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Low emissions intensity for Phase 1 Chemical Plant

- **Emissions intensity associated with the Phase 1 Chemical Plant is low compared with other lithium hydroxide production facilities**
- **Substantial Scope 3 emissions savings identified from amorphous silica and SOP, with further unquantified savings from caesium and rubidium**
- **Opportunities identified for further material reductions in emissions from use of electric mining equipment, solar power and heat, and production of lithium carbonate via sequestration of process CO₂**
- **Emissions associated with mining and the mineral concentration plant are comparable with other similar lithium mine and concentrator projects**
- **Greenhouse gas assessment report completed by leading industry consultant GHD Pty Ltd**

Lepidico Ltd (ASX:LPD) (“Lepidico” or “Company”) is pleased to announce that it has received a carbon footprint assessment for the integrated Phase 1 Project from leading industry consultant GHD Pty Ltd (GHD). Scope 1 and 2 emissions¹ intensity associated with the Abu Dhabi Phase 1 Chemical Plant is just 7.46t CO₂-e²/ t lithium hydroxide, which GHD advised as being, “low compared with other emission intensities reported or derived from lithium hydroxide production facilities.” Similar emissions associated with mining and the mineral concentration plant gave an emissions intensity of 0.13 tCO₂-e/ t concentrate, which is, “comparable with other similar lithium mine and concentrator projects.”

Lepidico’s Managing Director, Joe Walsh said, “GHDs work identifies Lepidico’s L-Max[®] and LOH-Max[®] technologies as providing a lower CO₂ intensity solution for the production of lithium chemicals versus conventional spodumene conversion. Lepidico has established an initial Scope 1 and 2 emissions reduction target of 2.0t CO₂-e/ t lithium hydroxide associated with using a greater proportion of non-fossil fuel sourced power in both Namibia and Abu Dhabi, as well as solar pre-heating of boiler water. Further substantial emission reduction opportunities have also been identified. GHD has advised that Scope 3 emissions should be industry competitive due to savings from by-products. The excellent environmental and social credentials associated with Phase 1 are proving important in Lepidico’s advanced offtake negotiations.

¹ Scope 1 covers direct emissions from owned or controlled sources. Scope 2 covers indirect emissions from the generation of purchased electricity, steam, heating and cooling consumed by the reporting company. Scope 3 includes all other indirect emissions that occur in a company’s value chain.

² Tonnes of carbon dioxide equivalent

Greenhouse Gas Assessment Executive Summary

GHD has prepared a high-level quantitative greenhouse gas (GHG) assessment for the Lepidico Phase 1 Project, an integrated alkali metal ore mining, mineral concentration, and processing project that spans across multiple countries. The assessment includes: the Karibib Operations in the operational phase; transport of the concentrates from Namibia to UAE by sea; the Abu Dhabi Chemical Plant for processing the concentrate to produce lithium hydroxide (using L-Max[®] and LOH-Max[®]) and several by-products; and transport of the final products to end-users. The GHG assessment is based on Lepidico provided data and reasonable assumptions made. The project is expected to operate for 14-years and expected to be in steady state post ramp-up from 2024 to 2034, with the source emissions activity data averaged for these 11 years.

Total Scope 1 and 2 emissions

The majority of the emissions are from the Phase 1 Chemical Plant operations, due to the high natural gas consumption and the generation and emission of carbon dioxide associated with the use of lime. Total Scope 1 and 2 emissions during the Phase 1 Chemical Plant phase account for 84% of the inventory, at 52,690 tCO₂-e. Of this 59% is associated with the use of natural gas in the conversion plant boiler, with opportunities identified to substantially reduce this (see below). The Karibib project is estimated to account for 16% of emissions, at 10,363 tCO₂-e (which includes an estimated 2,383 tCO₂-e for vegetation clearing).

Preliminary Scope 3 estimates for emissions from transport of concentrate from Namibia to UAE and transport of products and by-products are only 6,732 and 2,507 tCO₂-e respectively.

Emissions intensity

The L-Max[®] and LOH-Max[®] process technologies are materially different to conventional brine and spodumene processing in that a significant amount of the processing is there to recover valuable by-products. By-product processing involves additional electricity and natural gas use, as well as process emissions from limestone use. The emissions associated with the L-Max[®] and LOH-Max[®] processes have, therefore, been allocated to the lithium hydroxide product, as well as the by-products based on projected revenue split.

The emissions intensities for the different intermediate products and products were calculated based on the total emissions in tCO₂-e divided by the estimate of average tonnes produced. Only Scope 1 and Scope 2 emissions are considered, noting that emissions due to vegetation clearing during construction in Namibia were excluded.

The emissions associated only with mining and the mineral concentration plant gave an emissions intensity of 0.13 tCO₂-e/ t concentrate (1.37t CO₂-e/ t lithium hydroxide). This is comparable with other similar lithium mine and concentrator projects.

The emissions intensity associated with the Phase 1 Chemical Plant only was 7.46 tCO₂-e/ t LiOH (equivalent to 8.47 tCO₂-e/t lithium carbonate equivalent (LCE)). This is low compared with other emission intensities reported or derived from lithium hydroxide production facilities.

The emissions intensity of lithium hydroxide for the integrated plant (mine plus chemical plant) is 8.83 tCO₂-e/ t LiOH. Life cycle emissions intensities for operating integrated plants were not publicly available for comparison.

Emissions savings

The LOH-Max[®] process will produce valuable by-products including caesium sulphate, rubidium sulphate, amorphous silica, sulphate of potash and potentially gypsum.

The estimated potential emissions savings are approximately 34,009 tCO₂-e per year. This would offset a material proportion of envisaged overall annual Scope 3 inventory emissions.

Emission savings relating to use of caesium and rubidium compounds have not been quantified. However, some key uses of caesium sulphate demonstrate benefits of reducing emissions and enhancing productivity thereby reducing net emissions.

Further potential options for emissions reduction

Options for reduction in emission include on site and off site solar power to replace hydrocarbon sourced grid energy, which could reduce Scope 2 emissions to zero and total Scope 1 and 2 emissions by 16%.

Natural gas is assumed to be used in the Definitive Feasibility Study for generating process steam in the conversion plant, which represents the greatest single GHG emission source, 4.6 tCO₂-e/ t. However, Lycopodium, which is undertaking front end engineering and design work for Phase 1, has been requested to consider solar pre-heating of boiler feed water as well as a green hydrogen enabled boiler in the final selection of the boiler for the conversion plant. The latter could eliminate the use of natural gas resulting in a massive 59% reduction in Scope 1 and 2 emissions.

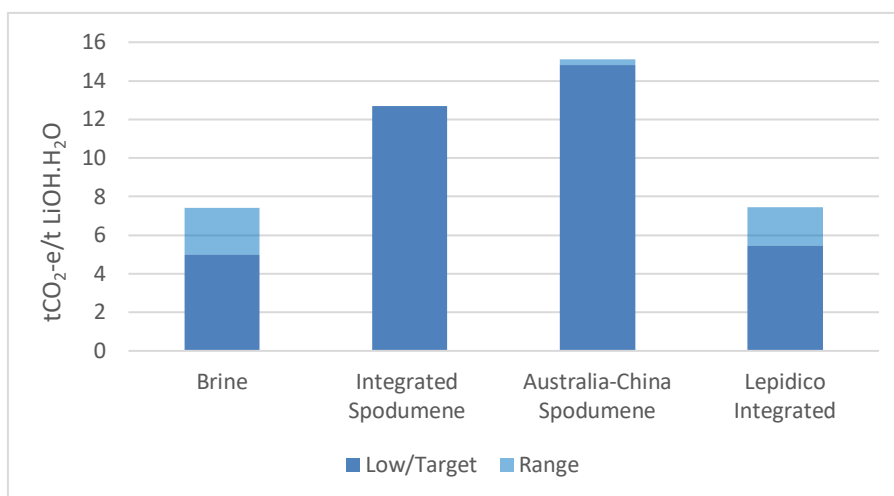
Diesel fuel consumed by the small mining fleet may also be substantially reduced should electric mining equipment be employed. This will be evaluated once suitable scale electric equipment becomes available.

Another significant development will be the implementation of a new technology developed by Lepidico to produce lithium carbonate from conversion of the lithium hydroxide monohydrate. The process will use carbon dioxide which is emitted from upstream use of limestone (process emissions) and sequester that carbon dioxide to produce the lithium carbonate. This will consume approximately 0.6 tCO₂-e per tonne of lithium carbonate and would reduce the Chemical Plant emissions intensity from 8.47 tCO₂-e/ t LCE to 7.87 tCO₂-e/ t.

Benchmarking

Emission intensity from the recovery of the raw material (brine or spodumene) through the supply chain to lithium hydroxide monohydrate production was assessed by GHD based on a literature review that sourced data for South American brine production, Australian spodumene processed in China and other integrated international lithium hydroxide refineries (Figure 1). Lepidico data is for the integrated Phase 1 Project at steady state operation post start-up and Lepidico's initial CO₂ reduction target of 2.0 tCO₂-e/ t, based on a greater proportion of power sourced from non-greenhouse gas generating sources and solar pre-heating of boiler water to reduce natural gas consumption. Further reduction opportunities have been identified including from substituting gas with hydrogen and the use electric mobile equipment for mining.

Figure 1: CO₂ intensity comparison for lithium hydroxide production tCO₂-e/t lithium hydroxide



Source: GHD data

About GHD

GHD is committed to solving the world's biggest challenges in the areas of water, energy and urbanisation.

GHD is a global professional services company that leads through engineering, construction and architectural expertise. Its forward-looking, innovative approaches connect and sustain communities around the world. Delivering extraordinary social and economic outcomes, GHD is focused on building lasting relationships with its partners and clients.

Established in 1928, GHD remains wholly owned by its people. GHD has 10,000+ diverse and skilled individuals connected by over 200 offices, across five continents – Asia, Australia, Europe, North and South America, and the Pacific region.

Further Information

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About Lepidico Ltd

Lepidico Ltd is an ASX-listed Company focused on exploration, development and production of lithium chemicals. Lepidico owns the technology to a metallurgical processes that have successfully produced lithium carbonate from non-conventional sources, specifically lithium-rich mica minerals including lepidolite and zinnwaldite. The L-Max[®] Process has the potential to complement the lithium market by adding low-cost lithium carbonate supply from alternative sources. More recently Lepidico has added LOH-Max[®] to its technology base, which produces lithium hydroxide from lithium sulphate without by-product sodium sulphate. The Company has completed a Definitive Feasibility Study for a nominal 5,000 tonne per annum Lithium Hydroxide Monohydrate capacity Phase 1 lithium chemical plant, targeting commercial production for 2023. The Project incorporates the Company's proprietary L-Max[®] and LOH-Max[®] technologies into the chemical conversion plant design. Feed to the Phase 1 Plant is planned to be sourced from the Karibib Project in Namibia, 80% owned by Lepidico, where a predominantly Measured and Indicated Mineral Resource of 11.87 Mt grading 0.45% Li₂O, (including Measured Resources of 2.20 Mt @ 0.57% Li₂O, Indicated Resources of 6.73 Mt @ 0.39% Li₂O and Inferred Resources of 2.94 Mt @ 0.50%, at a 0.15% Li₂O cut-off) is estimated. (ASX announcement of 12 March 2021). Ore Reserves total 6.72 Mt @ 0.46% Li₂O, 2.26% rubidium, 2.02% potassium and 320ppm caesium (ASX announcement of 28 May 2020).

Forward-looking Statements

All statements other than statements of historical fact included in this release including, without limitation, statements regarding future plans and objectives of Lepidico, are forward-looking statements. Forward-looking statements can be identified by words such as "anticipate", "believe", "could", "estimate", "expect", "future", "intend", "may", "opportunity", "plan", "potential", "project", "seek", "will" and other similar words that involve risks and uncertainties. These statements are based on an assessment of present economic and operating conditions, and on a number of assumptions regarding future events and actions that are expected to take place. Such forward-looking statements are not guarantees of future performance and involve known and unknown risks, uncertainties, assumptions and other important factors, many of which are beyond the control of the Company, its directors and management of Lepidico that could cause Lepidico's actual results to differ materially from the results expressed or anticipated in these statements.

The Company cannot and does not give any assurance that the results, performance or achievements expressed or implied by the forward-looking statements contained in this release will actually occur and investors are cautioned not to place any reliance on these forward-looking statements. Lepidico does not undertake to update or revise forward-looking statements, or to publish prospective financial information in the future, regardless of whether new information, future events or any other factors affect the information contained in this release, except where required by applicable law and stock exchange listing requirements.