

PATH TO BEST-IN-CLASS CO₂ EMISSIONS INTENSITY

- **Opportunities identified for material reductions in Scope 1 & 2 greenhouse gas emissions from already relatively low levels, with potential to be best-in-class at 3t CO₂-e/t LCE**
- **Water consumption attributable to lithium production modest at 33m³/t with potential to reduce by 12% by using green-hydrogen for process heat, with further reductions identified**
- **Integrated Phase 1 Project footprint optimises the use of industrial land, while reclamation on closure will rectify legacies and lead to material environmental benefits**
- **Compelling environmental credentials are becoming essential for securing lithium offtake for use in electric vehicles to be sold into Europe and North America and for securing project debt**

MONDAY, 11 OCTOBER 2021, PERTH: Lepidico is advancing well with discussions for supply of lithium hydroxide into the electric vehicle (EV) supply chain. Excellence in environmental stewardship, which includes demonstrating that products have low associated CO₂-e emissions, is now almost essential for chemicals supplied for EV manufacture, particularly for vehicle sales into the European and North American markets. This ethical sourcing of chemicals also extends to the evaluation of water and land usage, both of which can be challenging for certain types of lithium deposits and processes. This is not the case when employing Lepidico's proprietary process technologies, which will be commercialised in the Company's integrated Phase 1 Project that is now in its initial development phase.

Lepidico's Managing Director, Joe Walsh, said: "Phase 1 is designed to demonstrate that the mining and hydrometallurgical processing of lithium mica minerals can produce lithium chemicals with industry leading environmental and social credentials. In recent months Lepidico has built on GHDs greenhouse gas emissions work and identified a realistic pathway to reduce already competitive Scope 1 and 2 emission intensity to an industry leading 3t CO₂-e/t LCE. Alternatives have been identified to eliminate natural gas usage— which has the largest single reduction benefit to Phase 1's emissions – and trade-off work has already begun to assess the optimal technology to employ. Considerable work has also been undertaken to demonstrate to customers and other stakeholders that water and land use are also relatively modest, which will be published shortly in Lepidico's 2021 Sustainability Report, extracts from which are included in this release today."

Low Greenhouse Gas Emissions

A carbon footprint assessment of the integrated Phase 1 Project Definitive Feasibility Study (DFS) was completed by leading industry consultant GHD Pty Ltd (GHD) earlier in 2021. Scope 1 and 2 emission intensity from the Abu Dhabi chemical conversion plant is 7.46t CO₂-e /t lithium hydroxide, which GHD advised as being, “low compared with other emission intensities reported or derived from lithium hydroxide production facilities.” Upstream mining and mineral concentration at Karibib have an emissions intensity of 0.13t CO₂-e/ t concentrate (1.37t CO₂-e/ t LiOH), which is, “comparable with other similar lithium mine and concentrator projects.”

GHDs work has provided an excellent foundation for the evaluation of opportunities to reduce aggregate Scope 1 and 2 emissions to less than 3.0t CO₂-e/ t LCE; an industry leading position.

The largest single source of Phase 1 GHG emissions, equivalent to 4.43tCO₂-e/t LiOH, is the use of natural gas in the boiler, which is employed to generate process heat. Opportunities are now being evaluated to not just reduce natural gas consumption from DFS estimates but eliminate its use entirely.

Solar pre-heating of boiler feed water will materially reduce natural gas consumption and can be implemented prior to commissioning in 2023. The process heat required is relatively low at only 165°C which allows other renewable energy solutions to be considered to further reduce or eliminate natural gas consumption prior to or soon after start-up. The plant is also planned to be futureproofed by installing a hydrogen-enabled or hydrogen-ready boiler, which is being contemplated in the Front End Engineering and Design (FEED), currently being undertaken by Lycopodium. This will provide an alternative for the decarbonisation of all process heat when burning green hydrogen.

Integrated Phase 1 DFS Scope 1 & 2 emissions and reduction opportunities (tpa CO₂-e)

Source	DFS		Opportunity		Comment
	Scope 1	Scope 2	Scope 1	Scope 2	
Diesel: mine haulage	1,589		0		Electric mine haulage trucks
Diesel: other	4,075		4,075		Part electrification of mobile/fixed plant to be assessed
Wastewater treatment	20		20		To be assessed
Grid power		2,273		0	Off-grid modular concentrated solar power
Karibib sub-total	5,684	2,273	4,095	0	Intensity: 0.7t CO ₂ -e/t LCE
Natural gas (heat)	31,292		0		Green hydrogen enabled boiler with solar pre-heat
Process CO₂	13,281		13,281		Potential to reduce if lithium carbonate produced
Diesel	698		698		Part electrification of mobile plant to be assessed
Grid Power		7,419		0	Off-grid modular concentrated solar power
UAE sub-total	45,271	7,419	13,979	0	Intensity 2.3t CO ₂ -e/t LCE
Total	50,955	9,692	18,074	0	Intensity 3.0t CO ₂ -e/t LCE

Source: GHD and Lepidico estimates

At Karibib, the largest single Scope 1 emission is associated with diesel fuel usage, of which 28% will be consumed by trucks hauling ore and mine waste. Electrification of this small truck fleet is envisaged via equipment lease once suitable units become available.

Grid power supplied at Karibib already includes a significant renewable component with more projects planned in the coming years. By 2025 it is estimated that 80% of power will be generated from renewable sources. The UAE is also committed to progressively decarbonising its grid with 25% of non-fossil fuel supply planned by 2023. This is when Lepidico's Phase 1 plant is scheduled to commission.

To fast-track material reductions in Scope 2 emissions, off-grid renewable power solutions are being evaluated for both operating sites.

Low Water Consumption

The community impact of Phase 1 operations on groundwater availability at Karibib is projected to be zero, with ongoing monitoring to confirm this zero impact level. While the Abu Dhabi plant will use more water than Karibib, consumption is either relatively modest or in line with other lithium chemical production methods. Despite this, opportunities to reduce water consumption will continue to be evaluated.

Integrated operations water consumption product allocation

	Consumption %	Consumption rate M ³ /t LCE
Lithium hydroxide	44	33
Rubidium sulphate	32	24
SOP	10	8
Gypsum	5	4
Amorphous silica	5	4
Caesium sulphate	4	3

Source: Phase 1 DFS

Over the first four years of manufacture of all products total water consumption for the integrated operations is estimated in the DFS to be 415,000m³ annually.

Less than 20% of this total, 80,000m³, will be used at Karibib initially, where approximately 85% of the concentrator water requirement is recycled via filtration of both concentrate product and tailings. Water is lost to evaporation, seepage, and concentrate and tailings filter cakes.

Water at Karibib is sourced from four in-ground bores, three of which are located 3.5km from Rubicon and are equipped with submersible pumps, powered by dedicated solar arrays.

Lepidico's water permit was granted in 2017 and allows for 210,000m³ to be extracted annually. This allows for future expansion. Groundwater modelling indicates that natural meteoric recharge should more than replace the maximum capacity contemplated under the permit. Ongoing aquifer monitoring will be employed to confirm the modelling conclusions.

Chemical conversion in Abu Dhabi is estimated to consume 315,000m³ of water annually, nett of recycling. Water usage attributed to evaporators, crystallisers, dryers, cooling system and residue streams does not include water of hydration. Usage in each of these areas varies significantly and therefore consumption is apportioned back to the individual products where the unit processes are employed.

The balance of the nett water consumed is associated with common services which are apportioned to each product based on revenue contribution. Karibib consumption is also allocated according to revenue.

Raw water at KIZAD is mainly produced by desalination, most of which is powered by waste heat from gas fired power stations. The balance of water consumed in the UAE is sourced from dams and water harvesting.

Employing green hydrogen to fuel the boiler will also produce water that would be reclaimed for use in the plant, thereby reducing chemical plant consumption by an estimated 12%.

Land Use & Waste Management

Environmental land use impacts are predominantly attributable to the Namibian operations. Lepidico's closure plan will correct previous environmental remediation shortcomings, returning the land to agricultural use and making material improvements to the environment.

Karibib was mined at various times during the 20th century, largely for petalite. As such, it represents a brownfield development. Although no closure of these industrial sites has been undertaken previously, Lepidico's plans include formal mine closure; with the aim of rectifying environmental legacy issues and returning the land to agricultural use.

Phase 1 activities at Karibib are confined to an area of 9.6km² within the 69km² mining lease (ML 204). Within this, the areas for actual development will be far smaller with the majority of the footprint allocated to ground previously disturbed by historical mining activities.

Importantly, the expanse of the mining lease is sparsely populated with no permanent dwellings within the planned Phase 1 area.

Karibib operations do not require a dedicated tailings storage facility. Tailings from the concentrator will be dewatered and co-disposed with mine waste rock thereby filling the natural voids. Both tailings and waste have been assessed as environmentally benign, and there is no requirement for lining the waste management areas.

The Phase 1 chemical plant site is just 57,000m² and is located within an industrial free zone, which allows full foreign ownership as well as tax exemptions on imports and exports. Off-site infrastructure is supplied through a land lease agreement with Abu Dhabi Ports, which manages KIZAD, and includes direct connection to existing infrastructure; natural gas, 11kV power, potable water, sewer services, roads, and drainage. The KIZAD container port where concentrate from Walvis Bay, Namibia will be imported is 15km by road from the plant site.

Lepidico's hydrometallurgical technologies allow the silica and all alkali metals contained in mica minerals, lithium, potassium, caesium and rubidium to be extracted as valuable products. Residue from the chemical plant is predominantly white gypsum along with various benign alunites. This material has application in road and other forms of construction, where it is planned to be used. This will mean that the Phase 1 chemical plant will approximate to a zero-waste facility, a further point of differentiation with other lithium chemical manufacturing processes.

ABOUT LEPIDICO

Lepidico is an innovative developer of sustainable lithium hydroxide and other critical minerals, and the global leader in lithium mica processing.

With a tech-focused, ESG-led business model that is pilot-proven, our first lithium production – from far less contested mineral sources – are due in 2023. The Phase 1 Project will provide a meaningful contribution to decarbonisation the world's alkali metals supply chains. We are also working to grow our business with our second project, Phase 2. Other businesses have already begun to licence our patented-protected L-Max[®] and LOH-Max[®] technologies providing an avenue for royalty revenues.

For more information, [please visit our website](#).

Further Information

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