German Research Institute Confirms Recycled Graphite Performance

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- Lithium-ion cell confirms excellent cycling stability after 1000 cycles

EcoGraf Limited (EcoGraf or the Company) (ASX: EGR; FSE: FMK; OTCQB: ECGFF) is pleased to provide the positive findings from a research program completed by the Helmholtz Institute in Germany, where EcoGraf HFfree^{TM} proprietary processing technology has been used to purify graphite particles recovered from end-of-life lithium-ion batteries.

EcoGraf contributed its environmentally superior HFfree processing expertise to the research program and purified the recovered graphite particles to battery grade specification. The German Government funded program then compared the electrochemical performance of the recycled EcoGraf HFfree™ graphite with a number of commercial battery graphite products.

The study focused on the recovery and purification of graphite from end-of-life lithium-ion batteries, encompassing a mix of NMC and LCO battery chemistries. Through froth flotation, graphite was successfully recovered from the Black mass, and the resulting concentrate underwent purification using EcoGraf HFfree™ technology. The results of testing confirmed that the electrochemical performance of the EcoGraf HFfree™ recovered graphite from end-of-life lithium-ion batteries matches that of the brand-new commercial anode graphite as shown in the summary below.

It has been found that the structure and morphology of the recycled graphite are essentially unchanged compared to pristine commercial anode-grade graphite, and despite some minor impurities from the recycling process, the recycled graphite provides a remarkable reversible specific capacity of more than 350 mAh/g.

Even more importantly, newly assembled recycled graphite and Li[Ni0.5Mn0.3Co0.2]O2 (NMC532) cathodes cells show an excellent cycling stability with a capacity retention of 80% after 1000 cycles, i.e., comparable to the performance of reference full-cells comprising pristine commercial graphite. Further refinements in the electrolyte composition yielded remarkable stability, evidenced by negligible capacity loss and consistent performance throughout extended cycling tests.

The findings are positive, but further work is required. One of EcoGraf's innovative strategies involves blending recycled graphite with high-quality Tanzanian graphite for manufacturing anodes, thereby advancing sustainable battery solutions and ensuring high performance in lithium-ion cells.

The research program was undertaken in Germany, through a collaboration between the Helmholtz Institute Freiberg for Resource Technology (HIF) and the Helmholtz Institute Ulm (HIU). For a more in-depth understanding of the research and its implications, we invite you to explore the detailed findings in the published paper: https://onlinelibrary.wiley.com/doi/10.1002/cey2.483

These results are further validation of the effectiveness of the EcoGraf HFfree™ purification process for the production of high-performance battery graphite, as well as the re-use of recycled battery anode material for anode, battery and electric vehicle customers. EcoGraf is actively engaged in developing solutions for recycling anode scraps and leached black mass from end-of-life batteries, thus contributing to the circular economy and reducing waste in the battery industry.

It also follows the recently announced collaboration with BASF on anode recycling which sets out a framework for EcoGraf to support BASF's recycling R&D in Europe with its anode recycling capability (refer announcement dated 21 February 2024 titled 'Collaboration with BASF on Anode Recycling').

The Company is scheduled to commission the world's first HFfree battery anode material product qualification facility (PQF) in Western Australia, which has the benefit of additionally leveraging the EcoGraf HFfree™ process for anode recycling.

The PQF has been developed in response to requests from EV and battery manufacturers for EcoGraf HFfree™ products as part of qualification programs to underpin the Company's planned development of commercial scale battery anode material purification facilities for global battery markets. EcoGraf has received valuable support from the Commonwealth Government for the PQF, through a $2.9m grant that was provided under the Critical Minerals Development Program as part of Australia's Critical Minerals Strategy.

EcoGraf believes this recycling capability will fundamentally change the dynamics of the battery supply chain, leading to a significant reduction in CO2 emissions and lowering overall battery production costs. It uniquely positions the Company to support EU Commission requirements for lithium-ion battery recycling and will assist the global battery industry to optimise its supply chain and transition to closed-loop manufacturing efficiencies.

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

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About EcoGraf

EcoGraf is building a vertically integrated battery anode materials business to produce high purity graphite products for the lithium-ion battery and advanced manufacturing markets. Over US$30 million has been invested to date to create a highly attractive graphite mining and mineral processing business.

In Tanzania, the Company is developing the TanzGraphite natural flake graphite business, commencing with the Epanko Graphite Project, to provide a long-term, scalable supply of feedstock for EcoGraf™ battery anode material processing facilities, together with high quality large flake graphite products for specialised industrial applications.

Using its environmentally superior EcoGraf HFfree™ purification technology, the Company will upgrade the flake graphite to produce 99.95%C high performance battery anode material to supply electric vehicle, battery and anode manufacturers in Asia, Europe and North America as the world transitions to clean, renewable energy.

Battery recycling is critical to improving supply chain sustainability and the Company's successful application of the EcoGraf™ purification process to recycle battery anode material provides it with a unique ability to support customers to reduce CO2 emissions and lower battery costs.

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