

LITHIUM ION BATTERIES IN THE CIRCULAR ECONOMY – NEW DEVELOPMENTS FROM CSIRO

By

¹Thomas R  ther, ¹Adam Christensen, ²Gavin Collis, ¹Owen Lim, ³Andreas Monch, ^{1,4}Oliver Pohl, ¹Yanyan Zhao

¹CSIRO Energy, Australia
²CSIRO Manufacturing, Australia
³CSIRO Mineral Resources, Australia
⁴Swinburne University, Australia

Presenter and Corresponding Author

Dr Thomas Ruether

ABSTRACT

The estimated 2030 global demand for lithium-ion battery (LIBs) is expected to be around 3 TWh, nearly 10 times the demand of 2020. Large volumes of LIBs are entering national economies, including Australia's and beyond Battery electric Vehicles (BEV), are expected to support electrical grid stability and renewable energy adoption.

The implementation of the new technology needs to be accompanied by the principles of sustainability and circular economy, hence innovative End of Life (EoL) solutions are required for the expected large volume resource streams. The estimated EoL LIBs in Australia is expected to exceed 140,000 t by 2030 according to a 2020 report by the Battery Stewardship Council. To address this need, CSIRO's Electrochemical Energy Storage team at Clayton VIC has, over the past five years, developed an overarching project that will advance various aspects of LIB recycling.

For delegates from various backgrounds, this presentation covers three main topics (i) the greenhouse gas emissions, energy inputs and costs associated with producing and recycling lithium-ion cells for the three most common cathode chemistries: NMC, NCA and LFP (ii) overview of progress in key science areas – second life of LIBs and CSIRO's proprietary lithium salt recovery process, now entering into the pilot scale phase and (iii) opportunities for further development, collaboration and investment.

References

R. E. Ciez and J. F. Whitacre, Examining different recycling processes for lithium-ion batteries, *Nature Sustainability* 2019, 148, 148–156.
Battery Stewardship Council, Australian Battery Market Analysis, Report June 2022 (accessible online [bsc.org.au](https://www.bsc.org.au)).