



Covalent Lithium Pty Ltd

Onsite Scope 1 and 2 GHG Emissions Determination for:

Earl Grey Lithium Project

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Table of Contents

1 Introduction	2
1.1 Scope.....	2
2 Earl Grey Lithium Project Description	3
2.1 Location	3
2.2 Description	3
2.3 Activities Covered for the GHG Emissions Projection.....	3
3 Methodology	4
3.1 Inputs and Assumptions Made for the GHG Emissions Projection	4
3.1.1 Input Assumptions	4
3.2 Methods Used to Calculate GHG Emissions.....	7
3.3 Limitation and Exclusions.....	8
4 Results	9
4.1 Project Emissions.....	9
5 Summary	10
6 References	11

Table of Tables

Table 1 Available Data	5
Table 2 Estimated LNG Consumption	6
Table 3 Methods Used from the NGER (Measurement) Determination 2008	7
Table 4 Estimated Annual Scope 1 Emissions – With Solar Power	9
Table 5 Estimated Annual Scope 1 Emissions – Without Solar Power.....	9
Table 6 Estimated Annual Scope 1 Emissions – Electricity Purchased From Grid	9

1 Introduction

Covalent Lithium Pty Ltd (Covalent Lithium) is proposing to develop the Earl Grey Lithium Project, a pegmatite-hosted lithium deposit at the abandoned Mt Holland Mine Site.

The Environmental Protection Authority (EPA) is now requesting proponents to estimate Greenhouse Gas Emissions (GHG) of proposed projects as part of the environmental impact assessment process.

Covalent Lithium sought assistance from Greenbase to update the GHG projection prepared in 2019 for the Earl Grey Lithium Project.

1.1 Scope

This document summarises the scope 1 and 2 emissions estimated for the following proposed project:

- Earl Grey Lithium Project (the mine)

The following scenario has been considered in this assessment (and evaluates GHG emissions with and without the proposed solar farm):

- A nominal production rate at steady state assuming annual online factor of 75%, which is consistent with the Project's Referral under Part IV of the EP Act.

There will be no scope 2 emissions (indirect emissions) associated with the project as there will be no electricity purchased in 2 of the scenarios considered. A third and final scenario where there would be no LNG power generation plant on at the facility considers scope 2 emissions from purchasing electricity from the grid.

This assessment does not include emissions from the transportation of spodumene concentrate from the mine to the proposed Kwinana refinery. Emissions from this activity are not required to be included as this activity is not part of the mine operations. Transport activity will be conducted by external parties.

2 Earl Grey Lithium Project Description

2.1 Location

The Earl Grey Lithium Project will be located approximately 105 km south-southeast of Southern Cross in the Yilgarn Mineral Field of Western Australia.

2.2 Description

The proposed project includes open cut mining and processing of lithium ore.

The lithium concentrate will be transported to an existing Western Australian port for export to overseas markets or to the future potential lithium refinery in Kwinana.

The proposed life of mine (LoM) is 47 years.

2.3 Activities Covered for the GHG Emissions Projection

The following activities were considered for the GHG emissions projection:

- LNG consumption at the power station
- Diesel consumption
- Land clearing

In addition, the following phases of the project were considered:

- Development and construction phase
- Operations phase
- Closure phase.

It has been assumed that Covalent Lithium has taken into account fuel to be consumed during these phases when estimating fuel consumption data provided in Table 1.

3 Methodology

3.1 Inputs and Assumptions Made for the GHG Emissions Projection

3.1.1 Input Assumptions

Description:

Nominal production rate at steady state assuming annual online factor of 75%.

Assumptions

The following assumptions were made:

- Contraction period is Year 1.
- The concentrator will be pre-commissioned in Year 2
- LNG power station will be operational from Year 3.
- LNG power station electrical efficiency will be 36%.
- Land clearing would be consistent through the years (approximately 8 ha per year).
- In the scenario where electricity is purchased, electricity is purchased from the South West Interconnected System (SWIS) grid and the forward estimates of emissions factors for this are as provided in the report: Australia's Emissions Projections 2020 by Department of Industry, Science, Energy and Resources. Assuming year 3 of the project is 2023 as the initial year where electricity is purchased.

Available data:

The following data was provided by Covalent Lithium to calculate average total GHG emissions for the Earl Grey Lithium Project.

Table 1 Available Data

Item	Value	Units
Nominal rate	100	%
Online factor	75	%
Life of Mine (LoM)	47	Years
Electricity requirements over LoM - average [LNG & solar farm]	102,500	MWh
Powerstation running period	45	years
Electricity to be produced from solar power generation	28,300	MWh
Electricity to be produced from thermal power generation (LNG) - with solar	74,200	MWh
Electricity to be produced from thermal power generation (LNG) - without solar	102,500	MWh
Processing capacity	2,000,000	t/year
Diesel usage [annual maximum]		
Light Vehicles (transport) - [annual maximum]	380,000	L
Mining vehicles and equipment (stationary) - [annual maximum]	10,500,000	L
Power Station (stationary) - [annual maximum]	50,000	L
Land clearing	386	ha
Coordinates (lat/log)	-32.09793, 119.765540	
Year 1 - Construction period. Electricity will be produced by diesel generators	From May 2021 to Sept 2022	
Year 2 - Pre-Commissioning of concentrator. Electricity will be produced by diesel generators	From Sept 2022 to Feb 2023	
Year 3 onwards - Electricity will be produced by LNG generators	From Feb 2023 onwards	
In the scenario presented in table 6 there is no LNG usage or solar generation, all electricity is purchased from the grid		

Estimate of LNG usage

Greenbase estimated the average LNG consumption per year using the following data:

- Estimated electricity produced from thermal power generation presented in Table 1.
- LNG energy content from the National Greenhouse and Energy Reporting (NGER) (Measurement) Determination 2008, Schedule 1, Part 2 Item 26.
- LNG power station electrical efficiency (36%).

Table 2 Estimated LNG Consumption

Item	Value	Units
Estimated LNG used by powerstation per year - [with solar power]	29,328	kL
Estimated LNG used by powerstation over LoM - [with solar power]	1,319,763	kL
Estimated LNG used by powerstation per year - [without solar power]	40,514	kL
Estimated LNG used by powerstation over LoM - [without solar power]	1,823,123	kL

3.2 Methods Used to Calculate GHG Emissions

Scope 1 emissions from fuel consumption:

The GHG emissions projection for the Earl Grey Lithium Project provides scope 1 emissions (direct emissions) from fuel as per the National Greenhouse and Energy Reporting (NGER) Scheme rules.

The following major scope 1 emissions sources have been identified at the proposed mine site:

- LNG combustion
- Diesel combustion

The GHG estimates have been prepared using methods from the NGER (Measurement) Determination 2008:

Table 3 Methods Used from the NGER (Measurement) Determination 2008

Scope 1 Emissions Source	Method used	Emission factors sourced from
LNG usage	Method 1	NGER Determination, Schedule 1, Part 2 Item 26
Diesel usage for stationary purposes	Method 1	NGER Determination, Schedule 1, Item 40
Diesel usage for transport purposes	Method 1	NGER Determination, Schedule 1, Item 65

Method 1 is the default method for determining GHG under the NGER Scheme. It specifies the use of designated emission factors in the estimation of emissions. These emission factors are national average factors determined by the Australian Government.

Scope 1 emissions from land clearing:

Emissions associated with land clearing have been calculated using the Full Carbon Accounting Model (FullCAM) guidelines produced by the Department of Industry, Science, Energy and Resources (Australian Government, 2020) and methodology outlined in *Carbon Credits (Carbon Farming Initiative—Avoided Clearing of Native Regrowth) Methodology Determination 2015* (Australian Government, 2018). The process involves determining the carbon biomass for an area and converting it to carbon dioxide emissions when the land is cleared.

The carbon mass (tonnes of carbon per hectare) is calculated using the project location (latitude/longitude coordinates), total area to be cleared and long-term average rainfall. 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 (Australian Government, 2020).

Emissions have been calculated assuming all vegetation will be completely lost upon land clearing and converted to carbon dioxide emissions.

Scope 2 emissions from electricity purchased:

Scope 2 emissions from electricity purchased are calculated as per the forward-looking emissions factors provided by the Department of Industry, Science, Energy and Resource in "Australia's emissions projections 2020". The emissions factors used are for the South West Interconnected Systems grid. Significant scope 2 emissions are only projected in the scenario where there is no solar power farm or LNG power generation occurring at this facility.

3.3 Limitation and Exclusions

The following emissions sources have been excluded from the GHG emissions assessment as they were deemed either minor sources or no use was identified:

- Oils and greases,
- Acetylene,
- Soda ash,
- Sulphur Hexafluoride (SF₆),
- Hydro fluorocarbons (HFCs) and Perfluorocarbons (PFCs) and
- Other minor fuel sources.

4 Results

4.1 Project Emissions

Based on the data provided and assumptions made, the summary of the GHG emissions for the Earl Grey Lithium Project is provided in the tables below.

As LNG will be consumed from the third year of the LoM, annual emissions will increase after the first two years of operation.

Table 4 Estimated Annual Scope 1 Emissions – With Solar Power

Emissions Source	Year 1 (TCO2-e)	Year 2 (TCO2-e)	Year 3 and every year of operation thereafter (TCO2-e)
Emissions from LNG	-	-	38,235
Emissions from diesel for stationary purposes	28,588	28,588	28,588
Other Emissions (including land clearing)	2,765	2,765	2,765
Estimated Annual Scope 1 Emissions for the Facility	31,352	31,352	69,588

Table 5 Estimated Annual Scope 1 Emissions – Without Solar Power

Emissions Source	Year 1 (TCO2-e)	Year 2 (TCO2-e)	Year 3 and every year of operation thereafter (TCO2-e)
Emissions from LNG	-	-	52,818
Emissions from diesel for stationary purposes	28,588	28,588	28,588
Other Emissions (including land clearing)	2,765	2,765	2,765
Estimated Annual Scope 1 Emissions for the Facility	31,352	31,352	84,171

In the case where electricity is purchased from the grid instead of generated from an LNG generator from year 3, the emissions decrease after year 3 steadily until year 10 in line with the decrease in the forecast grid emissions factor. A figure from year 3 is provided as well as the average of the rest of the years for the LoM including year 3.

Table 6 Estimated Annual Scope 1 & 2 Emissions – Electricity Purchased From Grid

Emissions Source	Year 1 (TCO2-e)	Year 2 (TCO2-e)	Year 3 (TCO2-e)	Year 3 to end of LoM (year 47) Average (TCO2-e)
Scope 1 Emissions	31,352	31,352	31,352	31,352
Scope 2 Emissions	-	-	53,300	44,143
Estimated Annual Scope 1 and 2 Emissions for the Facility	31,352	31,352	84,652	75,495

5 Summary

1. The main scope 1 emissions sources at the Earl Grey Lithium Project will be:
 - LNG combustion
 - Diesel combustion
 - Land clearing
2. In 2 of the presented scenarios here, the facility will not purchase electricity; therefore, there will be no scope 2 emissions. In one of the scenarios where there are no solar generators or LNG generators installed there are scope 2 emissions associated with purchasing electricity from the South West Interconnected System.
3. Emissions from the transportation of spodumene ore concentrate from the mine to the proposed Kwinana refinery is not part of the onsite scope 1 emissions; therefore, emissions from this activity have been excluded.
4. Covalent Lithium will be required to include the emissions from the Earl Grey Lithium Project in the corporate NGER report under the NGER Scheme. This report must be submitted annually to the Clean Energy Regulator once reporting thresholds are exceeded. For more information about the NGER Scheme visit the [Clean Energy Regulator](#) website.
5. The annual scope 1 emissions are expected to be below the default baseline under the current Safeguard Mechanism (100,000 TCO₂-e); therefore, the facility would not have any obligations under the Safeguard Mechanism for this scenario.
6. It is expected that:
 - with the proposed solar power farm, GHG emissions for the facility will be 31,352 TCO₂-e in the first two years and 69,588 TCO₂-e from the third year.
 - without the solar farm, GHG emissions for the facility will be 31,352 TCO₂-e in the first two years and 84,171 TCO₂-e from the third year.
 - With no solar power farm or LNG power generation the GHG emissions for the facility will be 31,352 TCO₂-e in the first two years and 84,653 TCO₂-e in the third year before a modest decline until 2030. In this scenario a large portion of the emissions are scope 2.

6 References

Australian Government (2020), *National Greenhouse and Energy Reporting (Measurement) Determination 2008*. Available at:
<https://www.legislation.gov.au/Details/F2020C00600>

Department of Water and Environmental Regulation, Department of Western (2021). *Decisions Report - Work Approval Number W6460/2020/1*. Available at:
https://www.der.wa.gov.au/images/documents/our-work/licences-and-works-approvals/Decisions/W6460-Decision_report.pdf

Department of Industry, Science, Energy and Resources, Australian Government (2020). *Australia's emissions projections 2020*. Available at:
<https://www.industry.gov.au/sites/default/files/2020-12/australias-emissions-projections-2020.pdf>

Department of Industry, Science, Energy and Resources, Australian Government (2020). *Full Carbon Accounting Model (FullCAM)*, Available at:
<https://www.industry.gov.au/data-and-publications/full-carbon-accounting-model-fullcam>

Department of Industry, Science, Energy and Resources, Australian Government (2020). *FullCAM Guidelines: Requirements for use of the Full Carbon Accounting Model (FullCAM) with the Emissions Reduction Fund (ERF) methodology determination*. Department of Industry, Science, Energy and Resources Available at:
https://www.industry.gov.au/sites/default/files/2020-09/final_fullcam_guideline_avoided_clearing_of_native_regrowth_method.pdf

Australian Government (2018). *Carbon Credits (Carbon Farming Initiative—Avoided Clearing of Native Regrowth) Methodology Determination 2015*. Available at:
<https://www.legislation.gov.au/Details/F2018C00127>

Environment Protection Authority (EPA) (2020). *Environmental Factor Guideline: Air Quality*. EPA, Western Australia. Available at:
https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/EFG%20-%20Air%20Quality%20-%2003.04.2020.pdf

Environment Protection Authority (EPA) (2019), *Report and recommendation of the Environmental Protection Authority, Earl Grey Lithium Project, Report 1651*. Available at:
https://www.epa.wa.gov.au/sites/default/files/EPA_Report/EPA%20Report%201651%20-%20Earl%20Grey%20Lithium%20Project.pdf

Greenbase Pty Ltd (2019), *Covalent Lithium 2019 GHG Emission Projection*

Google Maps