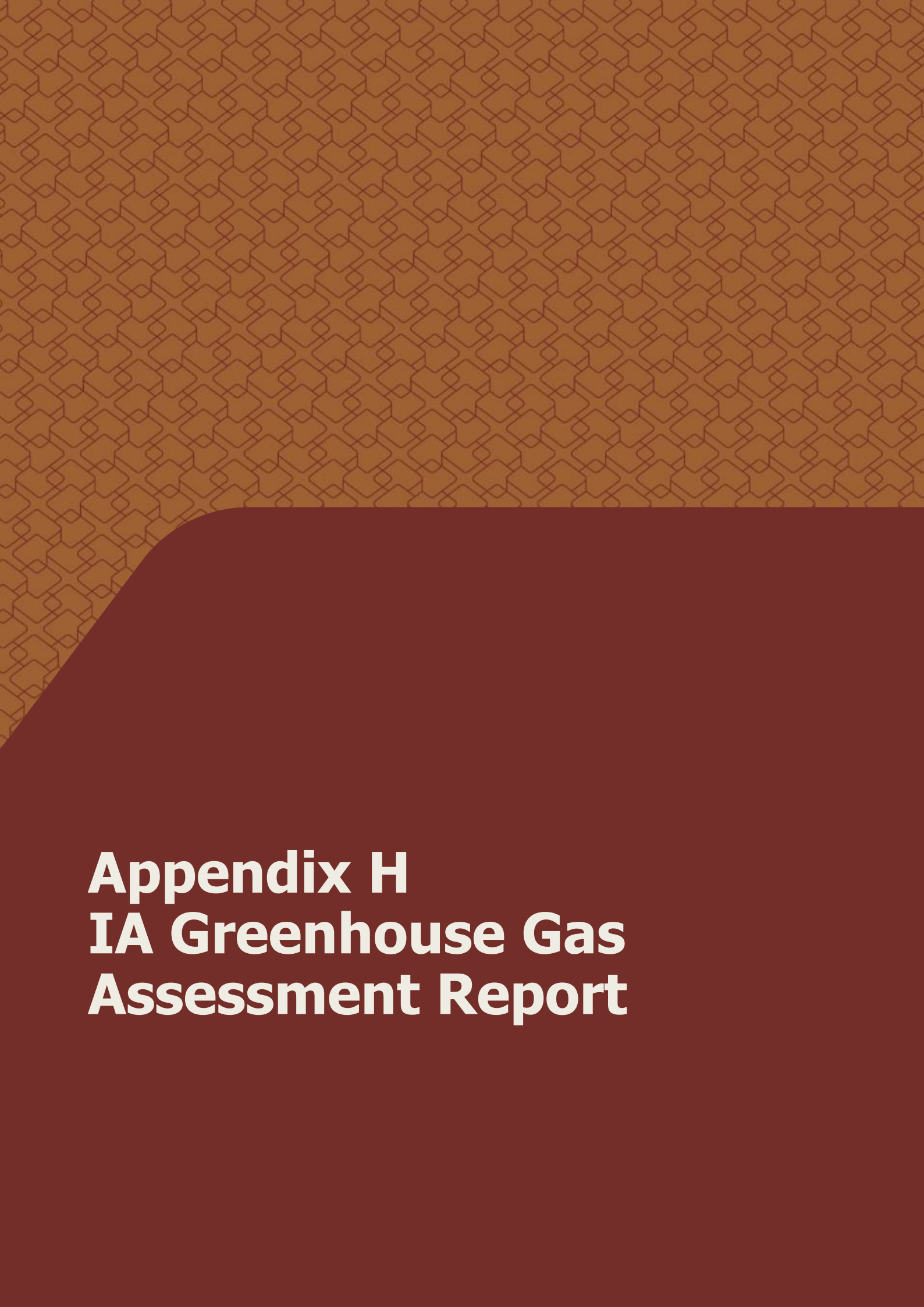




Appendix H IA Greenhouse Gas Assessment Report

Boggabri Coal Mine Greenhouse Gas Assessment

MODIFICATION 10



Document details and history

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Executive Summary

Boggabri Coal Operations Pty Ltd (BCOPL), a subsidiary of Idemitsu Australia Pty Ltd (IA), is seeking approval to modify its approved mining operations under State Significant Development (SSD) 09_0182 for the Boggabri Coal Mine (BCM), hereafter referred to as MOD 10. Approval is sought via an application made under Section 4.55 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act). MOD 10 seeks approval to recover additional known coal resources within the mining authorities held for the BCM, but which are located outside of the currently approved Mine Disturbance Boundary and extend mine life by a further 4 years to 2040.

The BCM modification will result in emissions across distinct project phases. No construction phase is proposed as part of the MOD10 approvals as this modification seeks to approve continuation of operation only.

The assessment boundary includes Scope 1, 2 and 3 emissions. Scope 1 and 2 emissions include those involved in the extraction and processing of coal. Scope 3 emissions include transport, energy production and coking coal use. Consistent with the current operations, product coal (i.e. both metallurgical and thermal products) from BCM will continue to be sold to countries who are signatories of the Paris Agreement.

The key outcomes of the MOD 10 assessment are:

- The estimated highest annual incremental increase in Scope 1 emissions due to the inclusion of MOD 10, over approved operations (as per MOD 8), is 0.21 Mt CO₂-e, which represents approximately 0.05% of Australia's emissions (that is 453.45 Mt CO₂-e for 2023, the latest year of estimates available¹).
- Coal produced by the BCM is predominantly exported to countries which are either signatories to the Paris Agreement and / or have announced or adopted domestic laws or policies to achieve their emissions targets.
- Whilst emissions from the end use of the coal have been calculated as Scope 3 emissions for the purposes of the MOD 10 assessment, BCOPL's customers account for these same emissions as Scope 1 emissions and are required to comply with their respective countries' emissions targets.

Consistent with the NSW EPA *Guide for Large Emitters*, BCOPL has applied the greenhouse gas mitigation hierarchy of avoid, reduce, abate, offset for this Modification. BCOPL has continued focus on improvements and innovation with respect to minimising greenhouse gas (GHG) emissions. Short and mid-term strategies to further minimise GHG emissions have been developed since 2022 and reviewed quarterly for progression and relevance to BCM operations and legislative obligations.

The IA internal governance framework allows a clear process of assessment of project viability which proactively allows securing of appropriate future project funding for decarbonisation projects. As such, all current and future decarbonisation opportunities and the offset strategy relating to Safeguard Mechanism Credits (**SMCs**) and Australian Carbon Credit Unit (**ACCU**) purchased, rely on this internal governance structure to proactively monitor, identify and secure as required.

BCM has already been identified as a Safeguard Facility and is subject to the Safeguard Mechanism. The emission goals for MOD 10 will be to:

- Operate within the prescribed baseline emission decline rate for Safeguard baselines (that is, 4.9% per year to 2030, followed by 3.285% per year thereafter).

¹ <https://ageis.climatechange.gov.au/>

- Operate with an emission intensity below the industry default emissions intensity.

In addition to the measures presented, BCM/ IA is committed to continual review and improvement of:

- Available technologies to reduce electricity consumption including solar and battery storage;
- Available technologies to reduce/replace diesel motors;
- Low emission / alternative-fuel fleet options in medium term;
- Encouraging staff to car-pool to and from work;
- Light vehicle replacement strategy;
- A business carbon management policy and roadmap that will form part of the IA decarbonisation strategy; and
- Continued participation on a number of industry bodies such as Low Emission Technology Australia to ensure ongoing commitment and continuous improvement in relation to emissions reduction initiatives, policy changes and industry readiness.

1.0 Introduction

Boggabri Coal Operations Pty Ltd (BCOPL), a subsidiary of Idemitsu Australia Pty Ltd (IA), is seeking approval to modify its approved mining operations under State Significant Development (SSD) 09_0182 for the Boggabri Coal Mine (BCM), hereafter referred to as MOD 10. Approval is sought via an application made under Section 4.55 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act). MOD 10 seeks approval to recover additional known coal resources within the mining authorities held for the BCM, but which are located outside of the currently approved Mine Disturbance Boundary.

MOD 10 comprises:

- Continued mining into the Modification Mining Area;
- Mine below MOD 8 mine plan within approved Mine Disturbance Boundary;
- Mine into Modification Disturbance Footprint (85 ha of additional disturbance);
- Mine to the Templemore Seam (depth approved by MOD 8);
- An additional recovery of approximately 30 Mt of ROM coal (25 Mt Product Coal);
- Maintain current ROM coal production rate at 8.6 Mtpa, and;
- Extend mine life by a further 4 years to 2040.

The project is classified as a large emitter as it meets the NSW Guide for Large Emitters Criteria as outlined in Section 2.1 Criteria for when this guide applies (pg. 11-12) of the EPA NSW Guide for Large Emitters – Guidance on how to prepare a greenhouse gas assessment as part of NSW environmental planning process, January 2025.

The coal mining activity includes vegetation clearance, topsoil removal/storage, overburden removal, blasting, coal extraction, coal processing, coal storage, waste movement, equipment and infrastructure maintenance activities and site rehabilitation.

This report presents an outline of Boggabri Coal GHG assessment requirements relevant to the proposed MOD 10 application. This report supports information to the Response to Submissions phase of assessment.

The assessment provided below has been sourced from:

- Boggabri Coal Mine Modification 10 (MOD 10). Xenith Consulting May 2025. Appendix E: Boggabri Coal Mine Modification 10 Air Quality and Greenhouse Gas Assessment – Airen Consulting – 23 May 2025
- Boggabri Coal Mine Modification 10 Response to Submissions. Xenith Consulting October 2025.

2.0 Background

Boggabri Coal Operations Pty Ltd (BCOPL) operates the Boggabri Coal Mine (BCM) on behalf of Idemitsu Australia Pty Ltd (IA) and its joint venture partners. The BCM is an open cut mine located approximately 15 kilometres (km) north-east of the township of Boggabri in the North West Region of New South Wales (NSW), wholly within the Narrabri Local Government Area (LGA).

BCM is within the Leard Mining Precinct, being located immediately adjacent to the Tarrawonga Coal Mine (TCM) to the south and Maules Creek Coal Mine (MCCM) to the north. BCM is part of the Boggabri, Tarrawonga, Maules Creek Coal Mining Complex (BTM Complex).

Table 1 below provides a summary of the currently approved operations at BCM.

Table 1 BCM Approved Operations

Component	Current Approval SSD 09_0182 (MOD 11)
Approved Mine Life	Mining operations until 31 December 2036.
Project Disturbance	2,047 ha.
Annual Production	Peak ROM coal production rate up to 8.6 Mtpa.
Coal Resources	Total coal resource estimate of 173.1 Million tonnes (Mt) of ROM coal. Target coal seams are from Herndale to the Templemore Seam. Depth of mining approved to 380 m.
Coal Processing	Up to 4.2 Mt of ROM coal to be processed in the CHPP in any calendar year.
Saleable Product	159 Mt of product coal.
Operational Hours	24 hours per day, seven days per week.
Full Time Equivalent (FTE) Employees	An average of 740 FTE employees for the period from 2023 to 2036 with a peak number of 876 FTE employees.
Mining Method – Overburden	Overburden extraction, transport and emplacement using shovel, truck and excavator. Up to 73.3 Million bank cubic metres (Mbcm) of overburden handled in the peak year modelled (i.e. 2027).
Mining Method – Coal Rejects/Tailings Management	Coal recovery using truck and shovel/ loaders. Co-disposal of approximately 8.7 Mt of reject material in pit for the period 2025 to 2036 (a total of 17.1 Mt over the life of SSD 09_0182).
Infrastructure	Mine Infrastructure Area (MIA) (as upgraded) including bath house and administration offices, fuel farm, vehicle wash bay, a two-bay and six-bay workshops, stores building, compound and laydown areas. Ancillary infrastructure (e.g. explosive magazines, oily water separator, crib huts, laydown pads, etc.). Power and communications infrastructure, including substation to transform the supply power voltage from 132 kilovolt (kV) to 11 kV. Coal Handling and Preparation Plant (CHPP): For selective washing of ROM coal to meet market demands. Feed surge bin to convey crushed coal to the CHPP at up to 500 tonnes per hour (tph). Heavy medium cyclone module and spirals technology with capacity up to 500 tph. Rejects bin (receives coarse and fine reject materials). 600,000 tonnes (t) of product coal stockpiles with associated underground reclaim system (with an additional stockpile capacity approved to receive ROM coal from the Tarrawonga Mine (subject to commercial agreement) that can be used by BCM). Train Loading: Rail spur, loop and train loading facilities. Operation of a mobile crushing plant within the approved Mine Disturbance Boundary. Pre-Shift Start-up Infrastructure.
Water Management	Water management system which separates clean, dirty and contaminated water streams.

Component	Current Approval SSD 09_0182 (MOD 11)
	Reuse of dirty and contaminated water to supplement dust suppression and other demands. Offsite water from Namoi River and associated alluvial aquifer utilised to meet water demands. Final Landform that is self-draining to the natural environment with drainage design objectives consistent with the original 2010 EA.
Site Access and Roads	Access via Kamilaroi Highway and the BCM mine access road. Access to the Pre-shift Start-up Infrastructure via the existing BCM mine access road and southern portion of the former Leard Forest Road.
Coal Transport	Up to 8.6 Mtpa of product coal transported via rail to market from BCM. Up to 3 Mtpa of product coal from TCM (subject to commercial arrangement). Maximum total of 10 Mtpa of coal railed via the Boggabri Rail Spur and loop. Up to 11 trains per day. Transport minor quantities (200 t per year) of coal by road for testing or marketing purposes.
Rehabilitation and Final Landform	Final landform that drains to the natural environment. Integrate mine planning with adjoining mines to minimise environmental impacts. Maximum height of the OEA of 400 m, which incorporates macro relief elements. Partially infilled mining void, minimising the size and depth of the final void which retains no surface water (i.e. no pit lake). Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems, including: Local native plant species; A landform consistent with the surrounding environment; and Ensure public safety.
Noise	Private receivers which were predicted to receive noise levels greater than Intrusive Criteria within the 2010 EA are identified with acquisition rights within SSD 09_0182. Noise monitored and managed in accordance with measures detailed within the <i>BCOPL Noise Management Plan (NMP)</i>.
Blasting	Blasting 9 am to 5 pm Monday to Saturday only, excluding public holidays. One blast per day, maximum of 4 blasts per week.
Interactions with other operations	Approvals are held to handle, process and transport coal from TCM (subject to commercial arrangement). Common boundary landform design in accordance with the Common Boundary Agreement. Joint rail spur with MCCM. BTM Complex Strategies, Plans and Programs.
Vegetation Corridor	250 m of land on the southern side (BCM side) of the joint boundary with neighbouring MCCM (to achieve a total of 500 m of native woodland vegetation between the mining areas).

In May 2025, BCM lodged a modification application (referred to as MOD 10).

The additional mining operations sought by MOD 10 would involve the following changes beyond that approved by MOD 11 to SSD 09_0182:

- An additional 85 ha of disturbance within the existing Project Boundary and beyond the disturbance footprint currently approved for BCM. The existing Vegetation Corridor will be maintained as conditioned in SSD 09_0182;
- Mining will continue to recover coal down to the Templemore Coal Seam within the existing Mine Disturbance Boundary recovering up to 15.4 Million tonnes (Mt) (approximate) of additional ROM coal resource;
- Operations in the Modification Disturbance Footprint will allow the mining of resources down to the Templemore Coal Seam. This is an additional 14.5 Mt of ROM coal;
- An additional four years of mining activities until the end of 2040;
- Changes to the conceptual final landform design (for MOD 8 and changes proposed for MOD 10) to reflect the additional overburden materials to be mined and the increase in mining area; and

- Amendments to the Conceptual Final Landform design resulting from the additional mining proposed.

There are no proposed changes to the currently approved mining methods, annual ROM coal extraction rate of up to 8.6 Mtpa, the operational workforce, nor the coal seams approved to be mined at BCM. Further to this, MOD 10 does not seek to change the approved operational hours, mining related infrastructure, water management system, coal handling and processing, transport methods and rates or access to the BCM.

3.0 Legislative and Policy context

3.1 Overview

GHG is a collective term for a range of gases that are known to trap radiation in the upper atmosphere, where they have the potential to contribute to the greenhouse effect (global warming). GHGs include:

- Carbon dioxide (CO₂); by far the most abundant GHG, primarily released during fuel combustion.
- Methane (CH₄); generated from the anaerobic decomposition of carbon-based material (including enteric fermentation and waste disposal in landfills).
- Nitrous oxide (N₂O); generated from industrial activity, fertiliser use and production.
- Hydrofluorocarbons (HFCs); commonly used as refrigerant gases in cooling systems.
- Perfluorocarbons (PFCs); used in a range of applications including solvents, medical treatments and insulators.
- Sulphur hexafluoride (SF₆); used as a cover gas in magnesium smelting and as an insulator in heavy duty switch gear.

It is common practice to aggregate the emissions of these gases to the equivalent emission of carbon dioxide. This provides a simple figure for comparison of emissions against targets. Aggregation is based on the potential of each gas to contribute to global warming relative to carbon dioxide and is known as the global warming potential (GWP). The resulting number is expressed as carbon dioxide equivalents (or CO₂-e).

GHG emissions that form an inventory can be split into three categories known as ‘Scopes’. Scopes 1, 2 and 3 are defined by the Greenhouse Gas Protocol² (WRI, 2004) and can be summarised as follows:

- Scope 1 – Direct emissions from sources that are owned or operated by the organisation (examples include combustion of diesel in company owned vehicles or used in on-site generators).
- Scope 2 – Indirect emissions associated with the import of energy from another source (examples include importation of electricity or heat).
- Scope 3 – Other indirect emissions (other than Scope 2 energy imports) which are a direct result of the operations of the organisation but from sources not owned or operated by them (examples include business travel, by air or rail, and product usage).

The purpose of differentiating between the scopes of emissions is to avoid the potential for double counting, where two or more organisations assume responsibility for the same emissions.

3.2 Federal Policy

Conference of Parties

The 21st yearly session of the Conference of Parties (COP), held in Paris in 2015, was pivotal for developing an international treaty on climate change. It resulted in “The Paris Agreement”, an

² The Greenhouse Gas Protocol is a collaboration between the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD). The Protocol provides guidance on the calculation and reporting of carbon footprints.

agreement 'to achieve a balance between anthropogenic (human induced) emissions by sources and removals by sinks of greenhouse gases in the second half of this century'. Subsequent COPs have sought to develop policy architecture to deliver on the commitments of COP21. In particular, following COP21, international agreements were made to:

- Keep global warming well below 2.0 degrees Celsius, with an aspirational goal of 1.5 degrees Celsius (based on temperature pre-industrial levels).
- From 2018, countries are to submit revised emission reduction targets every five years known as Nationally Determined Contributions (NDCs), with the first being effective from 2020, and goals set out to 2050.
- Define a pathway to improve transparency and disclosure of emissions.
- Make provisions for financing the commitments beyond 2020.

The *Climate Change Act 2022* operates as 'umbrella' legislation to implement Australia's net-zero commitments. It codifies Australia's net 2030 and 2050 GHG emissions reductions targets under the Paris Agreement including targets to cut emissions by 43% by 2030 from 2005 levels and achieve net zero emissions by 2050. On 18 September 2025, the Federal Government announced Australia's 2035 NDC under the Paris Agreement, setting a national target to reduce emissions by 62-70% below 2005 levels by 2035. To support the transition to new zero, the Australian Government has released Australia's new Net Zero Plan and sector plans, including a Resources Sector Plan - <https://www.dcceew.gov.au/climate-change/emissions-reduction/net-zero>.

National Greenhouse and Energy Reporting Act 2007

The Federal Government uses the *National Greenhouse and Energy Reporting Act 2007* (NGER Act) for the measurement, reporting and verification of GHG emissions in Australia. This legislation is used for a range of purposes, including international GHG reporting. Under the NGER Act, constitutional corporations in Australia which exceed thresholds for GHG emissions or energy production or consumption are required to measure and report data to the Clean Energy Regulator (CER) on an annual basis.

The NGER Act defines facility and corporate group emission thresholds. The facility thresholds are:

- 25,000 t or more CO₂-e (scope 1 and scope 2 emissions);
- Production of 100 terajoules (TJ) or more of energy; or
- Consumption of 100 TJ or more of energy.

The *National Greenhouse and Energy Reporting (Measurement) Determination 2008* (Measurement Determination) identifies several methodologies to account for GHGs from specific sources relevant to MOD 10. This includes emissions of GHGs from direct fuel combustion (fuels for transport energy purposes), emissions associated with consumption of power from direct combustion of fuel (e.g. diesel generators used during construction), and from consumption of electricity from the grid.

The Measurement Determination provides methods, criteria, and measurement standards for calculating and reporting GHG emissions and energy data under the NGER Act. It covers Scope 1 and Scope 2 emissions and energy production and consumption. The Measurement Determination is primarily used for historical reporting of activities. The calculation methodologies for BCM have been based on the National Greenhouse Accounts (NGA) Factors as the NGA Factors are used for the purposes of project assessment.

Safeguard Mechanism

The Safeguard Mechanism has been in place since 1 July 2016 and is a legislated framework that applies to all facilities that emit more than 100,000 tonnes of CO₂-e of Scope 1 emissions (emissions produced on-site) in a year. The Safeguard Mechanism places a limit on the amount of greenhouse gases Australia's largest industrial facilities can emit by assigning each facility covered by the

Mechanism a 'baseline'. Each year, every large facility within the Safeguard Mechanism reports their emissions to the CER. Any facility that emits more GHGs than allowed by their baseline has to take actions to reduce or offset their emissions.

Reforms to the Safeguard Mechanism took effect from 1 July 2023. Under these reforms, new baseline emissions numbers ('baselines') for designated large facilities are set on a declining trajectory aligned with achieving Australia's emissions reduction targets set out in the *Climate Change Act 2022* and its NDC. The decline rate for Safeguard facility baselines is currently 4.9% per year to 2030, and the Government has indicated that this will reduce to 3.285% per year from 1 July 2030 (with the decline rate to thereafter be set in 5-year blocks). The BCM is a Safeguard facility and will need to reduce its emissions in accordance with the Mechanism's emissions reduction targets (see section 5. below).

3.3 State Policy

Table 2 summarises the NSW Government legislation and policy documents that are relevant to MOD 10. Only the Net Zero Plan refers directly to coal mining.

Table 2 Relevant NSW Government Legislation and Policy

Title	Description
<i>Climate Change (Net Zero Future) Act 2023</i>	Legislates NSW Government's targeted reductions in GHG emissions of 50% of 2005 levels by 30 June 2030, 70% of 2005 levels by 30 June 2035, and net zero emissions by 2050. The Act does not impose any direct obligations on companies or facilities.
NSW Climate Change Policy Framework	Sets out the NSW Government's long-term goals of achieving net-zero emissions by 2050, and making NSW more resilient and better adapted to a changing climate.
Net Zero Plan Stage 1: 2020-2030	Foundation for the NSW Government's action on climate change. It outlines the NSW Government's plan to grow the economy, create jobs and reduce emissions during the 2020s.
Net Zero Plan Stage 1: 2020-2030 Implementation Update 2021 Net Zero Plan Stage 1: 2020-2030 Implementation Update 2022	These provide updates on the key achievements of the NSW Government under the Net Zero Plan and commit NSW to reducing emissions by 50% below 2005 levels by 2030, and 70% below 2005 levels by 2035.
NSW Climate Change Adaptation Strategy	Sets out the NSW Government's strategic approach for managing the impacts of climate change on the State.
NSW Waste and Sustainable Materials Strategy 2041	Sets out how NSW will transition to a circular economy over the next 20 years, including key reforms for reducing GHG emissions from materials (embedded carbon) and the waste sector.

The EPA is the primary environmental regulator for NSW. Although it has historically regulated some GHGs, the EPA has traditionally focussed on local and regional impacts on health and the environment. It has recently expanded its focus to more explicitly regulate the causes and consequences of climate change in NSW. Table 3 summarises the EPA legislation and policy documents that are relevant to climate change for MOD 10.

Table 3 Relevant EPA Legislation and Policy

Title	Description
<i>Protection of the Environment Administration Act 1991</i>	Outlines the EPA's statutory objectives and duty to address climate change. Section 6 of the Act outlines the EPA's statutory objectives to protect the environment and human health. The key elements are: - to protect, restore and enhance the quality of the environment in NSW, having regard to the need to maintain ecologically sustainable development - to reduce the risks to human health and prevent the degradation of the environment, including by taking action in relation to climate change. Section 9 of the Act imposes a statutory duty on the EPA to develop environmental quality objectives, guidelines and policies to ensure environment protection. This includes protection of the environment from climate change.
<i>Protection of the Environment Operations Act 1997</i>	Sets out EPA's statutory powers and regulatory tools, including environment protection licensing. Schedule 1 of the Act sets out the types of activities that need a licence. The EPA is required to consider its statutory objectives (above) when exercising its licensing functions.
Climate Change Policy (EPA 2023)	Supports and builds upon NSW Government's climate change policies and initiatives. The main purpose is to address: - the EPA's statutory objectives to protect, restore and enhance the quality of the environment in NSW, and to reduce the risks to human health and prevent the degradation of the environment - the EPA's statutory duty to develop environmental quality objectives, guidelines and policies to ensure environment protection from climate change.
Climate Change Action Plan 2023-26	Designed to deliver the Climate Change Policy. The Action Plan sets out: - the specific actions the EPA will take over the three years that it covers - the regulatory action the EPA will consider over the medium to longer term, where an increased regulatory response may be required to support the NSW Government's climate change commitments and policies, including achieving net-zero emissions in NSW by 2050.
Strategic Plan 2024–29	Describes how the EPA will deliver stewardship for the environment to protect, restore and enhance the environment and human health. It sets out commitments to effective regulation and a focus on high quality environmental outcomes across all of EPA's work. The plan details objectives and outcomes for three key areas: - caring for country - driving action on climate change - enabling a safe circular economy.
Waste Delivery Plan	Outlines the actions the EPA take to reduce the harmful impact of waste and drive behaviours that create a circular economy. The Waste Delivery Plan includes actions to reduce carbon emissions and building the resilience of the waste sector to climate change.

In January 2025, the EPA finalised its GHG assessment requirements in the “NSW Guide for Large Emitters” (EPA, 2025) (Guide). The Guide outlines the assessment requirements for new projects likely to have large emissions and proposed modifications of existing facilities likely to significantly increase their emissions. There are two main tests to determine the applicability of the Guide. These consider whether the project is a large emitter, and if these emissions will be “significant” based on the development type.

In July 2025, the EPA released its Consultation Drafts for “*Climate Change Mitigation and Adaptation Plans: Proposed Mitigation Requirements*”, and the *Proposed Greenhouse Gas Mitigation Guide for NSW Coal Mines*”. BCM's parent company Idemitsu Australia has been a member of the NSW EPA Climate Change Mining Advisory Group and actively involved in the development of and consultation on the Consultation Drafts.

4.0 Project description and staging

The BCM modification will result in emissions across distinct project phases. No construction phase is proposed as part of the MOD10 approvals as this modification seeks to approve continuation of operation only. The assessment considers Scope 1, Scope 2 and Scope 3 emissions for each stage (refer to Table 4).

Table 4 Activities by Project Stage

Project Stage	Years	Key Activities	Emissions Sources or sinks	Notes
Operations (Approved)	2025–2036	Overburden removal, coal extraction, CHPP, rail transport, progressive rehabilitation. Introduction of Boggabri Solar Farm and Battery Storage initiatives for Scope 2 reduction.	Scope 1 (diesel, fugitive, blasting), Scope 2 (electricity), Scope 3 (coal use, transport), vegetation regrowth from progressive rehabilitation	From approved baseline as per MOD 8
Operations (MOD 10)	2025–2040	Same as above for approved operation plus extended disturbance (85 ha) and additional ROM recovery, progressive rehabilitation.	Scope 1 (diesel, fugitive, blasting), Scope 2 (electricity), Scope 3 (coal use, transport), vegetation regrowth from progressive rehabilitation	Expected decrease in annual average emissions from baseline
Closure/ Rehabilitation	2040-2045	Decommission/ Landform shaping	Diesel or alternative fuel source, vegetation regrowth	Emissions decrease as operations wind down
Closure/ Rehabilitation	2040-2060+	Ecosystem establishment and development	Vegetation regrowth	Emission reduction

5.0 GHG emissions assessment

5.1 Assessment boundary

The assessment boundary includes Scope 1, 2 and 3 emissions. Scope 1 and 2 emissions include those involved in the extraction and processing of coal. Activities include vegetation clearance, overburden removal, topsoil removal/storage, blasting, coal extraction, coal processing, coal storage, waste movement, maintenance activities and site rehabilitation. Emission sources include diesel oil and grease use by mobile equipment (such as heavy, light) and stationary equipment (such as generators), fugitive and electricity use by the coal handling preparation plant (CHPP), maintenance and operating auxiliary infrastructure.

Scope 3 emissions include transport, energy production and coking coal use. Consistent with the current operations, product coal (i.e. both metallurgical and thermal products) from BCM will continue to be predominantly exported to Japan, South Korea, Netherlands, and Malaysia with no coal from BCM being sold to the domestic market. These countries are either signatories to the Paris Agreement and / or have announced or adopted domestic laws or policies to achieve their emissions targets.

The assessment boundary is summarised in Table 5.

Table 5 Summary of Scope 1, 2 and 3

Scope 1 Emissions (direct)	Scope 2 Emissions (indirect)	Scope 3 Emissions (indirect)
Fugitive emissions	Purchased electricity consumed by operation	Transport: Rail to port
Consumption of diesel	-	Transport: Shipping to international customers
Land use activities/ earth movement/ vegetation clearance	-	End use of product coal
overburden removal, topsoil removal/storage	-	-
coal extraction, coal processing, coal storage	-	-
waste movement, maintenance activities and site rehabilitation	-	-
Emission sources include diesel oil and grease use by mobile equipment (such as heavy, light) and stationary equipment (such as generators)	-	-
fugitive and electricity use by the coal handling preparation plant (CHPP)	-	-
maintenance and operating auxiliary infrastructure	-	-

The GHG source inclusions and exclusions are included below in Table 6. Emission sources include the dominant sources at coal mining operations that are often targeted by mitigation measures and of interest to stakeholders. The source exclusions represent those sources where activity data is unlikely to generate sufficient emissions to materially change impacts or influence the decision-making outcomes of stakeholders.

Table 6 GHG source inclusions and exclusions

Activity	Description	Scope
Included sources		
Diesel usage (on-site equipment)	Combustion of diesel fuel from on-site mobile and stationary plant and equipment	1
Fugitive	Fugitive emissions from the extraction of coal	1
Blasting	Detonation of explosives used for blasting	1
Vegetation clearing	Equivalent emissions from loss of carbon sink due to vegetation clearing	1
Electricity	Electricity usage	2
Transport (rail)	Transport of product coal by rail to port	3
Transport (shipping)	Transport of product coal by ship to market	3
Energy production	Combustion of thermal coal in power generators by end users	3
Coking coal use	Combustion of semi-soft coking coal by end users for steel production	3
Excluded sources		
Combustion of fuel for energy	Combustion of diesel fuel from on-site mobile and stationary plant and equipment for power generation	1
Construction diesel use	Combustion of diesel fuel from on-site equipment during the construction phase	1
Industrial processes	Sulphur hexafluoride (high voltage switch gear) Hydrofluorocarbon (commercial and industrial refrigeration)	1
Wastewater handling (industrial)	Methane emissions from wastewater management	1
Solid waste	Solid waste to landfill	3
Business travel	Employees travelling for business purposes	3
Employee travel	Employees travelling between their place of residence and HVO	3

It is noted that BCM's key Scope 1 emissions can largely be categorised into the Stationary Energy (excluding electricity generation) – mining sector / subsector using the Intergovernmental Panel on Climate Change (IPCC) Sectors (i.e. combustion of diesel fuel from on-site mobile and stationary plant and equipment).

While representing a much smaller proportion of BCM's Scope 1 GHG emissions, the following IPCC Sectors are also applicable:

- Fugitives – open cut mines (i.e. fugitive gaseous emissions released during mining from exposed coal seams);
- Land use, land use change and forestry (i.e. emissions associated with vegetation clearing); and
- Industrial process and product use (i.e. emissions associated with the use of explosives for blasting).

5.2 Emissions scenarios

The GHG emission scenario's (business as usual – BCM [as approved] and modified business - BCM [with Mod10]) are outlined in Table 7 below.

Table 7 Estimated GHG emissions from BCM with MOD 10 (including emissions from land clearing)

Year	Annual emission (Mt CO ₂ -e)								
	BCM (with MOD 8) Business as usual			BCM (with MOD 10) (Modified development)			Increment of MOD 10 (Project only)		
	Scope 1	Scope 2	Scope 3	Scope 1	Scope 2	Scope 3	Scope 1	Scope 2	Scope 3
2025	0.23	0.01	20.3	0.23	0.01	18.2	0.01	0.00	-2.1
2026	0.24	0.01	21.1	0.22	0.01	20.3	-0.01	0.00	-0.7
2027	0.26	0.01	20.4	0.21	0.01	19.9	-0.05	0.00	-0.5
2028	0.23	0.01	19.5	0.24	0.01	19.5	0.01	0.00	-0.1
2029	0.23	0.01	20.6	0.24	0.01	19.6	0.00	0.00	-1.0
2030	0.23	0.00	20.2	0.24	0.00	19.4	0.02	0.00	-0.8
2031	0.23	0.00	20.3	0.22	0.00	19.1	-0.01	0.00	-1.2
2032	0.22	0.00	17.1	0.23	0.00	19.7	0.01	0.00	2.6
2033	0.21	0.00	16.7	0.22	0.00	19.5	0.01	0.00	2.8
2034	0.19	0.00	15.0	0.22	0.00	19.6	0.04	0.00	4.5
2035	0.07	0.00	8.6	0.21	0.00	18.4	0.13	0.00	9.7
2036	-	-	-	0.21	0.00	17.7	0.21	0.00	17.7
2037	-	-	-	0.16	0.00	13.9	0.16	0.00	13.9
2038	-	-	-	0.15	0.00	13.8	0.15	0.00	13.8
2039	-	-	-	0.08	0.00	5.9	0.08	0.00	5.9
2040	-	-	-	0.02	0.00	3.6	0.02	0.00	3.6
Maximum	0.26	0.01	21.09	0.24	0.01	20.35	0.21	0.00	17.75
Average	0.21	0.00	18.18	0.19	0.00	16.75	0.05	0.00	4.25
Total	2.33	0.05	200.00	3.10	0.06	268.05	0.77	0.00	68.05

The key outcomes of the assessment are:

- The estimated highest annual incremental increase in Scope 1 emissions due to the inclusion of MOD 10, over approved operations (as per MOD 8), is 0.21 Mt CO₂-e, which represents approximately 0.05% of Australia's emissions (that is 453.45 Mt CO₂-e for 2023, the latest year of estimates available³).
- Coal produced by the BCM is predominantly exported to countries which are either signatories to the Paris Agreement and / or have announced or adopted domestic laws or policies to achieve their emissions targets.
- Whilst emissions from the end use of the coal have been calculated as Scope 3 emissions for the purposes of the MOD 10 assessment, BCOPL's customers account for these same emissions as Scope 1 emissions and are required to comply with their respective countries' emissions targets.

As stated in Section 1 of this report, this GHG assessment utilises all data contained within the MOD10 application material (Xenith, 2025(a) and (b)) and provided on the Planning Portal [MOD 10 - Increase to mine footprint and mine life | Planning Portal - Department of Planning and Environment](#).

As Boggabri Coal's approval 09_0182 (as modified) was declared an SSD on 20 June 2019 and was given subsequent to the grant of MOD 7, the comparison for the "substantially the same development" test is between any new Modification proposal (together with any Modifications made under Section 4.55 of the EP&A Act) and the development as approved as a State Significant Development (i.e. as approved with MOD 7). For a description of the MOD10 GHG emissions impacts compared to BCM (with MOD7) please refer to the Modification 10 Report (Xenith 2025(a)), Section 3.1, Section 6.1 and

³ <https://ageis.climatechange.gov.au/>

Appendix E- Air Quality and Greenhouse Gas Assessment dated 23 May 2025 prepared by Airen Consulting - section 7 (in particular Table 21).

5.3 Emissions sources (and emissions from existing operation)

The emission sources are listed in Table 8 below.

Table 8 Emission sources

Activity	Description	Scope	Emission estimation methodology
<i>Included sources</i>			
Diesel usage (on-site equipment)	Combustion of diesel fuel from on-site mobile and stationary plant and equipment (HME, light vehicles, generators)	1	Input data from BCOPL. Emission factors from NGA Factors (DCCEEW, 2024a).
Fugitive	Fugitive emissions from the extraction of coal	1	Measurement Determination Chapter 3, Part 3.2. Division 3.2.3, Subdivision 3.2.3.2, Method 2.
Blasting	Detonation of explosives used for blasting	1	Input data from BCOPL. Emission factors from NGA Factors (DCC, 2008). Blasting emissions are not reported in the more recent NGA Factors publications.
Vegetation clearing	Equivalent emissions from loss of carbon sink due to vegetation clearing	1	Calculated using "Carbon Gauge" developed by the Transport Authorities Greenhouse Group (TAGG, 2013) with respect to the total emissions distributed over the mine life in proportion to the ROM coal. Vegetation was assumed to be "Class D Open woodlands" and the biomass class was set to "Class 3:100-150 (tonnes of dry matter per hectare [t dry matter/ha])" based on BCM's location
Electricity	Electricity usage (CHPP, Workshops, Infrastructure buildings)	2	Input data from BCOPL. Emission factor projections from DCCEEW (2024b).
Transport (rail)	Transport of product coal by rail to port	3	Emission factors from the Department for Environment, Food and Rural Affairs (DEFRA) (2024) for "Freighting goods / freight train".
Transport (shipping)	Transport of product coal by ship to market	3	Emission factors from DEFRA (2024), based on "Freighting goods / cargo ship, bulk carrier".
Energy production	Combustion of thermal coal in power generators by end users	3	Input data (product coal) from BCOPL. Emission factors from NGA Factors (DCCEEW, 2024a).
Coking coal use	Combustion of semi-soft coking coal by end users for steel production	3	Input data (product coal) from BCOPL. Emission factors from NGA Factors (DCCEEW, 2024a).

Comprehensive GHG emission inventories were developed for BCM MOD 10 (Airen, 2025). **Figure 1** shows the distribution of the total life-of-mine Scope 1 and 2 emissions (as CO₂-e) by source type, based on the BCM with MOD 8. This inventory clearly identified diesel usage and electricity related emissions as the most significant sources.

Diesel use (scope 1) currently accounts for 70% of the GHG emissions from the operation, followed by electricity (scope 2) which accounts for 26% of the GHG emissions.

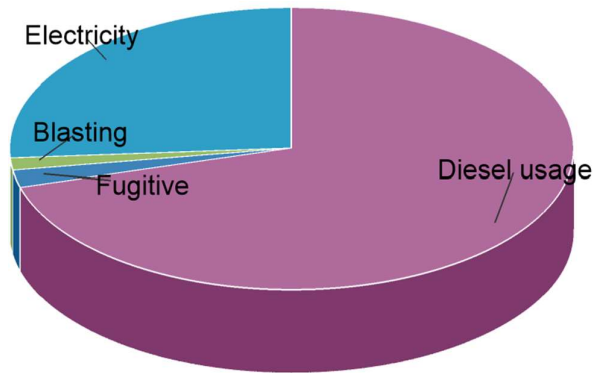


Figure 1: Distribution of Scope 1 and 2 GHG emission sources from the BCM as approved (MOD 8)

Based on the distribution above, BCOPL has targeted diesel usage and electricity sources when assessing and developing emission reduction measures for MOD 10.

In relation to fugitive emissions, the gas content included in both the Modification 8 assessment (approved by NSW January 2024) and MOD10 application (currently under assessment), was based on an analysis completed by GeoGas. GeoGas (2025) analysed at least 251 gas content samples collected over a number of years from boreholes located within the various mining seams across the mining and exploration leases, including several bores located within the now approved mining area. Three additional gas content boreholes are proposed to be drilled in August Q4 2025. In addition, a total of 349 remaining samples have been assessed to determine relations of gas content with depth, gas content with coal quality and gas composition.

In summary, the latest 2025 GeoGas analysis further supports information as previously presented for the Modification 8 application (Hansen Bailey, 2022):

- Gas content exhibits a range of between 0.1 and 1.0 m³ /t with the majority of samples (178 of 233) falling into a “low gas zone” with gas contents equal or less than 0.5 m³ /t;
- The highest gas contents does not occur within the deepest of the sampled boreholes, with the sampling suggesting a general decreasing trend in gas content with depth; and
- Calculated on a methane and carbon dioxide seam gas only basis the CH₄ to seam gas ratios for all but 18 of the 349 valid samples were lower than 20% CH₄, and the remaining samples were essentially 100% CO₂ composition.

In summary, there is no evidence of gas composition to depth correlation. Sampling, analysis, quantification and reporting of fugitive emissions although immaterial, will be ongoing, as required by the National Greenhouse Energy Reporting (NGER) scheme.

5.4 Emissions estimate

In addition to the *business-as-usual* (BCM as approved), the MOD 10 assessment has included the Solar Farm and battery storage in the assessment scenario. This is currently assumed as the best-practice mitigation case.

The Merriown Solar Farm (a 6.5MWp/4.95MVA solar farm) was successfully commissioned in September 2025. The solar farm is located behind the meter near the BCM and has commenced full-scale generation of up to 5 MW of renewable energy for the mine during daylight hours. This project will reduce the total electricity required to be sourced from the national grid from approximately 26,000 MWh (peak year) to approximately 14,000 MWh. This will reduce the total Scope 2 emissions (2025 to 2040) from 59,058 t CO₂-e to 31,305 t CO₂-e. That is, a reduction of approximately 47%.

In addition, the operation is committed to the inclusion of vanadium battery storage at the Merriown Solar Farm to further reduce electricity sourced from the national grid by approximately another 13% (approximate total of 60% reduction). Installation of the battery storage will be complete by end of 2026.

Key assumptions applied to the emissions estimate are therefore:

- Avoidance: Limited vegetation clearance prior to mining. Progressive rehabilitation to minimise cleared land area at any time.
- Minimisation: Road design optimisation, idle reduction, high-efficiency haul truck engines.
- Substitution: 60% renewable electricity supply by 2026 through the Merriown Solar Farm and battery storage.
- Offsets: Creation of offsets through forestation and regenerative agriculture. Accredited Australian Carbon Credit Units (ACCUs) for residual emissions.

As a result, the MOD 10 scenario reduces Scope 2 emissions by 2026 and achieves a reduction in Scope 1 emissions by 2030, aligning BCM's trajectory with the NSW Net Zero Plan targets.

Idemitsu Australia and BCOPL will comply with both State and Federal statutory requirements in relation to emission reduction, in addition continue to support the achievement of State targets under the NSW Net Zero Plan. Through industry participation, Idemitsu Australia is fully engaged on emerging industry obligations in, and will continue to monitor and implement emission reduction initiatives, where required.

5.5 Mitigation measures

Consistent with the NSW EPA *Guide for Large Emitters*, Boggabri Coal has applied the greenhouse gas mitigation hierarchy of avoid, reduce, abate, offset for this Modification.

Figure 2 outlines the NSW Guide for large emitters GHG emissions mitigation hierarchy.

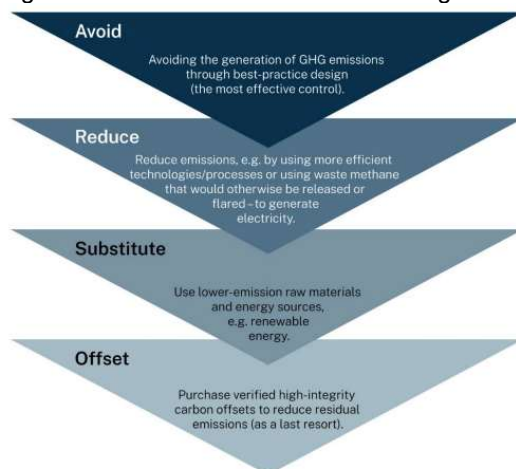


Figure 2 GHG emissions mitigation hierarchy

Consideration of avoidance, mitigation measures and offset strategies are embedded in the business planning processes of the BCM. Annual business planning processes forecast GHG emissions, assess the feasibility of mitigation measures, and develop offset strategies where emissions are not feasible to abate.

It is not currently feasible to avoid Scope 1 emissions (diesel use) as there is no current commercial supply available of biodiesel or renewable diesel for mobile fleet and stationary equipment use, and

there is no currently available electric alternative (significant uncertainties relating to battery capacity, cost, charging).

As detailed below, electricity (scope 2) will be substituted with renewable energy (on-site solar) in 2025 and the installation of a Vanadium Redox Flow Battery (VRFB) will be completed by the end of 2026.

Reducing fuel and electricity usage by mobile plant and fixed equipment is an objective of mine planning and / or good operational practice. The mitigation measures to reduce the level of future GHG emissions from BCM are documented in the Air Quality and Greenhouse Gas Management Plan (which would continue for MOD 10) (BCOPL, 2024). In addition, BCM is assessing the feasibility of transitioning to hybrid/electric light vehicles and will trial solar lighting plants.

GHG emissions from the BCM are principally associated with diesel combustion and the consumption of purchased electricity.

The following management practices will continue to be implemented at BCM to minimise emissions from the combustion of diesel and electricity consumption during the life of the mine:

- Procurement and use of equipment incorporating best-practice emissions reduction technologies (e.g. high efficiency motors).
- Pre-start inspections at each shift on mobile plant and vehicles.
- Maintaining equipment in good operating order (e.g. routine servicing).
- Minimise engine idle time.
- Optimise the design of roads to minimise the distance travelled by construction equipment.
- Tracking electricity bills and fuel usage.
- Install energy-efficient electrical equipment where possible (e.g. lighting).

BCOPL has continued focus on improvements and innovation with respect to minimising GHG emissions. Short and mid-term strategies to further minimise GHG emissions have been developed since 2022 and are reviewed quarterly for progression and relevance to BCM operations and legislative obligations.

Attachment A provides a summary of published benchmarking checklist against the BCM operation. Katestone was commissioned by the NSW Department of Planning and Environment (now DPHI) to develop a benchmarking checklist of current best practices for the abatement of greenhouse gas emissions from coal projects in NSW to assist DPHI with the review of AQGMPs submitted under Conditions of Consent (Katestone, 2023).

Katestone (2023) defines current best practice, as practice that will make a material contribution to greenhouse gas emissions reduction. The benchmarking checklist (**Attachment A**) addresses current best practice for (Katestone, 2023):

- Policy, targets, and systems.
- Scope 1 emissions (i.e. largely from fuel combustion and fugitive coal seam gas).
- Scope 2 emissions (i.e. offsite electricity generation emissions).
- Scope 3 emissions (i.e. largely from coal combustion).

BCOPL will continue to benchmark against State, Federal and International best practice design and assess feasibility of implementation.

BCOPL will comply with any future NSW EPA requirements based on the finalisation and implementation of the Climate Change Mitigation and Adaptation Plans: Proposed Mitigation Requirements, and Proposed Greenhouse Gas Mitigation Guide for NSW Coal Mines.

BCOPL is committed to reducing its scope 1 GHG emissions by 4.90% each year until 2030 and will review its progress annually and align its reduction targets with State and Federal requirements from 2030 onwards (2035) to achieve net zero by 2050.



BCOPL is a Safeguard facility and will continue to comply with annual NGER reporting requirements.

Table 9 outlines the proposed mitigation measures as part of the Modification 10 application. In addition to the measures presented, BCM/ IA is committed to continual review and improvement of:

- Available technologies to reduce electricity consumption;
- Available technologies to reduce/replace diesel motors;
- Encouraging staff to car-pool to and from work;
- Light vehicle replacement strategy;
- A business carbon management policy and roadmap that will form part of the IA decarbonisation strategy.

Table 9 Proposed mitigation measures

Mitigation measures proposed	Description	Timeframe ⁽¹⁾	Estimated emission reduction for proposed mitigation measure	Immediate action for Boggabri Coal Mine operations	Proposed commitments from MOD10 application								
Progressive Rehabilitation (backfilling, revegetation)	Backfilling and rehabilitation of mined areas to reduce fugitive emissions and provide long-term carbon sequestration potential.	Ongoing through operations	An estimated⁽²⁾ reduction (expressed as a percentage (%)) over the follow periods is proposed:<table><tr><th>Period</th><th>Est. Scope 1 reduction (%)</th></tr><tr><td>2025-2030</td><td>5</td></tr><tr><td>2031-2035</td><td>10</td></tr><tr><td>2036-2040</td><td>20</td></tr></table>	Period	Est. Scope 1 reduction (%)	2025-2030	5	2031-2035	10	2036-2040	20	Review and confirm clear milestones in annual Environmental reviews and proposed closure plan updates. Update all relevant management plans to reflect closure now in 2040.	Revision of the Final Void & Mine Closure Plan (Condition 72) to reflect current Rehabilitation Strategy (Condition 71) and progressive rehabilitation targets. Inclusion of progressive rehabilitation timelines in the revised closure plan. Rehabilitation schedule to be updated to reflect closure move from 2036 to 2040.
Period	Est. Scope 1 reduction (%)												
2025-2030	5												
2031-2035	10												
2036-2040	20												
		Medium to long term feasibility		<u>Regenerative Agriculture and Reforestation:</u> field studies have been finalised and BCOPL are progressing with the registration of the Project. This is anticipated to commence implementation in Horizon 2 2025.									
Energy Efficient Plant and Maintenance (reduce diesel use/ Scope 1)	Use of modern, fuel-efficient fleet; regular servicing and maintenance to reduce diesel consumption.	Immediate and ongoing	An estimated⁽²⁾ reduction (expressed as a percentage (%)) over the follow periods is proposed:<table><tr><th>Period</th><th>Est. Scope 1 reduction (%)</th></tr><tr><td>2025-2030</td><td>1</td></tr><tr><td>2031-2035</td><td>5</td></tr><tr><td>2036-2040</td><td>10</td></tr></table>	Period	Est. Scope 1 reduction (%)	2025-2030	1	2031-2035	5	2036-2040	10		Ongoing commitments to maintain efficient plant and review equipment purchases where appropriate.
Period	Est. Scope 1 reduction (%)												
2025-2030	1												
2031-2035	5												
2036-2040	10												

Mitigation measures proposed	Description	Timeframe ⁽¹⁾	Estimated emission reduction for proposed mitigation measure	Immediate action for Boggabri Coal Mine operations	Proposed commitments from MOD10 application								
Low emission / alternative-fuel fleet options (hybrids, biodiesel)	Assessment and potential use of hybrid or alternative-fuel mobile equipment as technology matures/become feasibly viable.	Medium to long-term feasibility (as technology becomes available).	An estimated⁽²⁾ reduction (expressed as a percentage (%)) over the follow periods is proposed: <table><tr><th>Period</th><th>Scope 1 Est. reduction (%)</th></tr><tr><td>2025-2030</td><td>5</td></tr><tr><td>2031-2035</td><td>10</td></tr><tr><td>2036-2040</td><td>20</td></tr></table>	Period	Scope 1 Est. reduction (%)	2025-2030	5	2031-2035	10	2036-2040	20	Continuation of site-wide fuel consumption tracking that has been implemented to measure and monitor: The review of fuel efficiencies in production, including Hierarchy road rules and engine Control Card upgrades; Fuel burn per base cubic metre of material moved; Fuel burn of 930E truck fleet; Total fuel consumption.	Continual review and monitoring of market ready options. Implementation of the finalised Greenhouse Gas Mitigation Guide for NSW Coal Mines. Will be dependent on NSW EPA direction on Tier 4 engines which are restricted to maximum B7
Period	Scope 1 Est. reduction (%)												
2025-2030	5												
2031-2035	10												
2036-2040	20												
Electrification of equipment	Electrified equipment to replace diesel	Long term feasibility	An estimated⁽²⁾ reduction (expressed as a percentage (%)) over the follow periods is proposed: <table><tr><th>Period</th><th>Scope 1 Est. reduction (%)</th></tr><tr><td>2025-2030</td><td>0</td></tr><tr><td>2031-2035</td><td>5</td></tr><tr><td>2036-2040</td><td>10</td></tr></table>	Period	Scope 1 Est. reduction (%)	2025-2030	0	2031-2035	5	2036-2040	10	Feasibility study of transition to electric light vehicles. Trial of electric lighting plants	Continual review and monitoring of market ready, available, feasible options.
Period	Scope 1 Est. reduction (%)												
2025-2030	0												
2031-2035	5												
2036-2040	10												
Electricity supply optimisation and renewables (onsite solar, grid supply)	Preference for carbon-neutral grid electricity; investigation of renewable integration (e.g. solar, off-grid renewables).	Immediate	An estimated⁽²⁾ reduction (expressed as a percentage (%)) over the follow periods is proposed: <table><tr><th>Period</th><th>Scope 2 Est. reduction (%)</th></tr><tr><td>2025-2030</td><td>60</td></tr><tr><td>2031-2035</td><td>80</td></tr><tr><td>2036-2040</td><td>90</td></tr></table>	Period	Scope 2 Est. reduction (%)	2025-2030	60	2031-2035	80	2036-2040	90	<u>Merriown Solar Farm</u> . Having been successfully commissioned in late September 2025, the solar facility has commenced full-scale generation of up to 5 MW of renewable energy for the mine during daylight hours, expected to reduce CO2 emissions by approximately 5,000 tons in its first year of operation . The Solar Farm aims to provide enough energy to support all BCM's daytime operations. This initiative will result in a significant decrease in BCM's electricity consumption from the grid.	Continual review and monitoring of market ready options.
Period	Scope 2 Est. reduction (%)												
2025-2030	60												
2031-2035	80												
2036-2040	90												

Mitigation measures proposed	Description	Timeframe ⁽¹⁾	Estimated emission reduction for proposed mitigation measure	Immediate action for Boggabri Coal Mine operations	Proposed commitments from MOD10 application
				<u>Battery Storage</u> Installation of a 12.6 MWh vanadium flow battery (VFB) with 6.3 hours of energy storage (installation expected to be complete by end 2026).	
		Medium term: feasibility and integration plan 2+years; staged implementation as grid or contract options permit.		Continuation investigation into: Hydrogen injection trial on haul trucks to decrease diesel usage.	Inclusion of electricity decarbonisation pathway in the proposed Climate Change Mitigation and Adaptation Plan, including timing for renewable integration, where feasible and appropriate
Methane / fugitive emissions monitoring and management (detection, possible capture or flaring)	Monitoring of coal seam gas release; evaluation of capture or flaring technology where technically and economically feasible.	Ongoing monitoring	Not applicable	Ongoing monitoring based on current management practice.	The testing and analysis conducted since 2009 has shown that gas contents in the existing and future coal seams at the BCM have been consistent and relatively low. Current monitoring practices will continue to monitor as directed by specialist.
Water & materials handling efficiency (reduce energy from pumping / haulage)	Minimising double-handling of overburden/coal; efficient pumping systems to reduce energy demand.	Immediate and ongoing: include in operating procedures and annual audits.	An estimated ⁽²⁾ reduction (expressed as a percentage (%)) over the follow periods is proposed:		Where appropriate, efficiency measures (minimising double-handling, pump efficiency) should be included in operational management plans / EMs.
			Period	Scope 1 Est. reduction (%)	
			2025-2030	5	
			2031-2035	10	
			2036-2040	20	

Mitigation measures proposed	Description	Timeframe ⁽¹⁾	Estimated emission reduction for proposed mitigation measure	Immediate action for Boggabri Coal Mine operations	Proposed commitments from MOD10 application								
Transport and haulage optimisation; employee travel measures	Efficient haul route design; traffic management to minimise diesel usage; employee carpooling/bus services encouraged.	Immediate and ongoing: revise Traffic Management Plan and implement employee transport measures as appropriate and feasible.	An estimated⁽²⁾ reduction (expressed as a percentage (%)) over the follow periods is proposed:<table><tr><th>Period</th><th>Scope 1 Est. reduction (%)</th></tr><tr><td>2025-2030</td><td>5</td></tr><tr><td>2031-2035</td><td>10</td></tr><tr><td>2036-2040</td><td>20</td></tr></table>	Period	Scope 1 Est. reduction (%)	2025-2030	5	2031-2035	10	2036-2040	20	Commitment to fleet optimisation and improvement: For example, installation of engine control card upgrades for the Komatsu 930 fleet is complete. Review of trial to be completed Q3 2025. Following this, investment in additional fleet (e.g. Cummins engine fleet) will be reviewed.	Continuation of transport demand measures (carpooling)). Continuation of haul route optimisation and truck scheduling. Continual review and monitoring of market ready options for feasibility.
Period	Scope 1 Est. reduction (%)												
2025-2030	5												
2031-2035	10												
2036-2040	20												
Climate Change Mitigation and Adaptation Plan (formal plan) / monitoring and reporting	Development and implementation of a formal plan (as required by NSW EPA Large Emitters Guidance) to identify new abatement opportunities over time.	Post-approval	--		Within 12 months of approval of this Modification, Boggabri Coal will prepare and submit a Climate Change Mitigation and Adaptation Plan for approval. The plan will: Consolidate the above mitigation measures and establish clear timeframes for implementation; Include rehabilitation milestones consistent with the revised closure year of 2040; Provide a monitoring and reporting framework aligned with the NSW EPA <i>Guide for Large Emitters</i> ; and Identify how offsets (including ACCUs) will be applied, if required, to ensure that residual emissions are transparently managed.								

(1): Timeframes proposed:

Immediate – BCOPPL current and ongoing practice

Medium – within 5 year timeframe

Long-term – initiative or investigation underway, however, if feasible, implementation may be >5year timeframe.

(2): Percentage reduction for each of the proposed mitigations measures is based on the following assumptions:

It is not currently feasible to avoid Scope 1 emissions (diesel use) as there is no current commercial supply available of biodiesel or renewable diesel for mobile fleet and stationary equipment use, and there is no currently available electric alternative (significant uncertainties relating to battery capacity, cost, charging).

As detailed above electricity (scope 2) is being substituted with renewable energy (on-site solar) which commenced in 2025 and the installation of a Vanadium Redox Flow Battery (VRFB) scheduled to be completed by the end of 2026.

GHG emissions from the BCM are principally associated with diesel combustion and the consumption of purchased electricity.

IA/BCOPL will continue an active watching brief and engagement with Industry, OEM's and industry suppliers on development, trial and technology readiness of decarbonisation solutions to reduce Scope 1 and 2 emissions including alternative fuels, electrification and renewable energy, including transition technologies. Reduction goals will be reassessed as required based on market availability, feasible technology, cost, efficiency and site specific demand and requirements.

5.6 Consistency with Safeguard Mechanism

Administered under the NGER Act, the Safeguard Mechanism, which commenced in 2016 and was reformed in 2023, applies to facilities that emit more than 100,000 tonnes of covered Scope 1 carbon dioxide equivalent emissions (CO₂-e) per year, which includes BCM. The Safeguard Mechanism requires covered facilities to keep their Scope 1 greenhouse gas emissions below an annual emissions limit, known as a baseline. These baselines are reduced at a default decline rate of 4.9% per annum to 2030.

Baselines are set each year based on a covered facility's production multiplied by an emissions-intensity value. However, the relevant emissions-intensity value is gradually being transitioned from facility-specific emissions-intensity values (that is, tonnes of emissions per unit of production based on site-specific historical data) to an industry-average or default emissions-intensity value.

BCM is a Safeguard Mechanism facility and had a FY2023-24 baseline of 206,330 t CO₂-e. BCM is required to reduce its baseline emissions at a rate of 4.9% year to 2030 and, from 2030 onwards, will align with the required baseline reduction rate as set.

Safeguard Mechanism facilities with emissions below their baselines in a given financial year can generate Safeguard Mechanism Credits (**SMCs**). Credits can be banked for future use, surrendered to meet their own compliance obligations, or sold to other Safeguard facilities to meet their compliance obligations.

If a facility is in exceedance of their baseline, there are several options to manage excess emissions. These options include purchasing or surrendering Australian Carbon Credit Units (**ACCUs**) or SMCs to meet their compliance obligations or applying for a multiyear monitoring period to allow more time (up to 5 years) to reduce emissions.

IA is also required to report total Scope 1 and 2 emissions, and net energy consumed, on behalf of BCM under the National Greenhouse and Energy Reporting (**NGER**) Scheme.

As identified in Section 5.2, the GHG emission scenario's (business as usual – BCM [as approved] and modified business - BCM [with Mod10]) the emission reduction strategy will be based on the following approach:

- **Baseline:** The estimated highest annual incremental increase in Scope 1 emissions due to the inclusion of MOD 10, over approved operations (as per MOD 8), is 0.21 Mt CO₂-e, which represents approximately 0.05% of Australia's emissions (that is 453.45 Mt CO₂-e for 2023, the latest year of estimates available⁴).
- **Strategy:** Reduce onsite emissions via efficiency and renewable energy, with residual compliance met through purchase of SMCs.
- **Integration:** BCM's offset program (discuss later in **Section 7**) will be used to meet safeguard obligations, with surplus credits retired voluntarily to align with NSW Net Zero Plan commitments.

⁴ <https://ageis.climatechange.gov.au/>

5.7 Industry participation

BCM actively participates on a number of industry bodies to ensure ongoing commitment and continuous improvement in relation to emissions reduction initiatives, policy changes and industry readiness:

- the NSW EPA Climate Change Mining Advisory Group through Idemitsu's Head of HSECT, contributing to the development of the NSW EPA proposed Greenhouse Gas Mitigation Guide for NSW Coal Mines Consultation Draft and the Climate Change Mitigation and Adaption Plans: Proposed Mitigation Requirements Consultation Guide, July 2025.
- IA is an active member of the Low Emissions Technology Australia (LETA) which is a not-for-profit fund that has contributed more than A\$400m to the development of low emission projects in hard to abate sectors and unlocked a total investment of A\$1.1b. IA is also a member of the Carbon Market Institute (CMI) and were members of the Electric Mine Consortium (EMC) until it ceased in late 2024.

6.0 Emission benchmarking and goal setting

6.1 Coal quality

An assessment was undertaken by Commodity Insights (CI, 2024) on the coal quality of BCM. A comparison was made of the BCM to similar coals sold into the seaborne market to assess the relative carbon emissions that would be generated both with the Boggabri MOD10 and without it.

BCM coal is characterised by high energy, low ash premium quality thermal, semi-soft coking and pulverised coal injection (PCI) coal. A summary is provided in Table 11.

Table 11: summary of Boggabri Coal quality

Thermal coal	Semi-soft coking coal	PCI coal
Boggabri thermal coal is a high-quality coal. Its properties can be summarised as follows: ASTM classification¹ of High Volatile "A" Bituminous coal. High calorific value, consistent with the very low ash content. Fuel ratio consistent with favourable combustion performance. Low sulphur level, consistent with low SO₂ emissions and low risk of acidic corrosion. HGI values consistent with favourable milling performance. Coal nitrogen levels below the maximum levels accepted by major Asian utilities for single burn coals. High ash fusion temperatures and benign ash chemistry consistent with a low risk of troublesome ash deposition. Trace element levels within the requirements of major end-users.	Boggabri semi-soft coal is a low ash coal and can be summarised as: a high volatile content consistent with its comparatively low rank indicated by a Mean Maximum Reflectance (MMR) of 0.65%, as is the case with most semi-soft coking coals. moderate caking properties as indicated by its crucible swelling number (CSN) of 5, and its relatively low maximum fluidity of 50 ddpm. due to its favourable ash composition the inclusion of Boggabri semi-soft coal in a coking blend would not be expected to have any deleterious effects on coke quality. low levels of impurities, including sulphur and phosphorus. Coals with both low rank and low fluidity are essentially filler coals included in coking coal blends to minimise the cost of the coke oven feed, without detracting from coke quality. These coals provide a source of fusible carbon and may also be included to enhance other properties of the blend (e.g., ash content, sulphur content, ash chemistry). Boggabri semi-soft coal meets these requirements.	Boggabri PCI coal is a high volatile coal with a high calorific value and low ash content. The coal also has a low sulphur content and a low phosphorus content, which are key attributes for any coal used in the steel making process.

Commodity Insights (CI, 2024) assessed the difference in carbon dioxide emissions at the point of consumption (ie. Scope 3 emissions) between the case of the MOD10 being approved and the case of the MOD10 not being approved, and the coal being supplied by a competing jurisdiction. The CO₂ emission calculation does not consider any additional abatement and/or emission reduction measures. As Indonesia and Russia will be the largest suppliers of thermal coal into the global seaborne market over the forecast period, calculations have been provided for coals from these countries.

Based on the MOD10 mine plan, if MOD10 did not advance and was replaced in the market by coal from Indonesia, an additional 1.7 million tonnes of CO₂ emissions would be generated over the life of the proposed amendment. In other words, Boggabri MOD10 will save 1.7 million tonnes of CO₂ being emitted if it replaces Indonesian thermal coal. Comparatively, replacement coal from Russia would result in an addition 1.9 million tonnes of CO₂ emissions being generated over the same period. This highlights that Boggabri thermal coal is less carbon intensive and would therefore result in significantly less CO₂ emissions.

Boggabri metallurgical coal quality has been compared to competing export coals from Australia, Russia and the United States. Boggabri has a very favourable coal sulphur level which is comparable with that of the Russian reference coal and lower than both the Australian and USA reference coals. Commodity Insights (CI, 2024) calculated the difference in carbon dioxide emissions at the point of consumption (i.e., Scope 3 emissions) for Boggabri's metallurgical coal production.

If Boggabri MOD10 did not advance and was replaced in the market by metallurgical coal from Russia (PCI and Semi-soft) or the United States (Semi-soft), this would result in an additional 0.5 million tonnes of CO₂ emissions being generated over the life of Boggabri MOD10. This highlights that Boggabri metallurgical coal is less carbon intensive than comparative coals in Russia and the United States and would therefore result in significantly less CO₂ emissions.

6.2 GHG emission specific to MOD10 approval

The GHG emissions associated with MOD 10 have been quantified by source. Table 12 shows the calculated GHG emissions in the State, National and Global context.

Direct annual GHG emissions from MOD 10 are estimated to be 0.05 Mt CO₂-e/y, on average, representing approximately 0.011% of Australia's estimated emissions (that is 453.45 Mt CO₂-e for 2023, the latest year of estimates available). The Scope 1 and 2 incremental emissions of MOD 10 would be small in the context of global GHG emissions, but it is acknowledged that all sources of GHG emissions will contribute in some way towards the potential global, national, state and regional effects of climate change.

Table 12 Comparison of emissions in the State, National and Global context

Statistic	Value
Emissions in the State context	
Total reported NSW GHG emissions in 2022 (https://ageis.climatechange.gov.au/)	119.84 Mt CO ₂ -e
MOD 10 total average annual Scope 1 and 2 (within Australia)	0.049 Mt CO ₂ -e
MOD 10 as a proportion of NSW's annual emissions	0.041 %
Emissions in the Australian context	
Total reported Australia GHG emissions in 2022 (https://ageis.climatechange.gov.au/)	453.449 Mt CO ₂ -e
MOD 10 total average annual Scope 1 and 2 (within Australia)	0.049 Mt CO ₂ -e
MOD 10 as a proportion of Australia's annual emissions	0.011 %
Emissions in the Global context	
Total average annual Scope 1, 2, and 3 (within and outside Australia) (www.climatewatchdata.org/ghg-emissions?end_year=2021&start_year=1990)	50,800 Mt CO ₂ -e
MOD 10 total average annual Scope 1, 2, and 3 (within and outside Australia)	4.302 Mt CO ₂ -e
MOD 10 as a proportion of annual global emissions	0.008 %

Benchmarking has been undertaken against NSW and international coal mines.

- BCM's current Scope 1 and 2 emissions intensity is ~0.026 tCO₂-e per tonne of ROM coal, which is comparable to NSW open-cut mines but higher than global best practice (0.018 tCO₂-e/t ROM).

The 'Safeguard Mechanism document' (DCCEEW, 2024c) includes default emissions intensities of production for various industries. The default emissions intensity for coal mining is an average of 0.0653 tonnes of CO₂-e per tonne of ROM coal. The estimated emissions intensity of MOD 10 will not exceed the default emissions intensity and is expected to decrease over the project life.

The BCM is a Safeguard facility and is subject to the declining emissions trajectory required by the Safeguard Mechanism, in support of Australia's NDCs, which are designed to deliver a 43% reduction in emissions (on a 2005 base year) by 2030, and net zero by 2050. As such BCOPL intends to continue to consider and assess the feasibility of mitigation measures to meet its compliance position under Safeguard or to generate Safeguard Mechanism Credits (SMCs).

The emission goals for MOD 10 will be to:

- Operate within the prescribed baseline emission decline rate for Safeguard baselines (that is, 4.9% per year to 2030, followed by 3.285% per year thereafter).
- Operate with an emission intensity below the industry default emissions intensity.

The expected declining trends in emissions intensity of MOD 10 is consistent with the NSW net zero plan emissions trajectory and therefore supports NSW efforts to decarbonise. In addition to the goals above, BCOPL is investigating further measures to reduce emissions from its operations. Should these investigations demonstrate viability of some or all of these measures (or other measures), then further reductions to GHG

emissions will be realised and contribute to the reducing trend in NSW emissions. As part of BCMs commitment to prepare and implement a Climate Change and Mitigation Adaption Plan (Table 9), BCOPL will continue to investigate and monitor emerging measures and assess these for potential future implementation to achieve further reductions to GHG emissions.

7.0 Offset strategy

BCOPL has applied the mitigation hierarchy described in the “Guide for Large Emitters” (EPA, 2025) with MOD 10 primarily targeting “reduction” in order to reduce electricity and diesel related emissions. An offset strategy is not a key part of MOD 10, however BCOPL will consider and assess the feasibility of various mitigation measures to meet its compliance position and contribute to NSW Net Zero plan targets and its the Safeguard Mechanism obligations, if there are residual emissions in the future that cannot be avoided or reduced.

If any additional offsets are required based on future obligations, they will be purchased through registered Clean Energy Regulator ACCU generation projects using approved ACCU Scheme Methods, with a focus on these coming from NSW and BCOPL's proposed carbon farming project involving regenerative agriculture and reforestation. Additional offsets, when required, will be addressed via a combination of onsite and accredited offsets in line with the NSW Large Emitters Guide.

For BCM, the offset volume, if abatement technology is not feasible is:

- Estimated requirement: ~23,000 tCO₂-e per year from 2030 onwards to meet BCM's reduction trajectory.

For BCM, the offset hierarchy currently applied is:

1. Onsite projects: Regenerative agriculture and reforestation (field studies completed, project registration complete for 2026 commencement).
2. Regional projects: Contribution to Namoi Catchment reforestation corridor (under investigation).
3. Accredited offsets: Purchase of ACCUs under the Federal Emissions Reduction Fund.

Offsets will be progressively retired in accordance with Safeguard Mechanism compliance and NSW Net Zero Plan requirements.

Outlined below is a summary of current obligations and future considerations in relation to BCM's offset strategy.

7.1 IA governance

IA is an Australian subsidiary of Japanese company, Idemitsu Kosan Co.Ltd.(www.Idemitsu.com), which is listed on the Tokyo Stock Exchange and adheres to its statutory reporting requirements for shareholders.

Idemitsu Australia, and its group companies, are committed to:

- Responsibly managing the environment in which we operate;
- Contributing to society and creating a space for people to reach their potential; and
- Complying with laws, regulations, lawful directives and internal obligations.

Idemitsu Australia has an Integrated Management System which includes Standards and Policies covering Expenditure Approvals and Governance for all projects including GHG/decarbonisation related projects.

The IA project management and investment evaluation process is based on five phases:

1. Concept phase (opportunity identification);
2. Pre-feasibility phase (screening due diligence);
3. Feasibility phase (full due diligence and approval);
4. Project approval and execution phase (execution, acquisition and integration); and
5. Operation phase (ongoing management and review).

Project Approval is based on the IA approved Authorities, depending on the level of capital expenditure (e.g. decarbonisation project), approvals are required as per below:

Capital Expenditure	Per Item of Capital
Level 1 – Managing Director/IA Board	Propose to IKC (Parent Company) Board
Level 2 – Directors, Chief Executive Officer (CEO)	Propose to IA Board
Level 3 – Chief Operating Officer (COO), Chief Commercial Officer (CCO)	Propose to CEO
Level 4 – General Manager (GM)	Propose to Level 3
Level 5 – Head of Department (HoD)	Propose to Level 3
Level 6 – Deputy General Manager (DGM), Managers	Propose to Level 3
Level 7 - Superintendents	n/a
Level 8 – Officers	n/a

The IA governance summarised above is applied to all decarbonisation projects. For example, the IA project management and investment evaluation process has been applied to the both the Merriown Solar Farm and Battery Storage Projects, which have progressed from Concept (Phase 1) through to Project Approval (Phase 4). Both initiatives will be operational (Phase 5) by end of 2026.

The IA governance allows a clear process of assessment of project viability which proactively allows securing of appropriate future project funding. As such, all current and future decarbonisation opportunities and the offset strategy relies on this internal governance structure to proactively monitor, identify and secure as required.

In addition, all projects relating to proposed mitigation measures and IA's decarbonisation strategy will adhere to the offset integrity principles as outlined in the Commonwealth *Carbon Credits (Carbon Farming Initiative) Act 2011*.

7.2 Current obligations

Current BCM offset commitments include:

- NSW: Contribute to the State targets of 50% reduction by 2030, 70% reduction by 2035 and net zero by 2050;
- Current Consent conditions (Project approval 09_0182):
 - Condition 24 – The Proponent must implement all reasonable and feasible measures to minimise the release of greenhouse gas emissions from the site to the satisfaction of the Secretary

- Condition 31 – The Proponent must prepare an Air Quality and Greenhouse Gas Management Plan for the project to the satisfaction of the Secretary
- Condition 31A – The Proponent must implement an Air Quality and Greenhouse Gas Management Plan as approved by the Secretary [Note: With the introduction of the EPA's Climate Change Policy and Climate Change Action Plan, the Proponent will be required to prepare and implement a Greenhouse Gas Mitigation Plan and a Climate Change Adaptation Plan in accordance with requirements provided by the EPA].
- Appendix 5, Table 1 – BCOPL will undertake regular monitoring of greenhouse gas emissions and energy efficiency initiatives to ensure that greenhouse gas emissions per tonne of product coal are kept to the minimum practicable level.
- Federal commitment: BCOPL is a Safeguard facility and will continue to comply with annual NGER reporting requirements. BCOPL intends to continue to consider and assess the feasibility of mitigation measures to meet its compliance position under the Safeguard Mechanism or to generate Safeguard Mechanism Credits (SMCs).
- To continually monitor future and additional offset requirements, BCM currently:
 - Model/forecast the production adjusted baseline compared to forecast emissions for (i) Life of Mine and (ii) annually to understand if BCM will have residual emissions;
 - (internal governance) Idemitsu Australia/ BCM has a Carbon Unit Purchasing Standard in place;
 - (internal governance) Idemitsu Australia's Annual and Mid Term Plan (based on three (3) year forward program) commits to purchase where required ACCUs/SMCs. This is in place to monitor any future residual emissions and ensure ACCUs/SMCs are budgeted for and banked where potentially required;
 - Continual tracking on purchasing ACCUs from NSW projects. Credits to be purchased through accredited agent from the Clean Energy Regulator registered projects under the ACCU Scheme;
 - Active watching brief and engagement with Industry, OEM's and industry suppliers on development, trial and technology readiness of decarbonisation solutions to reduce Scope 1 and 2 emissions including alternative fuels, electrification and renewable energy, including transition technologies;
 - Active member of the NSW GHG Mining Advisory Committee in developing future EPA Guides and Plans.
- Registration of re-forestation and regenerative agriculture projects on BCM owned land to create ACCUs for future offsetting/relinquishment to meet obligations to achieve State and Federal targets/obligations. Project details include:
 - Commitment to a 25 year project, which will create approximately 12,900 ACCUs per year (based on approved Clean Energy Regulator methodologies) for 25 years (total approx. 323,000 ACCUs) which will be used as an offset where required.
- Project commitment of both the Merriown Solar Farm which is operational and a Battery Storage project which is proposed to be fully operational by end of 2026. This commitment will result in further reduction electricity sourced from the national grid by up to approximately 70%.

7.3 MOD10 approval (under assessment)

Obligations will be same as outlined in Section 7.1, plus any additional obligations required as part of MOD10 updated consent (09_0182) conditions.

7.4 Future obligations

As outlined in Section 7.2 and 7.3, plus commitment to future implementation of the finalised BCM Climate Change Mitigation and Adaptation Plans.

Consideration of future requirements and emerging commitments based on EPAs' Consultation Draft obligations, such as the Proposed Mitigation Requirements, and the Proposed Greenhouse Gas Mitigation Guide for NSW Coal Mines. In addition, and where commercially viable, implementation of alternative fuels and future zero emission large mining equipment (see Table 9).

7.5 Climate risk and resilience

As a commitment to continuous improvement, Idemitsu Australia will undertake:

- An annual risk assessment in relation to GHG emissions reduction and decarbonisation.
- Continual monitoring of risk assessment and register in relation to climate change – from both a local physical risk (eg. drought, flooding, extreme temperatures and impact on water resources, biodiversity and production) and consideration of business transition (eg. technology readiness, legislation and policy considerations and changes).

This information has fed into BCM's consideration of transition risks and physical risks associated with climate change.

- Transition Risks: Increasing carbon price under Safeguard Mechanism, legislative and policy reforms, potential restrictions on Scope 3 export markets, changing investor expectations.
- Physical Risks: Increased risk of flooding (Namoi catchment), higher average temperatures affecting workforce safety, and increased bushfire risk in rehabilitated areas.
- Resilience Measures: Adaptive water management, progressive rehabilitation to reduce fire risk, regular fire break maintenance and operational flexibility for heat events.

The effects of climate change have been considered within the relevant environmental impact assessments completed within the Modification Report and the Submissions Report ([MOD 10 - Increase to mine footprint and mine life | Planning Portal - Department of Planning and Environment](#)).

8.0 Conclusion

As presented in this assessment, BCOPL intends to continue to consider and assess the feasibility of mitigation measures to meet its compliance position under the Safeguard Mechanism and the NSW Net Zero plan emissions target trajectory. This assessment will be update as required to reflect current guidance and legislation requirements and in line with the proposed Boggabri Coal **Climate Change Mitigation and Adaptation Plan**.

The emission goals for MOD 10 will be to:

- Operate within the prescribed baseline emission decline rate for Safeguard baselines (that is, 4.9% per year to 2030, followed by 3.285% per year thereafter).
- Operate with an emission intensity below the industry default emissions intensity.

The expected declining trends in emissions intensity of MOD 10 is consistent with the NSW net zero plan emissions trajectory target and therefore supports NSW efforts to decarbonise.

In addition to the goals above, BCOPL is investigating further measures to reduce emissions from its operations which are presented in Table 9. Should these investigations demonstrate viability of some or all of these measures (or other measures), then further reductions to GHG emissions will be realised and contribute to the reducing the trend in NSW emissions.

Based on information as supplied in the DCCEEW NSW Greenhouse Gas Emission Projection 2024 Methods Paper (DCCEEW, 2025), emissions projections for all currently approved coal mine operations were developed. The recent DCCEEW 2024 projections included Boggabri Coal Modification 10 in their scenario projections (Scenario 3).

The business as usual (BAU) Scope 1 emissions projects for the coal mining sector are presented in Figure 21 and Figure 24 of DCCEEW (2025) and copied below for reference.

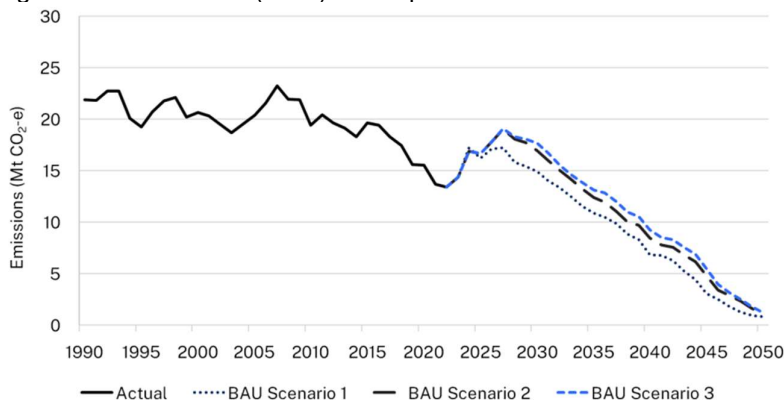


Figure 21 Scope 1 emissions for coal mining showing inventory estimates (1990–2022) and BAU emissions projections for 3 scenarios developed for the 2024 update

[Source: DCCEEW 2025, page 81 [NSW greenhouse gas emissions projections 2024](#)]

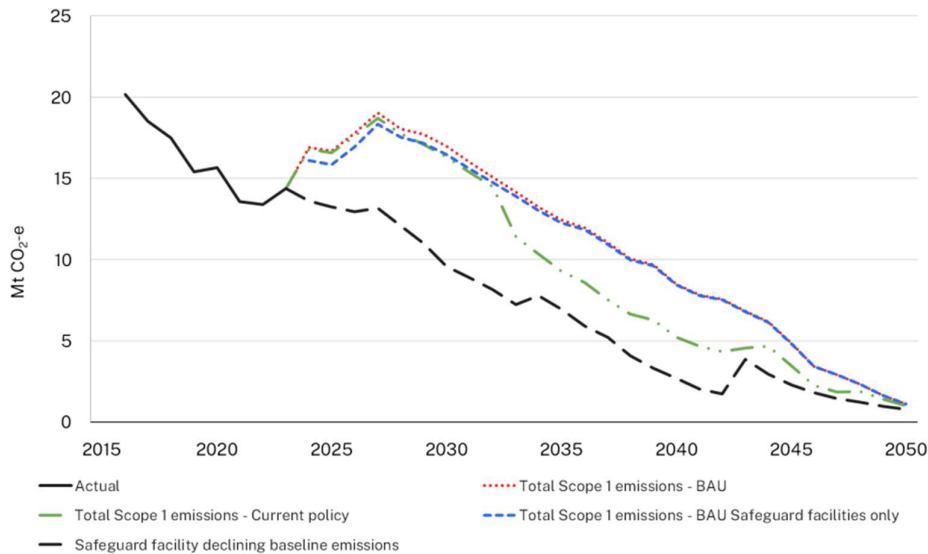


Figure 24 Scope 1 emissions for coal mining showing inventory estimates (1990 to 2022), scope 1 BAU and current policy emissions projections, scope 1 emissions for Safeguard coal mines only, and the Safeguard declining baseline for the coal mining sector (2023 to 2050)

[Source: DCCEEW 2025, page 88 [NSW greenhouse gas emissions projections 2024](#)]

If a comparison is made against the NSW data (DCCEEW, 2025) against BCM, the following assumptions can be made:

- Based on the Year 2030, DCCEEW has estimated that the NSW Scope 1 emissions contribution by coal mining (i.e, underground, open cut) is approximately 18 Mt CO₂-e (Scenario 3 Figure 21). Based on Boggabri Coal operations (inclusive of MOD10), it is estimated that at Year 2030, BCOPL Scope 1 emission is approximately 0.24 Mt CO₂-e, which equates to approximately 1.33% of Scope 1 emissions contribution from NSW coal mining.
- Based on the Year 2035, DCCEEW has estimated that the NSW Scope 1 emissions contribution by coal mining (i.e, underground, open cut) is approximately 14 Mt CO₂-e (Scenario 3 Figure 21). Based on Boggabri Coal operation (inclusive of MOD10), it is estimated that at Year 2035, BCOPL Scope 1 emission is approximately 0.24 Mt CO₂-e, which equates to approximately 1.50% of Scope 1 emission contribution from NSW coal mining.
- Based on the Year 2050, Boggabri Coal will have ceased operation based on MOD10 life of mine and will be at zero emission. If a comparison is made for Year 2040, DCCEEW has estimated that the NSW Scope 1 emissions contribution by coal mining (i.e, underground, open cut) is approximately 10 Mt CO₂-e (Scenario 3 Figure 21). Based on Boggabri Coal operation (inclusive of MOD10), it is estimated that at Year 2040, BCO Scope 1 emission is approximately 0.02 Mt CO₂-e, which equates to approximately 0.20% of Scope 1 emission contribution from NSW coal mining.

Table 13 presents the estimated Boggabri Coal Scope 1 value at year 2030, 2035 and 2040, expressed as a percentage of NSW coal mining projections and inclusive of the proposed mitigation measures.

Table13: Estimated Boggabri Coal Scope 1 values

At Year	Boggabri Coal (inclusive of MOD10) Scope 1 Annual emission (Mt CO ₂ -e) ⁽¹⁾	Estimated BCO Scope 1 emission contribution as a percentage of NSW coal mining projections ⁽²⁾	Boggabri Coal proposed Scope 1 emission reduction based on proposed mitigation measures ⁽³⁾	Estimated BCO Scope 1 emission contribution as a percentage of NSW coal mining projections ⁽²⁾ <u>inclusive of proposed mitigation measures⁽³⁾</u>
2030	0.24	1.33%	5%	1.27%
2035	0.21	1.50%	10%	1.35%
2040	0.02	0.20%	20%	0.16%

- (1) Values as presented in Table 7 of this report. This is inclusive of BCO's emission goals to operate within the prescribed baseline emission decline rate for Safeguard baselines (that is, 4.9% per year to 2030, followed by 3.285% per year thereafter).
- (2) Approximate values only as applying projections as presented in Figure 21 of DCCEEW 2025. [NSW greenhouse gas emissions projections 2024](#)
- (3) Values as presented in Table 9 of this report and shown here as an estimated maximum percentage reduction for the five year period.

The estimated values demonstrate that overall, the Boggabri Coal operation (inclusive of MOD10) inclusive of the proposed mitigation measures, and as a percentage of NSW Scope 1 coal mining projections, is small.

As part of BCOPL's commitment to prepare and implement a Climate Change and Mitigation Adaption Plan (Table 9), BCOPL will continue to investigate and monitor emerging measures and assess these for potential future implementation to achieve further reductions to GHG emissions. The IA internal governance framework allows a clear process of assessment of project viability which proactively allows securing of appropriate future project funding for decarbonisation projects.

The proposed mitigation measures successfully reduce overall NSW emission contribution and if any additional offsets are required based on future obligations, they will be purchased through registered Clean Energy Regulator ACCU generation projects using approved ACCU Scheme Methods.

9.0 References

Xenith 2025(a) Boggabri Coal Mine Modification 10 (MOD 10). Xenith Consulting May 2025. Appendix E: Boggabri Coal Mine Modification 10 Air Quality and Greenhouse Gas Assessment – Airen Consulting – 23 May 2025

Xenith 2025(b) Boggabri Coal Mine Modification 10 Response to Submissions. Xenith Consulting October 2025.

Commodity Insights 2024. Market Report. Boggabri MOD10 Report. 15 November 2024

DCCEEW, 2025. NSW Greenhouse Gas Emissions Projections 2024. Methods Paper. Department of Climate Change, Energy, the Environment and Water.

Katestone, May 2023. Best Practice Checklist for Greenhouse Gas Abatement by NSW Coal Mines. Prepared for the NSW Department of Planning and Environment. Final.

Appendix A

BCOPL acknowledge that the most effective way for short to medium term changes, is to target Scope 1 and Scope 2 emission reduction management practices. In addition to the requirements of the NSW EP Guide for Large Emitters, NSW DPHI commissioned a study on what industry benchmark may be in relation to establishment of assessment criteria for Scope 1 and Scope 2. A comparison against criteria established in this report (Katestone, 2023) to BCOPL current practices at time of this application, are summarised in Table A1 and A2 below.

Cells in **grey** and **bold** demonstrate where Boggabri Coal is currently operating.

Table A1: Review of Table 4: Benchmarking criteria for Scope 1 components of coal mine operation

Scope 1	Element	Below best practice	Best practice	Emerging Best practice	Application to BCOPL
Procurement policy	Fuel efficient vehicles	No mention of procurement policy regarding purchase of fuel-efficient vehicles	Procurement policy requiring purchase of most fuel-efficient vehicles practicable		Procurement policy implemented
Fuel use efficiency	Maintenance of fleet vehicles	No mention of schedule fleet servicing	Schedule fleet servicing	Proactive servicing of vehicles triggered by fuel monitoring system	Fuel monitoring system installed
	Maintenance of plant	No mention of scheduled plant maintenance	Schedule plant maintenance	Proactive servicing of plant triggered by fuel monitoring system	Fuel monitoring system installed
	Fleet vehicle operation	No standards, regulations, or monitoring of driver behaviour	Control system optimisation of vehicle performance and driver behaviour	Automation	Control system installed. Options for Automation currently under investigation.
	Fuel choice	Continue with petrol or diesel	Use of blended biofuels where practicable	Use of biofuels where practicable	Additional biofuel options currently being investigated by BCOPL
	Drive train			Procurement policy to replace diesel and petrol vehicles and HV, BEV or FCV ⁶ where practicable	This has been investigated by BCOPL in 2023/24 and is currently not feasible but will continue to be monitored.

Scope 1	Element	Below best practice	Best practice	Emerging Best practice	Application to BCOPL
	Haul road optimisation	No mention of haul road optimisation for energy efficiency	Haul road design optimised for energy efficient operation		Current practice in mine optimisation planning
	Haul road management	No mention of haul road maintenance	Regular maintenance of haul roads to ensure gradient and track resistance is minimised.	Maintenance and redesign of haul road if required triggered by vehicle performance monitoring	Current practice in mine optimisation planning
	Material handling	No mention of plan to minimise material handling	Annual operation plan to minimise material handling	Life of Mine Plan to minimise material handling	Current practice in mine optimisation planning
	Automation of processes	No mention of automation	Commitment to automation of certain activities across the mine	Automation and investigation of AI to ensure optimisation of mining activities	Currently under investigation
Fugitive emissions	Methane	No application of methane capture and oxidation	Implementation of VAMMIT to capture and oxidise methane	Implementation of VAMCAP and VAMCAT to capture and use methane as a supplementary fuel. Offsetting of fugitive methane emissions from open cut mines	Not applicable as currently no Open Cut technology. Monitoring in the existing and future coal seams at the BCM have been consistent and relatively low. Fugitive emissions offset as a part of Safeguard mechanism.
	Sulphur hexafluoride (SF6)	No plan for responsible management of SF6 (if applicable)	Plan for responsible management of SF6 (if applicable)	Replacement of SF6 with non GHG (if applicable)	

Table A2: Review of Table 5: Benchmarking criteria for Scope 2 components of coal mine operation

Scope 2	Element	Below best practice	Best practice	Emerging Best practice	Application to BCOPL
Electricity consumption	Energy efficiency plan	No energy efficiency plan mentioned	Energy efficiency plan articulated		This is well advanced at BCM with commitment in both short and long term strategy
	Renewable electricity	No commitment made to purchasing renewably generated electricity	Commitment to the purchase of renewable generated electricity to power the mine site	Investment in renewable electricity generation (onsite or offsite)	Solar Farm Project commitment with construction commenced. Battery storage committed



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