

EcoGraf Limited: Significant Battery Recycling Results

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RECOVERED HIGH PURITY BATTERY ANODE MATERIAL SUPPORTS THE GLOBAL EFFORTS TO INCREASE RECYCLING OF LITHIUM-ION BATTERIES

[EcoGraf Ltd.](#) (EcoGraf or the Company) (ASX: EGR) is pleased to announce the results from its ongoing customer recycling program's using EcoGraf™ proprietary purification process to recover high purity battery anode material from lithium-ion battery materials.

Key Highlights

- Significant results up to 100% carbon achieved from EcoGraf™ purification of production battery anode scrap generated through the manufacture of lithium-ion batteries support the potential to re-use in the battery to reduce battery production costs
- Further positive results confirm the recovery of high purity anode material of up to 99.6% carbon from a range of 'black mass' material from recycled end of life lithium-ion batteries
- Results demonstrate potential to re-use recovered high purity battery anode material in the higher priced industrial natural and synthetic graphite markets
- Testwork remains ongoing with significant interest from customers, including leading electric vehicle manufacturers, battery manufacturers and battery recyclers
- EcoGraf(TM) results confirm the opportunity to support electric vehicle (EV) and battery manufacturers achieve sustainable closed-loop manufacturing
- World Bank report highlights the importance of recycling to support the transition to renewable energy, with Bloomberg forecasting recycling market to be worth US\$18 billion by 2030

In conjunction with the extensive growth in lithium-ion battery use and manufacturing for electric vehicles and energy storage, recycling of batteries and battery materials has become a major environmental and economic concern for both government and industry.

Most of the focus to date has been on the recycling and recovery of cathode minerals with little attention being paid on the recycling of the graphite anode material.

In testing undertaken in collaboration with potential customers, the Ecograp™ proprietary purification process has now been applied successfully to recycling of both 'production scrap' and 'black mass' materials.

PRODUCTION SCRAP	is the graphite material which is a waste product generated from each stage of the battery anode manufacturing (refer Figure 2).
BLACK MASS	is the residual graphite material remaining after hydrometallurgical processes have recovered the high cathode metals from end-of-life lithium ion batteries.

Presently the black mass is considered waste and is relegated to landfill, which is a practice that is now inconsistent with environmental and sustainability objectives of major electric vehicle (EV) and battery manufacturers.

The results of recycling programs have demonstrated that excellent recycling recoveries can be achieved from both Production Scrap and Black Mass material using the company's EcoGraf™ purification process.

Table 1 displays the carbon grade ranges of the recovered anode materials before and after purification using EcoGraf™ proprietary purification process for the product samples representing both 'Production Scrap' and 'Black Mass' material.

Table 1 - EcoGraf™ Recycling Results

	PRODUCTION SCRAP	BLACK MASS
	(%C)	(%C)
Product Sample	98-99.85%	30-50%
EcoGraf™ Purification	98.6%-100%	98-99.6%

Carbon (%C) grades determined by Loss on Ignition (LOI) method.

The carbon grades achieved for the recovered anode material support the potential for re-use of both the production scrap into the lithium-ion supply chain and 'black mass' graphite into the higher priced, high purity industrial markets for natural and the synthetic markets.

The purification of the production scrap provides an exciting opportunity for EcoGraf™ to participate in returning this material directly back into the supply chain, supporting the recycling imperative while at the same time potentially reducing battery production costs.

The high purity graphite market is considered greater than 99% carbon with the synthetic market commencing with grades from 98% carbon.

Results are encouraging, however additional work in collaboration with customers is continuing to further refine the process.

Further improvement is expected as the recycling programs using the EcoGraf™ process are optimised for this recycling purpose. The current tests were undertaken using the standard EcoGraf™ purification flowsheet, which was configured for production of the purified of battery graphite from natural flake graphite concentrates.

Recent reports provide the importance of battery recycling.

- World Bank Group 'Minerals for Climate Action' report highlighting the role that recycling and re-use of minerals will play in meeting increasing mineral demand in the future. Battery anode material is forecast to comprise 54% of the total volume of future mineral demand for energy applications

- Bloomberg forecast market to be worth US\$18 billion by 2030, supported by regulatory directives, especially in Europe (EU Battery Directive 2006/66/EC), which require battery manufacturers (or third parties acting on their behalf), to finance the cost of collecting, treating and recycling waste batteries.

Natural and synthetic graphite are major battery anode materials in the lithium-ion battery and the recovered anode material is a composite of both synthetic and natural graphite. There are good markets in both natural and synthetic graphite markets for the recycled materials.

The market pricing for high purity natural graphite (>99% Carbon), including batteries, carbon brushes, lubricants and powder metallurgy can attract prices of up to US\$4,500/t. Much higher prices are received for synthetic graphite products which range from US\$2,000/t up to US\$20,000/t for niche synthetic materials.

The Company looks forward to providing further updates as the testwork remains ongoing with over six expressions of interest from customers, including leading electric vehicle manufacturers, battery manufacturers and battery recyclers interested in evaluating the application of company's EcoGraf™ purification.

This announcement is authorised for release by Andrew Spinks, Managing Director.

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ENGINEERING CLEAN ENERGY

About EcoGraf

Founded on a commitment to innovation and sustainability, EcoGraf is building a vertically integrated business to produce high purity graphite for the lithium-ion battery market.

The new state-of-the-art processing facility in Western Australia will manufacture spherical graphite products for export to Asia, Europe and North America using a superior, environmentally responsible purification technology to provide customers with sustainably produced, high performance battery anode graphite. In time the battery graphite production base will be expanded to include additional facilities in Europe and North America to support the global transition to clean, renewable energy in the coming decade.

In addition, the Company's breakthrough recovery of graphite from recycled batteries using its EcoGraf™ process will enable the recycling industry to reduce battery waste and use recycled graphite to improve battery lifecycle efficiency.

To complement the battery graphite operations, EcoGraf is also developing the TanzGraphite natural flake graphite business, commencing with the Epanko Graphite Project, which will supply additional feedstock for the spherical graphite processing facilities and provide customers with a long term supply of high quality graphite products for industrial applications such as refractories, recarburisers and lubricants.

EcoGraf, a unique vertically integrated graphite business, positioned for the future of clean energy.

A video fly-through of this new facility is available online at the following link:
<https://www.ecograf.com.au/#home-video>

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