ionic
rare earths

ASX: IXR

ASX Announcement

22 January 2024

IONICRE'S MAGNET RECYCLING PLANT NOW IN CONTINUOUS OPERATION IN BELFAST, UK

- **24/7 operation has commenced at the Ionic Technologies Magnet Recycling Demonstration Plant in Belfast, UK;**
- **Production will be fed directly into UK Government sponsored project with Ford and Less Common Metals;**
- **2.7 tonnes of end of life (EOL) permanent magnets have been processed through crushing and grinding circuits, ready for startup of leaching and separation circuits;**
- **Continuous operations are de-risking the technology and the process flowsheet; and**
- **Other supply chain collaborations with rare earth metal, alloy, and magnet manufacturers plus Original Equipment Manufacturers (OEMs) underway to expand global offering from Ionic Technologies.**

The Board of Ionic Rare Earths Limited ("IonicRE" or "the Company") (ASX: IXR) is pleased to advise the commencement of 24/7 operations at Ionic Technologies International Ltd ("Ionic Technologies"), a 100% owned subsidiary based in Belfast, UK.

Ionic Technologies is a global first mover in the recycling of Neodymium-Iron-Boron (NdFeB) permanent magnets to high purity separated magnet rare earth oxides (REOs) – enabling the creation of sustainable, traceable, and sovereign rare earth supply chains.

During 2023, Ionic Technologies constructed a magnet recycling Demonstration Plant and produced quantities of high purity (> 99.5%) neodymium (Nd) and dysprosium (Dy) rare earth oxides (REOs) (ASX: 19 June 2023).

Ionic Technologies is now operating the Demonstration Plant on a continuous basis, with the intention to produce high purity separated rare earth oxides at the design production capacity of 10 tonnes per annum, from 30 tonnes per annum of end-of-life permanent magnets or production swarf.

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This production will flow immediately into the UK Government supported CLIMATES collaboration with Ford Technologies and Less Common Metals (LCM).

Ionic Rare Earths Managing Director, Mr Tim Harrison, said the continuous operation allowed the Company to deepen supply chain relationships and provided additional data to support the completion of the feasibility study on a commercial plant located in Belfast, UK.

> *"The commencement of 24/7 operation in Belfast is a major technical achievement for the Ionic Technologies team."*
>
> *"It is an important step forward for Ionic Rare Earths in mining, refining, and recycling the magnet and heavy rare earths critical for the energy transition, advanced manufacturing, and defence," Harrison said.*
>
> *"The continuous operation enables the production of samples and verification data, supports sector relationships, plus new strategic partner relationships."*
>
> *"This cements our position in the emergence of alternative, secure and traceable supply of magnet and heavy rare earths to market."*

Harrison said the continuous operation was de-risking the technology and the flowsheet, plus evaluating the robustness of the process in taking variable feedstocks of magnets with variable magnet rare earth distribution, coated or oxidised magnets, and swarf material from metal to magnet manufacturing, and producing high purity magnet REOs.

> *"This Demonstration Plant, operating 24/7, will soon be hosting potential strategic partners looking to get access to sustainably produced magnet rare earths in a market where demand is expected to quickly outstrip supply."*
>
> *"We look forward to supplying our collaboration partners, LCM and Ford, for scaled up downstream value addition all the way to permanent magnets and demonstrating a circular magnet rare earth supply chain."*
>
> *"The Demonstration Plant is also validating data for the feasibility study underway for a commercial plant to be located in Belfast, UK, with the potential for turnkey plants in our key focus markets."*

Demonstration Plant Background

In September 2022, the UK Government's Innovate UK Automotive Transformation Fund Scale up Readiness Validation ("SuRV") program, coordinated by the Advanced Propulsion Centre (APC), awarded a £1.72 million grant (A$2.90 million) to Ionic Technologies to build a demonstration magnet recycling plant to produce separated magnet rare earth oxides (REOs), a first for the UK, as a scale up of successful previous pilot campaigns using the Company's patented technology.

On 12 September 2023, Ionic Technologies announced it had successfully secured additional funding for two Innovate UK CLIMATES grants from the totalling £2 million (A$3.90 million). The successful grant funding submissions centred on two CLIMATES projects:

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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 has commenced a feasibility study for a commercial magnet recycling plant in Belfast, UK (refer ASX announcement 7 December 2023).

Ionic Technologies has established technical and operational teams to both operate the plant and support continued technical optimisation programs, enabling 24/7 operation of the Demonstration Plant. Production schedules are now in place, to ensure maximised asset usage, safe operation and to fulfil supply chain demand for production campaigns to both committed collaboration partners and new partnerships the Company is exploring.

To date, approximately 2.7 tonnes of permanent magnets have been processed through front end operations, enabling the commencement of the digestion circuit for treatment and solid-liquid separation.

The separation circuit has been water commissioned and feed to the circuit is expected to start over the next two weeks.

Simultaneously, Ionic Technologies is readying capability to complete Dysprosium (Dy) and Terbium (Tb) separation utilising the existing mixer-settler pilot plant equipment. This complex separation of Heavy Rare Earths provides supply chain partners with high purity (99.5% or above) Heavy Rare Earth Oxides to be used in developing grain boundary diffused (GBD) sintered permanent magnet production.

Figure 1: Magnet pre-processing, showing jaw crusher in use on left, and crushed permanent magnets on the right.

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Figure 2: Charged Rod Mill and milled magnet slurry.

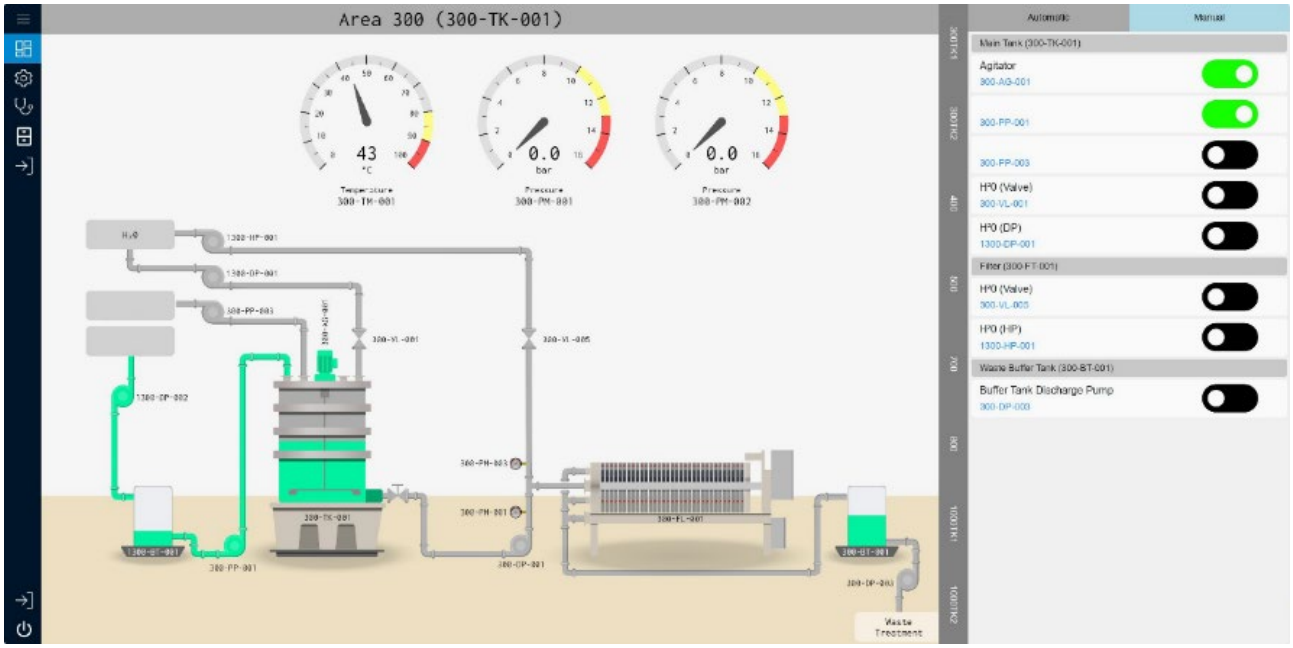

Figure 3: SCADA mimic for Digestion circuit.

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Figure 4: Loading milled magnet slurry into the Digestion reactor.

Figure 5: Left, Digestion outlet pipework and valves, and right, Separation circuit feed pumps.

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Figure 6: Separation circuit mixer-settlers post water commissioning ready to receive feed stream.

Figure 7: Pilot plant mixer-settler circuit commencing for Dy/Tb separation.

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 REEs 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.

The Company's proprietary technology provides a universal method for the recovery of high purity grade rare earth elements 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 electric vehicle (EV) and wind turbine deployment.

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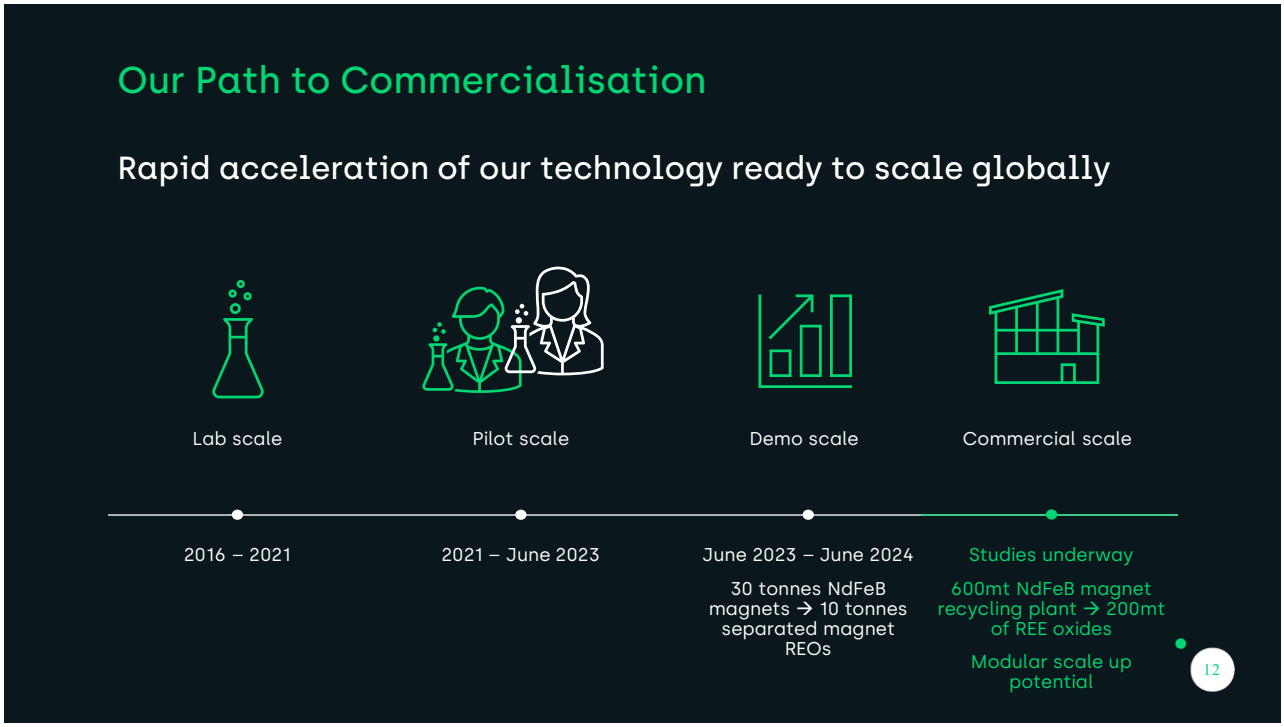

Figure 8: Ionic Technologies path to production.

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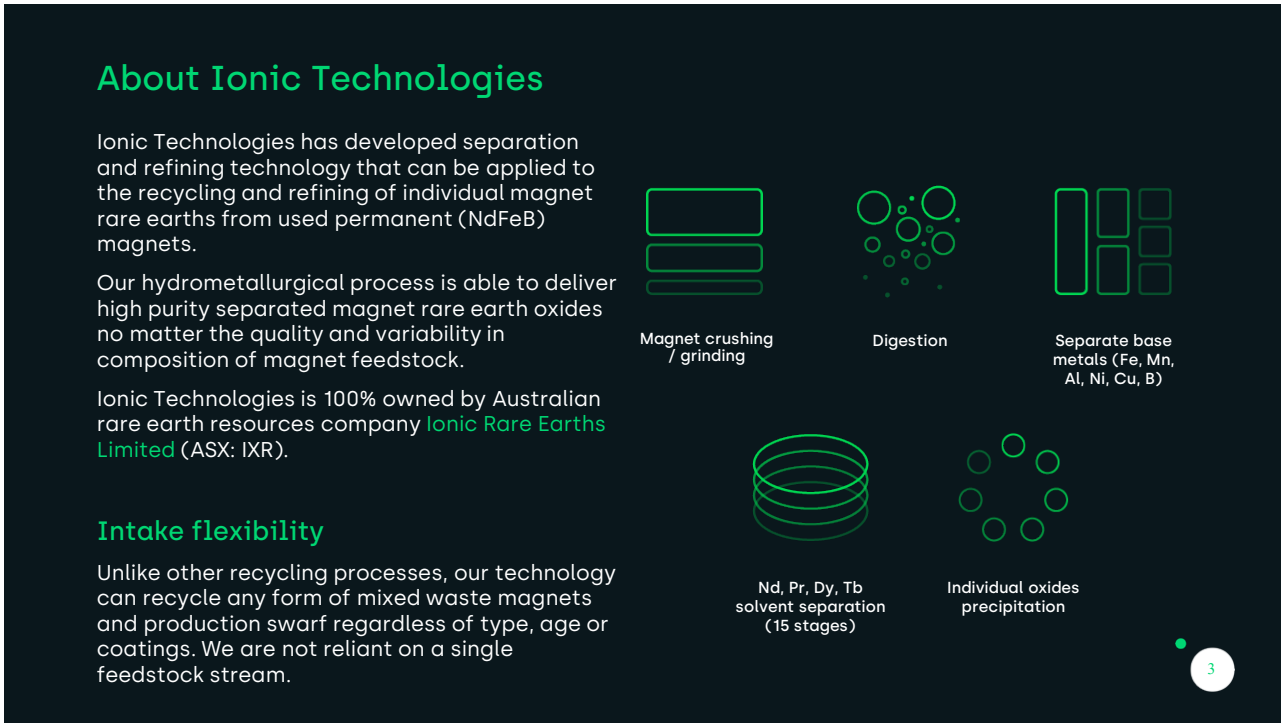

Figure 9: Ionic Technologies technology overview.

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 Makuutu Rare Earths Project in Uganda, 60% owned by IonicRE, moving to 94% ownership in Q1 2024, 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 which was awarded in January 2024. 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. In September 2023, Ionic Technologies announced with the support of the UK government, collaboration partnerships to build a domestic UK supply chain, from recycled REOs to metals, alloys and magnets and supplying UK based electric vehicles (EV) manufacturing, with potential to replicate across other key markets.

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 integrated strategy completes the circular economy of sustainable and traceable magnet and heavy rare earth products needed to supply applications critical to EVs, 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.

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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 applicable law and the ASX Listing Rules, Ionic Rare Earths Limited does not undertake any obligation to update or revise any information or any of the forward-looking statements in this document or any changes in events, conditions, or circumstances on which any such forward looking statement is based.