

12 September 2023

IONIC TECHNOLOGIES PARTNERS WITH FORD, LCM AND BGS TO ANCHOR UK RARE EARTH SUPPLY CHAIN FROM MAGNET RECYCLING

- **IonicRE's magnet recycling business Ionic Technologies, has executed landmark partnership agreements with Ford Technologies Limited (Ford), Less Common Metals Limited (LCM), and British Geological Survey (BGS) to create a UK rare earth supply chain from recycled magnets;**
- **Ionic Technologies' world leading recycling technology will be used to produce high purity, separated and traceable rare earths from end-of-life magnets and swarf, for supply to LCM for alloy production to be converted to NdFeB magnets for ultimate use by Ford in electric vehicle (EV) production;**
- **The UK government will support the Ionic Technologies, Ford and LCM partnership via a £1 million project, with Ionic Technologies announced as the major beneficiary and lead collaborator in the focus on delivering the UK's first domestic sourcing of separated high purity magnet rare earth oxides (REOs);**
- **The UK government is supporting an additional £1 million project in funding a feasibility study into the construction and supply side dynamics of a magnet rare earth recycling plant in the UK in collaboration with the British Geological Survey;**
- **The funding is part of the UK Government's circular critical materials supply chains (CLIMATES) program; and**
- **The move is an important step towards sovereignty for the UK, in developing market leading technology and building a supportive pathway for Ionic Technologies to commercialise the first magnet recycling facility in Belfast to feed escalating supply chain appetite for circular economy magnet REOs.**

The Board of Ionic Rare Earths Limited ("IonicRE" or "The Company") (ASX: IXR) is pleased to advise further government support and supply chain progress through Ionic Technologies International Ltd ("Ionic Technologies"), a 100% owned subsidiary based in Belfast UK.

Ionic Technologies has secured a collaboration partnership with Ford Technologies (Ford) and Less Common Metals (LCM) to develop a UK supply chain for recycled magnet rare earths to magnets, and in partnership with British Geological Survey to complete a feasibility study and supply chain

analysis for a UK magnet recycling facility. Both programs have been successful in obtaining UK government support through grant funding.

Ionic Technologies has successfully, for the second year in a row, secured funding from the UK Government.

Ionic Technologies has developed rare earth element separation and refining technology and applied this to the recycling of spent permanent Neodymium-Iron-Boron (NdFeB) magnets to enable the creation of sustainable, traceable, and sovereign rare-earth supply chains.

One of these programs will support Ford which currently has four drive production facilities globally.

The majority of Ford's European Union (EU) production will come from its UK based Halewood facility which is planning to produce close to half a million units per annum by 2026.

To support production at this facility there will be a requirement for over 600 tonnes of magnet raw material per annum. Ford will test and analyse the performance of magnets provided through the project, to prove the efficacy of high specification magnets containing rare earth elements (REEs) of recycled origin from Ionic Technologies.

Each stage of the process from magnet recycling to EV testing will generate waste (magnets and swarf), including the magnets used in Ford's electric vehicle (EV) motors.

Ionic Technologies will recycle this material, thus completing a totally circular rare earth supply chain within the UK.

The two programs totalling £2 million (A\$3.90 million), which includes a direct cash injection of approximately £750,000, is for Ionic Technologies to become the lead collaborator for the two CLIMATES projects.

Ionic Technologies will take the lead with organisations that are developing secure and traceable critical minerals supply chains in the UK and the EU.

Ionic Rare Earth's Managing Director Tim Harrison commented;

"We are harnessing our technology to accelerate mining, refining and recycling of magnet and heavy rare earths critical for energy transition, advanced manufacturing, and defence," Ionic Rare Earth's Managing Director Tim Harrison said.

He said that the "CLIMATES funding that Ionic Technologies had been awarded by Innovate UK demonstrated IonicRE's strategy to create a collaborative, western supply chain for Rare Earths with Ford Technologies and Less Common Metals in the UK and European Union."

"The other CLIMATES grant would see Ionic Technologies develop the business case and potential scale up of a commercial magnet recycling facility in Belfast, in partnership with British Geological Survey."

Thomas Kelly, General Manager of Ionic Technologies said the funding provided was adding significant value to the business.

“Ionic Technologies is driving the emerging supply chain for Rare Earths, and its ability to meet the increasing demand for critical minerals in the UK and abroad.”

“This will enable the UK to meet its Net Zero ambitions, by serving renewable technologies such as wind energy and EV manufacturing,” Kelly said.

Innovate UK’s CLIMATES Program

Ionic Technologies successful grant funding submissions centred on two CLIMATES projects:

1. in partnership with Less Common Metals (LCM) and Ford Technologies, Ionic Technologies will develop a traceable, circular supply chain of rare-earths for application in EV motors within the UK, and
2. in partnership with the British Geological Survey, Ionic Technologies will complete a feasibility study of a commercial magnet recycling plant in Belfast.

Mike Biddle, Executive Director for Net Zero at Innovate UK congratulated Ionic Technologies and its two project partners:

“By recycling and recovering valuable rare-earth elements, companies like Ionic Technologies are reducing the environmental impact of extraction, saving energy, and creating a resilient supply chain in a growing global market.

“I congratulate Ionic Technologies for securing funding for two CLIMATES projects. They have demonstrated their commitment to this challenge, and I wish them and their partners well on their innovation projects.”

The UK’s innovation agency, Innovate UK, has announced a £6.6m investment in research projects which aim to help build a stronger supply chain of the critical minerals we rely on every day.

The Critical Materials for Magnets Competition is part of the CLIMATES program, announced in February 2023, which committed £15m of government funding for cutting-edge research to strengthen the supply of critical materials.

This supply chain represents a huge opportunity for UK businesses; the global market for rare-earth elements (REE) is projected to grow from \$2.5bn to \$5.5bn by 2028¹.

In total, 16 UK-based innovation projects were announced as winners of the first competition, consisting of 40 organisations.

See link for official statement. [Cutting-edge projects secure £6.6m investment to strengthen the UK’s supply of critical minerals, Innovate UK, 11 September 2023.](#)

¹ Fortune Business Insights



Figure 1: UK Innovate team visiting Ionic Technologies in Belfast recently, L-R Thomas Kelly (General Manager, Ionic Technologies), Martyn Cherrington (Innovate UK), Matthew Reeves (Innovate UK), Neruja Srikantharajah (Engineering Manager, Ionic Technologies), Megan Pheonix (Innovate UK), Evi Petavratzi (Principal Mineral Commodity Specialist, British Geological Survey), Deborah Jones (Innovate UK), Steven Morris (Innovate UK), Mark Patton (Minerals Geologist, Geological Survey of Northern Ireland), Fergal Coleman (Head of Technology, Ionic Technologies), Marie Cowan. (Director, Geological Survey of Northern Ireland) and Sheena Hindocha (Innovate UK).

Grant 1 – The EV Permanent Magnet Circular Supply Chain

Ionic Technologies, Ford Technologies (Ford) and Less Common Metals (LCM) will establish a demonstration circular supply chain for Rare Earth Elements (REEs) in the UK, by utilising innovative technologies to create high specification magnets containing 100% recycled REEs for use in Electrical Vehicles (EVs).

Ionic Technologies has demonstrated patented technology at the Demonstration Plant in Belfast producing high purity rare earth oxides (REOs) at a rate of 10 tonnes per annum. At 99.5% purity or higher, the REOs produced are suitable for use in high specification magnets for EVs and other technology contributing towards the UK's NetZero ambitions.

LCM is a world leader in the manufacture and supply of complex alloy systems and metals including those based on rare earths. LCM produces alloys made from REOs, which are supplied to permanent magnet production companies worldwide. A sub-contract magnet producer will be used to manufacture multiple magnet types which meet Ford's specifications.

Simon Palmer, Chief Engineer, Vehicle Hardware Engineering Europe, Commercial Vehicles, Ford Motor Company said; "Ford is proud to link up with Ionic and Less Common Metals to deliver the EV

Permanent Magnet Circular Supply Chain project. The project which is co-funded by Innovate UK's CLIMATES program is a strategically important step to secure the supply of sustainable rare earth materials to support growth of electric vehicles."

Albert Slot, Managing Director of LCM commented: "LCM is thrilled to be working with Ionic Technologies and Ford to establish a demonstration circular supply chain for Rare Earth Elements in the UK by creating high specification recycled REE magnets."

"As a world leader with over 30 years of experience, this project aligns with LCM's values and we look forward to contributing to the UK Green Targets for EVs, which will create an attractive alternative circular supply chain."



Figure 2: Ford's Halewood facility in the UK (source: www.ford.com).



Figure 3: LCM's facility at Ellesmere Port in the UK (source: www.lesscommonmetals.com).



Figure 4: Rare earth metal alloy production via electrolysis at LCM (source: www.lesscommonmetals.com).

Grant 2 – A feasibility study into the construction and supply side dynamics of a magnet rare earth recycling plant in the UK

Ionic Technologies and British Geological Survey (BGS) is seeking to establish of a secure supply of rare earths for the UK, through the implementation of an advanced study into the REE ecosystem within the country and the feasibility of a first-of-kind commercial REO production facility in Belfast.

The UK Government wants to create market depth, economic development and accelerate the move towards a net-zero tomorrow.

The project will expand on the existing BGS material stocks and flows model for rare earths, with new, pertinent data on wind turbines, EVs and other vehicles, all containing significant REE content which could be recycled within the UK.

With this information, Ionic Technologies will be able to specify a commercial facility, capable of receiving and processing end-of-life or waste magnet material through a plant designed using Ionic Technologies' patented technology to produce REOs with purity of 99.5%+ quality.

REOs of this quality are used in the production of high specification magnets, utilised in EVs and defence applications as well as technology such as wind turbines.

In addition to a significant expansion of publicly owned data on the REE eco-system in the UK, the project will also equip Ionic Technologies with technical data to create a source of REOs that would provide the UK with a secure, sovereign supply of REOs independent of geo-political influence and supply chain insecurity.

Dr Evi Petavratzi, from BGS said: "We are very pleased to be able to work alongside Ionic Technologies to elevate the knowledge base of the UK stocks and flows of rare earths in permanent magnets. This will derive critical knowledge that enables new investment and business opportunities to develop, as well as fast-track the establishment of a circular economy of rare earths in the UK."



Figure 5: BGS's Nottingham facility in the UK (source: www.bgs.ac.uk).

Technology Overview

Since its founding in 2015, as a spinout from Queens University Belfast (QUB), Ionic Technologies has developed processes for the separation and recovery of rare earths from mining ore concentrates and waste permanent magnets.

The technology developed is a step up in efficient, non-hazardous, and economically viable processing with minimal environmental footprint.

Ionic Technologies has demonstrated capability to achieve near complete extraction of rare earths from spent magnets and waste (swarf) to a recovery of high value magnet REO product quality exceeding 99.9% REO.

Ionic Technologies now has “first mover” advantage in the industrial elemental extraction of separated REOs from spent magnets and waste, enabling near term magnet REO production capability to satisfy growing demand from the energy transition, advanced manufacturing, and defence.

Ionic Technologies proprietary technology provides a universal method for the recovery of high purity REOs from lower quality and variable grade magnets, to be used in the manufacture of modern high-performance and high specification permanent magnets required to support substantial growth in both EV and wind turbine deployment.



Figure 6: Ionic Technologies path to production.

About Ionic Technologies

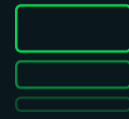
Ionic Technologies has developed separation and refining technology that can be applied to the recycling and refining of individual magnet rare earths from used permanent (NdFeB) magnets.

Our hydrometallurgical process is able to deliver high purity separated magnet rare earth oxides no matter the quality and variability in composition of magnet feedstock.

Ionic Technologies is 100% owned by Australian rare earth resources company **Ionic Rare Earths Limited** (ASX: IXR).

Intake flexibility

Unlike other recycling processes, our technology can recycle any form of mixed waste magnets and production swarf regardless of type, age or coatings. We are not reliant on a single feedstock stream.



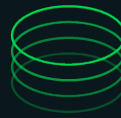
Magnet crushing / grinding



Digestion



Separate base metals (Fe, Mn, Al, Ni, Cu, B)



Nd, Pr, Dy, Tb solvent separation (15 stages)



Individual oxides precipitation

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Figure 7: Ionic Technologies technology overview.

Authorised for release by the Board.

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About Ionic Rare Earths Ltd

Ionic Rare Earths Limited (ASX: IXR or IonicRE) is set to become a miner, refiner and recycler of sustainable and traceable magnet and heavy rare earths needed to develop net-zero carbon technologies.

The flagship Makuutu Rare Earths Project in Uganda, 60% owned by IonicRE, is well-supported by existing tier-one infrastructure and is on track to become a long-life, low Capex, scalable and sustainable supplier of high-value magnet and heavy rare earths oxides (REO). In March 2023, IonicRE announced a positive stage 1 Definitive Feasibility Study (DFS) for the first of six (6) tenements to progress to a Mining Licence Application (MLA) which is pending in Uganda. The Makuutu Stage 1 DFS defined a 35-year life initial project producing a 71% rich magnet and heavy rare earth carbonate (MREC) product basket and the potential for significant potential and scale up through additional tenements.

Ionic Technologies International Limited (“Ionic Technologies”), a 100% owned UK subsidiary acquired in 2022, has developed processes for the separation and recovery of rare earth elements (REE) from mining ore concentrates and recycled permanent magnets. Ionic Technologies is focusing on the commercialisation of the technology to achieve near complete extraction from end of life / spent magnets and waste (swarf) to high value, separated and traceable magnet rare earth products with grades exceeding 99.9% rare earth oxide (REO). In June 2023, Ionic Technologies announced initial production of high purity magnet REOs from its newly commissioned Demonstration Plant. This technology and operating Demonstration Plant provides first mover advantage in the industrial elemental extraction of REEs from recycling, enabling near term magnet REO production capability to support demand for early-stage alternative supply chains.

As part of an integrated strategy to create downstream supply chain value, IonicRE is also evaluating the development of its own magnet and heavy rare earth refinery, or hub, to separate the unique and high value magnet and heavy rare earths dominant Makuutu basket into the full spectrum of REOs plus scandium.

This three-pillar strategy completes the circular economy of sustainable and traceable magnet and heavy rare earth products needed to supply applications critical to electric vehicles, offshore wind turbines, communication, and key defence initiatives.

IonicRE is a Participant of the UN Global Compact and adheres to its principles-based approach to responsible business.

About Innovate UK

Innovate UK, part of UK Research and Innovation, is the UK’s innovation agency. Innovate UK work to create a better future by inspiring, involving and investing in businesses developing life-changing innovations.

Innovate UK's mission is to help companies to grow through their development and commercialisation of new products, processes, and services, supported by an outstanding innovation ecosystem that is agile, inclusive, and easy to navigate.

Find out more at <https://www.ukri.org/councils/innovate-uk>.

About British Geological Survey

The British Geological Survey is a world-leading geological survey and global geoscience organisation, focused on public-good science for government and research to understand earth and environmental processes.

British Geological Survey is the UK's premier provider of objective and authoritative geoscientific data, information and knowledge to help society to use its natural resources responsibly, manage environmental change and be resilient to environmental hazards.

Find out more at <https://www.bgs.ac.uk>.

About Less Common Metals

Less Common Metals Limited is a privately-owned company and world leader in the manufacture and supply of rare earth-based metals and alloys. Main markets served are; the global permanent magnet industry, specialist master alloy consumers and producers of functional materials based on rare earth-containing alloys. With considerable experience in the production and characterisation of materials to tight compositional tolerances and controlled microstructures, LCM offers an innovative and highly flexible approach to a wide range of material requirements.

Find out more at <https://lesscommonmetals.com>.

About Ford Technologies

Ford Technologies Limited is a subsidiary of the Ford Motor Company. Ford Technologies Limited own and operate a major Research & Development complex at Dunton, Essex, UK. Ford currently has 4 drive production facilities globally; the majority of EU production will come from its UK based Halewood facility which is planning to produce close to half a million units per annum by 2026.

Find out more at <https://www.ford.co.uk/experience-ford/about-ford>.

Forward Looking Statements

This announcement has been prepared by Ionic Rare Earths Limited and may include forward-looking statements. Forward-looking statements are only predictions and are subject to risks, uncertainties and assumptions which are outside the control of Ionic Rare Earths Limited. Actual values, results or events may be materially different to those expressed or implied in this document. Given these uncertainties, recipients are cautioned not to place reliance on forward looking statements. Any forward-looking statements in this document speak only at the date of issue of this document. Subject to any continuing obligations under

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