# EARL GREY LITHIUM PROJECT EXPANSION

## GREENHOUSE GAS ASSESSMENT TECHNICAL REPORT

### Version 1.3.2 – Debottlenecking Scenario with updated Land Clearing Activity

Prepared by **Greenbase Pty Ltd**
On behalf of **Covalent Lithium Pty Ltd**

**Prepared September 2023**

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**Rounding of Amounts**

All $CO_2$-e and energy amounts included in this document have been rounded to the nearest Tonne and GJ respectively, except when rounding would result in a zero.

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# Summary


Covalent Lithium Pty Ltd (Covalent Lithium) is the proponent for the Earl Grey Lithium Project (the Project), located at Mt Holland, WA.

The proposed Project encompasses a mine and spodumene processing plant. The Life of Mine (LOM) is 25 years.

This greenhouse gas (GHG) assessment has been prepared to support referral under section 38 of the Environmental Protection Act 1986 (EP Act), taking into account the requirements of the Environmental Protection Authority's (EPA) Environmental Factor Guideline for Greenhouse Gas Emissions (EPA, 2023). Covalent Lithium propose to expand mining and processing capacity at Earl Grey and the cumulative effects of this alongside the existing project approval are considered in this report. The estimated GHG emissions from the Project have been calculated for this assessment to determine if the cumulative scope 1 or 2 emissions trip the 100,000tCO2e threshold where a greenhouse gas management plan is required as per 2023 EPA guidance.

Both scope 1 and scope 2 emissions are forecast to be below this 100,000tCO2e/year threshold in all years of operation.

The main sources of scope 1 GHG emissions identified in the Project are diesel combustion and land clearing. The total estimated scope 1 GHG emissions over the LOM are 1,723,850 tCO2-e. **The peak annual scope 1 emissions are estimated to peak in 2026 at 92,125 tCO2-e/annum.** 67,180tCO2e of these emissions in 2026 are biogenic emissions occurring from land use changes.

Scope 2 emissions are derived from electricity purchased from the South West Interconnected System (SWIS) grid, **The annual scope 2 emissions are estimated to peak in 2029 at 81,815 tCO2-e/annum.**

Scope 3 emissions were examined in this assessment with key emission sources identified as purchased goods and services, fuel and energy related activities, upstream transportation and distribution, employee commuting, downstream transportation and distribution, and processing of sold products. Total estimated scope 3 emissions for these sources over LOM are estimated at 28,227,572 tCO2-e. Scope 3 emissions are expected to peak in 2033 at 1,433,323 tCO2-e/annum. The emissions associated with downstream processing make up approximately 90% of these emissions.

The scope 1, 2 & 3 projections for the cumulative effects of the existing Earl Grey Lithium Project mine plan in addition to this expansion project are summarised in Table 1.

The GHG emission intensity for the Project was estimated as 0.16 tCO2-e/tonnes spodumene produced based on scope 1 & 2 GHG emissions and the forecasted spodumene production. This was lower than other peers assessed.

**Table 1 GHG Emissions Summary**

| Scope | GHG Emissions LOM (tCO2-e) | GHG Emissions Annual* (tCO2-e) | GHG Emissions During Peak Year (tCO2-e) | Estimated Peak Year |
|---|---|---|---|---|
| Scope 1 (Excluding Biogenic) | 1,296,041 | 51,842 | 87,601 | 2042 |
| Scope 1 (Including Biogenic) | 1,638,688 | 68,954 | 92,125 | 2026 |
| Scope 2 | 1,318,729 | 52,749 | 81,815 | 2028 |
| Scope 3 | 28,227,572 | 1,129,103 | 1,433,323 | 2033 |

*Average over LOM (25 years)

# 1 Introduction

## 1.1 Background

This greenhouse gas (GHG) assessment has been prepared to assess the Earl Grey Lithium Project (the Project) to determine whether it exceeds the 100,000 tCO2-e of annual scope 1 or scope 2 emissions at any stage across 25 years of operation.

The estimated GHG emissions, energy consumption and production from the Project have been calculated in this assessment and the likely contribution to regional, state and national emissions estimated.

A summary of the project details is outlined in Table 2.

**Table 2 Project Summary Table**

| | |
|---|---|
| Project Name | Earl Grey Lithium Project (the Project) |
| Proponent Name | Covalent Lithium Pty Ltd (Covalent Lithium) |
| Key Environmental factor and objective | Factor: Greenhouse Gas Emissions<br><br>EPA Environmental Objective: To maintain air quality and minimise emissions so that environmental values are protected (EPA, 2023) |
| Proposed commencement date of the Project | 2023 |

## 1.2 Earl Grey Lithium Project

The Earl Grey Lithium Project (the proposal) is to develop a pegmatite-hosted lithium deposit at the abandoned Mt Holland mine site, located 105 km south-southeast of Southern Cross, Shire of Yilgarn. The proponent for the proposal is Covalent Lithium Pty Ltd.

The main components of the proposal include mining of lithium ore and the processing of this ore to produce spodumene concentrate.

## 1.3 Australian GHG Landscape

Australian resources are nationally and globally significant from an economic and GHG perspective (Denis-Ryan *et al*, 2020). To manage Australia's contribution to global GHG's, several frameworks, agreements and policies have been put in place in recent times. The history and key points of these strategies, which underpin the basis of Australian GHG reporting, are discussed below.

The United Nations Framework Convention on Climate Change (UNFCCC) came into force in 1994 with the aim of stabilising GHG concentrations and preventing dangerous human interference with the climate system (UNFCCC, 2021). Australia, along with over 190 other countries, is a member of this Convention and submits regular reports detailing its annual and quarterly emissions, progress towards targets, projections, and mitigation actions to fulfill its reporting obligations to the UNFCCC.

Australia is also a signatory to the Kyoto Protocol, ratified in December 2007, and the Paris Agreement, ratified in November 2016. Under the Paris Agreement, Australia has committed to reducing emissions by 26-28% below 2005 levels by 2030. In June 2022, Australia updated its Nationally Determined Contribution (NDC), committing to reduce greenhouse gas emissions to 43% below 2005 levels by 2030. The revised 2030 commitment is both a single-year target to reduce emissions to 43% below 2005 levels by 2030 and a multi-year emissions budget from 2021-2030 (DCCEEW, 2022b). The purpose of the Paris Agreement is to restrict global warming to 'well below' 2oC above pre-industrial levels, with a goal of 1.5oC. The Agreement states that, in order to achieve the 1.5oC, global emissions will need to reach net zero in the second half of the century.

The National Greenhouse and Energy Reporting (NGER) scheme, established by the National Greenhouse and Energy Reporting Act 2007 (NGER Act), is Australia's national framework under which companies are required to report their GHG emissions and energy consumption and production. The objectives of the NGER scheme include informing government policy and helping to meet Australia's international reporting obligations.

In October 2021, Australia set a national net-zero target. Alongside this, each state and territory has set their own net-zero target. Additionally, many Australian businesses have pledged net-zero targets. Western Australia is committed to achieving net-zero emissions by 2050 as outlined in the Western Australian Climate Policy (Government of Western Australia, 2020b).

To further align with national and state goals of reducing and managing GHG emissions, the Government of Western Australia published the Greenhouse Gas Emissions Policy for Major Projects (State Emissions Policy) in August 2019. This Policy aims to inform the decision-making process for Environmental Impact Assessments (EIA) assessed by the EPA. Under the Policy, projects with significant GHG emissions (over 100,000 t $CO_2$-e of Scope 1 emissions per year) are required to demonstrate their ability to contribute to Western Australia's net-zero target. The Environmental Greenhouse Gas Emissions Guideline (EPA, 2023) has been prepared to further inform the EIA process.

According to recent government reports, Australia's emissions for the year to December 2022 were 464 million $tCO_2$-e (DCCEEW, 2022a). This represents a decrease of 0.4% compared to the previous year. As shown in Figure 1, Australia's emissions recorded in the last twenty years peaked in 2007 and have since been following a downward trend.

Key factors driving Australia's long-term emission trends outlined by The Department of Climate Change, Energy, the Environment and Water (DCCEEW) in its recent quarterly report (DCCEEW, 2022a) include:

- Ongoing reductions in emissions from electricity,
- Increased transport emissions reflecting a continuing recovery from the impacts of COVID restrictions on movement,
- Increased emissions from stationary energy (excluding electricity), agriculture, and fugitive emissions.

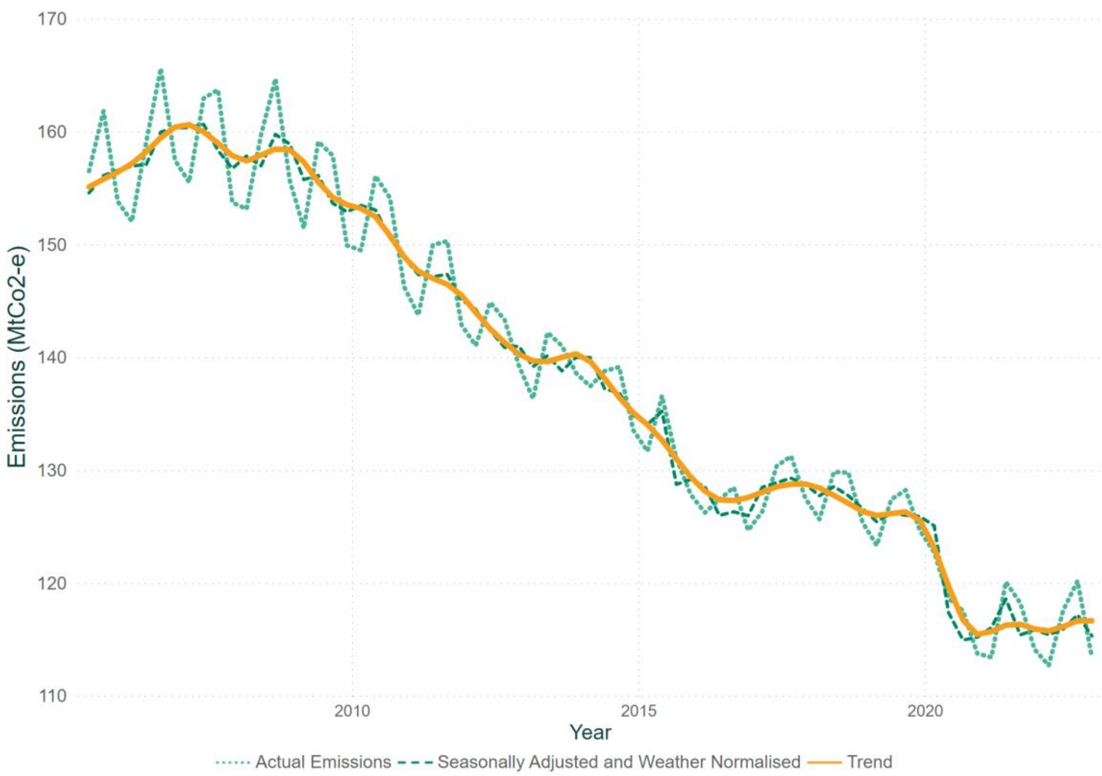


**Figure 1 Australia's Annual Emissions Over Time (DCCEEW, 2022)**

## 1.4 Applicable Environmental Factors

The EPA considers two environmental factors in relation to air, namely Air Quality and Greenhouse Gas Emissions. The objective of each of these environmental factors are outlined below:

- Air Quality - to maintain air quality and minimise emissions (from point sources) so that environmental values are protected.
- Greenhouse Gas Emissions - to reduce net greenhouse gas emissions in order to minimise the risk of environmental harm associated with climate change.

The EPA has also published guidelines on each of these environmental factors, namely the Air Quality Environmental Factor Guideline (EPA, 2020) and Greenhouse Gas Emissions Environmental Factor Guideline (EPA, 2023).

This GHG assessment has been prepared to assist Covalent Lithium in meeting the objective of the EPA's Greenhouse Gas Emissions Environmental Factor Guideline (EPA, 2023), and will not directly address the Air Quality Environmental Factor Guideline (EPA, 2020).

The GHGs included in the Greenhouse Gas Emissions Environmental Factor Guideline are covered by the UNFCCC's Reporting Guidelines on Annual Inventories and are listed below:

- Carbon dioxide ($CO_2$),
- Methane ($CH_4$),
- Nitrous oxide ($N_2O$),
- Sulphur hexafluoride ($SF_6$),

- Hydro fluorocarbons (HFCs), and
- Perfluorocarbons (PFCs).

The main GHG emissions associated with the Project are $CO_2$, $CH_4$ and $N_2O$.

# 2 GHG and Energy Inventory

## 2.1 Activities Affecting Key Environmental Factors

The key infrastructure and principal activities to be undertaken by the Project have been identified and outlined below:

- Open mining pits,
- Processing plant (crushing, beneficiation, leaching),

It is noted that the emissions associated with further downstream processing of Spodumene concentrate is captured under the Covalent Lithium Hydroxide Refinery (WA EPA Assessment number 2282).

## 2.2 GHG Emissions and Energy Sources

GHG emissions can include both *direct* and *indirect* emissions, i.e., Scope 1, scope 2 and scope 3 emissions. Identified emission, energy production and energy consumption sources from the Project are discussed below.

### 2.2.1 Scope 1 GHG Emissions

Scope 1 GHG emissions are *direct* emissions from sources within the boundary of the facility or organisation, e.g., fuel combusted on site.

The significant sources of scope 1 GHG emissions resulting from the activities identified from the project are as follows:

- Diesel consumption by the mining fleet, support equipment and other vehicles (non-transport and transport purposes), and
- Land use changes (biogenic).

### 2.2.2 Scope 2 GHG Emissions

Scope 2 GHG emissions are *indirect* emissions from the consumption of purchased electricity, steam or heat produced by another organisation.

The scope 2 emissions at the Project are comprised of emissions associated with the purchasing of electricity from the South West Interconnected Systems (SWIS) grid.

### 2.2.3 Scope 3 GHG Emissions

Scope 3 GHG emissions are all other *indirect* emissions that are of a consequence of an organisation's activities but are not from sources owned or controlled by the organisation, e.g., the emissions associated with the extraction, refinement, and delivery of diesel to site.

The GHG Protocol (2011) divides scope 3 GHG emissions into two groups, depending on the financial transactions of the company:

- Upstream indirect GHG emissions related to purchased or acquired goods and services,
- Downstream indirect GHG emissions related to sold goods and services.

Scope 3 GHG emissions are further split into 15 categories to provide a systematic framework for companies to quantify, manage and reduce emissions across their corporate value chain. To avoid double counting emissions, the categories are designed to be mutually exclusive. Table 3 outlines all scope 3 categories, their relevancy to the project and indicates those included in the GHG assessment. A full list and description of the scope 3 categories as well as definitions of relevancy are outlined in Appendix A.

Initial estimates for scope 3 emissions for the life of the project have been made, however, these are subject to significant uncertainty given the current phase of the supporting engineering studies. The inclusion or exclusion of scope 3 categories was based on an assessment of category relevance to the project and the ability to provide an accurate estimate.

**Table 3 Scope 3 GHG Emissions Categories (Greenhouse Gas Protocol, 2011)**

| Category | Relevancy | Included/Excluded in Assessment |
|---|---|---|
| **1. Purchased goods and services** | **Material and directly influenced by the company; should be calculated.** | **Included** |
| 2. Capital goods | **Material but cannot be accurately separated from purchased goods and services. As such these emissions are reported under category 1.** | **Included (Category 1)** |
| **3. Fuel- and energy-related activities**<br><br>**(Not included in scope 1 or scope 2)** | **Material and directly influenced by the company; should be calculated.** | **Included** |
| **4. Upstream transportation and distribution** | **Material and directly influenced by the company; should be calculated.** | **Included** |

| | | |
|---|---|---|
| 5. Waste generated in operations | Not material | Excluded (Waste product from processing included in category 4) |
| 6. Business travel | Not material for a single facility. Business travel occurs at a corporate level, but it is unknown at this point the degree to which this will be effected by this project. | Excluded |
| **7. Employee commuting** | **Material, fly in – fly out commute included.** | **Included** |
| 8. Upstream leased assets | Not material for a single facility | Excluded |
| **9. Downstream transportation and distribution** | **Material; can be estimated from global shipping estimates. Final destination of product is still uncertain.** | **Included** |
| **10. Processing of sold products** | **Material; existing GHG assessment for Covalent Lithium's Kwinana Lithium Hydroxide facility is used.** | **Spodumene refinery emissions are included** |
| 11. Use of sold products | Potentially material, cannot yet be estimated due to uncertainty in final product at this stage. | Excluded |
| 12. End-of-life treatment of sold products | Potentially material, cannot yet be estimated due to uncertainty in final product at this stage. | Excluded |
| 13. Downstream leased assets | Not material for a single facility | Excluded |
| 14. Franchises | Not material for a single facility | Excluded |
| 15. Investments | Not material for a single facility | Excluded |

## 2.3 Limitations and Exclusions

The following emissions and energy sources have been excluded from the assessment as they were deemed either minor sources or no use was identified (exclusions from the scope 3 are outlined in Table 3):

- Oils and greases,
- Sulphur Hexafluoride ($SF_6$),

- Hydro fluorocarbons (HFCs) and Perfluorocarbons (PFCs),
- Other minor fuel sources (e.g., ULP), and
- Wastewater treatment plant (WWTP).

Other exclusions are noted below:

- Exploration activities,
- No construction and closure phases are included in this assessment due to lack of information,
- Explosives used for mining. There are no methods included in the NGER Determination to calculate emissions from explosives.

Whilst the estimates in this assessment have been calculated using the best available information, it should be noted that potential for technology change (implementation of best available technology) and updates to costing over the project LOM may result in adjustments to emission estimates.

## 2.4 GHG Emissions and Energy Methodology

### 2.4.1 Scope 1 GHG Emissions

#### Fuel Consumption

For emission calculations, fuel use can be split into 2 categories, namely transport (for road-registered vehicles), non-transport, based on the associated activity.

Scope 1 GHG estimates from fuel consumption have been prepared using methods and emissions factors from the *National Greenhouse and Energy Reporting (Measurement) Determination 2008 (*NGER Determination), as applicable to 2022-23 financial year (FY2023) reporting. The emission factors applied to calculations are shown in Table 4. The emission factors are provided in carbon dioxide equivalents ($CO_2$-e), and therefore include the global warming potential (GWP) of each gas.

**Table 4 GHG Emission Factors applied to the Project**

| Emission/Energy Source | Energy Content Factor | Emission Factor (kg $CO_2$-e/GJ) | | | |
|---|---|---|---|---|---|
| | | $CO_2$ | $CH_4$ | $N_2O$ | Total |
| GWP | | 1 | 28 | 265 | |
| Diesel (Post-2004 Transport) | 38.6 GJ/kL | 69.9 | 0.01 | 0.5 | 70.41 |
| Diesel (Non-transport) | 38.6 GJ/kL | 69.9 | 0.1 | 0.2 | 70.20 |

### Land Clearing

Lost carbon sink emissions associated with land clearing have been calculated using the Full Carbon Accounting Model (FullCAM) guidelines produced by the Department of Climate Change, Energy, the Environment and Water (DCCEEW, 2020) and methodology outlined in *Carbon Credits (Carbon Farming Initiative—Avoided Clearing of Native Regrowth) Methodology Determination 2015* (CER, 2018). The process involves determining the carbon mass for an area and converting it to carbon dioxide emissions (scope 1 emissions) when the land is cleared.

The carbon mass (tonnes of carbon per hectare) is calculated using the project location (latitude/longitude coordinates). The maximum carbon mass of trees per hectare and the associated forest debris carbon mass per hectare have been utilised in the calculations. Other baseline settings used in the FullCAM calculations were set up in accordance with the FullCAM Guidelines (DCCEEW, 2020). Emissions have been calculated assuming all vegetation and debris will be completely lost upon land clearing and converted to carbon dioxide emissions, which have apportioned based on proposed year of land clearing.

## 2.4.2 Scope 2 GHG Emissions

Scope 2 emissions are expected from electricity purchased from the South West Interconnected System (SWIS) grid. Forward estimates for scope 2 emissions factors associated with the SWIS grid are taken from forecasts provided by DCCEEW for 2022 to 2035 (DCCEEW, 2022b). The estimated emissions factor for 2035 is extrapolated for the remainder of the LOM. State emissions reductions are assumed to be achieved one year later than forecast to account for delays in emissions reduction activities and provide a conservative estimate of Scope 2 emissions.

Scope 2 GHG estimates from grid electricity consumption have been prepared using methods and emissions factors from the National Greenhouse and Energy Reporting (Measurement) Determination 2008 (NGER Determination), as applicable to 2022-23 financial year (FY2021) reporting. The emission factors applied to this calculation are from the Department of Climate Change, Energy, the Environment and Water's report, *Australia's Emissions Projections 2022* (DCCEEW, 2022b), presented in Table 5. Forward estimates of SWIS emissions reductions are assumed to be realised one year later than DCCEEW projections, to provide a conservative estimate of scope 2 emissions.

**Table 5 SWIS Projected Emissions Factors**

| Year | SWIS Emissions Factor ($tCO_{2-e}$/MWh) |
|---|---|
| 2023 | 0.51 |
| 2024 | 0.49 |
| 2025 | 0.46 |
| 2026 | 0.41 |
| 2027 | 0.38 |
| 2028 | 0.35 |

| | |
|---|---|
| 2029 | 0.31 |
| 2030 | 0.29 |
| 2031 | 0.24 |
| 2032 | 0.23 |
| 2033 | 0.23 |
| 2034 | 0.22 |
| 2035 | 0.21 |
| 2036 onwards | 0.2 |

### 2.4.3 Scope 3 GHG Emissions

To calculate scope 3 GHG emissions, the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (2011) has been consulted and the GHG Protocol Technical Guidance for Calculating Scope 3 Emissions (2013) referenced where required.

The two main methods of quantifying scope 3 GHG emissions are direct measurement and calculation. Direct measurement involves monitoring, mass balance or stoichiometry to quantify emissions, while calculation uses an emission factor and activity data to calculate emissions. Due to the difficulty in direct measurement generally the calculation method is used, as such the general formula for calculating emissions is outlined below:

$$GHG\ Emissions = Activity\ Data\ x\ Emisssion\ Factor$$

A variety of emission factor sources were used, including but not limited to:

- National Greenhouse Accounts Factors (2023),
- The existing Covalent Lithium Hydroxide Refinery EPA additional assessment information: GHG Management Plan V7 February 2021 and,
- National Greenhouse and Energy Reporting (Measurement) Determination 2008.

When estimating the Scope 3 emissions, fuel-based or goods and distance-based methods are considered the most appropriate options. These methods involve tracking the amount of fuel or goods used and the distance they travel, respectively.

## 2.5 GHG Emissions Results

### 2.5.1 Scope 1 GHG Emissions

Scope 1 GHG emissions have been estimated for the Project activities over the expected LOM. The key inputs used to calculate the scope 1 GHG emissions associated with the project are outlined in Table 7.

**Table 6 Key Project Inputs**

| Input | Value (over LOM) |
|---|---|
| LOM – construction + operation | 25 Years |
| Total Material Mined | Total: 549,634,441 Tonnes<br>Ore: 94,488,854<br>Waste: 455,145,587 |
| Total Spodumene Concentrate Produced | 18,183,638 Tonnes |
| Power Source (Electricity Purchased) | SWIS Grid |
| Total Electricity Purchased | 5,280,305 MWh (211,212 MWh per annum avg over LOM) |
| Total Diesel Consumption | 472,218 kL |
| - Non-transport Diesel | 452,874 kL |
| - Transport Diesel | 25,344 kL |
| Cleared Area | 1,635.5 ha |

The inputs applied to the Project land clearing calculations are shown in Table 7.

**Table 7 Land Clearing Input Data the Project**

| Input | Value |
|---|---|
| Project Location Coordinates | -32.09793 North; 119.76554 East |
| Long Term Average Rainfall (annual) | <500 mm |
| Other Baseline Settings | As outlined in FullCAM guidelines |

## Fuel Consumption

For the Project, scope 1 GHG emissions are associated with diesel consumed by the project's mining fleet.

The results show an estimated 1,376,910 tCO2-e of scope 1 GHG emissions (with an average of 55,076 tCO2-e/year) are expected over the LOM from fuel use by the mining fleet and for electricity production. The resulting emissions, by source, are outlined in Table 8.

**Table 8 Estimated Scope 1 Emissions associated with Fuel Usage**

| Sources | Emissions Over LOM ($tCO_2$-e) | Average Annual Emissions ($tCO_2$-e/year) | Peak Annual Emissions ($tCO_2$-e/year) | Year of Peak Annual Emissions |
|---|---|---|---|---|
| Diesel combustion (non-transport) | 1,227,161 | 49,086 | 84,470 | 2042 |
| Diesel combustion (transport) | 68,881 | 2,755 | 3,131 | Post 2029 (constant) |
| **Total** | **1,296,041** | **51,842** | **87,601** | **2042** |

## Land Clearing

Input data outlined in Table 7 was entered into the FullCAM simulation model producing an estimated maximum carbon biomass for the project area of 57.1 tCarbon/ha (Table 9). An emission factor of 209.5 $tCO_2$-e/ha is calculated from this carbon biomass via the Carbon Credits Methodology (CER, 2018).

Note, carbon biomass is considered the carbon mass of trees plus the carbon mass of forest debris.

**Table 9 Estimated Carbon Biomass and Emission Factor for Land Clearing**

| Item | Value |
|---|---|
| Maximum Carbon Biomass (t Carbon/ha) | 57.1 |
| Emission Factor ($tCO_2$-e/ha) | 209.5 |

The results show an estimated 342,647 tCO2-e of scope 1 GHG emissions are expected over the LOM from land clearing. The resulting emissions from the proposed area to be cleared and applying the above emission factor are outlined in Table 10. The majority of these emissions occur between 2026 and 2028. See Figure 2 for more information.

**Table 10 Estimated Scope 1 Emissions Associated with Land Clearing**

| Area (ha) | Emissions Over LOM ($tCO_2$-e) |
|---|---|
| 1,635.5 | 342,647 |

## Total Scope 1 GHG Emissions

The emissions calculated from fuel use and land clearing have been combined to provide an overall estimate of scope 1 GHG emissions. The estimated scope 1 GHG emissions over the LOM are 1,638,688 tCO2-e and the average annual emissions are 65,548 tCO2-e/year. Peak annual scope 1 emissions are 92,125 tCO2-e. A summary of the scope 1 GHG emissions breakdown, by source, for the project over LOM is outlined in Table 11 and Figure 2.

**Table 11 Estimated Scope 1 Emissions by Source over LOM**

| Category | LOM Scope 1 Emissions ($tCO_2$-e) |
|---|---|
| For Non-transport Purposes | 1,227,161 |
| For Transport Purposes | 68,881 |
| Land Clearance | 342,647 |
| **Total** | **1,638,688** |

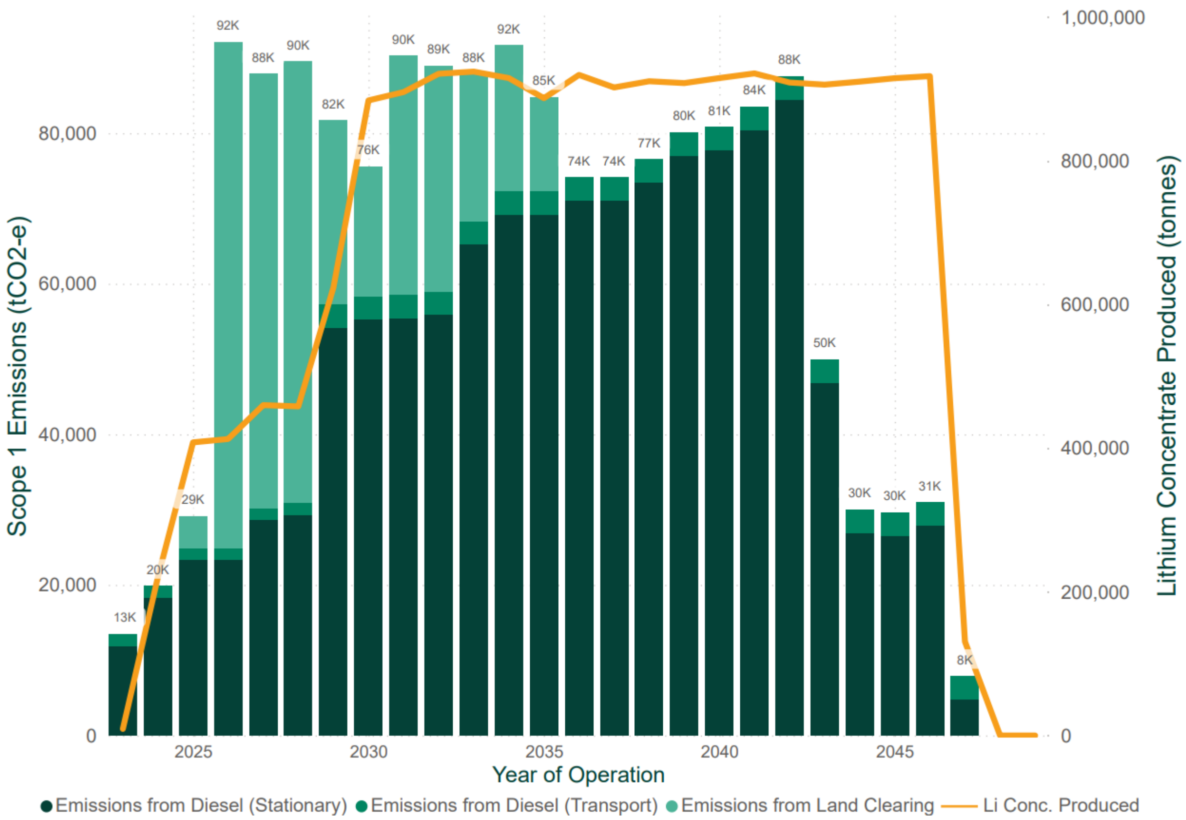


**Figure 2 Estimated Scope 1 Emissions by Source over LOM**

Scope 1 emissions are largely driven by changes in stationary diesel fuel usages, which are closely linked to production. The forecasted increase in production during 2029 is projected to lead to elevated non-biogenic scope 1 emissions over the proceeding 14 years, peaking at 87,601 tCO2-e in 2042. Transport diesel emissions are projected to double post-2029 in conjunction with the production increase but remain far less than those from non-transport sources. Biogenic scope 1 emissions from land clearing largely occur between 2026 and 2028 as waste dumps and TSF areas are prepared for the increase in mining activity in 2029.

### 2.5.2 Scope 2 GHG Emissions

Scope 2 GHG emissions have been estimated for the Project activities over the expected LOM. The key inputs used to calculate the scope 1 GHG emissions associated with the project are outlined in Table 12

**Table 12 Key Scope 2 Project Inputs**

| Input | Value (over LOM) |
|---|---|
| LOM – construction + operation | 25 Years |
| Power Source (Electricity Purchased) | SWIS Grid |

| | |
|---|---|
| Total Electricity Purchased | 5,280,305 MWh (211,212 MWh per annum at peak consumption – from 2029) |

Applying the projected SWIS grid factors as per section 2.4.2 LOM scope 2 emissions are 1,318,729 tCO2-e. The average scope 2 emissions throughout the LOM are 52,749 tCO2-e per annum and peak in 2029 at 81,815 tCO2-e.

**Table 13 Estimated Scope 2 Emissions over LOM**

| Category | LOM Scope 2 Emissions ($tCO_2$-e) |
|---|---|
| Purchased Electricity (SWIS) | 1,318,729 |
| **Total** | **1,318,729** |

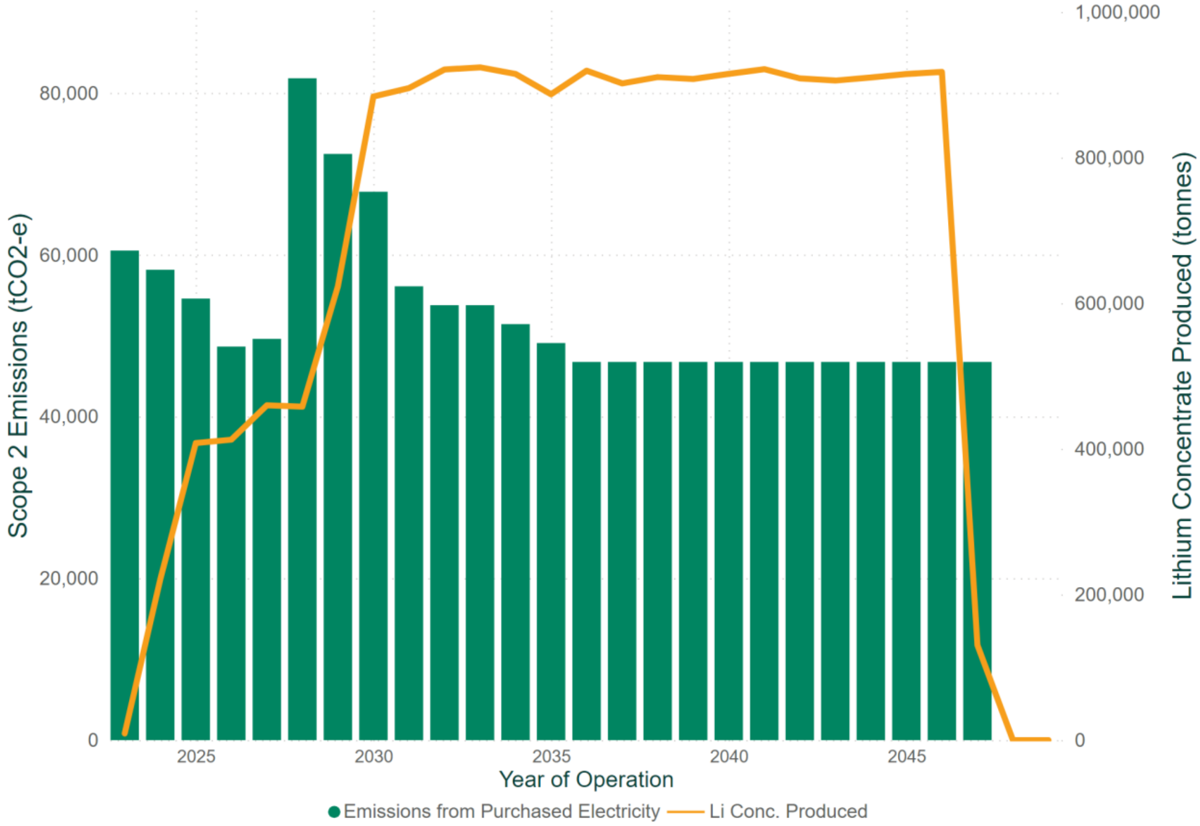


**Figure 3 Scope 2 Emissions by Source over LOM**

Scope 2 emissions steadily decline for the Project until 2028 as electricity purchased stays constant and the SWIS grid emissions factor decreases as per DCCEEW (2022b) guidance. There is a large increase in 2029 as the Project expansion is commissioned due to an increased electricity requirement of the new plant.

### 2.5.3 Scope 3 GHG Emissions

Six categories of scope 3 GHG emissions were determined to be material for the Covalent Lithium in Section 2.2.3. These being:

- Purchased goods and services
- Fuel and energy related activities
- Upstream transportation and delivery
- Employee Commute
- Downstream transportation and delivery
- Processing of sold products

Data used in the calculations was sourced from supply chain analysis of processing plant reagents, projected fuel and electricity requirements, projected spodumene and lithium hydroxide rates, and the downstream Kwinana Lithium Hydroxide Refinery GHG report.

The scope 3 results shown in Table 14 and Figure 4 show that of the six categories, processing of sold products was the highest contributor making more than 90% of the scope 3 GHG emissions. These emissions relate to refinery emissions from processing of spodumene concentrate and lithium hydroxides. It should be noted that a large portion of the emissions at the refinery are scope 3 emissions from the refineries own purchased goods and services.

**Table 14 Estimated Scope 3 Emissions over LOM**

| Category | Scope 3 Emissions ($tCO_2$-e) |
|---|---|
| Purchased Goods and Services (including capital goods) | 897,059 |
| Fuel and Energy Related Activities | 530,556 |
| Upstream Transportation and Delivery | 557,455 |
| Employee Commute | 70,738 |
| Downstream Transportation and Delivery | 42,627 |
| Processing of Sold Products | 26,129,136 |
| **Total** | **28,227,572** |

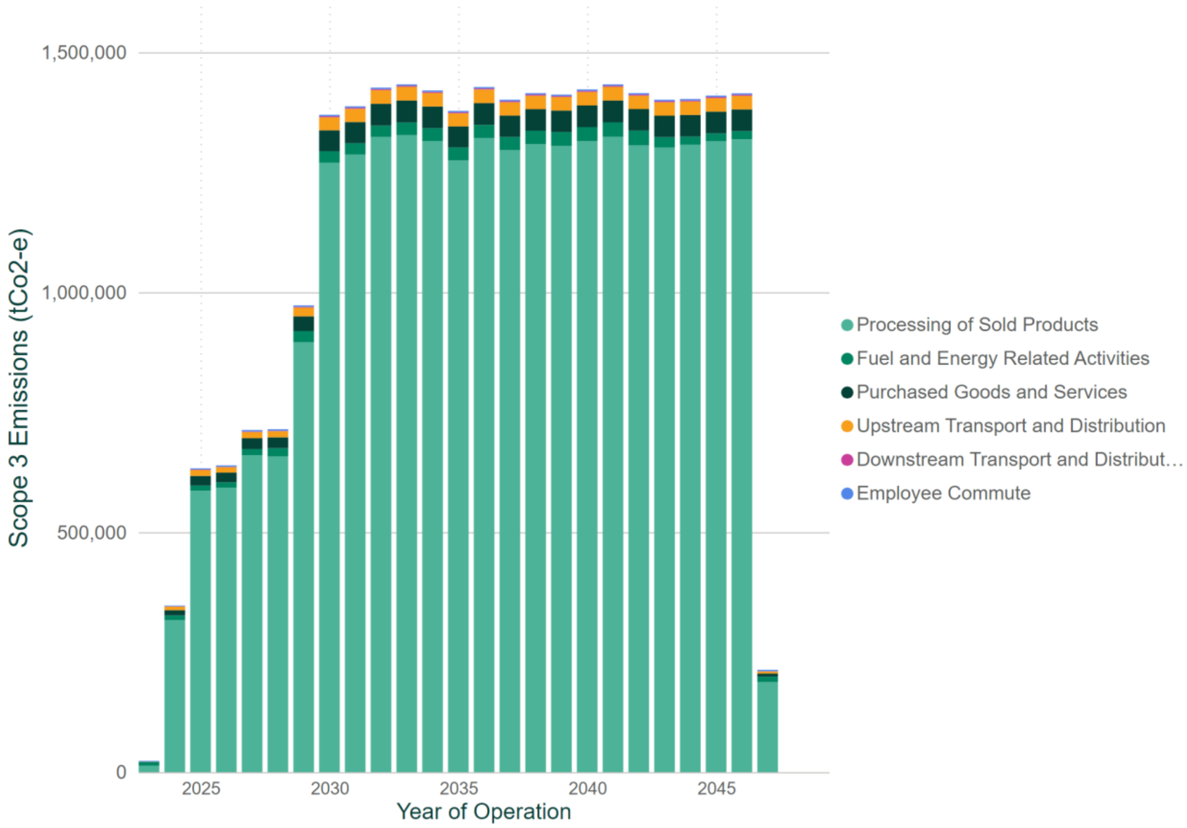


**Figure 4 LOM Scope 3 Emissions by Source**

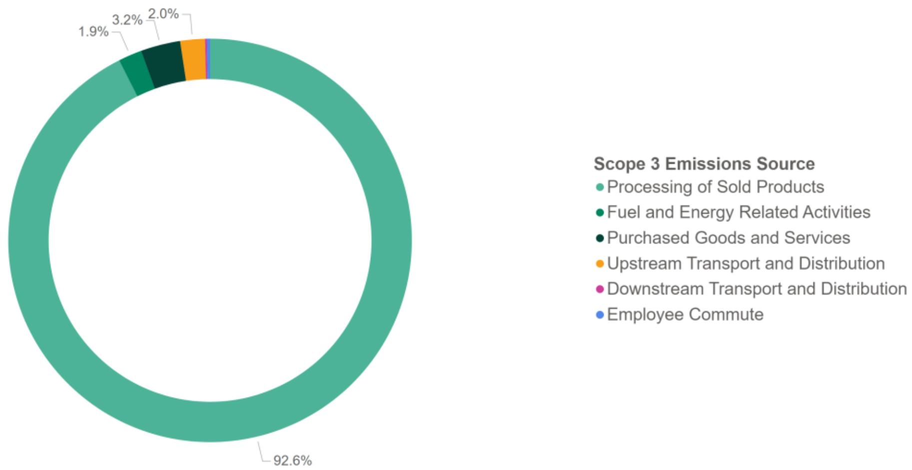


**Figure 5 LOM Scope 3 Emissions Percentage Breakdown**

# 3 Benchmark Assessment

## 3.1 Emission Intensity

Emissions intensity was estimated based on production forecasted data and estimated emissions. Emission intensity is calculated by:

$$Emission\ intensity = \frac{Scope\ 1 + 2\ emissions}{Spodumene\ concentrate\ produced}$$

The average emission intensity over the LOM estimated for the Project is 0.16 tCO2e/tonne spodumene concentrate produced.

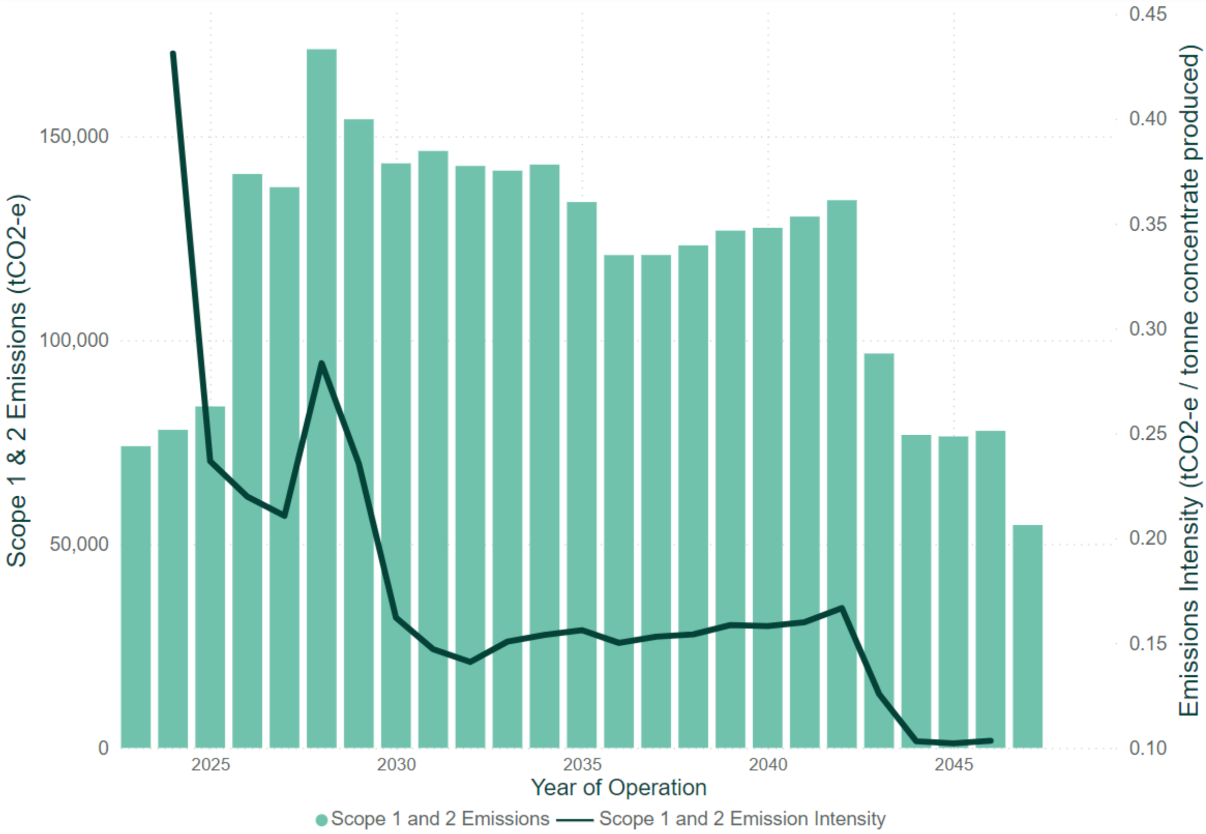


**Figure 6 Emission intensities and combined Scope 1 & 2 estimates of the Project over LOM**

The estimated emission intensity of the Project was compared with the other lithium projects that have:

- Similar annual production
- Of a similar region (southern WA) or located within Australia
- Spodumene hard-rock lithium ore as the target
- Publicly available production and greenhouse gas emissions data

The estimated emissions intensity of the Project was also compared with other existing Australia lithium concentrate projects, including Mt Cattlin Lithium Mine, Greenbushes Lithium Mine and the (Finniss Lithium Mine Proposed). The GHG emission intensities benchmarking comparison for the EGP is outlined in Table 15.

**Table 15 GHG Emission Intensities Benchmark**

| Project | Spodumene Production (t/year) | Total Scope 1 + 2 Emissions ($tCO_2$-e /year) | Scope 1 + 2 Emissions Intensity ($tCO_2$/t Spodumene) | Source(s) and notes |
|---|---|---|---|---|
| **Earl Grey Lithium Project** | 727,346 | 118,297 | 0.16 | LOM Averages for this assessment |
| **Mt Cattlin Lithium Mine** | 191,570 | 35,484 | 0.19 | Galaxy Sustainability Report 2019 and 2019 Financial results |
| **Greenbushes Lithium Mine** | 698,000 | 177,975 | 0.23 | Appendix G – Greenhouse Gas Estimate for Greenbushes Expansion Project (2018) |
| **Finniss Lithium Project** | 190,000 | 43,667 | 0.23 | Finnis Lithium Project Greenhouse Gas Assessment. Projected emissions during operational phase used. (2021) |

# 4 GHG Monitoring and Reporting

## 4.1 National Greenhouse and Energy Reporting (NGER)

The NGER scheme is a Commonwealth initiative, introduced in 2007, to provide data and accounting in relation to GHG emissions and energy consumption and production.

Under the NGER scheme, corporations that exceed the corporate or facility thresholds need to report annually to the CER (Table 16).

**Table 16 Key NGER Thresholds**

| Level | GHG Emissions | Energy Consumed / Produced |
|---|---|---|
| Facility | 25,000 $tCO_2$-e | 100,000 GJ |
| Corporate | 50,000 $tCO_2$-e | 200,000 GJ |

The controlling corporation (as defined in the *NGER Act)* of this project is likely to be the part owner of Covalent Lithium Pty Ltd, Wesfarmers Ltd. It is expected that Wesfarmers Ltd will continue to include the GHG emissions, energy consumption and energy production from this project in their NGER report.

## 4.2 Safeguard Mechanism

Starting on 1 July 2016, the Australian Government introduced a Safeguard Mechanism under section 22XS of the NGER Act. As a consequence, responsible emitters controlling facilities which emit 100,000 $tCO_2$-e (Default Baseline) or more of scope 1 GHG emissions will be required to meet the safeguard requirements, including keeping the facility's net emissions at or below a set baseline emissions level.

Section 22XB of the NGER Act requires that the responsible emitter report annual covered emissions to enable a comparison against a baseline determined by the CER.

In the event of the reported annual emissions being below the baseline, the Safeguard facility would become eligible for Safeguard Mechanism Credits (SMC) under the new reform which could be used for compliance purposes. However, should the emissions be above the baseline; the responsible emitter will be required to 'make good' the excess emissions by surrendering carbon credit units or alternatively be liable to a substantial penalty.

With the highest forecast annual Scope 1 GHG emissions (excluding changing land use emissions) of 87,601 $tCO_2$-e the Project is not likely to exceed the default baseline of 100,000 $tCO_2$-e when it is in operation.

## 4.3 Adaptive Management and Management Plan Review

In line with the concept of adaptive management, it is recommended that mitigation and management strategies be reviewed and updated (where appropriate) in response to triggers such as:

- Introduction of a new process or activity that has the potential to alter existing GHG emissions,
- Changes to relevant State or Commonwealth legislation, policy or guidelines,
- Introduction of new GHG reduction technologies,
- Technical review of implemented emissions monitoring,
- Relevant audit findings,
- EPA and decision-making authorities' comments during the Environmental approval process, or
- Update or implementation of an operating licence issued under Part V of the EP Act.

# 5 Glossary

| Terms | Definitions |
|---|---|
| **CER** | Clean Energy Regulator |
| **$CH_4$** | Methane |
| **$CO_2$** | Carbon Dioxide |
| **$CO_2$-e** | Carbon dioxide equivalence, the amount of the gas multiplied by a value specified in the regulations in relation to that kind of greenhouse gas. |
| **Determination** | The NGER Determination 2008 |
| **Downstream emissions** | Indirect GHG emissions related to sold goods and services |
| **EPA** | Western Australian Environmental Protection Authority |
| **EP Act** | *Environmental Protection Act 1986* |
| **Facility** | Is a single enterprise that undertakes an activity, or a series of activities that involve greenhouse gas emissions, the production of energy or the consumption of energy. |
| **GHG** | All greenhouse gases mentioned in the NGER Act |
| **HFCs** | Hydro fluorocarbons |
| **LOM** | Life of Mine |
| **$N_2O$** | Nitrous Oxide |
| **NGER** | National Greenhouse and Energy Reporting |
| **NGER Act** | The National Greenhouse and Energy Reporting Act 2007 as it applies to the current reporting year |
| **Non-transport** | Includes purposes for which fuel is combusted that do not involve transport energy purposes, see Sections 2.20, and 2.42 of the Determination. |
| **PFCs** | Perfluorocarbons |
| **PNG** | Pipeline Natural Gas |
| **Regulations** | The NGER Regulations 2008 |
| **Safeguard Mechanism Rules** | National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015 |
| **Scope 1** | Emission of greenhouse gas, in relation to a facility, means the release of greenhouse gas into the atmosphere as a direct result of an activity or series of activities (including ancillary activities) that constitute the facility. |
| **Scope 2** | Emission of greenhouse gas, in relation to a facility, means the release of greenhouse gas into the atmosphere as a direct result of one or more activities that generate electricity, heating, cooling or steam that is consumed by the facility but that do not form part of the facility. |
| **Scope 3** | Indirect emissions of greenhouse gas, that are not included in scope 2, that occur in the value chain of the reporting company. |
| **$SF_6$** | Sulphur Hexafluoride – a gas used in switchgear and circuit breakers for insulation. |
| **t Carbon** | Tonnes of Carbon |
| **t $CO_2$-e** | Tonnes of carbon dioxide equivalent |
| **Transport** | Includes purposes for which fuel is combusted for transport by vehicles registered for road use, rail transport, marine navigation, and air transport, see Sections 2.20, and 2.42 of the Determination |
| **UNFCCC** | United Nations Framework Convention on Climate Change |
| **Upstream emissions** | Indirect GHG emissions related to purchased or acquired goods and services |

# Appendix A Scope 3 Emission Categories and Relevancy

| Category | Description |
|---|---|
| 1. Purchased goods and services | All emissions from the production of products and services purchased or acquired by the reporting company in the reporting period. *Example: The emissions associated with the extraction, production and transportation (between suppliers) of copper that is purchased by the reporting company to create bronze.* |
| 2. Capital goods | All upstream emissions from the production of capital goods purchased by the company in the reporting period. *Example: Emissions associated with the production of excavators used by the reporting company.* |
| 3. Fuel- and energy-related activities<br>(Not included in scope 1 or scope 2) | All emissions related to the production (extraction, processing, transport etc.) of fuel and energy purchased by the reporting company, that are not included in the company's scope 1 and scope 2 emissions. *Example: The emissions from extracting crude oil, processing it to form diesel and transporting it to a site run by the reporting company.* |
| 4. Upstream transportation and distribution | All emissions resulting from the transportation and distribution of purchased products, between a company's tier 1 suppliers and its own operations, in vehicles not owned by the reporting company, as well as any third-party transportation and distribution services purchased by the reporting company between a company's own facilities. *Example: Emissions from transportation of purchased copper between the supplier and the reporting company's bronze manufactoring facility.* |
| 5. Waste generated in operations | All emissions from third-party treatment and disposal of waste that is generated by the company in the reporting period. *Example: Waste sent from the reporting company's site facilities for recycling, disposal at landfills, incineration, composting, etc.* |
| 6. Business travel | All emissions from the transportation of employees for business-related activities in vehicles owned or operated by third-parties. *Example: Flights to business conferences and meeting suppliers.* |
| 7. Employee commuting | All emissions from the transportation of employees between their homes and worksites. *Examples: FIFO and DIDO to site.* |
| 8. Upstream leased assets | All emissions from the operation of leased assets that are not included in the company's scope 1 and 2 emissions inventory. *Example: Emissions from leased cars, offices and buildings.* |
| 9. Downstream transportation and distribution | All emissions from third-party transport and distribution of the company's sold products in the reporting period. *Example: Emissions from third-party marine transportation of iron ore sold by the reporting company to be processed by another company.* |
| 10. Processing of sold products | All emissions from processing of sold intermediate products by third-parties, subsequent to the sale of the product by the reporting company. *Example: Emissions from processing of iron ore sold by the reporting company to create steel.* |

| | |
|---|---|
| 11. Use of sold products | All emissions from the use of goods and services sold by the reporting company in the reporting period. *Example: Emissions from the combustion of diesel, produced by the reporting company, as fuel for cars.* |
| 12. End-of-life treatment of sold products | All emissions from the waste disposal or treatment of products sold by the company in the reporting period, at the end of their life. *Example: Emissions from recycling of metal cans sold by the reporting company.* |
| 13. Downstream leased assets | All emissions from the operation of assets owned by the company and leased to third-parties in the reporting period, if they are not included in the company's scope 1 and scope 2 emissions. *Example: Emissions from electricity used in offices/buildings leased by the reporting company to other operations.* |
| 14. Franchises | All emissions from the operation of franchises, by franchisees, not included in the franchisor's scope 1 and scope 2 emissions. *Example: Emissions from operations associated with a company's trademark.* |
| 15. Investments | All emissions associated with operating the reporting company's investments in the reporting period. *Example: Emissions associated with a mine a company has a financial investment in but not operational control.* |

| Criteria | Description |
|---|---|
| Size | They contribute significantly to the company's total anticipated scope 3 emissions. |
| Influence | There are potential emissions reductions that could be undertaken or influenced by the company. |
| Risk | They contribute to the company's risk exposure (e.g., climate change related risks such as financial, regulatory, supply chain, product and customer, litigation, and reputational risks). |
| Stakeholders | They are deemed critical by key stakeholders (e.g., customers, suppliers, investors, or civil society). |
| Outsourcing | They are outsourced activities previously performed in-house or activities outsourced by the reporting company that are typically performed in-house by other companies in the reporting company's sector. |
| Sector guidance | They have been identified as significant by sector-specific guidance. |
| Other | They meet any additional criteria for determining relevance developed by the company or industry sector. |

Source: GHG Protocol (2011)

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