

08 December 2021

## IONICRE ACQUIRES RARE EARTH SEPARATION AND MAGNET RECYCLING TECHNOLOGY

- **Binding Term Sheet signed for strategic acquisition of Seren Technologies Limited, a UK private company, that has developed Rare Earth Element (REE) separation and refining technology using ionic liquids**
- **SerenTech has also developed technology applicable for rare earth permanent magnet recycling to extract individual magnet rare earth elements (Nd, Pr, Dy and Tb) from NdFeB permanent magnets**
- **The acquisition of SerenTech provides IonicRE with established capability (IP, team and know-how), unique technology and application potential**
- **SerenTech has the scope to provide IonicRE with a step change in magnet recycling capability, for near term REE production potential from magnet and swarf recycling which is forecast to provide a growing portion of the REE supply chain in the future**
- **SMM forecast recycling of NdFeB magnets and swarf is likely to be the largest growth of NdPr supply from 2021 to 2025**
- **Synergies with IonicRE's planned downstream rare earth refinery study and new magnet recycling initiative to be unlocked providing a step change in high value Nd, Pr, Dy and Tb production capacity**

Ionic Rare Earths Limited (**IonicRE** or the **Company**) (ASX: IXR) is very pleased to advise that the Company has entered into a binding Term Sheet (**Term Sheet**) for the acquisition of 100% of Seren Technologies Limited (**SerenTech**), a UK private company with unique and leading-edge rare earth separation technology.

SerenTech has an exclusive "patent and know-how" licence from Queens University Belfast allowing it to develop and commercialise technology relating to Multifunctional Amide Ionic Liquids for

Separation of Rare Earth metals (MAIL). SerenTech has also developed further know-how in this area and lodged a further four (4) global patents, providing a pipeline of opportunities in which to deploy the technology.

The technology uses Multifunctional Amide Ionic Liquids (MAIL) for separation and refining of rare earth elements (REE), which includes the full contingent of the proposed basket from Makuutu; consisting of the lanthanides series, Lanthanum (La), to Lutetium (Lu), plus Scandium (Sc) and Yttrium (Y). Separated and refined products to high purity above 99.99% REO grades have been demonstrated at pilot scale in two key applications;

- Mining ore concentrate: the pilot scale plant has processed concentrate received from supply chain stake holders and achieved separation of REEs; and
- Permanent magnet (Neodymium-Iron-Boron, NdFeB) recycling: the pilot scale plant has processed spent permanent magnets received from supply chain stake holders and achieved extraction of 100% recycled rare earth oxides at purity 99.99% plus.

The technology has application potential to other critical raw materials.

IonicRE Managing Director Tim Harrison commented:

*“This is another step in IonicRE’s transition to be a vertically integrated rare earths company. The IonicRE Board and management are very excited as to the potential this Agreement and technology brings to the Company. The addition of SerenTech to the group will provide the Company with additional capability for rare earth separation, to individual rare earth elements refined to high purity oxides, which will further advance the Company’s plan to unlock additional value from the unique critical and heavy rare earth basket to be produced at Makuutu.”*

*“Importantly, there is immediate potential to roll out a strategy incorporating permanent magnet recycling into the near-term activities of the Company, providing an interim step to help bridge the gap between production at Makuutu and going downstream with our own dedicated separation and refining asset.”*

*“Longer term, the synergies that can be created from this acquisition and technology, have substantial upside. IonicRE will aim to integrate new, secure and traceable rare earth production to supply western end users. This will create a significant opportunity where IonicRE will maximise its control, and market share, through supplying the unique rare earth basket from Makuutu, at a time when significant shortfalls are forecast.”*

*“The recycling of NdFeB magnets, used in electric motors, wind turbine generators and consumer electronics, is likely to become increasingly important as the lag on project development, capital investment and ramping up of capital intensive hard rock rare earth projects becomes evident, and where some estimates forecast up to 25% of the magnet rare earth supply could be from recycling by the end of this decade”.*

### **Acquisition Rationale**

The acquisition of SerenTech delivers IonicRE an immediate rare earth separation and refining capability to target high purity products. Most attractive is the demonstrated capability to recycle

NdFeB magnets via extraction of the individual REE content to produce high purity REO products, which we expect will provide a step change to magnet recycling appeal globally.

SerenTech has demonstrated capability to separate magnet rare earths Neodymium (Nd), Praseodymium (Pr), Dysprosium (Dy) and Terbium (Tb) for modest capital requirements. This presents an opportunity for targeted deployment in key markets in the US, Europe and Asia where existing inventories of magnets exist and where the current recycling technology fails to be able to achieve similar REE extraction results, thus providing a step change advantage and the ability to take an early mover position in new NdPr supply.

Opportunities have been identified for near term demonstration and deployment of the technology to help bridge the shortfall in magnet REE's (Nd, Pr, Dy and Tb) supplied to western markets where demand is expected to grow by up to 20% compounded annually. Shanghai Metals Market (SMM) recently forecast the recycling of NdFeB scrap is likely to be the largest growth of NdPr supply from 2021 to 2025<sup>1</sup>.

### **About Seren Technologies Limited**

Seren Technologies Limited is a subsidiary of Seren AG, a private equity company based in Switzerland, with a focus on early-stage development of new technologies, which provides or facilitates financing and seeks to add value through investment analysis, corporate structuring and business development.

Since its founding in 2015, SerenTech has developed processes for the separation and recovery of REEs from mining ore concentrates and waste permanent magnets with the potential to provide a step change in efficient, non-hazardous and economically viable processing with minimal environmental footprint, compared to current practices. SerenTech has developed a toolkit of separation techniques and solvent systems incorporating both conventional organophosphorus extractants and ionic liquids (ILs) that can be combined to and applied to different mixed rare earth feeds.

### **About Ionic Liquid Separation of Rare Earth Elements**

Seren Technologies' process uses an alternative and more environmentally benign extractant, an optimised ligand, or Multifunctional Amide Ionic Liquid (MAIL), for rare earth metal extraction, separation and processing.

SerenTech has a worldwide, exclusive license from Queen's University Belfast (QUB) and has a filed a further four global patents applications pending grant. The ionic liquid technology has several advantages compared to existing or alternative options with respect to the industrial processing of rare earths:

- The ionic liquid is fully recyclable to the extent the ligand can be considered a capital rather than operational cost;

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<sup>1</sup> <https://news.metal.com/newscontent/101669714/Scrap-Recycling-Likely-to-be-the-New-Growth-Engine-of-PrNd-Market-in-2021-2025/>

- Greatly reduced acid consumption, with optimum pH levels between 2 and 4 throughout the whole process;
- High separation factors for individual REE separation and refining capability;
- There are no toxic waste products; and
- Potential to tune the ligands to focus on particular pairings or groupings of rare earths, giving greater flexibility in approaching the separation of rare earths from mining feed sources.

Impressively, work to date has demonstrated capability for REEs to achieve near complete extraction from lower quality spent magnets and waste (swarf) to near complete recovery to high value rare earth oxide (REO) product quality exceeding 99.99% REO.

This presents a potential opportunity to provide a first mover advantage post acquisition to IonicRE in the industrial elemental extraction of REEs from spent magnets and waste, enabling near term magnet REO production capability to satisfy growing demand and lagging new supply chains.

The technology developed by SerenTech provides considerable benefits over alternative magnet recycling technology presently being marketed and operated, including hydrogen decrepitation, which simply breaks down spent magnets and swarf to be recast as magnets of the similar or lesser quality. The advantage of the ionic liquids technology developed by SerenTech is to provide potential for magnets REEs to be extracted from lower quality magnets to be able to be recycled into newer higher content REE containing permanent magnets, used in higher value applications.

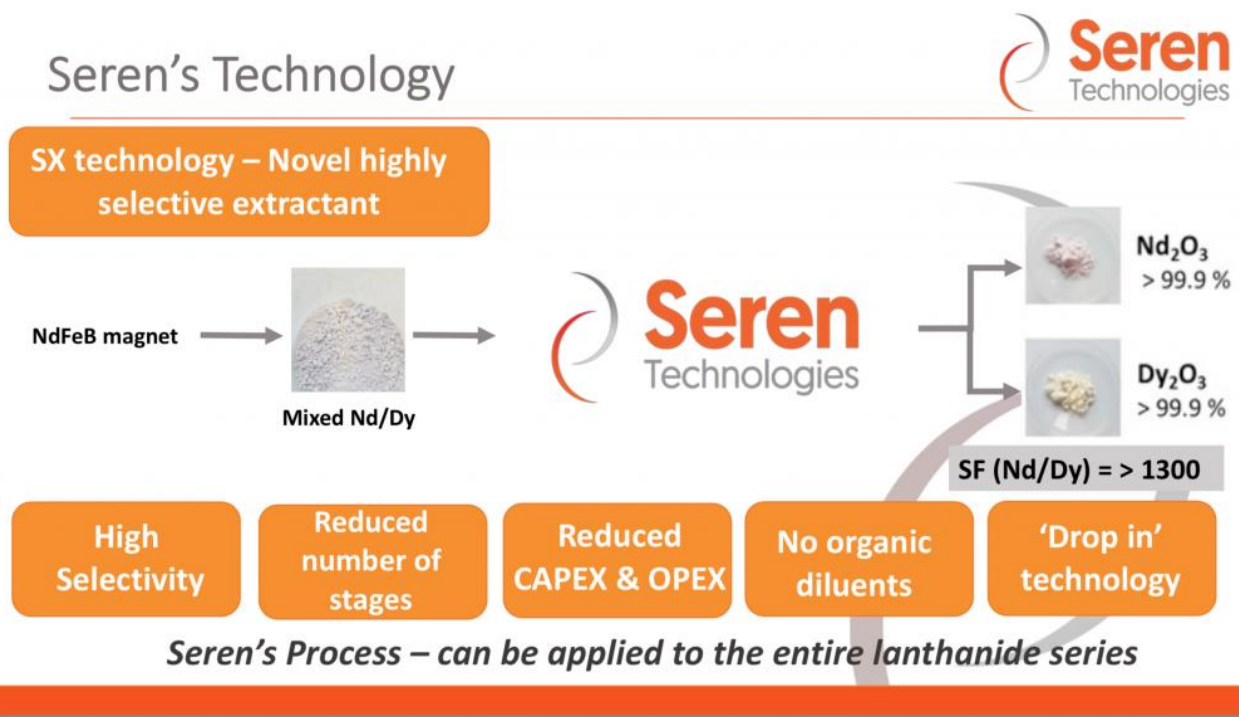


Figure 1: Magnet recycling potential of ionic liquids technology developed by SerenTech.

## Acquisition Terms

The Company has entered into a binding Term Sheet to acquire 100% of SerenTech from Seren AG, Professor Peter Nockemann and Professor Martin Atkins (**Sellers**) pursuant to the following key terms:

- a US\$150,000 non-refundable fee (**Option Fee**) which provides IonicRE a period of 90 days to complete due diligence investigations on the Technology and the Company, including legal, tax and technical due diligence, commencing on the date the Company pays the Option Fee (**Due Diligence Period**);
- Subject to the satisfaction or waiver of the conditions set out below, upon exercise of the option to acquire SerenTech and completion of the proposed acquisition IonicRE will:
  - (a) pay US\$1,000,000 in cash to the Sellers (or their nominees);
  - (b) issue to the Sellers (or their nominees) 48 million fully paid ordinary shares (**Shares**) in IonicRE having a deemed value of US\$1,500,000 being A\$0.044 per Share. The Shares must remain in escrow for a period of 12 months from the issue date of the Shares (*the issue of these Shares is expected to be met through the Company's existing LR 7.1 15% capacity*);
  - (c) pay the Sellers 25% of any licence fee received by IonicRE from a third party to use the technology for magnet recycling or rare earth separation technology (**Milestone 1 Payment**), to a maximum of US\$1,500,000.
  - (d) Upon reaching commercial production for a magnet recycling plant or rare earth separation and refining plant developed using the technology and designed for a scale exceeding 100 tonne per annum Rare Earth Oxide equivalent production capacity or greater (**Milestone 2**) pay the Sellers US\$1,500,000 less the total Milestone 1 Payments paid to the Sellers (**Milestone 2 Payment**).

Completion of the proposed acquisition will be subject to the satisfaction or waiver of the following conditions within the time periods indicated below:

- (i) satisfaction of IonicRE's due diligence investigations within the Due Diligence Period;
- (ii) the receipt of any required shareholder approvals required by IonicRE and any required waiver of any ASX Listing Rules within 60 days of the execution of the Binding Sale Agreement or Exclusive Option Agreement;
- (iii) entry into an exclusive option agreement based on the terms of the Term Sheet (Exclusive Option Agreement), under which the Buyer will have 90 days to purchase 100% of the shares in SerenTech, inclusive of the Technology Rights held by SerenTech and/ or a formal share purchase agreement based on the terms contained in the Term Sheet and other terms customary for a transaction of this nature (Binding Sale Agreement) within the Due Diligence Period; and

- (iv) obtaining any regulatory consents or approvals, (including any approval from the ASX or waiver of any relevant ASX Listing Rules) within 60 days of execution of the Binding Sale Agreement or Exclusive Option Agreement.

The initial cash purchase consideration is intended to be funded from current working capital. The Company does not anticipate making any changes to its Board of Directors or management as a result of the proposed acquisition.

ASX have confirmed that shareholder approval for the purposes of Listing Rule 11.1.2 and re-compliance with Chapters 1 and 2 of the Listing Rules will not be required for the proposed acquisition.

### **Indicative Timetable**

The Due Diligence Period is expected to be completed by 1 March 2022 with completion of the proposed acquisition likely to follow in Quarter 2, 2022.

Authorised for release by the Board.

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