



# **KEMERTON LITHIUM HYDROXIDE PROCESSING PLANT**

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## **GREENHOUSE GAS SUMMARY REPORT**

**2022 Calendar Year**

**Prepared March 2023**

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### **Rounding of Amounts**

All CO<sub>2</sub>-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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**Table 1 Document Glossary**

Term / Acronym	Meaning
<b>CH<sub>4</sub></b>	Methane
<b>CO<sub>2</sub></b>	Carbon Dioxide
<b>CO<sub>2</sub>-e</b>	Carbon dioxide equivalence, the amount of the gas multiplied by a value specified in the regulations in relation to that kind of greenhouse gas.
<b>NGER Determination</b>	The NGER Determination 2008 as it applies to the current reporting year
<b>Facility</b>	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.
<b>GHG</b>	All greenhouse gases mentioned in the NGER Act
<b>LPG</b>	Liquefied Petroleum Gas
<b>N<sub>2</sub>O</b>	Nitrous Oxide
<b>NGER</b>	National Greenhouse and Energy Reporting
<b>Non-transport</b>	Includes purposes for which fuel is combusted that do not involve transport energy purposes, see Sections 2.20, and 2.42 of the NGER Determination.
<b>PNG</b>	Pipeline Natural Gas
<b>Scope 1</b>	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.
<b>Scope 2</b>	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.
<b>SF<sub>6</sub></b>	Sulphur Hexafluoride – a gas used in switchgear and circuit breakers for insulation.
<b>t CO<sub>2</sub>-e</b>	Tonnes of carbon dioxide equivalent
<b>Transport</b>	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 NGER Determination

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# 1 Introduction

This document has been prepared to provide a summary of the greenhouse gas (GHG) emissions and energy for the Kemerton Lithium Hydroxide Processing Plant (Kemerton) during 2022 Calendar Year (CY2022) during operations startup and commissioning. It is intended to provide a summary and explanation of the treatment taken on the data supplied by Kemerton Lithium Hydroxide Processing Plant (Kemerton) to estimate the emissions and energy.

## 1.1 Scope of Work

Greenbase was engaged by MARBL Lithium Operations Pty Ltd (MARBL Lithium) to assist with compiling and estimating GHG emissions that are required to be reported to the Department of Water and Environmental Regulation (DWER) for Kemerton under condition 9-8 of MS1187 by 31 March 2023. Information to be submitted includes the Scope 1 and 2 GHG emissions as a result of the commissioning and operating of Train 1, total lithium hydroxide produced, and the relevant GHG intensity per tonne of lithium hydroxide produced.

The scope of work for this engagement was to identify data requirements, collate fuel, energy, hydrocarbons, and other greenhouse data from the facility, review the data and carry out data validation checks, run emissions calculations using the methods and factors detailed in the Australian National Greenhouse and Energy Reporting (NGER) scheme.

## 2 Emissions and Energy Summary

The table below shows the estimated amount of Scope 1 and Scope 2 GHG emissions, energy consumed and produced of Kemerton during CY2022 for commissioning and operating the facility.

This is the first calendar year GHG emissions estimates for Kemerton, and thus there are no other calendar year's totals to be compared with.

**Table 2 Kemerton GHG Emissions, Energy Consumed and Produced**

GHG EMISSION (tCO <sub>2</sub> -e)			ENERGY (GJ)		
Scope 1	Scope 2	Total Scope 1 & 2	Consumed	Net Consumed	Produced
9,500	13,548	23,048	242,789	242,789	0

## 2.1 Emissions and Energy Breakdown by Sources

Please see below the breakdown emissions and energy sources for Kemerton during CY2022. Electricity purchased from grid is the major emissions and energy source followed by PNG combustion.

**Table 3 Kemerton GHG Emissions and Energy Values - Source**

Source	Emissions (t CO <sub>2</sub> -e)						Energy (GJ)				
	Activity	Primary Variable	Scope 1		Scope 2		Scope 1+2		Consumed	Net	Produced
Acetylene combusted	233	m <sup>3</sup>	N/A	0.472	N/A		0.472	N/A	9.16	N/A	
Carbonate material usage	1,364	Tonne	N/A	540	N/A		540	N/A		-	
Diesel combusted	227	kL	N/A	616	N/A		616	N/A	8,761	N/A	8,761
Electricity purchased	19,924	MWh	N/A		13,548	N/A	13,548	N/A	71,727	N/A	71,727
Grease used as lubricant	6.24	kL	N/A	0.847	N/A		0.847	N/A	242	N/A	242
LPG combusted	8.03	kL	N/A	12.5	N/A		12.5	N/A	206	N/A	206
Lubricating oil used	7.08	kL	N/A	3.82	N/A		3.82	N/A	275	N/A	275
Non-lubricant fluid oils	7.33	kL	N/A				-		284	N/A	284
Pipeline natural gas combusted	161,284	GJ	N/A	8,311	N/A		8,311	N/A	161,284	N/A	161,284
SF6 Stock CO <sub>2</sub> -e	1,714	Tonne	N/A	15.3	N/A		15.3	N/A		-	
<b>Total:</b>				9,500	N/A	13,548	N/A	23,048	N/A	242,789	N/A

**Table 4 Kemerton GHG Emissions and Energy Values - Energy**

Energy Source	Consumed				Produced		
	Category	Source Units		Gigajoules		Source Units	Gigajoules
<b>Energy Consumed by Other Means</b>				<b>284</b>	<b>N/A</b>		
Non-lubricant fluid oils		7.33	kL	N/A	284	N/A	
<b>Energy Consumed from Grid</b>				<b>71,727</b>	<b>N/A</b>		
Electricity purchased		19,924	MWh	N/A	71,727	N/A	
<b>Energy Consumed through Combustion</b>				<b>170,778</b>	<b>N/A</b>		
Acetylene combusted		233	m <sup>3</sup>	N/A	9.16	N/A	
Diesel combusted		227	kL	N/A	8,761	N/A	
Grease used as lubricant		6.24	kL	N/A	242	N/A	
LPG combusted		8.03	kL	N/A	206	N/A	
Lubricating oil used		7.08	kL	N/A	275	N/A	
Pipeline natural gas combusted		161,284	GJ	N/A	161,284	N/A	
<b>Total:</b>					242,789	N/A	

## 2.2 General Notes and Exclusions

Methods and emissions factors from the NGER Determination have been used to estimate the GHG emissions from Kemerton.

### Diesel

- Fuel usage was derived from the fuel bowser records and the split between transport and non-transport was determined based on the classes of vehicles that would be expected to be road registered.
- Method 1 was used for all activities, except for the combustion of fuel by transport vehicles. All transport vehicles are assumed to be post 2004 models and method 2 was used to calculate methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) emissions.
- Energy consumed from diesel combustion was estimated using the default diesel energy content from the NGER Determination.

### **PNG**

- PNG used by boilers, dryers, kilns and roasters at Kemerton. Emissions from PNG combustion were estimated using Method 1, non-transport emissions factors from the NGER Determination.
- Energy consumed from PNG combustion was estimated using the default energy content from the NGER Determination.

### **Oils and Greases**

- The oil and grease usage could be reconciled back to invoices. Purchases were categorised into lubricating oils, non-lubricating oils and greases. Lubricating oils and greases were partially combusted through use; while non-lubricating oil is non-combusted fluid oils.
- Grease was converted from kg to L using a specific gravity of 1.
- Emissions from partial combustion of oils and greases were estimated using Method 1 from the NGER Determination. No emissions were estimated from the usage of non-lubricating oil.
- Energy consumed from oil and gas partial combustion and usage of non-lubricating oil was estimated using the default energy contents from the NGER Determination.

### **Acetylene**

- The amount was derived from invoice records.
- Acetylene bottles were converted using volumes provided by the manufacturer.
- Emissions from acetylene usage were estimated using Method 1 from the NGER Determination.
- Energy consumed from acetylene used was estimated using the default energy content from the NGER Determination.

### **LPG**

- The amount was derived from invoice records.
- Emissions from LPG combustion were estimated using Method 1 from the NGER Determination.
- Energy consumed from LPG combustion was estimated using the default energy content from the NGER Determination.

### **Carbonate use**

- Usage of limestone ( $\text{CaCO}_3$ ) was recognised from Kemerton. It was derived from invoice records.
- No energy consumption was reported from the use of carbonate.

### **Electricity Purchased**

- Electricity purchased from Kemerton was reported as Scope 2 emissions. The relevant grid factor was used for the emissions estimation.



**Sulphur Hexafluoride**

- Leaks from equipment containing SF<sub>6</sub> from Kemerton were included using Method 1, which uses a default leakage rate.

**Other**

- With the exception of oils and greases, all fuel has been assumed to be combusted.
- Method 1 from the NGER Determination was used for all activities, except of the emissions from transport vehicles which are mentioned above.
- Use of HFCs for air conditioning and refrigeration were not included in this assessment.
- Energy produced and consumed from electricity generated by field generators smaller than 500KW were not estimated in this assessment.

### 3 Emission Intensity

Emissions intensity was estimated based on production data and estimated emissions (Scope 1 & 2). Emission intensity is calculated by:

$$\text{Emission intensity} = \frac{\text{GHG emissions}}{\text{Lithium hydroxide produced}}$$

Emission intensity estimated for the Kemerton during CY2022 when the facility had just started operations and commissioning is showed in the Table 5.

**Table 5 Emission Intensity Summary for Kemerton during CY2022**

	<b>Emissions Intensity (tCO<sub>2</sub>-e/tonnes lithium hydroxide)</b>
Facility Operations and Commissioning (Scope 1)	75
Purchased Electricity – SWIS (Scope 2)	108
Scope 1 + 2	183

The emission intensities are high mainly due to the low production rates during CY2022, as the plant was still in operations start-up phase and commissioning. Emissions intensities are expected to decrease when the plant production rate increases.

## 4 Safeguard Mechanism

In 2016, the Australian Government introduced a Safeguard Mechanism under subsection 22XS(1) of the Act. As a consequence, responsible emitters controlling facilities which emit Scope 1 emissions of 100,000 tonnes of CO<sub>2</sub>-e or more are required to report to the CER in accordance with Section 22XB of the Act.

Kemerton does not trip the 100,000 tonnes of CO<sub>2</sub>-e threshold for inclusion in the Safeguard Mechanism.

**Table 6 Scope 1 emissions compared to Safeguard Mechanism Threshold**

FACILITY	SCOPE 1 EMISSIONS (t CO <sub>2</sub> -e)	TRIPPED SAFEGUARD THRESHOLD
Kemerton Lithium Hydroxide Processing Plant	9,500	No

If Kemerton are expected to continue to increase in Scope 1 emissions as it increases production, it will need to be assessed each year.

## Appendix A Quality Assurance

The following checks have been conducted when preparing Kemerton CY2022 GHG Emissions Summary:

Greenbase Check	Description	Check Done? (Y/N)	Comments
<b>Electricity production efficiency range check</b>	Calculates the electricity production efficiency for each NGER facility and determines if it's within 29-39% efficiency.	N	No electricity produced* onsite *Energy produced and consumed from electricity generated by field generators smaller than 500KW were not estimated in this assessment
<b>Fuel balance</b>	Fuel consumption vs invoices	Y	The variance between the usage and the invoices/deliveries has been checked to ensure they are within the acceptable range.
<b>Monthly data trend check</b>	Check the monthly data trend to ensure they are align and within suitable range, e.g. the magnitude are consistent	Y	Where monthly data is available was checked against last year's data to ensure they are on the similar trend.
<b>Complete data</b>	Ensure required data is complete.	Y	Customised data collection spreadsheets were used for data collection for each reportable facilities. The data collection spreadsheets have been customised to include all required data to complete the report.  The data collection spreadsheet was completed and all data was provided by Kemerton.