

Kibaran starts feasibility study on production of lithium-ion battery grade graphite

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HIGHLIGHTS

- Kibaran aims to sell battery-grade graphite to the lithium-ion battery industry in Japan and Korea, where strong growth is anticipated on the back of the electric car market
- GR Engineering appointed as lead manager to operate under the existing partnership and exclusivity agreement
- Results will be benchmarked to and reported in accordance with end user specifications

Kibaran Resources Limited (ASX: KNL) is pleased to announce it has commenced a feasibility study on downstream processing of its graphite, including the production of battery-grade (spherical) graphite for the lithium-ion battery market.

Production of battery-grade graphite offers Kibaran a substantial opportunity to add value to the graphite concentrate it plans to produce at its Epanko project in Tanzania.

It will also enable Kibaran to further capitalise on the rapidly growing demand for battery-grade graphite from the lithium-ion battery industry.

Kibaran recently signed a binding offtake agreement with Sojitz Corporation, which is a major supplier of raw materials to the lithium-ion battery industry in Japan and Korea.

Kibaran has engaged GR Engineering Services Ltd (GRES) (ASX:GNG) as the lead study manager. GRES is the Company's engineering partner for the development of the Epanko Graphite Project.

Kibaran and GRES are working together to appoint appropriate consultants in the specialised technical areas and the study will be overseen by the Company's technical graphite specialist and recently appointed Director, Mr Christoph Frey.

Kibaran and GRES have entered into an agreement that is consistent with its existing arrangement whereby GRES will provide its services to Kibaran exclusively in terms of graphite related projects within the Southern African Development Community (SADC) group of Countries.

FEASIBILITY STUDY - DOWNSTREAM PROCESSING

The Study will be based on initial annual production consistent with the current market demand for battery grade graphite, with staged increases based on forecast demand. The Company is accessing its strategic partners to develop demand models in order to optimise its staged production growth approach.

The study will be fully funded by Kibaran's recent \$10.9 million capital raising and is part of the Company's vertically integrated growth strategy. It will assess the economics of developing a manufacturing facility to produce battery-grade spherical graphite and other value added products. The scope of work will include study management, engineering, procurement and estimates of project capital and operating costs.

The study will evaluate different routes for the production of spherical graphite with a focus on methods with

low environmental footprint and competitive production costs.

It will position Epanko as a major new source of battery grade graphite for the high growth battery market. Kibaran is specifically targeting the existing market in Japan and Korea, given Panasonic (Japan) and LG Chem (Korea) are developing the world's largest gigafactories. Product samples will also be distributed within the German market.

The study will examine locations for the manufacturing facility in Tanzania near the main port of Dar es Salaam, given all Kibaran's graphite projects are connected by either rail or road to Dar es Salaam. Dar es Salaam's ability to provide low cost grid power is a significant infrastructure advantage.

Current testwork is well advanced with the previously reported bulk sample having been processed at a production scale plant and the concentrate is now available for the production of spherical graphite.

FORECAST DEMAND OF SPHERICAL NATURAL GRAPHITE FOR LITHIUM-ION BATTERIES

Demand for lithium-ion batteries is expected to increase through the demand from both the electric vehicle (EV) and energy storage systems (ESS). It is expected these markets will require new sources of graphite manufactured to higher environmental standards than existing supply.

The company is confident of delivering this vertically integrated growth strategy given that the previously completed scoping study on downstream processing delivered a compelling investment case (refer announcement dated 4th August 2015). The company also has significant competitive and technical advantages due the existing binding agreements which have been secured due to the superior quality of Epanko graphite.

BENCHMARKING RESULTS TO END USER REQUIREMENTS

It's important to recognise that while all graphite can be spherotised, every battery manufacturer has its own unique and very detailed set of specifications. The Company's spherical graphite tests will therefore be tailored to meet various manufacturers specifications. The level of detail of such specifications is outlined in Table 1.

Key points in terms of reporting spherical graphite characteristics are:

- Spherical graphite is reported on particle size distribution (D10, D50, D90)
- Particle size distribution has an important influence on tap density and the pricing.
- D50 is usually the central value.
- Tap density should be as high as possible.
- Specific surface area (SSA, measured according to BET) should be as low as possible.

With higher tap densities, the capacity of the battery is increased, as more mass of active material (graphite) is used in the battery. A lower specific surface area (SSA) increases the amount of cycles in the battery life and it also contributes to number of other positive effects for the performance of the battery.

Table 1 - A typical product specification for Spherical Graphite by a leading lithium-ion anode material manufacturer

Fixed Carbon Content	99.96% min	Tap Density(g/ml)	0.96 ±0.05
Ash Content	0.04% max	SSA(m²/g)	6.0 ±0.25
Moisture	0.10% max	D10 (micron)	10 ±1.0
pH	5.5 - 7	D50 (micron)	16 ±0.5
Fe(ppm)	<=35 ppm	D90 (micron)	23 ±1.0
Ca(ppm)	<=25 ppm	D-Top (micron)	<=50
S (ppm)	<=15 ppm		
Si(ppm)	<=45 ppm		
Ni (ppm)	<=5 ppm		
Zn(ppm)	<=10 ppm		
Cr(ppm)	<=5 ppm		
Al (ppm)	<=15 ppm		
Cu (ppm)	<=5 ppm		

To be economically viable, battery grade spherical graphite has to meet the individual, strict quality requirements of the Lithium-ion anode producers. Furthermore tests need to demonstrate battery specific performance under real life conditions in the test centres of battery producers, rather than simple bench scale laboratory analysis.

Therefore the Company's approach will be to run the tests utilising production plant equipment.

Epanko's purified spherical graphite will be sent to various potential customers and leading test institutes for intensive evaluation. Kibaran will continue its realistic philosophy and approach to the graphite business in order to access remaining opportunities for partnerships within the market place.

MARKET PRICING - SPHERICAL GRAPHITE

Spherical graphite pricing is subject to a number of factors which include particle size distribution, however current pricing for standard grade, purified, uncoated spherical graphite with a Carbon content > 99.95% is ~US\$3,000/t.

The company will be aiming to produce the highest quality spherical graphite which attracts significantly higher prices, ranging up to US\$5,000.

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