the gas to generate electricity for distribution in

⁹⁰ <https://insite.hvo.com.au/document-library/reports-annual-hvo-2021>

the NSW power grid.” - [Integra Underground 2021 Annual Review 1 January to 31 December](#)

	2018/19	2019/20	2020/21
Integra Underground			
Scope 1 (tCO ₂ -e)	601601	601244	553,209
scope 1 diesel	5,126	3,205	2,707
scope 1 fugitive	596,475	598,039	550,411
Scope 2 (tCO ₂ -e)	38,673	44,038	43,984
Total (Scope 1 and 2)	640,274	645,282	597,193
ROM coal production	2,629,615	2,758,160	3,042,365
Emissions intensity per t ROM coal	0.243	0.234	0.196

Liddell Coal Operations

Summary

- No evidence that renewable energy is being considered or purchased to lower Scope 2 emissions.
- Glencore failed to publish any information about GHG emissions or the performance of mitigation measures at this mine in the [Liddell Annual Review 2021](#).
- Emissions intensity is increasing (based on ROM coal production divided by Scope 1 emissions).

Background

The [AQGHG Management Plan for Liddell](#) states:

- “The largest source of Scope 1 GHG emissions is fugitive methane emissions, which accounts for 72% of all direct GHG emissions from the site. Diesel usage accounts for approximately 27%, with blasting contributing less than 1%. (SLR, 2013).”
- “Initial investigations into methane drainage requirements have indicated it is not feasible to flare methane and/or capture methane for energy production prior to mining the coal seams present at the LCO.”

The [Liddell Coal Operations Development Consent](#) requires Glencore to:

- “implement all reasonable and feasible measures to minimise the release of greenhouse gas emissions from the site”; and
- “describe what measures will be implemented over the next year to improve the environmental performance of the development”.

N.B. As Liddell does not publicly report its GHG emissions, Lock the Gate has not been able to calculate emissions intensity in 2020/21 based on Scope 1 and 2 emissions. The Scope 1 emissions intensity calculations in the table below are based on data that was obtained via a CER FOI (aqua) and from the CER’s ‘Safeguard Facilities’ web page (green).

	2018/19	2019/20	2020/21
Liddell			AR has no GHG results 14/7/22
Scope 1 (tCO2-e)			
Scope 2 (tCO2-e)			
Scope 1 (tCO2-e) - CER data	186,233	174,805	168,540
Scope 2 (tCO2-e) - CER data	21,837	23,970	
Total (Scope 1 and 2)	208,070	198,775	
ROM coal production	5,863,647	5,746,444	4,986,000
Emissions intensity per t ROM coal (Scope 1 only)	0.032	0.030	0.034

Mangoola Open Cut

Summary

- Emissions intensity is increasing (diesel use - which accounts for most of the Scope 1 emissions - is expected to continue to increase)
- There is no evidence at all in Annual Reviews, the AQGHG Management Plan nor in the ESAP that renewable energy is being considered or purchased to lower Scope 2 emissions.
- No indication that biofuels or electrification of vehicles are under consideration to improve diesel emissions

Mangoola's [Air Quality Management Plan](#) states that Condition D34(c) of SSD 8642 requires Glencore to "[r]eport on greenhouse gas monitoring and abatement measures in the Annual Review". There is isn't much information about emissions reduction in the latest [Mangoola Open Cut Annual Review 2021](#). Instead the AR refers to the [Energy Savings Action Plan](#) "which identifies opportunities at Mangoola to reduce greenhouse gas emissions and energy consumption, as well as specifying actions to realise these opportunities".

The ESAP states that:

- "It should be noted that the upward trend in diesel usage is expected to continue as the mine ages due to increases in the effective haulage lengths."
- Glencore expects "a degradation in overall performance" in terms of increasing diesel use" as the mine progresses away from infrastructure and haul lengths increase."

	2018/19	2019/20	2020/21
Mangoola			
Scope 1 (tCO2-e)	125,072	109,110	97,971
Scope 1 diesel	113,301	99,900	91,030
Scope 1 fugitive	11,053	8,575	6,941
Scope 2 (tCO2-e)	53,053	39,446	37,044
Total (Scope 1 and 2)	178,125	148,556	135,015
ROM coal production (t)	12,920,522	9,373,538	8,028,889
Emissions intensity per t ROM coal	0.014	0.016	0.017

Mt Owen

Summary

- No evidence that renewable energy is being considered or purchased to lower Scope 2 emissions. MGO claim in their GHG plan that these emissions are “not under the direct operational control of MGO”.
- Emissions intensity has increased per tonne of ROM coal mined
- Despite diesel being “responsible for the majority of MGO’s energy use”, there is no indication that biofuels or electrification of vehicles is under consideration to improve diesel emissions.

The [Mt Owen development consent](#) (updated June 2021) requires Glencore to:

- “(c1) take all reasonable steps to improve energy efficiency and reduce greenhouse gas emissions from the development”;
 - “Reasonable relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and the nature and extent of potential improvements”
- Schedule 2: “In addition to meeting the specific performance criteria established under this consent, the Applicant must implement all reasonable and feasible measures to prevent and/or minimise any material harm to the environment that may result from the construction, operation, or rehabilitation of the development.”

The [Mt Owen / Glendell AQ and GHG Management Plan](#) states:

- that “The majority of electricity use at MGO is associated with the operations associated with the Mt Owen CHPP. Greenhouse gas emissions associated with electricity use are produced offsite and not under the direct operational control of MGO.”
- “Diesel use is responsible for the majority of MGO’s energy use. Diesel combustion is also responsible for a significant proportion of MGO’s gas emissions.”

	2018/19	2019/20	2020/21
Mt Owen Mine			
Scope 1 (tCO2-e)	155,363	175,794	159,884
Scope 1 diesel	134,400	133,950	118,504
Scope 1 Fugitive	20,963	41,844	41,380
Scope 2 (tCO2-e)	42,238	0	34,065
Total (Scope 1 and 2)	197,601	175,794	193,949
ROM coal production	8,930,000	8,060,000	7,780,000
Emissions intensity per t ROM coal (Scope 1 and 2)	0.022	0.022	0.025

Glendell

Summary

- No evidence that renewable energy is being considered or purchased to lower Scope 2 emissions. MGO claim in their GHG plan that these emissions are “not under the direct operational control of MGO”.

- Despite diesel being “responsible for the majority of MGO’s energy use”, there is no indication that biofuels or electrification of vehicles is under consideration to improve diesel emissions.

	2018/19	2019/20	2020/21
Glendell			Jan to Dec 2021
Scope 1 (tCO ₂ -e)	154,414	158,721	119,101
Scope 1 diesel	107,776	111,377	92,660
Scope 1 Fugitive	46,632	47,344	26,440
Scope 2 (tCO ₂ -e)	1,587	43,444	1,945
Total (Scope 1 and 2)	156,001	202,165	121,846
ROM coal production	4,240,000	3,560,000	3,300,000
Emissions intensity per t ROM coal (Scope 1 and 2)	0.037	0.057	0.037

Ravensworth Open Cut and Ravensworth Underground

Summary

- Over the last three years, the mothballed Ravensworth Underground mine emitted 493,467 t CO₂-e without producing a single tonne of coal. At 600 AUD per tCO₂ for the Social Cost of Carbon⁹¹, that’s a climate damage bill over 3 yrs of \$296M in return for zero royalties from coal sales to NSW.
- There is no evidence that renewable energy is being considered or purchased to lower Scope 2 emissions attributable to Ravensworth Open Cut.
- There is no indication that biofuels or electrification of vehicles is under consideration to improve diesel emissions at Ravensworth Open Cut.
- Total Scope 1 emissions at Ravensworth Open Cut increased despite coal production decreasing.

Ravensworth Complex Annual Review 2021:

- “The combined Ravensworth Open Cut and Ravensworth Underground ... GHG emissions for 2021 were 495,798T CO₂-e.”
- “There were no significant issues regarding GHG throughout the reporting period.
- At S 6.15.4 of the 2021 Annual Review, under ‘Proposed Improvements, Glencore state: “There are no proposed improvements for greenhouse gas management in 2022.”

Ravensworth Open Cut Air Quality and Greenhouse Gas Management Plan (March 2022)

- “Condition 19, Schedule 3 ... states: The Proponent shall implement all reasonable and feasible measures to minimise the release of greenhouse gas emissions from the site to the satisfaction of the Secretary.”
- “the Ravensworth Complex will consider all reasonable and feasible opportunities to mitigate Scope 1 and 2 GHG emissions by operational changes, if a substantial divergent trend from the EA predictions is identified.”

⁹¹ Expert Report to the NSW IPC on the Greenhouse Gas and Climate Implications of the Narrabri Underground Mine Stage 3 Extension, Dr Penny D Sackett, Distinguished Honorary Professor, ANU Institute for Climate, Energy and Disaster Solutions, 23 February 2022

- “Initial investigations into methane drainage requirements have indicated it is not feasible to flare methane and/or capture methane for energy production prior to mining the coal seams present at the Ravensworth Complex.

Ravensworth Open Cut	2019	2020	2021
Scope 1 (tCO ₂ -e)	311,740	302,225	324,204
Scope 2 (tCO ₂ -e)	11,567	58,409	10,690
Total (Scope 1 and 2)	323,307	360,634	334,894
ROM coal production	14,922,000	13,324,000	12,863,000
Emissions intensity per t ROM coal	0.022	0.027	0.026

Ravensworth Underground	2019	2020	2021
Scope 1 (tCO ₂ -e)	161,513	161,527	155,993
Scope 2 (tCO ₂ -e)	4,638	4,885	4,911
Total (Scope 1 and 2)	166,151	166,412	160,904
ROM coal production	0	0	0
Emissions intensity per t ROM coal	N/A	N/A	N/A

Ulan Coal

Summary

- Ulan Coal appears to have the 2nd highest Scope 2 emissions of any coal mine in NSW (2nd only to South32's Bulli Seams / Appin mine).
- Scope 2 emissions increased - year on year - for the last three years in a row
- There is no evidence that renewable energy is being considered or purchased to lower Scope 2 emissions.

Ulan Coal Mines Pty Limited (UCMPL) operates the mine as a joint venture, managed by Glencore Coal Assets Australia (GCAA).

Ulan Coal Air Quality and Greenhouse Gas Management Plan

- “Fugitive gas production rates of 0.2 m³ /tonne are extremely low given that Australian coal seam gas contents range between <1.0 m³ /tonne to 30 m³ /tonne (ACARP 2010).
- “SEE Sustainability (2009) advise that the predicted maximum greenhouse index for on-site activities is 0.029 tCO₂-e/tonne of product coal, which is significantly less than the Australian coal mining industry average of 0.079 tCO₂-e/tonne. This is primarily due to the ‘non-gassy’ nature of the underground mines, i.e. they produce low levels of methane compared to other mines combined with the comparatively low energy intensity associated with Ulan’s operations.”
- “UCMPL are not required to commit to specific greenhouse gas performance targets under legislation, industry codes of practice or CAA Standards.”
- “UCMPL implements all reasonable and feasible management controls to mitigate Scope 1 and 2 greenhouse gas emissions associated with the site.”
- Site procurement processes require all procurements to be approved via an Application for Expenditure (AFE). An AFE specifically requires the preparation of an energy efficiency study that demonstrates how new procurement will impact environmental factors. The following excerpt from an AFE completed by UCMPL

demonstrates how UCMPL will consider energy efficiency during the procurement process. An AFE completed by UCMPL for the purchase of three new bulldozers included the following energy efficiency study.

“The D11T dozer has greater fuel efficiency than the currently operating dozers with a diesel burn rate 26 litres per hour lower than the N series D11. The replacement of three dozers is expected to save approximately 402,480 litres of diesel per year. The Caterpillar D11T meets EPA Tier 2 and EU Stage II engine exhaust emissions regulations”.

- “Common fugitive emission management controls such as flaring, methane capture and energy production have been considered for the Ulan Mine Complex; however, internal evaluation has either deemed the technologies technically unfeasible or very low priority due to their relative cost of abatement.”
- “The Ulan Mine Complex underground workings do not require pre-drainage to manage methane levels. Without a pre-drainage system supplying high concentrations of methane it is not technically feasible to flare methane and/or capture methane for energy production. **It may be technically possible to install a thermal flow reversal reactor (TFRR) to oxidise low methane concentrations in the air flow exhausted from the underground ventilation system**, however, an equivalent investment at a gassy site would generate a better greenhouse gas control outcome for GCAA and the environment.”

Ulan Coal Mines - underground and open cut	2018/19	2019/20	2020/21
Scope 1 (tCO ₂ -e)	59,829	36,147	41,154
Scope 2 (tCO ₂ -e)	133,908	147,057	151,559
Total (Scope 1 and 2)	201,825	183,205	192,713
ROM coal production	12,623,841	11,166,859	12,511,000
Emissions intensity per t ROM coal	0.016	0.016	0.015