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ASX Announcement

14 March 2024

IONIC TECHNOLOGIES SET TO BECOME FIRST ASX RARE EARTH OXIDE PRODUCER FROM RECYCLED WIND TURBINES

- **Ionic Technologies' rapidly developing sustainable and secure Western supply chain, with Company set to become next ASX-listed magnet Rare Earth Oxide (REO) producer;**
- **Ionic Technologies' Belfast Demonstration Plant progresses magnet REO production from wind turbine magnet recycling program;**
- **In 2023, European wind farms saw 736 MW of wind power decommissioned across nine countries;**
- **Permanent magnet recycling from the rapidly growing EU wind turbine decommissioning and repowering forecast to see five-fold rise by 2030; and**
- **5 tonnes of decommissioned wind turbine permanent magnets processed through crushing, grinding circuits and digestion circuits; NdPr/DyHo separation to commence, following successful production of mixed REO products.**

Ionic Rare Earths Limited ("IonicRE" or "the Company") (ASX: IXR) is rapidly assembling a secure and sustainable Western supply chain for the renewable energy industry. The Company is in line to become the next ASX-listed magnet rare earth oxides (REOs) producer, and the first major producer of recycled separated magnet REO in the Western world, following the completion of process commissioning at Ionic Technologies' Belfast, Northern Ireland magnet recycling plant.

A wholly owned subsidiary, Ionic Technologies is a global first mover in the recycling of Neodymium-Iron-Boron (NdFeB) permanent magnets to high purity separated magnet 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 has now commenced operations processing of end of life (EOL) permanent magnets from a decommissioned wind turbine generator. To date, five tonnes of permanent magnets from the seven-tonne magnet, have been processed to intermediate REE products. Process

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commissioning of both digestion and oxalation stages has been finalised, and these circuits have been used to produce batches of mixed REO products. pH adjustment and feed preparation for the mixer-settler separation stages of this production run are underway.

The first production run features NdPr/DyHo separation, from which the target will be to produce high purity NdPr oxide, plus separated Dy oxide and Ho oxide (holmium). High purity NdPr oxide and Dy oxide will then be passed on to partners under the collaboration agreement with Less Common Metals (LCM) and Ford (ASX: 12th September 2023) to develop a traceable, circular supply chain of rare earths for application in EV motors within the UK.

Ionic Rare Earths' Executive Chairman, Mr Brett Lynch, commented:

"This is a major step forward in the development of an ex-China supply chain, with IonicRE offering the potential to become the first and only REO recycler from wind turbine magnets in the Western world.

"The size of the prize is significant, given the tremendous rate of growth in the wind turbine market, particularly given our proximity to the UK and Northern Ireland wind farms market with the Port of Belfast on our doorstep. With over 3,000 wind turbines located across the island of Ireland, the opportunity is compelling.

"IonicRE offers a clean and green process that is leading the way through innovative technology to deliver a secure supply chain for the Western world, underpinning the wind farm industry and other renewable energy sectors critical to global decarbonisation."

The Company's location in Belfast, where the harbour infrastructure will play a key role in UK offshore wind capacity roll out, and the Windsor Framework benefiting Northern Ireland's opportunity with immediate access to European markets provides IonicRE with a unique exposure to this market.

Significant progress has been made to deliver the Demonstration Plant and produce high purity REOs, from end-of-life permanent magnets and magnet production waste streams throughout the supply chain.

Notably, the variability in the REE composition in end-of-life permanent magnets can result in significant variability in the products produced by other recycling technologies. IonicRE's offering can accommodate this variability, plus other feed stream such as swarf from rare earth metals, alloy and magnet manufacturing, enabling consistent high purity REO products of recycled origin, another unique selling point for the technology.

IonicRE is also working with a number of new potential partners to evaluate alternative feed streams to satisfying demand for production campaigns.

Wind Turbine Recycling Potential

Wind farms have a finite operational lifetime, typically ranging from 15 to 25 years, after which they are decommissioned. An alternative common in Europe is a process called repowering where operators replace smaller, less efficient turbines with larger, modern turbines with increased capacity, even with fewer new turbines. This increased capacity is known as repowered capacity.

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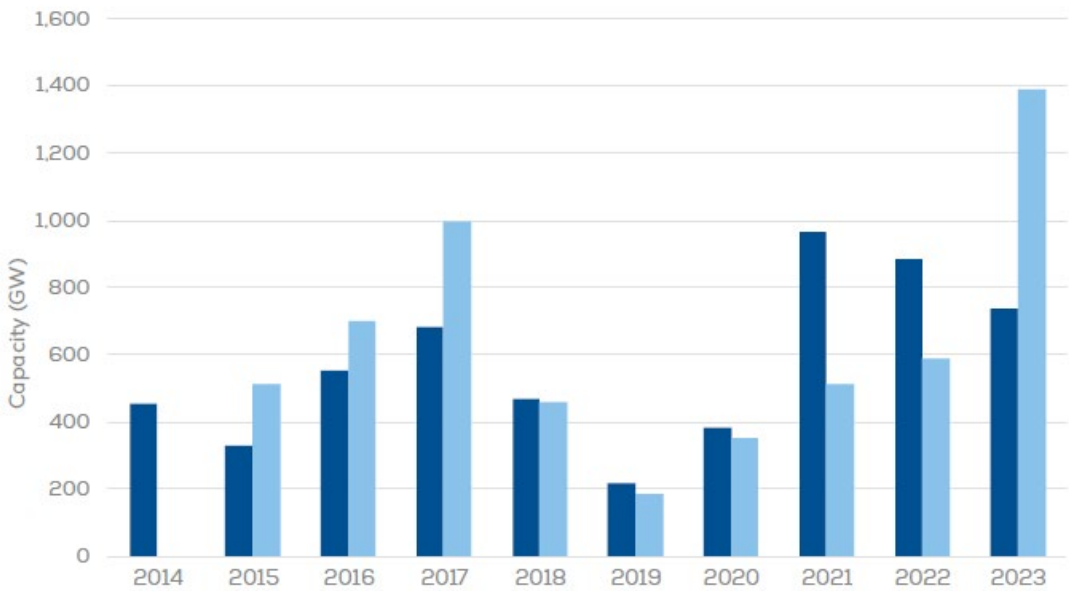
Wind farm repowering typically trebles its output on average, while also reducing the number of turbines on operation. For this reason, it presents a unique opportunity to quickly ramp-up wind energy production in Europe.

IonicRE has been engaging with European wind farm operators, and OEMs (original equipment manufacturers) to help position the Company and the technology at the forefront of the emerging recycling opportunity across both permanent magnets sourced from decommissioned and repowering streams. As the European wind turbine fleet ages, supported by government incentives, the amount of repowering is expected to increase increasing access to more magnets beyond the decommissioning profile.

In 2023, European wind farms saw 736 MW of wind power across nine countries was decommissioned, and 1.4 GW of new capacity came from repowering projects (see Figure 1).



	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Decommissioned capacity	455	329	555	684	466	217	383	964	883	736
Repowered capacity	-	513	700	996	461	185	351	515	591	1,392

Figure 1: Decommissioned and repowered capacity in Europe, 2014-23 (source; Wind Europe).

A recent report from Wind Europe[1] indicated a significant proportion of European onshore wind farms are approaching the end of their planned operational lifetime. Currently, 22 GW of Europe's existing wind farms have already been running for more than 20 years. By 2030, 52 GW of capacity will be more than 20 years old, and it is expected that almost all repowered capacity by 2030 will come from onshore wind.

Over the next seven years Wind Europe forecasts expect annual decommissioned capacity to increase seven-fold to 5.2 GW, along with a more than three-fold increase in repowering to 5.0 GW as illustrated in Figure 2.

[1] Wind Europe, Wind Energy in Europe; 2023 statistics and the outlook for 2024 to 2030.

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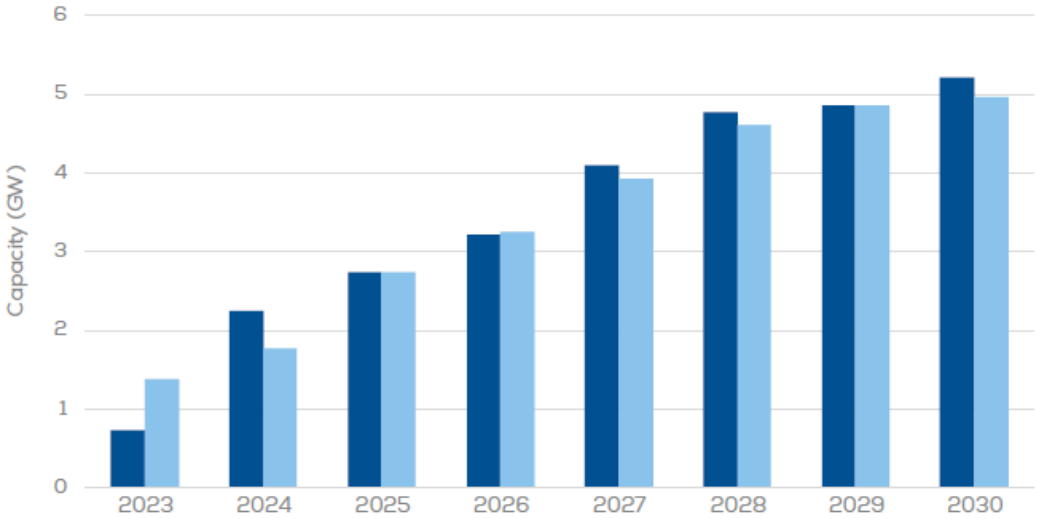

	2023	2024	2025	2026	2027	2028	2029	2030
Decommissioned capacity	0.7	2.3	2.7	3.2	4.1	4.8	4.9	5.2
Repowered capacity	1.4	1.8	2.7	3.3	3.9	4.6	4.9	5.0

Figure 2: Decommissioned and repowered wind power capacity in Europe out to 2030 – Wind Europe's Outlook.

The cumulative expectation for decommissioned wind farms is estimated at approximately 27 GW between now and 2030, representing a substantial base load for the development of magnet recycling from existing wind turbine capacity.

Typically, each MW of wind turbine capacity, if using permanent magnet direct drive generators, can include up to 600 kg of permanent magnets. IonicRE is working with wind farm operators and OEMs to understand the market opportunities. It should be noted that the existing wind turbine fleet includes both turbines using direct drive permanent magnets and geared drives which do not use permanent magnets.

As not all projects are repowered, the annual repowered project capacity tends not to exceed the decommissioned amount, as the proportion of projects which are repowered varies considerably by region and the policies which govern repowering, and the capacity repowered each year arises from the repowering of projects in previous years.

Mr Lynch added: *"Since joining IonicRE in January and undertaking my first visit to the Company's operations, including Belfast, I've rapidly gained an understanding of the size of market opportunity for IonicRE.*

"It's clear that the commercial potential for magnet recycling is developing rapidly, and IonicRE is at the forefront of realising this opportunity through its sustainable, traceable innovative technology.

"We are now in a position to capitalise on our first mover advantage, developing a sustainable business that delivers growth in shareholder value while supporting important global policy goals such as net zero emissions."

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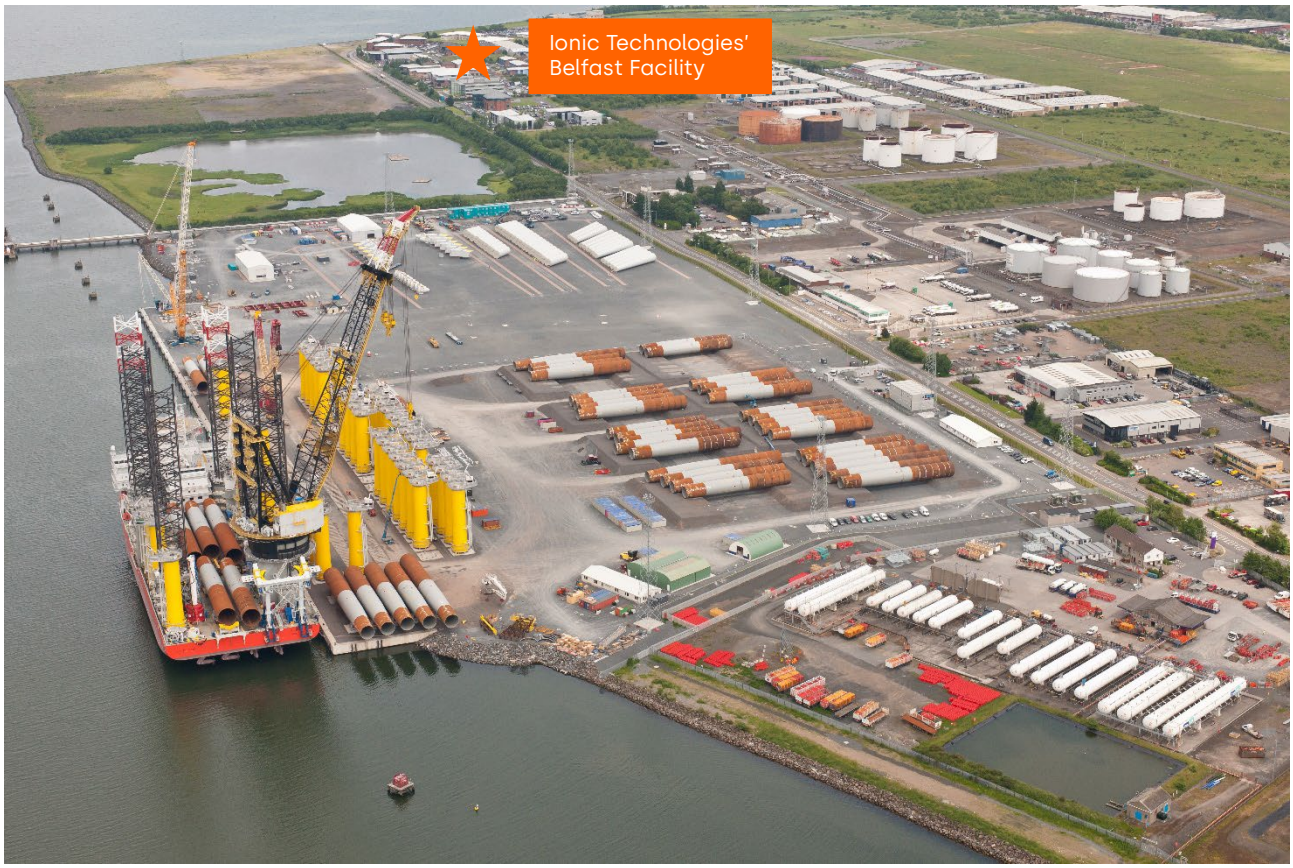

Figure 3: Belfast Harbour's D1 Offshore Wind Installation Terminal located at the Titanic Quarter (source; Belfast Harbour Commission).

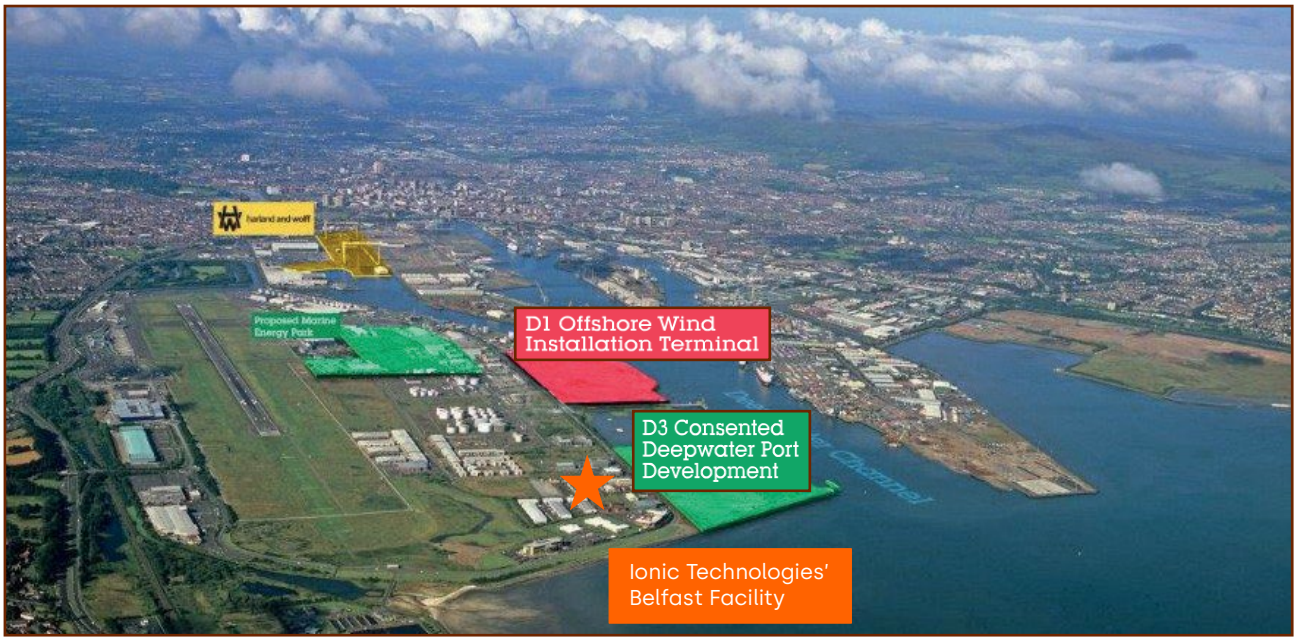

Figure 4: Belfast Harbour D1 Offshore Wind Installation Terminal and infrastructure adjacent to Ionic Technologies facility (source; Belfast Harbour Commission).

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Figure 5: Operator preparing Filter Press for mixed REO cake production.

Figure 6: Cake intermediate product prior to removal from filter press cloths.

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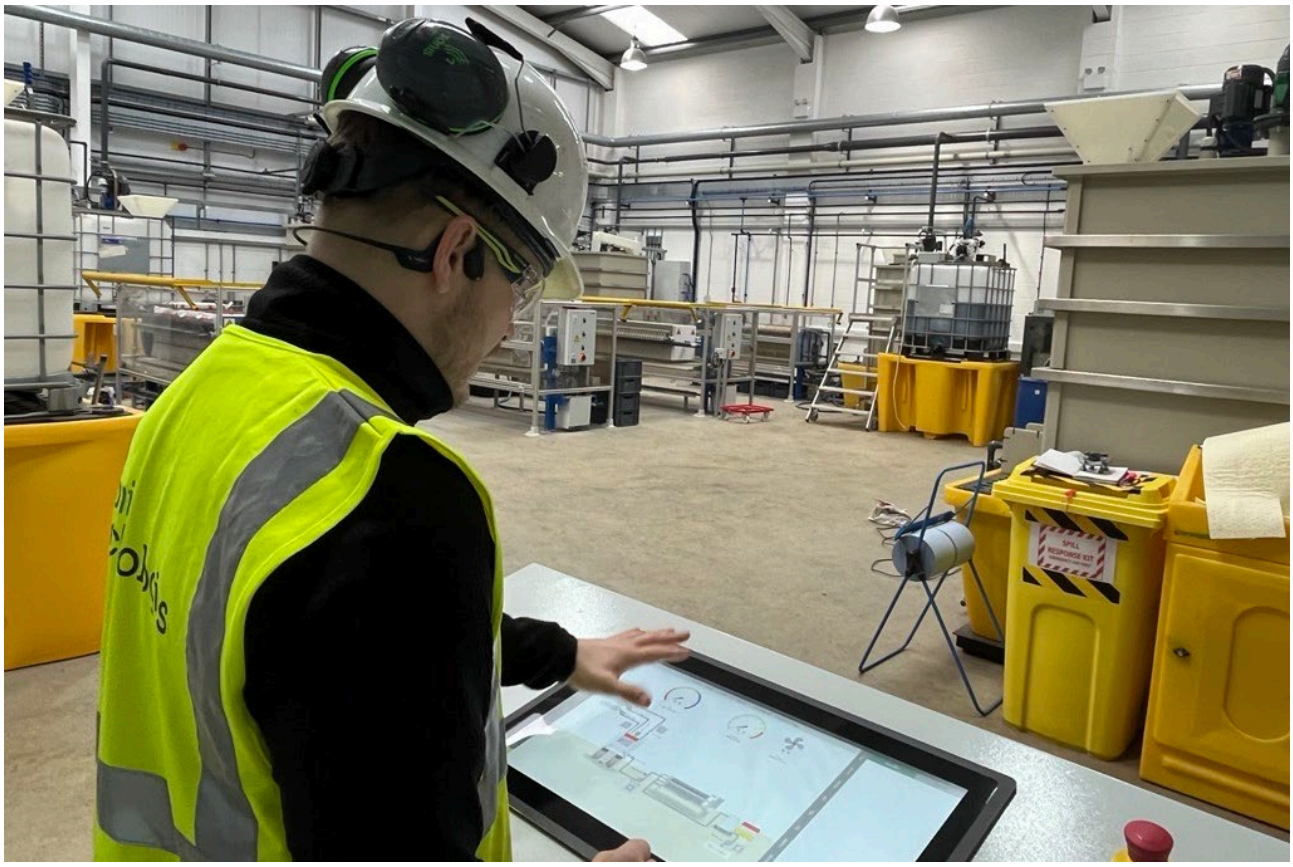

Figure 7: Operator utilising Demonstration Plant Control System.

Figure 8: Digestion processes and associated filter presses.

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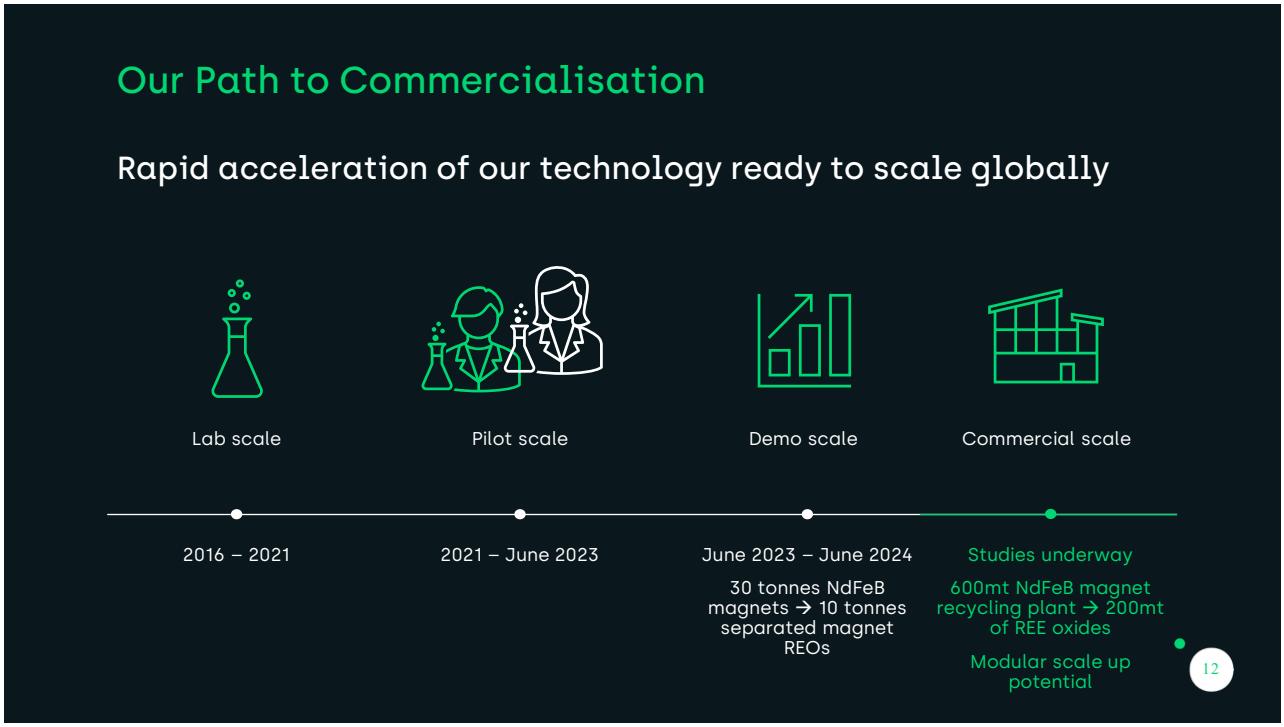

Figure 9: Ionic Technologies path to production.

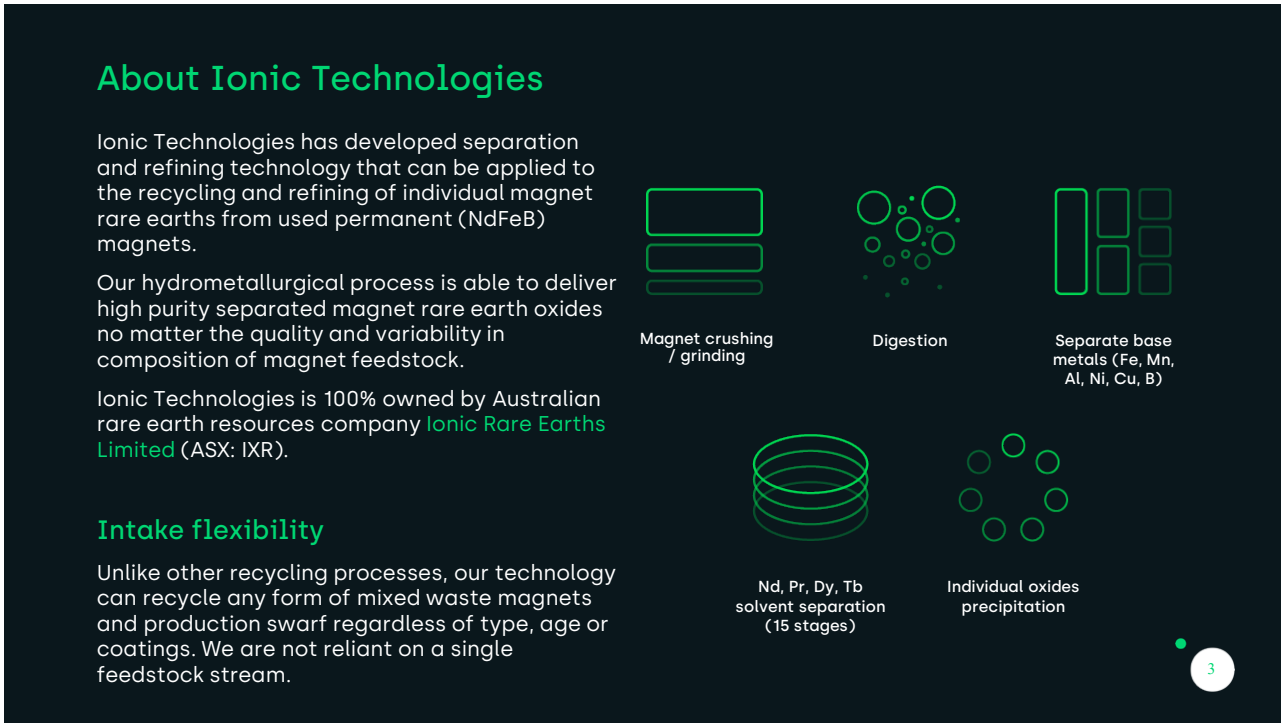

Figure 10: Ionic Technologies technology overview.

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For more information about IonicRE and its operations, please visit www.ionicre.com.

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 Q2 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.

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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.

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.

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