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CURRAGH BORD AND PILLAR MINE PROJECT EAR GHG REPORT

Coronado Global Resources

PROJECT NO: A024-1647A **ISSUED**: 16/10/2024

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VERSION	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED
A	06/06/24	Draft report	S Byrom	I Budd	J Joubert
B	11/06/24	Final report	S Byrom	J Joubert	J Joubert
C	26/07/24	Updated final report	S Byrom	J Joubert	J Joubert
D	1/10/24	Final report	S Byrom	J Joubert	J Joubert
E	8/10/24	Updated final report	S Byrom	J Joubert	J Joubert
1.0	16/10/24	Final Report	S Byrom	J Joubert	J Joubert

1. Introduction

Talisman Technical Pty. Ltd. was commissioned by Coronado Global Resources Inc (Coronado), to prepare a greenhouse gas (GHG) report as part of the Environmental Assessment Report (EAR) for the Curragh Bord and Pillar Mine Project (the project). The report addresses the GHG information requirements for Environmental Authority (EA) amendment applications specified in the Department of Environment, Science, and Innovation (DESI) *Guideline: Greenhouse gas emissions* (ESR/2024/6819, Version 1, 15 May 2024) (DESI GHG Guideline).

Curragh Mine is a large-scale open cut coal mine located approximately 6 km north of Blackwater township in Central Queensland (Figure 1). The mine has been operating since 1983 and produces export metallurgical and thermal coal. The mine has an approved production rate of up to 18 Mtpa of Run-of-Mine (ROM) coal and utilises dragline, truck and shovel, and highwall mining methods.

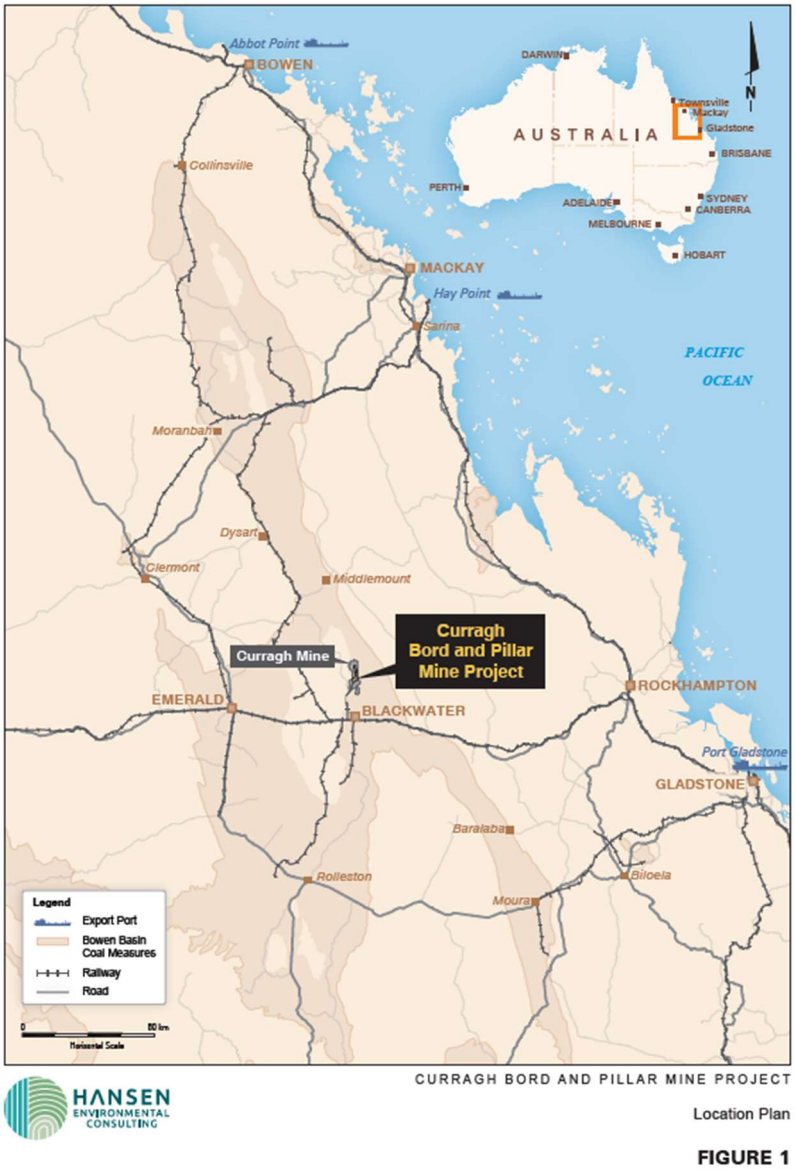

Figure 1: Location plan

Curragh Mine currently has two main operational areas, Curragh South and Curragh North. Curragh South is the original mining area and contains key mine infrastructure including the Coal Handling and Preparation Plant (CHPP), rail loop and train loading facility and Mine Industrial Area (MIA).

Curragh North is located at the northern end of Curragh Mine and commenced operations in 2006. Curragh North includes three open cut pits (Pit S, Pit T and Pit U) and large in-pit and out-of-pit overburden emplacement areas (Figure 2). There is a transport corridor from Curragh North to Curragh South that includes an overland conveyor and haul road. ROM coal from Curragh North is transported to the CHPP at Curragh South via the overland conveyor. Mine infrastructure at Curragh North includes:

- MIA including a workshop, vehicle servicing facilities, store and administration buildings;
- ROM coal stockpile area and conveyor loading facility; and
- Mine water management infrastructure including raw water supply, mine water dams, flood protection levees, pumps and pipelines.

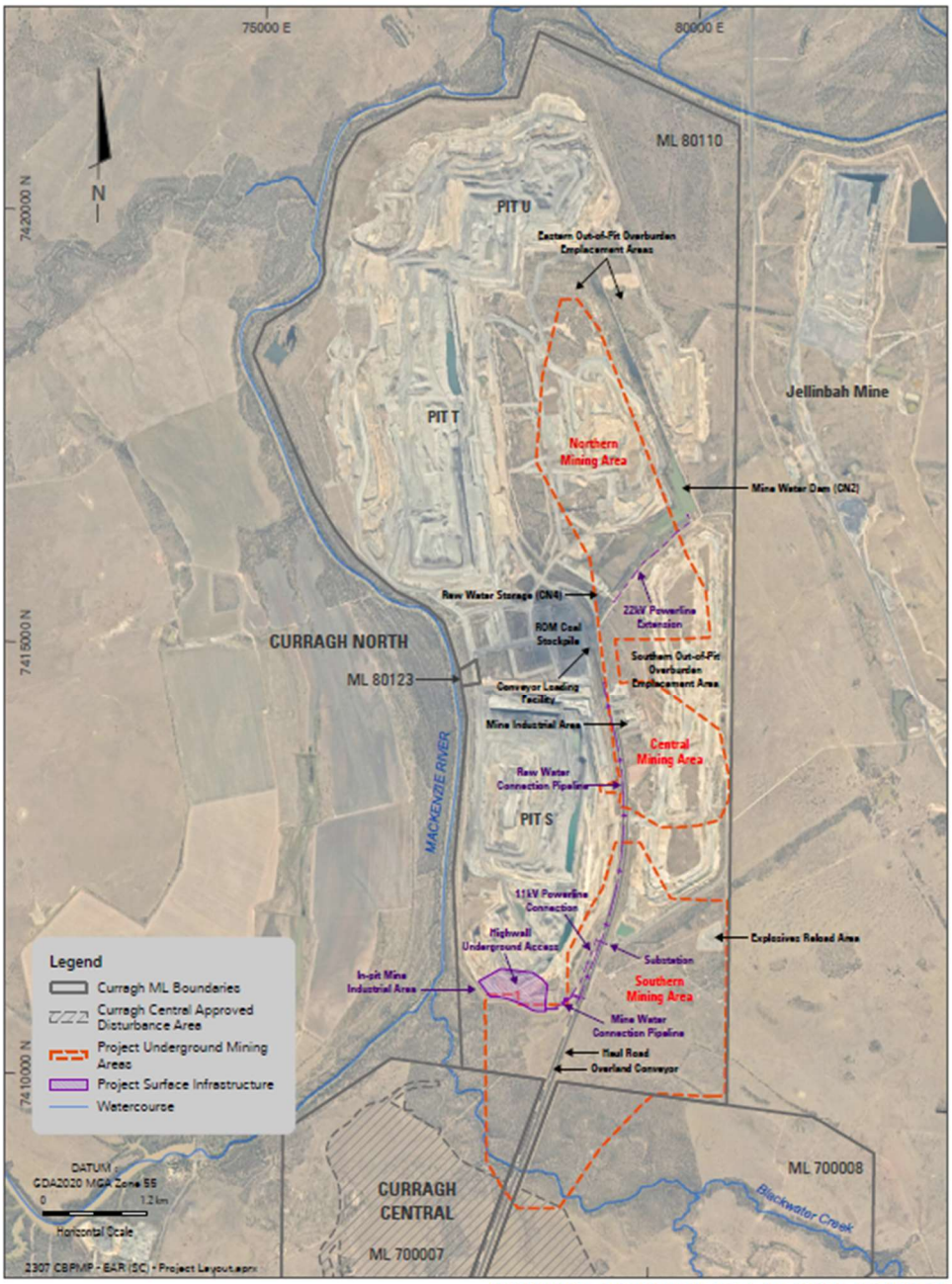

Figure 2: Project layout

The Curragh Central area adjoins the southern end of Curragh North. There are approved open cut mining areas in the Curragh Central area that have not been developed to date. The northern limit of the approved Curragh Central mine disturbance area is shown in Figure 2.

The project involves the development of an underground bord and pillar mine in the Mammoth coal seam accessed from the highwall of Pit S (Figure 2). The proposed underground mining area is within the existing Curragh mining leases. The underground mine will have a mine life of approximately 10 years and a peak production rate of approximately 3.2 Mtpa of ROM coal. The project does not involve an increase in the approved Curragh Mine peak production rate.

The project will utilise existing Curragh Mine infrastructure including:

- Curragh North haul roads and access roads, ROM coal stockpile area, overland conveyor and conveyor loading facility, and power, raw water and mine water supplies.
- Curragh South CHPP, rail loop and train loading facilities, and tailings and rejects storage areas.

New surface infrastructure required for the project will be limited to a MIA located on the pit floor at the southern end of Pit S adjacent to the underground mine portals, and surface connections to existing Curragh North infrastructure for raw water supply, mine water supply and power (Figure 2).

To address the DESI GHG Guideline requirements for medium to high emitting projects, the report covers the following:

Table 1: DESI GHG Guideline Requirements

GUIDELINE REQUIREMENT (Appendix C)	REPORT SECTION
GHG emissions inventory (Scope 1, Scope 2 and Scope 3)	3. Project Emissions
GHG emission mitigation and management practices (including Scope 3 where possible)	4.1. GHG Mitigation and Management
GHG abatement plan	4.3. Project GHG Abatement Plan
A risk assessment that outlines the scale of expected GHG emissions from the activity and how they are expected to contribute to climate change impacts on Queensland's environmental values	5.2. Risk Assessment

2. Regulatory setting

Australia has committed to reducing its greenhouse gas emissions by 43% below 2005 levels by 2030. This target was an update from a previous goal of a 26-28% reduction, aligning more closely with the objectives of the Paris Agreement. Additionally, Australia has set a goal of reaching net-zero emissions by 2050. This long-term target is part of the global effort to limit global warming to well below 2 degrees Celsius, and ideally to 1.5 degrees Celsius, compared to pre-industrial levels. These targets are part of Australia's commitment under international agreements like the Paris Agreement. Queensland has aligned with the target to achieve net zero emissions by 2050, and an interim target of a 30% reduction by 2030.

The National Greenhouse and Energy Reporting Scheme (NGERS) plays a crucial role in Australia's strategy to meet its greenhouse gas emissions reduction targets. Under NGERS, corporations that meet certain thresholds for greenhouse gas emissions, energy production, or energy consumption must report their emissions, energy production, and energy consumption to the Clean Energy Regulator (CER) annually. The thresholds typically include emitting 50kt CO_2-e or more, producing or consuming 200 terajoules or more of energy, or a combination of both. NGERS provides a framework for the systematic collection, calculation, and reporting of greenhouse gas emissions, energy production, and energy consumption data from Australian corporations. This data is essential for understanding the country's overall emissions profile and tracking progress towards its reduction targets.

The Safeguard Mechanism applies to facilities emitting more than 100,000tCO_2-e greenhouse gases per year. These facilities are required to keep their net emissions within a declining baseline set by the government. If a facility's emissions exceed their baseline, they must take steps to reduce their emissions or offset the excess by purchasing and surrendering eligible emissions units, like Australian carbon credit units (ACCUs). The initial Safeguard period extends to 2030, with a review in 2027 to assess the effectiveness of the structure and set the structure for the proceeding period.

Both these measures are part of Australia's strategy to reduce greenhouse gas emissions and meet its international obligations. The NGERS provides a framework for measuring and reporting emissions, which is critical for understanding the scale of emissions and tracking progress, while the Safeguard Mechanism is designed to ensure that large emitters take responsibility for their emissions and contribute to national emissions reduction efforts.

3. Project Emissions

Potential sources of GHG emissions related to the project have been identified as follows:

Scope 1 Emissions:

- Fossil fuel combustion: Emissions of carbon dioxide (CO_2), nitrous dioxide (N_2O) and methane (CH_4) from the combustion of diesel by stationary and mobile plant and equipment at the mine during construction and operation, and during closure/remediation.
- Fugitive emissions: Emissions from the release of coal bed methane.

Scope 2 Emissions:

- Electricity use: Indirect emissions from the generation of purchased electricity by the mine during construction and operation.

Scope 3 Emissions:

- Coal transport: Transport of product coal to market: consumption of fossil fuels and electricity are required to deliver the product from the mine to the end user.
- Coal combustion: Combustion of coal by end users. The primary intended end users of the product will be based in Asia-Pacific, the Americas and Europe with the coal used for the purposes of steelmaking. The secondary product is thermal coal used for electricity generation.
- Production/supply of diesel consumed.
- Electricity transmission losses.

Emission estimation methods and emission factors have been sourced from the following resources:

- **Scope 1 and Scope 2**: from *National Greenhouse and Energy Reporting (Measurement) Determination 2008* (Cth)[1], *Estimating Emissions and Energy from Coal Mining Guideline* 2024, Clean Energy Regulator[2], and the Coronado internal gas model developed to estimate emissions in the underground workings. The gas model was built using gas data provided by GeoGAS from "Curragh Underground Project: Gas Reservoir Characterisation and Emission Modelling, August 2022". This report summarises the gas testing program undertaken, gas reservoir characterisation, and data for permeability, gas content, composition, isotherms, gas saturation, and total gas in place. This data was then incorporated into the mine plan. The pre-drainage methodology, volumes and timing was developed by Drive Mining, a specialist consulting firm on underground gas management. To determine the VAM emissions, the pre-drainage volumes have been subtracted from the total gas in place. The post mining emissions refer to the remaining gas desorption while coal is in stockpiles, prep plant, and rail. This volume is determined by the CER as a Method 1 factor applied to ROMt. This determines the Business as Usual (BaU) emissions profile.
- **Scope 3**: the latest National Greenhouse Accounts Factors Workbook[3], applying guidance from the latest Climate Active technical guidance manual to determine which Scope 3 emissions sources must be included on the basis that they are assessed as relevant against the relevance test[4]. Additional methods include the *GHG Protocol Corporate Value Chain*[5]. Rail distance is from Curragh to Gladstone. Shipping distance is from Gladstone to Japan. The accuracy of these estimates is based on material emissions sources associated with the downstream of the coal mining industry. The accuracy of these estimates is based on the following emissions factors. Further assessment is required to provide a more detailed estimation.

The emission factors used in this estimation are as follows:

Table 2: Emission factors

EMISSION SOURCE	EMISSION FACTOR	UNITS	SOURCE
SCOPE 1			
Diesel combustion – stationary energy	70.20	kg CO_2-e/GJ	National Greenhouse Accounts Factors Workbook 2023
Fugitive gas	-	-	Sourced from gas model
Post mining	0.019	tCO_2e/ROMt	NGER Measurement Determination 2008
Flared gas	0.0018	t CO_2-e/m^3	Estimating Emissions and Energy from Coal Mining Guideline 2024, Clean Energy Regulator
SCOPE 2			
Consumption of purchased electricity	0.73	kg CO_2-e/kWh	National Greenhouse Accounts Factors Workbook 2023

[1] National Greenhouse and Energy Reporting (Measurement) Determination 2008, https://www.legislation.gov.au/Series/F2008L02309

[2] Clean Energy Regulator, Estimating Emissions and Energy from Coal Mining Guideline 2024, https://cer.gov.au/document/estimating-emissions-and-energy-coal-mining-guideline

[3] National Greenhouse Accounts Factors (https://www.dcceew.gov.au/climate-change/publications/national-greenhouse-accounts-factors

[4] Climate Active, Technical Guidance Manual, https://www.climateactive.org.au/be-climate-active/tools-and-resources/technical-guidance-manual

[5] GHG Protocol, Corporate Value Chain (Scope 3) Standard, https://ghgprotocol.org/standards/scope-3-standard

EMISSION SOURCE	EMISSION FACTOR	UNITS	SOURCE
SCOPE 3			
Production/supply of diesel consumed	17.3	kg CO_2-e/GJ	National Greenhouse Accounts Factors Workbook 2023
Electricity transmission losses	0.15	kg CO_2-e/kWh	National Greenhouse Accounts Factors Workbook 2023
Transport of product coal	-	-	See note ^
Combustion of product (metallurgical)	92.03	kg CO_2-e/GJ	National Greenhouse Accounts Factors Workbook 2023
^ Downstream Scope 3 emissions from the transport of product coal by rail and ship were calculated using the *Mobile Combustion Greenhouse Gas Protocol Transport Calculation Tool*, version 2.6. This is calculated as weight distance for both rail and shipping based on product tonnes and distance from mine to port and port to customer. The emission factors used in the GHG Protocol tool come from the UK Dept. for Environment, Food and Rural Affairs (DEFRA), the United States (US) Environmental Protection Agency (EPA) and the Intergovernmental Panel on Climate Change's (IPCC) 2006 Guidelines for National Greenhouse Gas Inventories. The tool was developed by Clear Standards Inc. in collaboration with World Resources Institute. There are no emission factors available in the NGA Factors for these activities.			

The emissions estimate for the project are as follows:

Table 3: Project emissions by source – BaU (tCO_2e)

EMISSION SOURCE	EMISSIONS
SCOPE 1	
Diesel combustion – stationary energy	41,042 tCO_2e
Fugitive gas	7,014,581 tCO_2e
Post mining	400,924 tCO_2e
SCOPE 1 LOM TOTAL	**7,456,548 tCO_2e**
SCOPE 2	
Consumption of purchased electricity	260,236 tCO_2e
SCOPE 2 LOM TOTAL	**260,236 tCO2e**
SCOPE 1 AND SCOPE 2 LOM TOTAL	**7,716,783 tCO_2e**
SCOPE 3	
Production/supply of diesel consumed	10,086 tCO_2e
Electricity transmission losses	53,473 tCO_2e
Transport of product coal (rail)	92,177 tCO_2e
Transport of product coal (shipping)	4,445,592 tCO_2e
Combustion of product (metallurgical)	42,997,911 tCO_2e

EMISSION SOURCE	EMISSIONS
SCOPE 3 LOM TOTAL	**47,599,238 tCO_2e**
PROJECT LOM TOTAL	**62,772,569 tCO_2e**

Scope 3 emissions represent approximately 86% of total LOM emissions. These emissions are sourced from outside of Australia. The majority of these Scope 3 emissions are:

- Shipping: 8%
- Combustion of product (metallurgical): 78%

The average annual emissions across LOM are shown below for the construction phase and the operational phase:

Table 4: Construction phase emissions estimate (tCO_2e)

EMISSION SOURCE	EMISSIONS
CONSTRUCTION	
SCOPE 1	
Diesel combustion – stationary energy	84 tCO_2e
Fugitive gas	295 tCO_2e
Post mining	0 tCO_2e
SCOPE 1 CONSTRUCTION TOTAL	**379 tCO_2e**
SCOPE 2	
Consumption of purchased electricity	808 tCO_2e
SCOPE 2 CONSTRUCTION TOTAL	**808 tCO2e**
SCOPE 1 AND SCOPE 2 CONSTRUCTION TOTAL	**1,187 tCO2e**
SCOPE 3	
Production/supply of diesel consumed	21 tCO_2e
Electricity transmission losses	166 tCO_2e
SCOPE 3 CONSTRUCTION TOTAL	**187 tCO_2e**
CONSTRUCTION TOTAL	**1,374 tCO_2e**

Table 5: Operational annual average emissions estimate (tCO_2e)

EMISSION SOURCE	EMISSIONS
OPERATIONS - ANNUAL AVERAGE	
SCOPE 1	
Diesel combustion – stationary energy	4,551 tCO_2e
Fugitive gas	779,365 tCO_2e
Post mining	44,547 tCO_2e
SCOPE 1 OPERATIONS - ANNUAL AVERAGE TOTAL	**828,463 tCO_2e**
SCOPE 2	
Consumption of purchased electricity	28,825 tCO_2e
SCOPE 2 OPERATIONS - ANNUAL AVERAGE TOTAL	**28,825 tCO2e**
SCOPE 1 AND 2 OPERATIONS - ANNUAL AVERAGE TOTAL	**857,288 tCO2e**
SCOPE 3	
Production/supply of diesel consumed	1,118 tCO_2e
Electricity transmission losses	5,923 tCO_2e
Transport of product coal (rail)	10,242 tCO_2e
Transport of product coal (shipping)	493,955 tCO_2e
Combustion of product (metallurgical)	4,777,546 tCO_2e
SCOPE 3 OPERATIONS - ANNUAL AVERAGE TOTAL	**5,288,783 tCO_2e**
OPERATIONS - ANNUAL AVERAGE TOTAL	**6,146,072 tCO_2e**

Based on the combined Scope 1 and Scope 2 unabated emissions, the project is defined as a medium to high emitter for the purposes of this amendment application.

4. GHG management and reporting

NGERS

Coronado Australia Holdings (CAH) Pty Ltd is the parent entity and has operational control over the Curragh Mine, for the purpose of reporting against the National Greenhouse and Energy Report Scheme (NGERS).

CAH submits an NGERS report each year as the operation is above the facility threshold. Curragh Mine reports their Scope 1 and Scope 2 emissions and energy production and consumption data to the CER under section 19

of the NGER Act. CAH reports the emissions and energy for the Curragh Mine through the Emissions and Energy Reporting System (EERS).

Records are maintained by CAH to enable the CER to ascertain whether the corporation has complied with obligations under the NGER Act. This includes information that can be used to verify the relevance, completeness, consistency, transparency, and accuracy of reported data during an external audit.

For the period 1 July 2022 to 30 June 2023, the "Energy and Emissions Report", in compliance with Section 19 of the National Greenhouse and Energy Reporting Act 2007 was subject to reasonable assurance through an independent external auditor.

The new bord and pillar project will form part of the broader Curragh complex and be subject to the same level of reporting, record keeping and external assurance as the existing facility.

Safeguard Mechanism

The Safeguard Mechanism applies to facilities with more than 100,000 tonnes of Scope 1 carbon dioxide equivalent (CO2-e) emissions each year. CAH is the responsible emitter with operational control over the Curragh Mine facility for the purpose of reporting against the Safeguard Mechanism.

Following the Safeguard Mechanism reform in 2023, new obligations and reporting requirements are now applied to Curragh Mine as a Safeguard facility from 1 July 2023.

The Safeguard Mechanism is aimed at reducing greenhouse gas emissions from large industrial facilities through setting limits, or baselines, on the quantity of annual emissions these facilities can produce.

The reformed Safeguard Mechanism means the Curragh Mine Complex's Safeguard baseline will adjust with annual production (Run-of-Mine Coal Production Variable) and be subject to a decline rate of 4.9% each year to 2030.

As per the previous Safeguard Mechanism set-up, if a facility is above the baseline, there are several options to manage this, including pre-existing options such as the purchase and surrender of Australian Carbon Credit Units (ACCUs) or entering multi-year monitoring periods. At the close of 2023, Coronado established accounts with several brokers and financial institutions, for purchasing small volumes of ACCUs as part of project readiness. New options also include purchasing and surrendering Safeguard Mechanism Credits (SMCs) or applying to borrow baseline from the previous year.

The modified Safeguard Mechanism has continued to be considered in the Curragh Mine emissions reduction approach.

4.1 GHG Mitigation and Management

DESI GHG Guideline states that for medium to high emission category projects, a GHG Abatement Plan is required. This plan must identify and report against the GHG emission reduction measures that will be implemented to achieve emission reductions required by the Commonwealth Safeguard Mechanism and associated baseline, and be consistent with the Queensland emission reduction targets.

The requirement to develop a GHG Abatement Plan is a relatively new concept which requires the appropriate analysis and study to progress. There are a number of studies currently underway across the broader Curragh Mine facility. As the Curragh Mine is a Safeguard facility which includes both the underground and open cut mines, the studies process that is currently underway is a holistic process to ensure the most cost-effective abatement is achieved across the facility. The detail of the facility-wide decarbonisation strategy can be seen in Table 8 below.

Proposed management practices need to demonstrate that all reasonable and practical measures have been applied to manage GHG emissions through best practice design, process, technology, and management following the GHG abatement hierarchy (Figure 3).

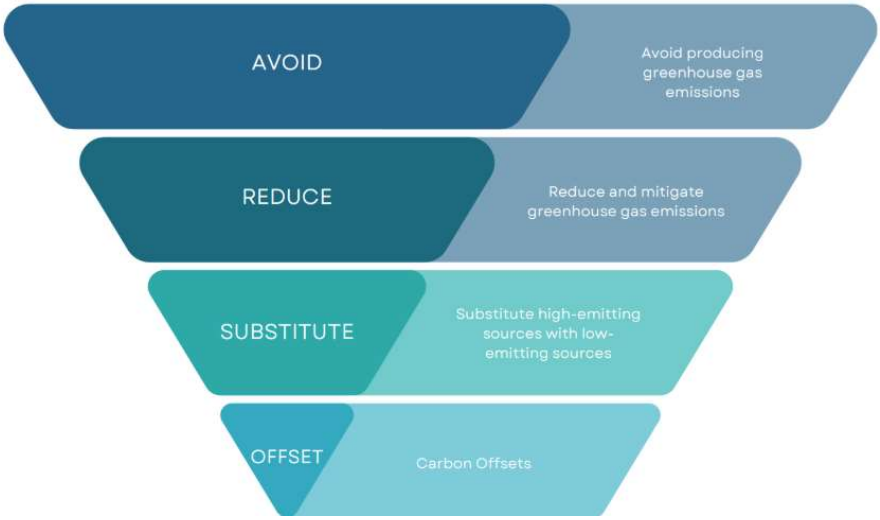

Figure 3: GHG abatement hierarchy

The mitigation and management practices explored for the project can be categorised as a reduction methodology according to the GHG abatement hierarchy, as well as incorporating the necessary ACCUs (offsets) to meet any potential gap in Safeguard compliance for the facility. The majority of Scope 1 and Scope 2 emissions for the project are sourced from fugitive emissions, as coal seams naturally contain methane which is released during the mining process. Fugitive emissions are typically emitted via three sources: pre-drainage, ventilation air methane, and post mining sources. As fugitive emissions are an inherent part of the coal mining process, it is not reasonable or practical to avoid or substitute these emissions.

To influence the reduction of Scope 3 emissions, CAH is a member of LETA, the industry body for the coal mining sector. Since 2006, Australia's black coal producers have committed $550 million through LETA to identify, research, and develop technologies that can reduce emissions associated with coal-fired power generation and steel production, including carbon capture and storage, and advanced coal-fired power generation technologies. LETA also focus attention on reducing emissions from black coal operations, including ventilation air methane abatement.

4.2 Curragh Facility GHG Abatement Plan

As a Safeguard facility, an application is being prepared for a Multi-Year Monitoring Period (MYMP) to allow time to implement emissions reduction projects across the facility. The MYMP allows for reductions to be achieved across a 5-year period to account for projects that require time to implement. During this MYMP period, Coronado will undertake pilot gas program trials to develop the forward decarbonisation strategy for reducing fugitive emissions and to develop the optimal gas drainage approach. The first gas pilot program will determine the optimal way for degassing the underground mine. This program has been granted an EA amendment to allow for drilling to commence late 2024. This pilot project has required considerable investment, study and approvals process to develop the executable project. Open cut pre-drainage ahead of mining is still at a concept level in Australia. Coronado has applied to partner with LETA to develop and trial an industry approach to degassing open cut coal mines. Pending funding and regulatory approvals this project is expected to commence H1 2025.

The facility level GHG abatement strategy is as follows:

Immediate initiatives

- MYMP application to the CER.
- Flaring of all gas recovered to reduce emissions from fugitive sources. Flaring of coal mine methane is required in the short term to firm up the flow rate before a gas utilisation project can be appropriately scoped.
- Q4 2024 gas pilot program to optimise gas recovery from the bord and pillar project. This work is required to be conducted well in advance of mining activities to achieve optimised methodologies and realisation of opportunities.
- H1 2025 open cut gas pilot program to understand how to effectively reduce fugitive emissions from the open cut operations.
- Gas truck trial to understand the potential of beneficial use of coal mine methane, reducing emissions from fugitive and diesel sources.

Short-term initiatives (FY25)

- Operational efficiency resulting in energy consumption improvements.
- Ongoing investigation into coal mine methane utilisation for power generation at Curragh.
- Continuing fuel additive investigations.

Medium-term initiatives

- Investigating long-term on-site or off-site renewable energy mix supply (50% renewable supply).
- Investigating long-term options for pre-drainage in advance of open cut mining operations – the largest source of emissions for OC mining at Curragh.

Long-term initiatives

- Investigating technology changes in equipment, for example battery/electric, trolley assist and crushing/ conveying systems, to reduce diesel consumption.
- Considering the viability for carbon-offset generation across Coronado-owned, Queensland-based, non-operational land.

4.3 Project GHG Abatement Plan

The requirement to develop a GHG Abatement Plan is a relatively new concept which requires the appropriate analysis and study to progress. As the Curragh Mine is a Safeguard facility which includes both the underground and open cut mines, the studies process that is currently underway is a holistic process to ensure the most cost-effective abatement is achieved across the facility. The detail of the ongoing studies related directly to the underground project is detailed below.

Emissions from this project are sourced from fugitive, diesel and electricity (Figure 4).

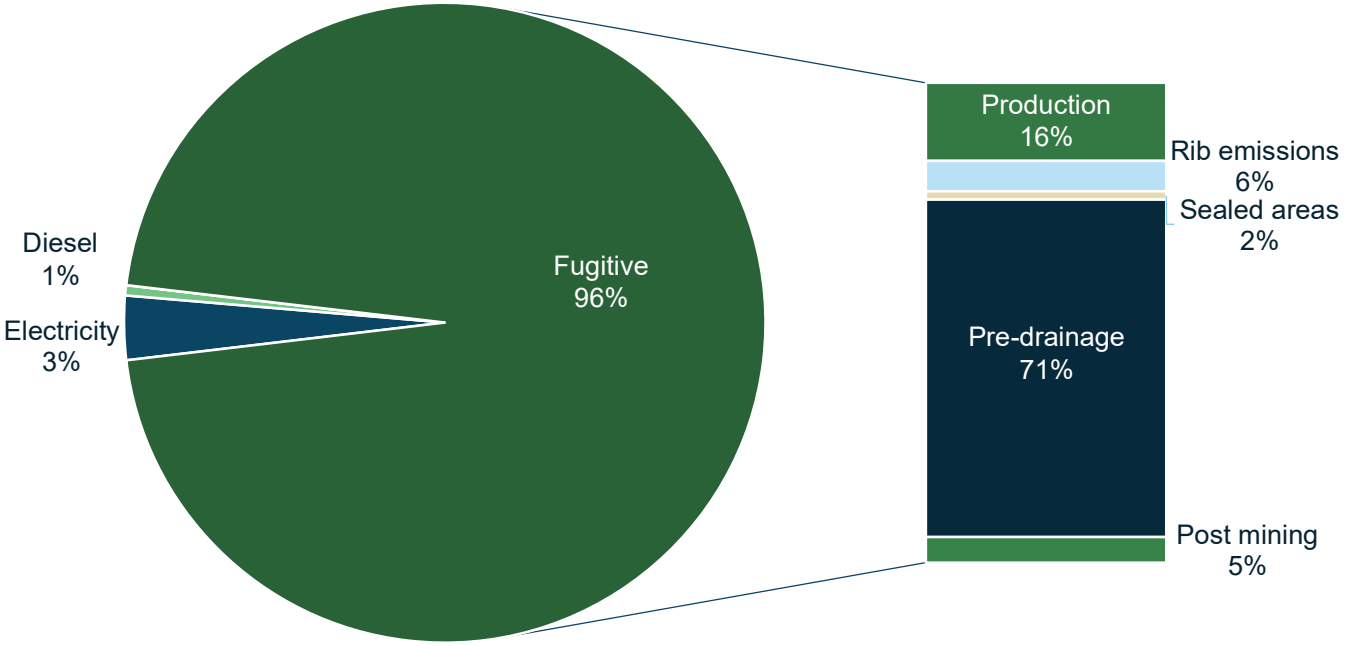

Figure 4: Scope 1 and Scope 2 emission sources

To mitigate and manage the GHG emissions associated with the project, the following scenarios have been assessed:

- Gas drainage with flaring
- Gas drainage with power generation
- Gas drainage with compressed natural gas (CNG) conversion for use in retrofit haul trucks
- Gas drainage with liquified natural gas (LNG) conversion for offtake
- Optimised gas drainage with CNG conversion for use in retrofit haul trucks
- Optimised sealing of underground areas

These scenarios have been informed by study process and marginal abatement cost (MAC) curve. A MAC curve is a tool used to display various emission reduction scenarios in terms of their cost-effectiveness. It ranks scenarios by $/t$CO_2$e, helping decision-makers identify the most economically efficient ways to reduce their carbon footprint. Utilising a MAC curve is essential in planning a decarbonisation pathway as it provides a clear visual guide for prioritising actions based on their cost and impact on reducing GHG emissions. This tool was used to assess and prioritise the abatement opportunities analysed for the underground project, with flaring presenting as the first opportunity to implement. As a result, this has formed part of our project.

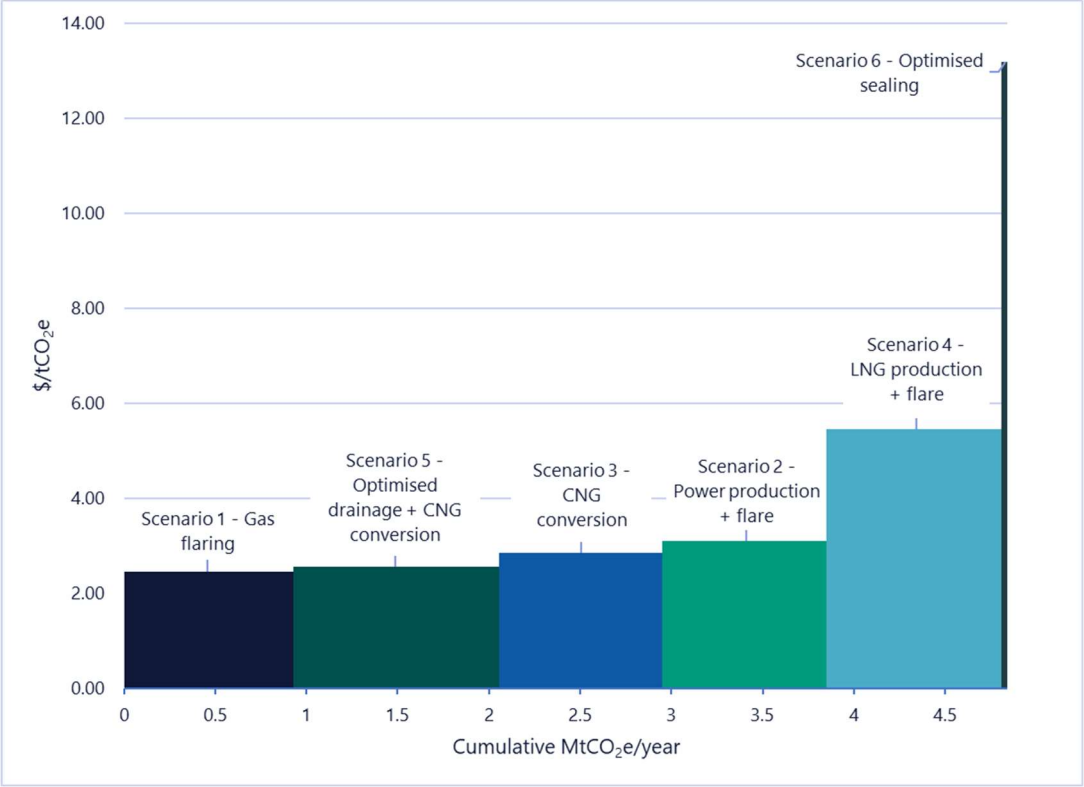

Figure 5: MACC for emission reduction scenarios

Additionally, considerations to the ventilation air methane, post mining, diesel and electricity emissions sources are discussed below.

4.3.1 Emission reduction opportunities

The majority of emissions are sourced from fugitive gas, which changes across the mine plan in line with gas content. The gas content contours (see Figure 6) give an understanding of the embedded emissions from fugitive gas.

Gas threshold limits are set by the mine to determine how mining can safely take place. Gas drainage is used to lower the seam gas to below the relevant gas outburst threshold value to ensure safe mining operations. Removal of gas from the coal seam and surrounding strata is an effective method in reducing or eliminating gas outbursts. The benefits of gas drainage are:

- Reducing the gas content of coal to a level that prevents a gas outburst event.
- Gas given off from the virgin coal is reduced so that gas percentage in intake airways and at working faces are kept within statutory limits and coal production rates are not governed by gas emission rates. This is achieved by degasification of coal prior to mining, i.e. pre-drainage.

Gas drainage will be required before mining in the east and northeast (i.e. gas contents > 6 m^3/t) to lower gas contents to safe and manageable levels. The initial year of the project is in an area of low gas content (between 1-6 m^3/t) resulting in lower emissions when compared to areas where the coal seam dips deeper to the north-east of the mine. As such, no pre-drainage of gas is required in this area at these levels as it is below the outburst threshold of 6 m^3/t.

Coronado will commence gas drainage early ahead of mining in areas with higher gas contents with the gas pilot program. This supports the development of a progressive abatement plan aligned with our overall strategy which provides Coronado with a valuable opportunity to implement and trial strategic decarbonisation initiatives for the

broader facility, including the gas management strategy being refined based on the results of the pilot gas program.

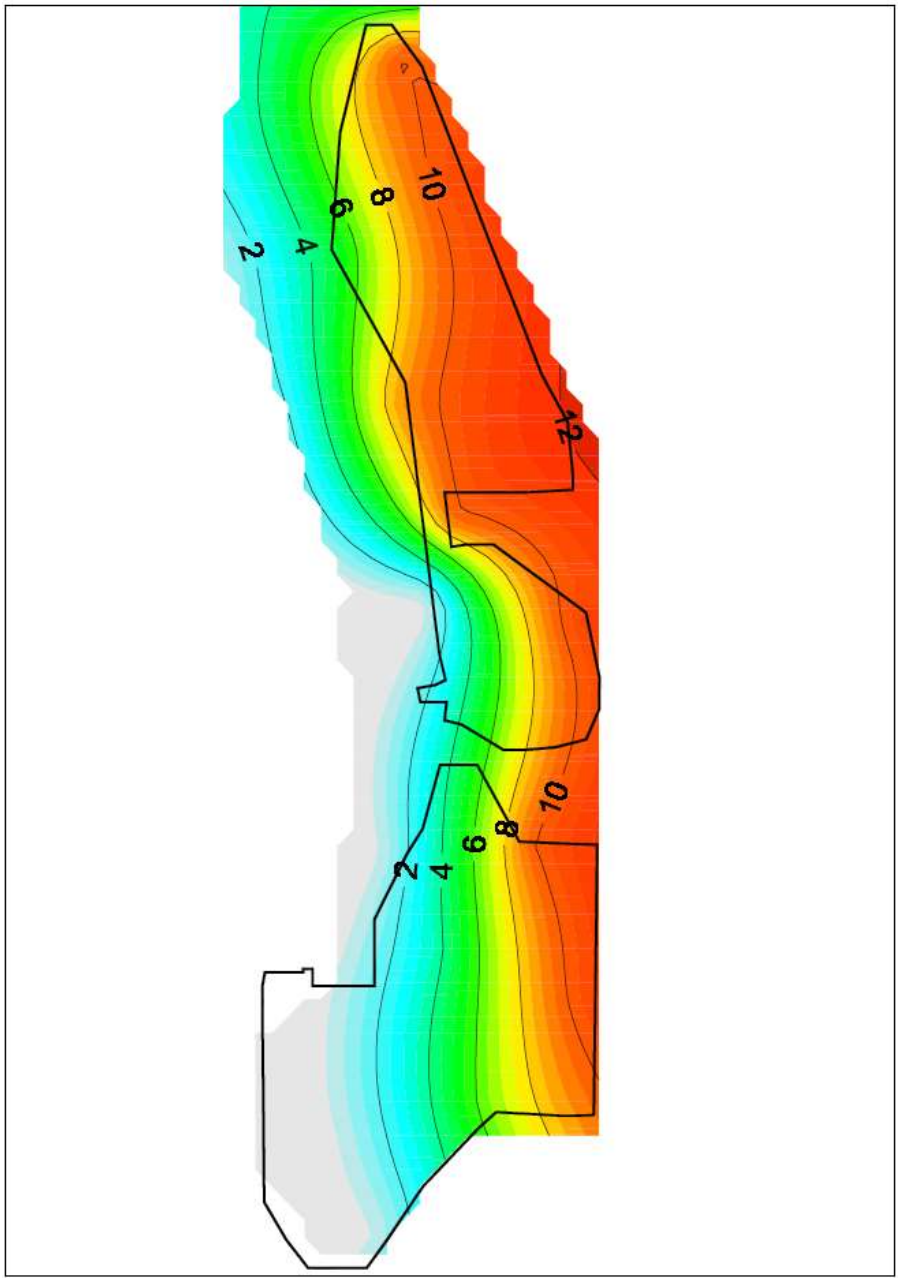

Figure 6: Gas content contours Qm³/t, Mammoth seam[6]

Gas pre-drainage with flare

Pre-drainage presents an opportunity to reduce project emissions. The gas pilot program scheduled to commence Q4 2024 will confirm the feasibility of gas drainage techniques and inform the decarbonisation strategy for the project. The volume of gas drained in this pilot project will be too low to economically reuse the gas. Instead, this pilot will confirm the gas drainage flow rate ahead of the potential future underground mine project. This will then inform the evaluation of potential beneficial reuse of life-of-mine gas drainage.

[6] Gas contour data from GeoGAS, 2022, Curragh Underground Project: Gas Reservoir Characterisation and Emission Modelling, August 2022

Beyond the pilot program, pre-drainage of coal mine methane will likely form part of the emissions reduction activities along with a potential beneficial reuse of gas.

For immediate abatement, all pre-drained gas will be flared, with the exception of intermittent venting periods due to unforeseen safety reasons. This flaring results in a reduction of 64% of Scope 1 emissions. As per the Estimating Emissions and Energy from Coal Mining Guideline 2024, flaring of coal mine methane reduces the associated emissions by approximately 90%. The emissions profile of the project with the flaring abatement scenario are shown in Figure 7

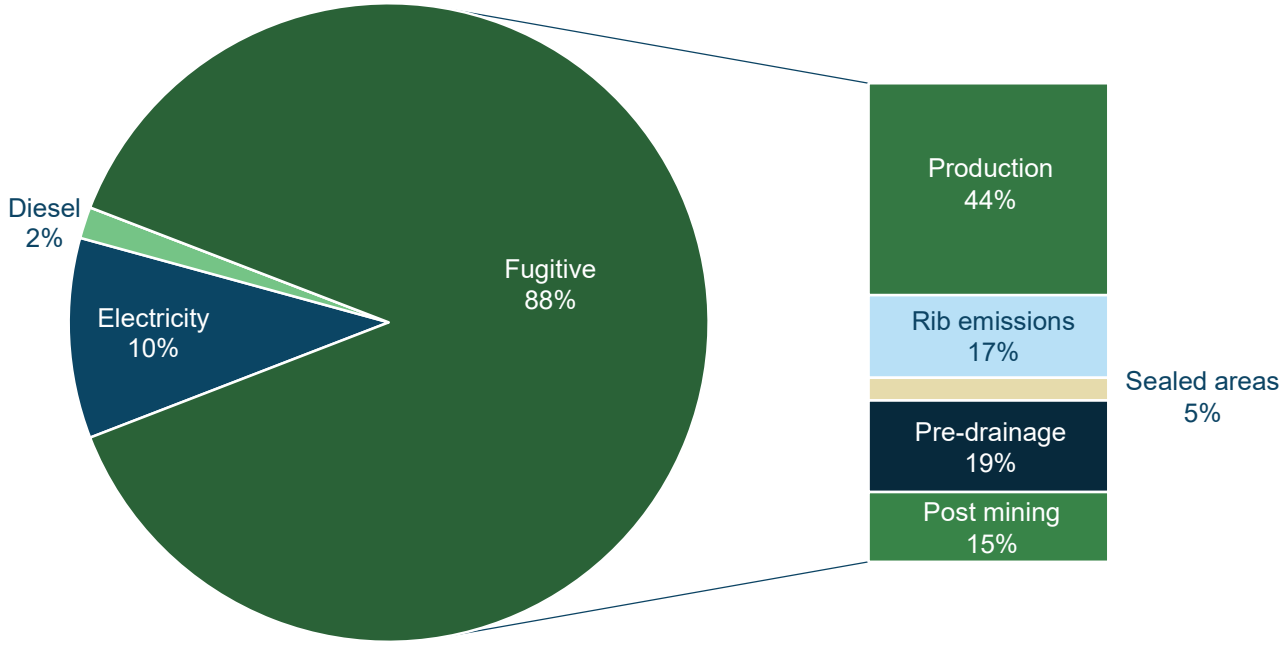

Figure 7: Scope 1 and Scope 2 emission sources, flared scenario

The emissions for the project resulting from the flared abatement scenario are show in Table 6 and Figure 8 below.

Table 6: Scope 1 and Scope 2 emissions by source, flared scenario

EMISSION SOURCE	PROJECT EMISSIONS	EMISSIONS FLARING SCENARIO
SCOPE 1		
Diesel combustion – stationary energy	41,042 tCO_2e	41,042 tCO_2e
Fugitive gas	7,014,581 tCO_2e	2,266,924 tCO_2e
Post mining	400,924 tCO_2e	400,924 tCO_2e
SCOPE 1 TOTAL	**7,456,548 tCO_2e**	**2,708,890 tCO_2e**
SCOPE 2		

EMISSION SOURCE	PROJECT EMISSIONS	EMISSIONS FLARING SCENARIO
Consumption of purchased electricity	260,236 tCO_2e	260,236 tCO_2e
SCOPE 2 TOTAL	**260,236 tCO_2e**	**260,236 tCO_2e**
SCOPE 1 AND SCOPE 2 TOTAL	**7,716,783 tCO_2e**	**2,969,126 tCO_2e**

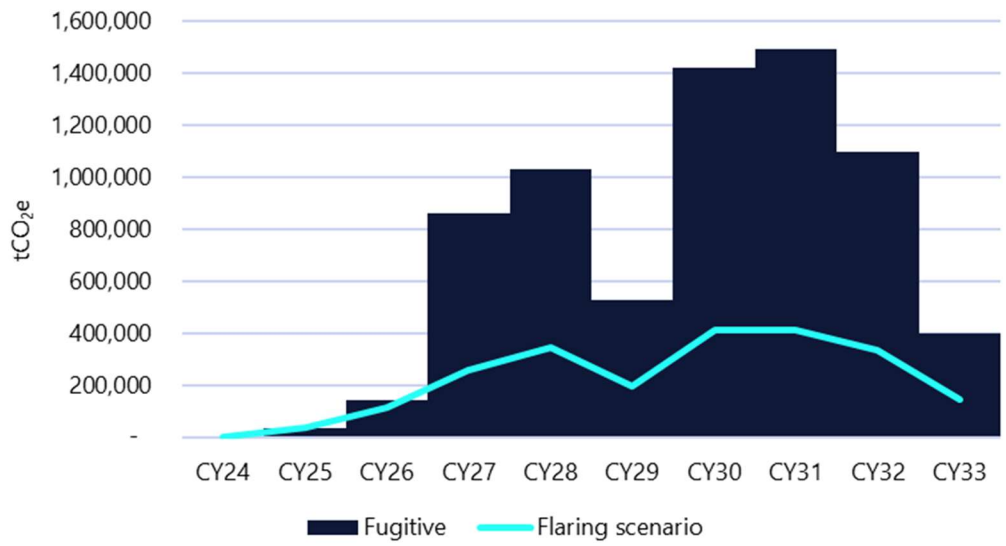

Figure 8: Gas drainage + flare scenario emissions reductions (tCO_2e)

Gas pre-drainage, power generation and flare

The power solution modelled in this scenario is the Jenbacher containerised "ready-to-use" power plants. The gas engine has a power output of up to 3,360 kW and electrical efficiency up to 45.9% when utilising coal mine methane. Each engine requires a gas flow rate of 207 l/s. Five Jenbacher engines have been used to model this scenario at a total of 16.8 MW installed capacity. The average power generation from these units 123 GWh per year. Electricity consumption accounts for approximately 8% of overall LOM emissions. The generation of power from these units would generate ACCUs under the CER's ACCU Scheme.

This scenario is currently under investigation as part of the short-term initiatives. Gas will need further engineering studies, the gas flow rate and volume from pre-drainage across a defined period needs to be confirmed. This requires a period of active gas monitoring during and after the pilot gas program. Gas will be flared during the pilot gas program to reduce emissions.

Gas pre-drainage and CNG conversion

Compressed natural gas (CNG) is currently being assessed in the Queensland coal mining industry as an option to reduce diesel emissions. The CNG truck conversion technology is currently provided by Mine Energy Solutions, who provide retrofits to all major original equipment manufacturer (OEMs). Haul trucks can be retrofitted with the CNG dual fuel technology and engine technology to enable the dual injection of CNG and diesel. Coronado are

currently undertaking a trial of CNG trucks at the Curragh Open Cut Mine. This scenario produces CNG to feed into this truck trial, which could displace diesel emissions for the Curragh Open Cut Mine.

Gas pre-drainage and LNG conversion

The conversion of coal mine methane to LNG via a micro-LNG plant involves several steps. Once methane is captured through pre-drainage, it is then purified. Gas purification removes impurities such as carbon dioxide, nitrogen, and water vapor from the captured methane to meet LNG specifications. In the liquefaction process, purified methane gas is cooled to approximately -162°C to convert it into liquid form (LNG), using cryogenic cooling techniques. The LNG is then stored in cryogenic tanks preparing it for transportation, leveraging the reduced volume for efficient distribution. This scenario is converting the coal mine methane to LNG for offtake.

Optimised gas pre-drainage and CNG conversion

This scenario is built on the assumption that gas drainage can be increased to recover 93.1% across LOM of fugitive gas volumes of the base case. This is based on draining the underground workings to $2m^3/t$ – beyond the safety threshold. This allows us to gain 11.5% more gas from the underground, increasing the overall emissions reduction potential of this scenario. This scenario is dependent on the success of the gas pilot program.

Optimised sealing

Following gas drainage, the remaining emissions from underground coal mines are in the form of VAM. These emissions tend to be in low methane concentrations. As mines progress and more areas are sealed, increased proportions and volumes of the gas reporting to the vent stack are sourced from sealed areas. To mitigate this, pressure balancing of seals to reduce the volume of gas that can escape around a seal through the strata is required. Sealed emissions account for approximately 5% of overall LOM emissions in the base case.

4.3.2 Other emission sources

Ventilated air methane

As shown in Figure 7, approximately 66% of fugitive emissions, or 58% of Scope 1 and Scope 2 emissions, are sourced from ventilation air methane (VAM). VAM emissions are sourced from any fugitive source underground that is not pre-drained. This includes emissions from the workings, sealed areas and ribs. These emissions are managed underground as part of the ventilation system within the underground atmosphere. VAM is challenging to mitigate as the air volume is large with low and variable in concentrations of methane. Regenerative Thermal Oxidation (RTO) is the only proven and commercially used technology for VAM abatement on a large scale and are currently implemented in the US and China[7]. This technology is successfully implemented in Coronado Buchanan Mine in the US.

In Australia, there has been one small scale RTO demonstration for VAM abatement, but it has not yet been adopted on a large scale. The high temperature operation of RTOs connected to underground coal mines present a risk and the RTO plants installed overseas do not satisfy the Australian mining standards and industry expectations for safety[8]. Effort in Australia is focused on demonstrating safe integration and operation of VAM abatement with AngloAmerican undertaking studies with the view to deploy a demonstration unit[7]. As a result, this

[7] Climate Change Authority, Sector Pathways Review, 2024, https://www.climatechangeauthority.gov.au/sector-pathways-review

[8] AusIMM, Australian Fugitive Methane Reduction: a case study for coal mining, 2022, https://www.ausimm.com/bulletin/bulletin-articles/australian-fugitive-methane-reduction-a-case-study-for-coal-mining/

is not an available solution for VAM emissions in the short term. Nevertheless, this approach forms part of our longer term decarbonation options assessment when it becomes available.

As part of LETA, who are supporting the trial of VAM technologies in Australia, we are gathering feedback and information firsthand on the viability and success or risks of these trials. With our leadership in VAM usage at Buchanan in the US, Coronado fully expects to implement the technology in Australia when technically and commercially feasible.

Post mining

As presented in Figure 7, 15% of fugitive emissions, or 13% of Scope 1 and Scope 2 emissions, are sourced from post mining. Post mining emissions refer to the continued desorption of methane from the ROM coal on stockpiles after it has been mined and brought to surface. The calculation methodology for these emissions is a Method 1 factor provided by the CER that is applied to ROM tonnes. There is currently no abatement opportunity for this emission source available to the industry.

Diesel

Emissions from diesel represent 2% of this project. The sources for diesel emissions include people movers, light vehicles, loaders, back-up generators, and other auxiliary equipment. The Climate Change Authority Sector Pathways Review 2024 highlights three emissions reduction levers for reducing emissions from diesel on site: electrification of haulage and equipment, fuel cell electric trucks, and sustainable fuels[7]. Both electrification and fuel cells are at low technology readiness levels, which presents the major barrier to adoption. The additional barrier is the use of electric and hydrogen equipment in an underground coal Group 1 environment. To date there is only one people mover demonstrated as a battery electric, explosion-protected vehicle for underground coal[9]. Sustainable fuels, while commercially available, face barriers to adoption of high opex and a lack of supply[7]. From the Curragh facility level, diesel emissions reductions are under investigation in the open cut operations through gas truck trials using compressed natural gas, fuel additives trials, and in the long-term, investigating electric equipment as it becomes available. Considering the marginal impact that diesel emissions represent as part of this underground project, this is not a viable option to decarbonise this project in the short term, however as technologies mature, this may become a commercially and technically viable option for future operations.

Electricity

As shown in Figure 7 and displayed in Table 6, electricity usage represents 10% of total Scope 1 and Scope 2 emissions. Electricity is used on site to power the mine industrial area, ventilation system, dewatering plant, compressed air, continuous miners, shuttle cars, and conveyors. Curragh Mine is a grid connected mine, utilising electricity from the National Electricity Market. As part of the Curragh facility decarbonisation strategy, a long-term renewable energy mix supply is being investigated, through both on site and off site options. Additionally, there is an ongoing investigation into coal mine methane utilisation for power generation on site at Curragh.

A summary of the options for abatement for the project is detailed in

[9] Ampcontrol, Driftex, 2022, https://ampcontrolgroup.com/projects/driftex

Table 7[7].

Table 7: Project abatement option summary

Abatement Option	Cost of implementation	Emissions abated	Lead time	Technology readiness
VAM abatement	$$$	High	5-10 years	Demonstration
Pre-drainage	$	High	1-3 years	Commercial
Electrification of equipment	$$$	Low	10+ years	Demonstration
Fuel cell electric trucks	$$$	Low	10+ years	Demonstration
Sustainable fuels	$$	Low	Supply dependent	Commercial
Renewable energy	$$	Low	2-5 years	Commercial
Offsets	$$	As required	Immediate	Commercial

To support the gas pilot program that will inform the gas management strategy going forward, the use of offsets has been incorporated into the GHG abatement plan to enable determination of an emissions reduction target.

To address the DESI GHG Guideline requirements for medium to high emitting projects, a project specific GHG abatement plan can be seen in Table 8.

Table 8: Project GHG Abatement Plan

Requirement	Description
a) Project details	Curragh Bord and Pillar Mine Project Underground mine 21 MT ROM across 10-year project No increase to approved facility ROM limit (18Mtpa) Minimal surface disturbance and tree clearing
b) Emissions projections and commencing abatement measures	See Table 3, Table 4, and Table 5 for emissions projections for the project. The mitigation and management practices explored for the project is in accordance with the GHG abatement hierarchy, relevant guidelines and NGER Safeguard Mechanism Rule. In line with the project's commitment to sustainability and regulatory compliance, a strategic approach has been developed to achieve the required 4.9% year on year reduction in emissions for the project. This target aligns with the Safeguard Mechanism reduction requirements, and to address this, the project intends to purchase Australian Carbon Credit Units (ACCUs). While the gas pilot program is underway, the only immediate reduction available is through flaring the gas and offsetting Scope 1 emissions by purchasing ACCUs in the

Requirement	Description
	short term. However, in the first year of operations, due to the low gas content, operations will have a lower emissions intensity compared to the open-cut operations. In this case, the initial mining area (see Figure 6) emissions are projected to be approximately 14,575 tCO_2e below the declining baseline, representing approximately 15% below the declining baseline. This presents a valuable opportunity for Coronado to focus efforts on implementing and trailing emissions reduction strategies without the immediate need for additional ACCU purchases in the first year. Importantly, this reduced intensity will significantly lower the facility's overall emissions, aligning with Coronado's strategic decarbonisation objectives and facilitating compliance with Safeguard Mechanism emissions reduction targets. The use of ACCUs is viewed as a temporary measure, designed to ensure compliance with emission reduction targets during the project's early stages. While effective in the short term, reliance on offsets would be cost-prohibitive and thus does not constitute Coronado's long-term strategy for emissions management. As such, at a facility level, Coronado's decarbonisation journey remains committed to the development of robust, on-site abatement initiatives. To ensure compliance with the Safeguard Mechanism, only ACCUs will be considered for offsetting emissions. A procurement guideline for purchasing ACCUs will be developed to first consider Queensland-based ACCUs. If Queensland-based ACCUs cannot be sourced, other states and territories can be considered. The Queensland emissions reduction target is 30% reduction by 2030. To continue to effectively decarbonise mining operations at Curragh, the full facility needs to be taken into account to deliver a holistic decarbonisation strategy. The following activities will be undertaken for the project as part of the Curragh facility decarbonisation strategy: **Immediate initiatives related to the project** • MYMP application to the CER. • Flaring of all gas recovered to reduce emissions from fugitive sources. Flaring of coal mine methane is required in the short term to firm up the flow rate before a gas utililsation project can be appropriately scoped and engineered. • Q4 2024 gas pilot program to optimise gas recovery from the bord and pillar project. This work is required to be conducted well in advance of mining activities to achieve optimised methodologies and realisation of opportunities. To maintain 4.9% reduction year-on-year, a combination of a forward gas program and ACCUs will be utilised to achieve this target.
c) GHG emissions reference point	As this project is captured by the Commonwealth Safeguard Mechanism as part of a larger facility, the reference point is determined by the Safeguard Mechanism. The emissions intensity determination for the Curragh facility has been developed as per the *National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015 (Safeguard Rule)* at 0.0482 tCO_2e/ROMt.
d) Emission reduction targets	As this project is captured by the Commonwealth Safeguard Mechanism as part of a larger facility, the emission reduction targets are determined by the Safeguard Mechanism. These targets are reported in the Coronado Sustainability Report.

<table>
<tr><th>Requirement</th><th>Description</th></tr>
<tr><td></td><td>
The project will reduce Scope 1 emissions in line with the National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015 (Safeguard Rule). This is based on the emissions intensity determination for the Curragh facility. To determine emissions reduction targets, the emissions intensity determination is transitioned from facility-specific to industry average values to 2030 at the ratio of industry-average to facility-specific ratio of 5:95 to 50:50. A decline rate is then applied as 4.9% year on year to determine the calculated emissions intensity, which is applied to the production variable of ROM tonnes. For the purposes of this report, the assumptions of how emissions intensity and decline rates are used will continue beyond 2030, however this is subject to change as the post-2030 Safeguard rules are determined. The targets are set on a production variable basis, however using the forecast of ROM tonnes can assist in forecasting emissions reduction targets Table 9.

Table 9: Emissions baseline
<table>
<tr><th></th><th>Calculated Emissions Intensity (tCO_2e/ROMt)</th><th>Forecast ROMt</th><th>BaU Emissions (tCO_2e)</th><th>Estimated Baseline (tCO_2e)</th><th>Emissions Gap (tCO_2e)</th></tr>
<tr><td>CY25</td><td>0.0450</td><td>2,132,232</td><td>80,961</td><td>95,915</td><td>-14,575</td></tr>
<tr><td>CY26</td><td>0.0433</td><td>2,482,727</td><td>167,984</td><td>107,430</td><td>60,554</td></tr>
<tr><td>CY27</td><td>0.0415</td><td>2,587,753</td><td>312,855</td><td>107,326</td><td>205,529</td></tr>
<tr><td>CY28</td><td>0.0402</td><td>2,745,510</td><td>403,397</td><td>110,482</td><td>292,914</td></tr>
<tr><td>CY29</td><td>0.0388</td><td>1,408,529</td><td>228,388</td><td>54,707</td><td>173,681</td></tr>
<tr><td>CY30</td><td>0.0373</td><td>2,967,797</td><td>476,679</td><td>110,611</td><td>366,068</td></tr>
<tr><td>CY31</td><td>0.0355</td><td>3,121,089</td><td>478,818</td><td>110,902</td><td>367,916</td></tr>
<tr><td>CY32</td><td>0.0322</td><td>2,549,535</td><td>390,879</td><td>82,070</td><td>308,809</td></tr>
<tr><td>CY33</td><td>0.0302</td><td>1,106,093</td><td>168,930</td><td>33,451</td><td>135,478</td></tr>
</table>
The emissions gap reflects the project's emissions reduction target, based on an annualised production forecast. Actual ROM tonnes and resulting actual reported emissions are subject to change due to adjustments in the mine plan. Despite these fluctuations, the project, combined with the broader facility, will continue to comply with the Environmental Authority extraction rate limit (EPML00643713: Condition A11) of 18 million tonnes per annum. This flexibility, accounting for variable production rates via the Emissions Intensity Determination, aligns with the Safeguard Mechanism framework, where actual emissions are subject to reduction compliance requirements.

Scope 2 emissions are also expected to reduce through the 2022 Queensland Energy and Jobs Plan, and the renewable energy transformation of the grid.
</td></tr>
<tr><td>e) GHG emission reduction program</td><td>
As the project is a part of a larger facility under the Safeguard Mechanism, the emissions reduction program for the project is required to be incorporated into the overall facility to determine the optimal pathway for reducing emissions across the entire operation.

Using the life of mine plan as the basis of preparation, an assessment of abatement scenarios and corresponding marginal abatement cost curves (MACC) (see Section 4.3) has been completed for the project. Coronado is currently finalising assessments on the
</td></tr>
</table>

Requirement	Description

	most cost-effective forms of abatement to go forwards to feasibility studies and potential trials. This work will then be used to quantitatively inform the abatement plan.
	
	Emission Reduction Measures for Implementation
	
	Implementation details including timeframes for implementation and estimated reduction of emissions expected:
	
	• **Immediate**
	  ○ Emissions reductions for the Curragh facility will be in line with the Safeguard Mechanism reductions
	  ○ The lower gas content in the initial mining area will result in emissions below the declining baseline, meaning no emissions reductions are required in the first year of production. This provides Coronado with a valuable opportunity to implement and trial strategic decarbonisation initiatives, while the gas management strategy is being refined based on the results of the pilot gas program. The outcomes of this program, anticipated by Q3 2025, will further support the facility's long-term emissions reduction goals.
	• **Continuous improvement**
	  ○ Coronado has committed to continuous improvement to decarbonisation through the decarbonisation strategy
	
	Risk Assessment
	
	See Section 5.2 for further detail.
	
	Justification for Each Measure and Estimates of Abatement
	The justification for the abatement option is summarised in Section 4.2 and
	
	Table 7.
	
	Ongoing Monitoring
	
	Ongoing monitoring of project emissions will be undertaken in accordance with the National Greenhouse Gas and Energy Reporting Act.

f) Advancing technologies and opportunities	As part of the Curragh facility decarbonisation strategy, provisions for regularly reviewing new technologies to identify opportunities to further reduce emissions and energy efficiency are be incorporated. A technology review will give an update on the status of emissions reduction opportunities applicable to the project, including the technology readiness levels and industry updates. This will be delivered through an annual report, further detailed in Section H of this table.
g) Monitoring and auditing	The program for monitoring GHG emissions and auditing against GHG emission reduction targets will be incorporated into the established Curragh Mine NGERs monitoring and external assurance processes. The open cut operations at Curragh report fugitive emissions using Method 2, a higher order methodology prescribed by the regulator to estimate fugitive emissions from open cut coal mines. The project will report fugitive emissions using Method 4 for VAM and pre-drained gas, Method 2 for flared gas, and Method 1 for post mining emissions.[2]

Requirement	Description
	In addition, a dynamic gas model is currently under development for the project to inform beyond best practice fugitive emissions forecasting, management and reductions. As data is captured through gas testing, this will feed back into continuous calibration of the model. This dynamic model will deliver continuous optimisation opportunities by simulating drainage scenarios. This is best practice in the gas industry and represents leading edge practices in the coal mining industry.
h) Reporting	The program for monitoring GHG emissions and auditing against GHG emission reduction targets will be incorporated into the established Curragh Mine NGERs reporting processes. Beyond NGERS and Safeguard reporting, an annual report will be provided to review compliance with the project's decarbonisation strategy. This report will be delivered within 3 months following the NGERS and Safeguard assurance and verification process held by the CER. This is finalised by 31st March of each year for the preceding financial year. The annual GHG report will include: **Technology review** • A systematic process to evaluate current implementation of decarbonisation projects using existing technology. This enables a continuous improvement process for existing practices on site. • A technology review will give an update on the status of emissions reduction opportunities applicable to the project, including the technology readiness levels and industry updates. • Update to the assessed abatement opportunities and prioritisation using MAC curves. As technologies and methodologies progress, this will change the applicability to the project, and therefore the marginal abatement cost opportunity. **Compliance NGER, GHG plan and emissions reduction target** • Coronado's NGER assurance audits are conducted annually, providing limited assurance over the accuracy and integrity of GHG data and the methodologies applied. To avoid unnecessary duplication of efforts, the EA audit will be scoped to focus on identifying material non-compliance with the implementation of the GHG Emissions Reduction Plan, rather than repeating aspects already covered by the above-mentioned audits and submissions to the Clean Energy Regulator. This will ensure that compliance with the EA addresses the key compliance requirement of verifying monitoring practices against the approved GHG abatement strategy, without revisiting data collection, calculation methodologies, or detailed assessments already assured under the NGERs and SGM audits. Compliance with NGER requirements will therefore be verified through the existence of a NGERs Assurance Audit report as the primary evidence. The Assurance Audit will provide verification that the monitoring program and emissions data adhere to the established NGER legislative requirements.

Requirement	Description
	• An assessment against compliance with emissions reduction target. This will include a breakdown of how compliance was achieved, i.e., projects, offsets, etc. **Data integrity review** • A systematic process for reviewing and verification of Scope 1 and Scope 2 GHG inventory and emission estimations. **Facility level updates** • Updates from the facility as a whole to provide context on abatement strategies from the broader Curragh decarbonisation strategy.

5. Potential Impacts of GHG Emissions on Environmental Values

The GHG emissions intensity of the project, assuming that pre-drained gas will be flared at a minimum, results in a LOM emissions intensity of 0.17 tCO_2e/ROMt. The industry average emissions intensity as defined in the Safeguard Mechanism by the CER is 0.0653 tCO_2e/ROMt. However, when analysing publicly available Safeguard facility data from FY20, the industry average emissions intensity is 0.116 tCO_2e/ROMt and the industry median is 0.06 tCO_2e/ROMt for both metallurgical and thermal coal. Underground coal mines typically have higher GHG emissions intensities than open cut mines as the gas content of coal generally increases with depth. The industry average of Safeguard-covered underground coal mine facilities in FY20 is approximately 0.28 tCO_2e/ROMt. While the project is higher than the industry average for all coal mines, it is lower than the industry average for underground coal mines (see Figure 9). This is a result of two factors: 1) the mining method, bord and pillar, produces lower gas emissions than longwall mines[10], and 2) the gas concentration, content and volume can vary significantly resulting in some underground mines producing more CO_2e than others. Mines with active CSG operations are more likely to have higher gas concentration, content and volumes to make the gas commercially viable. Figure 10 shows more recent data from FY23 from Queensland facilities. While there are some differences between these two figures, notably different reporting periods and geographic inclusions, there is good agreement.

Of note, a large proportion of open cut mines in Queensland are currently reporting Method 1 fugitive emissions. Changes to legislation will require these mines to move to a higher order methodology that requires an actual measurement of fugitive emissions. This is expected to result in increased emissions from open cut coal mines. Curragh open cut currently reports Method 2 for fugitive emissions.

[10] Singh, et.al. 2022, Updated greenhouse gas inventory estimates for Indian underground coal mining based on the 2019 IPCC refinements, https://doi.org/10.1016/j.isci.2022.104946

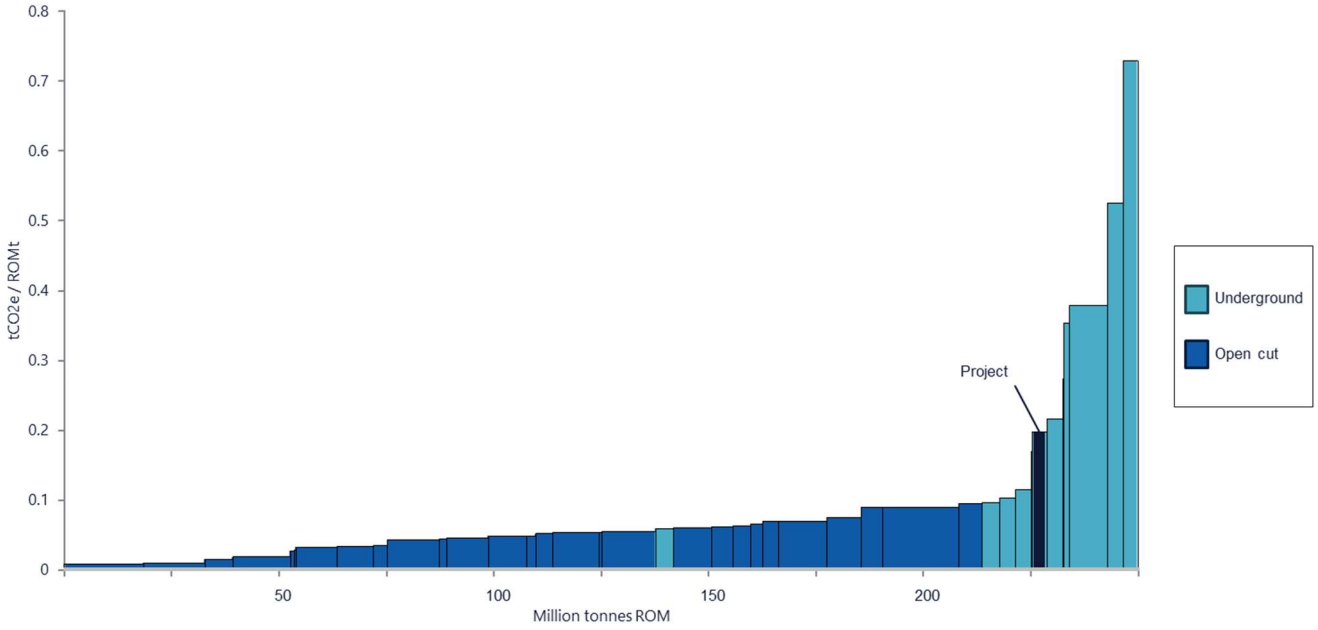

Figure 9: Scope 1 emission intensity of Australian coal mines, FY20 (tCO_2e/ROMt)[11]

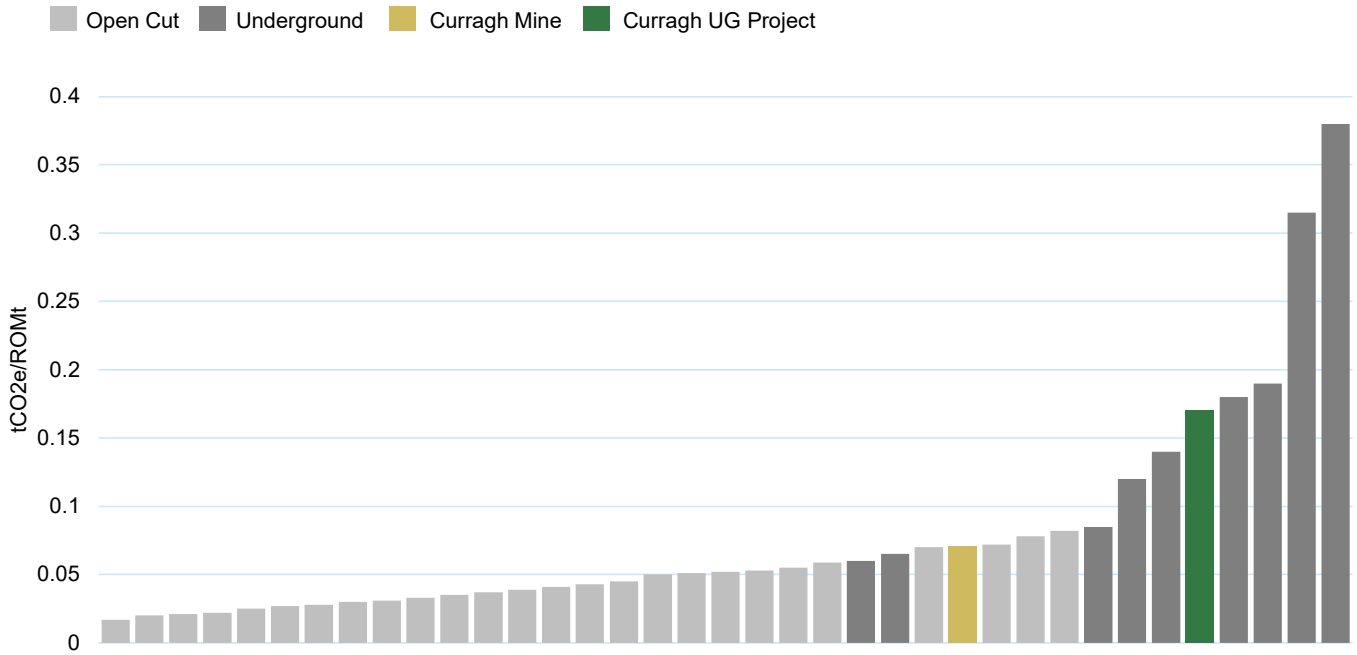

Figure 10: Scope 1 emission intensity of QLD coal mines, FY23 (tCO_2e/ROMt). Source: modified from Ember[12]

Coronado is a seaborne metallurgical coal producer, with a global presence in export markets. The Queensland government's position is that 'demand for metallurgical coal is expected to be stronger for longer than thermal coal. This is because the steelmaking process that uses metallurgical coal does not face as many immediate, low-emission alternatives as the thermal coal used to produce electricity. Steel will also remain in strong demand, including for renewable energy equipment such as wind turbines'[13].

[11] Compiled from Safeguard facility reported emissions and publicly available production data

[12] Includes updated data for Curragh open cut mine to reflect FY23 actual reported data

[13] State of Queensland, 2022, Queensland Resources Industry Development Plan, https://www.resources.qld.gov.au/__data/assets/pdf_file/0005/1626647/qridp-web.pdf

Global demand for steel has been increasing in recent years due to population and economic growth, and it is expected to continue rising, particularly due to economic expansion in India and other ASEAN countries.[14]

The Queensland Treasury states that metallurgical coal has a "critical role in producing the steel for the renewable technologies we need to decarbonise our state".[15] Wind turbines, solar farms, and hydroelectric dams are all steel-intensive infrastructure that underpin renewable energy generation. It is also 100 percent recyclable, making it a uniquely sustainable material. CAH produces a variety of high quality low-ash metallurgical coal products which are exported globally to a diverse customer base of leading steelmakers.

CAH exports the majority of its metallurgical coal to steel producers in Japan and India. The export and combustion of metallurgical coal represents the majority of material Scope 3 emissions, and approximately 94% of total LOM emissions. While it is difficult to control, and therefore mitigate, emissions associated with Scope 3, each of the export countries have Nationally Determined Contributions in place under the Paris Agreement. Japan aims to reduce its greenhouse gas emissions by 46% in 2030 from 2013 levels, setting an ambitious target which is aligned with the long-term goal of achieving net-zero by 2050.[16] As India is a developing country, there are different responsibilities under the Paris Agreement that apply. India has committed to an emissions intensity target as opposed to an absolute target, aiming to reduce the emissions intensity of its GDP by 45% by 2030 from 2005 levels, among other sustainability targets.[17]

5.1 Comparison of Estimated Project Emissions

Australia's net GHG emissions estimates for the inventory used to track Australia's progress towards its Paris Agreement targets in 2021-22 totalled 432.6 $MtCO_2e$.[18] The reported 2021-22 total GHG emissions in Queensland of 124.09 $MtCO_2e$ accounted for 30% of national GHG emissions.

The contributions of the predicted annual Scope 1, Scope 2 and Scope 3 emissions resulting from the project within Australia are provided in Table 10. This comparison indicates that the annual average emissions are an insignificant proportion of both the Australian and Queensland total emissions, accounting for 0.08% and approximately 0.28% of these, respectively.

Table 10: Project emissions compared with annual emissions for Australia and Queensland (Scope 1, Scope 2 and Scope 3 within Australia)

	Australia	QLD	Project (Within Australia)
2021-22 ($MtCO_2e$)	433	124	**0.35 $MtCO_2e$**
Project - Annual Average	0.08%	0.28%	

[14] International Energy Agency, Steel, https://www.iea.org/energy-system/industry/steel

[15] Queensland Treasury, Low Emissions Investment Partnership, https://www.treasury.qld.gov.au/investment/investment-programs-and-support/low-emissions-investment-partnerships/

[16] Climate Watch, Japan - Summary of Updated First Nationally Determined Contribution, https://www.climatewatchdata.org/ndcs/country/JPN?document=revised_first_ndc

[17] Climate Watch, India - Summary of Updated First Nationally Determined Contribution, https://www.climatewatchdata.org/ndcs/country/IND?document=revised_first_ndc

[18] DCCEEW, National Inventory Report 2022, https://www.dcceew.gov.au/climate-change/publications/national-inventory-report-2022

The annual global GHG emissions in 2022 emissions totalled 57,400 $MtCO_2e$ according to the United Nations Environment Programme[19].

The contributions of the predicted annual Scope 1, Scope 2 and Scope 3 emissions resulting from the project within and outside of Australia are provided in Table 11. This comparison indicates that the project would account for approximately 0.001% of the annual global emissions.

Table 11: Project emissions compared with annual global emissions (Scope 1, Scope 2 and Scope 3 worldwide)

	World	Project (Global)
2022 ($MtCO_2e$)	57,400	**5.56 $MtCO_2e$**
Project - Annual Average	0.0097%	

5.2 Risk Assessment

The IPCC has identified that human-induced climate change is already affecting weather and climate extremes across the globe and that "continued emission of GHGs will cause further warming and long-lasting changes in all components of the climate system. Increasing the likelihood of severe, pervasive, and irreversible impacts for people and ecosystems".[20] In Queensland, average temperatures across the state are currently 1°C higher than they were 100 years ago. While it is difficult to determine the likelihood and magnitude of impacts to environmental values from an individual project's GHG emissions, it is recognised that any increases in net GHG emissions may also increase the risks, and the larger the relative scale of net GHG emissions, the more significant the contribution may be.

As seen in Table 10, the contribution of emissions from the project when compared with Queensland's emissions profile represents 0.28%. While this is an insignificant proportion of Queensland's total emissions, it is noted that CAH, as a Safeguard covered facility, will reduce emissions in line with the legislation. As per the Queensland Regional Climate Change Impact Studies,[21] the Bowen Basin region is likely to see higher temperatures, hotter and more frequent hot days, more intense downpours, less frequent but more intense tropical cyclones, rising sea level more frequent sea-level extremes, and warmer and more acidic seas.

The project emissions represent 0.28% of Queensland's emissions and 0.08% of Australia's emissions. This increase is statically insignificant. Hence from a risk perspective, the project's GHG emissions will not increase the likelihood and magnitude of impacts to environmental values, nor increase the risk of climate change-related events. As outlined in Section 5 above, on a global perspective, the customers of this metallurgical coal have NDCs in place to decarbonise their own jurisdictions. The need for steel to decarbonise other sectors, such as the renewable energy sector, along with the Safeguard-led decarbonisation of the Curragh Mine, will further contribute to limiting the effect of the project emissions on climate change. The risk rating is therefore D1, insignificant consequence, unlikely likelihood, as per the Coronado Risk Matrix (Figure 11).

[19] ENEP, Emissions Gap Report 2023, https://www.unep.org/interactives/emissions-gap-report/2023/#section_0

[20] ICPP, Climate Change 2014 Synthesis Report Fifth Assessment Report, https://ar5-syr.ipcc.ch/topic_futurechanges.php

[21] Department of Energy and Climate, Climate Change in the Whitsunday, Hinterland and Mackay region 2024, https://www.qld.gov.au/__data/assets/pdf_file/0026/68561/mackay-whitsunday-climate-change-impact-summary.pdf

6. RISK MATRIX - SMS-001A Risk Management Levels & Guidelines

	CONSEQUENCE				
Loss Type	**1 Insignificant**	**2 Minor**	**3 Moderate**	**4 Major**	**5 Catastrophic**
People (STAR, JSA and above)	Low-level short-term subjective inconvenience or symptoms. Includes First Aid Cases.	Objective but reversible impairment. Includes Medical Treatment Cases.	Moderate irreversible disability or impairment to one or one or more persons. Includes Lost Time Injury.	Permanent total disabilities or impairment. Single fatality.	Short- or long-term health effects leading to multiple fatalities, or irreversible human health effects to multiple persons.
Environmental and Cultural Heritage (STAR, JSA and above)	No lasting effect. Rectified by immediate corrective action. Technical non-compliance. Low level social or cultural impacts.	Minor incident, no significant impact. Monitoring result not in compliance, community complaint. Minor medium-term social impacts on social population.	Significant environmental incident, large spill, off-site discharge. Ongoing social issues. Significant damage or infringement to structures or items of cultural significance.	Major impact to surrounding environment. Ongoing serious social issues. Significant damage or infringement to structures or items of cultural significance. Disregard of cultural heritage.	Very serious widespread environmental / social impacts. Irreparable damage to highly valued structures / items or cultural significance. Highly offensive infringement of cultural heritage.
Reputation (WRAC and above)	Public concern restricted to local complaints. Ongoing scrutiny from regulator.	Minor, adverse local public or media attention and complaints. Significant hardship from Regulator.	Attention from media and or heightened concern by local community. Significant difficulties in gaining approvals. Environment credentials moderately affected.	Significant adverse national media or public attention. May lose license to operate or not gain approval.	Serious public or media outcry (international coverage). License to operate threatened. Reputation severely tarnished.
Materials, Assets and Business Operations (WRAC and above)	Slight damage. <$999 No disruption to operation	Minor damage. $1,000 - $24,999. Brief disruption to operation.	Local damage. $25,000 - $99,000. Partial shutdown.	Major damage. $100,000 - $5M Partial loss of operation.	Extreme damage. >$5M. Substantial or total loss of operation.

LIKELIHOOD	**(use only as guide)**	**Risk Rating**				
A - Almost Certain	The event is expected to occur in most circumstances	**Medium**	**High**	**High**	**Very High**	**Very High**
B - Likely	The event will probably occur in most circumstances	**Medium**	**Medium**	**High**	**High**	**Very High**
C - Possible	The event should occur at some time	**Low**	**Medium**	**High**	**High**	**High**
D - Unlikely	The event could occur at some time	**Low**	**Low**	**Medium**	**High**	**High**
E - Rare	The event may occur in exceptional circumstances	**Low**	**Low**	**Medium**	**Medium**	**High**

Risk Level	**Risk Tolerability Criteria and Action Requirements**		
Very High	SSE		The activity must be stopped immediately until action to reduce the level of risk is undertaken or authority to continue is received.
High	Risk must be managed in line with the ALARA Principles	Superintendent or above	The activity must be stopped immediately until action to reduce the level of risk is undertaken or authority to continue is received.
Medium		Supervisor or above	Take action to reduce the level of risk if possible or can authorise tolerations.
Low		Supervisor or above	Tolerable risk unless circumstances change.

Figure 11: Coronado Risk Matrix