

londrive Accelerates Pre-Feasibility Study

Highlights

- Following its successful capital raising, londrive accelerates the Pre-Feasibility Study (PFS) for its exclusively licensed battery recycling technology.
- londrive's early mover advantage is underpinned by a study of the global battery recycling market which concluded that its technology provides an attractive and unique environmental value proposition in a rapidly growing market.
- londrive has successfully completed the first phase of its large-scale bench trials, at the University of Adelaide, with results indicating:
 - scalability of the high metal recoveries; and
 - solvent losses of less than 2% with the ability to re-use the solvent (as the largest input cost, this is critical for economic viability).
- The results of the second phase of large-scale bench trials are expected to be announced by early July, following independent verification by IMO in Perth.
- londrive has shortlisted highly credible organisations, in the target markets of the EU, US and Australia, to undertake the final three PFS activities, comprising:
 - (1) high-level process engineering design and costing of a 10,000 tpa black mass plant;
 - (2) economic benchmarking of DES against conventional hydromet processes; and
 - (3) process engineering review of alternative process configurations to reduce Capex and Opex, (high level value engineering), and a specific focus on further enhancing the solvent recovery processes.
- Further details of these final three activities will be provided as the engagements are finalised and the activities commence in subsequent updates.
- The PFS, which aims to de-risk the commercialisation path, is on track for completion by October 2024, positioning londrive at the forefront of sustainable battery recycling efforts.
- In parallel, londrive is advancing discussions with potential collaboration partners, particularly in the EU where the European Green Deal and new Batteries Regulation are generating a sense of urgency for sustainable battery recycling.

Iondrive Limited (ASX: ION) (“Iondrive” or the “Company”) is pleased to provide an update on the progress towards the completion of our Pre-Feasibility Study (PFS). The company is making significant strides in the development of its exclusively licensed deep-eutectic solvent (DES) battery recycling technology, with the final key activities about to commence.

Iondrive Limited CEO Dr Ebbe Dommissie commented:

“We are close to announcing three outstanding engineering and benchmarking partners from Australia, Germany and the US, to assist with the high-level engineering design and costing of our DES battery recycling process. The aim of this work is to understand and improve the technology’s economic competitiveness through benchmarking against industry standards. The successful large-scale bench trials at the University of Adelaide have provided excellent results that will feed directly into these upcoming engineering studies. Additionally, the tailwinds of supportive government policies in the EU, US, and Australia offer us an outstanding opportunity to push forward with our sustainable battery recycling technology. Both legislative and regulatory changes and government funding are enabling the acceleration of the commercialisation of ION’s technology.”

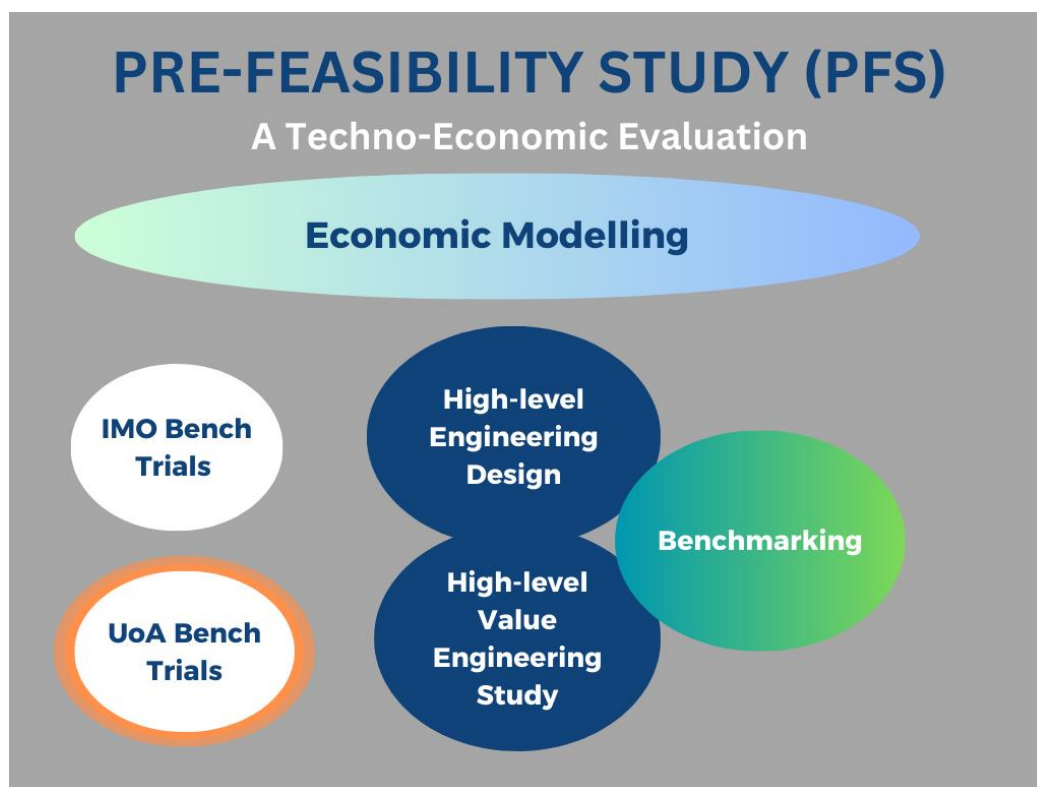


Diagram1: Overview of ION’s PFS Activities

Iondrive’s patented technology is built around the use of Deep-eutectic solvents with the process developed from fundamental research from the University of Adelaide’s Materials Research Engineering Centre. A Deep Eutectic Solvent (DES) is a mixture of two solvents that exhibit enhanced properties compared to their individual constituents. A DES is usually prepared by mixing the two solvents with one being a Hydrogen Bond Acceptor (HBA) with the other Hydrogen Bond Donor (HBD).

DES processes offer several advantages over traditional recycling methods. A DES is generally less toxic, reusable and more environmentally benign than the strong acids and organic solvents used in conventional hydrometallurgical processes. They produce fewer harmful gaseous emissions and generate less hazardous waste, leading to a lower environmental footprint. The components of a DES are often inexpensive and readily available, reducing material costs. Importantly, a DES can selectively dissolve specific metal oxides in black mass from spent Li-ion batteries. This selectivity reduces the need for multiple refining stages, improving overall recovery efficiency and purity of the recovered materials. Additionally, the improved selectivity and efficiency of DES-based processes can lower operating costs by reducing energy consumption and the need for extensive downstream processing. The simplicity and effectiveness of a DES could potentially make them easier to scale up for industrial applications and attractive for the urban mining of battery metals (nickel, manganese, cobalt and lithium) addressing the growing challenge to find less energy intensive and environmentally friendlier processes to address the looming increase in recycling batteries from the rapidly growing fleet of electric vehicles.

Iondrive has provisional patents lodged covering the use of particular DES solvents in the recovery of metals from battery recycling.

Phase 1 Large-scale Bench Trials (University of Adelaide) - Complete

Initial smaller scale research showed Iondrive's exclusively licensed and provisionally patented DES Battery Recycling Technology recovers over 95% of critical minerals such as lithium, manganese, cobalt, and nickel from Li-ion batteries. The large-scale bench trials were a 1,000 time scale up on initial research, have now been successfully completed at the University of Adelaide. These trials investigated the DES process in larger volumes (up to 120 grams), to verify scalability of chemistry, quantify solvent losses, and establish an accurate mass balance. Independent verification of the University's large-scale bench trial results are currently being undertaken by Independent Metallurgical Operations (IMO) in Perth (see further below under Upcoming Milestones for PFS Completion). The data will form the basis for the design and costing of a commercial-scale plant to evaluate the economics of the process at scale.

Key findings include:

- The DES battery recycling process chemistry (metal recoveries) scales effectively with larger volumes.
- High selectivity on par with early trials was maintained.
- Solvent losses of less than 2% were recorded, which is critical for the economics of the process, as solvent costs are a major cost driver.

Upcoming Milestones for PFS Completion

To complete the PFS, Iondrive will undertake several critical studies, including:

- **Phase 2 Large-scale-Bench Trials (Independent verification).** Independent verification of the large-scale bench trial results currently being undertaken by Independent Metallurgical Operations (IMO) in Perth whilst also generating process data for the pilot plant design. The results from the verified large-scale bench trials are expected to be available by early July.
- **High-Level Process Engineering Design of a 10,000 tpa Black Mass Plant:** We have shortlisted highly credible organisations to conduct this study and will award to the selected EPC partner shortly.
- **Benchmarking Study:** This study will compare Capex and Opex costs of our DES process against conventional hydrometallurgical processes and will identify differences in cost drivers and areas for optimisation.
- **High-Level Process Engineering Review of Solvent Recovery and Value Engineering Study:** Process engineering review of the DES Solvent Recovery Process and high-level value engineering to further the efficiency and cost-effectiveness of the DES process.

Advancing Discussions with Potential Collaboration Partners

Prior to commencing the PFS, a leading battery market consultant, RhoMotion, were engaged to undertake a study of the global battery recycling market. The RhoMotion study concluded that Iondrive's DES process provides an attractive environmental value proposition in the rapidly growing battery recycling market¹. The DES process uses benign, biodegradable organic solvents without high temperatures or corrosive acids that are associated with incumbent processes. The study noted that these environmental advantages and the focus on Li-ion batteries would be particularly attractive in the EU, the US and Australia. Discussions with potential collaboration partners in these target markets are generating tangible interest in Iondrive's unique DES recycling process.

In particular, the EU's new Batteries Regulation, part of the European Green Deal², creates strong market dynamics for the adoption of new environmentally sustainable recycling technology. The regulation aims to improve the environmental performance of batteries throughout their lifecycle, including production, use, and recycling. Key elements of the regulation include targets for recycling efficiency, material recovery, and recycled content, which will be gradually introduced from 2025 onwards, creating a real sense of urgency and call to action. The regulation mandates that all collected waste batteries must be recycled (ban on landfilling), with high levels of recovery for critical raw materials such as cobalt, lithium, and nickel. In addition, the Critical Raw Materials Act³ (CRMA) supports these efforts by setting benchmarks for recycling at least 25% of the EU's annual consumption of critical raw materials by 2030. The CRMA serves as a major driver for advancing recycling initiatives and securing funding to achieve these goals. By adopting stricter targets for recycling, the regulations seek to minimise environmental impacts and reduce dependency on raw material imports.

¹ <https://wcsecure.weblink.com.au/pdf/ION/02744673.pdf>

² https://environment.ec.europa.eu/news/new-law-more-sustainable-circular-and-safe-batteries-enters-force-2023-08-17_en

³ https://single-market-economy.ec.europa.eu/sectors/raw-materials/areas-specific-interest/critical-raw-materials/critical-raw-materials-act_en

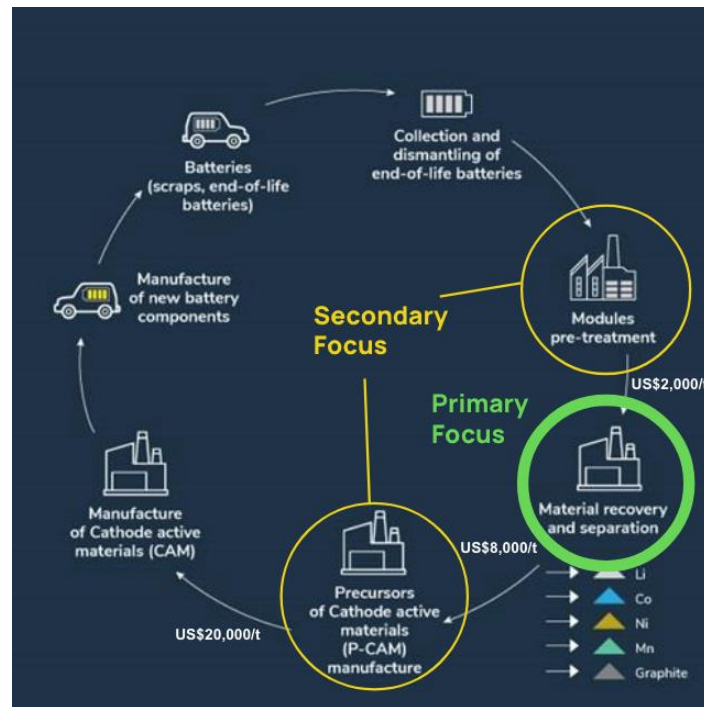


Diagram 2: ION's focus in the Battery Recycling Value Chain

Authorised for release by the Board of Iondrive Limited.

Further Information

Ebbe Dommissie
CEO
08 8368 8888
info@iondrive.com.au

Aiden Bradley
Investor and Media Relations
+61 (0) 414 348 666
aiden@nwrcommunications.com.au

Iondrive Limited: Company Profile

Iondrive is an emerging leader in battery recycling technology, listed on the Australian Securities Exchange (ASX ticker "ION"). The company's primary focus is on developing and commercialising innovative solutions for lithium battery recycling. Iondrive's Hydrometallurgical Battery Recycling project employs a patented, environmentally safe solvent to gently separate critical components from used batteries, providing a safer and more efficient alternative to traditional methods.

In addition to its battery recycling initiatives, Iondrive holds exclusive worldwide licenses from the University of Adelaide for next-generation battery technologies, including an enhanced performance non-flammable lithium-ion based battery and a low-cost, high cycle life water-based battery.

While the main emphasis is on battery technology, Iondrive also maintains a portfolio of exploration projects in South Korea, focusing on lithium. Backed by a first-class technical team, Iondrive is dedicated to advancing sustainable battery technologies and contributing to the circular economy in both Europe and Australia.