FUTURE BATTERY INDUSTRIES CRC

Activity Report 2023

Australian Government
Department of Industry, Science and Resources

AusIndustry
Cooperative Research Centres Program

CONTENTS

CHAIRMAN'S REPORT

TIM SHANAHAN - CHAIRMAN

Mid 2023 marks the fourth of six years for the Future Battery Industries Cooperative Research Centre (FBICRC). Our team of 74 participants are collaborating with approximately 180 researchers across Australia to making a positive impact to the direction of Australia's battery industries.

This year has been a year of acceleration in every sense of the word.

The world has woken to the battery opportunity. Competition and rivalry to capture battery and critical minerals industries has intensified. The Inflation Reduction Act, European Critical Raw Materials Act, and other global interventions are influencing the direction of investment.

Recognising this, in March 2023, we released the Charging Ahead report which identified the battery industry opportunity has doubled. By 2030, the industry could deliver $55 billion in GDP and 61,400 jobs. We thank BASF, IGO, South32, Calix for their sponsorship of the report.

The FBICRC's work has sharpened Australia's response, informing the 2023 Critical Minerals Strategy and the forthcoming National Battery Strategy, as well as contributing to policy development across Australia.

The industry has enjoyed strong support from the Albanese government. Substantial support has been offered, including the $15 billion National Reconstruction Fund, an expanded $4 billion Critical Minerals Facility, and additional facilities through CEFC and ARENA.

Multiple state governments have offered grants, are developing common user facilities, and are actively building industrial ecosystems to capture this opportunity. This is truly a national effort.

The FBICRC continued to make strong progress across each of its four strategic pillars:

- To leverage Australia's mineral and mining advantages into battery materials innovation and production.
- To accelerate the uptake of battery technologies in Australia.
- To advance our research capability in battery materials and precursor manufacturing.
- To facilitate battery industry development.

Our research program has developed and validated novel electrolytes, state-of-the-art anode and cathode materials. It has developed new traceability technology and deepened the understanding of lifecycle analysis and ESG standards. Its projects have field trialled battery technology new to Australia, and helped to build industry confidence in larger scale investments. And more.

I would once again like to acknowledge and thank Shannon and the FBICRC team and to acknowledge the contributions from my fellow directors across another successful year of operation.

Next year, we look forward to a time of delivery and transition as the FBICRC leverages its research back into industry. The FBICRC capability created by industry, for industry, will pay dividends for years to come and will position Australia at the leading edge of this exciting revolution.

CEO UPDATE

SHANNON O'ROURKE - CHIEF EXECUTIVE OFFICER

Across the globe, we're witnessing a transformation in battery and critical minerals industries. Clean energy expenditure increased to A$2.5 trillion, up from A$1.6 trillion just three years earlier. Batteries, critical minerals, and mining are front and centre on the path to net zero.

Australia is starting to capture its share. We are on track to process more of our minerals, make battery materials, cells, packs, and systems and recycle what we use. Through its industry sponsored research, reports and advocacy the FBICRC has enabled industry, government and academia to respond with purpose. Our partners continue to make strong headway both in Australia and around the world, and we've had strong support and engagement from National, State and International governments in our journey.

The Charging Ahead report, released in March 2023, highlighted increasing intervention in global battery and critical minerals markets. We have twice the opportunity, but are faced with strong competitive headwinds from our international rivals.

The FBICRC's work, amplified by our 74 participants, is building a strong foundation to succeed.

In mid 2022, we launched the Cathode Precursor Production Pilot Plant. Within just one year, the facility produced state-of-the-art precursor materials. This was a truly national effort, leveraging the synthesis expertise of Curtin and CSIRO, the Electrochemical Testing project at QUT, and the materials research team at UTS.

We achieved success in mineral processing. Curtin and MPS demonstrated glycine leaching technology for Nickel and Cobalt with potentially transformational opportunities. The lithium project led by Murdoch University has similar potential.

The University of Melbourne and Deakin contributed heavily to our materials successes. The electrolytes project developed new materials with better thermal stability and improved formation properties. The anodes project successfully developed high silicon anode materials that enable industry leading energy density.

Our researchers developed new understanding and technologies to accelerate Australia's battery and critical minerals industries. The Certification Commonalities report revealed new challenges in ESG reporting, Trusted Supply Chain validated new traceability technology, and the Mobile Mine Project at UoA developed new algorithms to enable better mine electrification planning. The electrical engineering team at UWA developed a new 100kW modular inverter and new AI inverter control technologies to enable high quality, reliable power.

The FBICRC improved the state-of-the-art in recycling and use of mine wastes. Curtin's recycling process enables distributed, environmentally safe processing and separation of battery waste using novel solvents, and the NSW Government awarded a grant to undertake FEED for a pilot plant. The process legacy project continued to develop the Leaching Environmental Assessment Framework for critical minerals and investigate the use of copper tailings for roadbase.

The National Battery Testing Centre installed a BASF NaS battery at IGO's Nova Mine, a RedEarth lithium battery and ESI Asia Pacific's Energy Warehouse at QUT's Banyo site.

We have now satisfied our student recruitment objectives by engaging 48 higher degree by research students. Around 20 of these will complete their degrees by mid 2025.

Three masterclasses were successfully conducted across a broad range of topics including Electrochemical Testing, Cell Production, Lifecycle Engineering, Vanadium processing, battery material manufacturing, graphite, and material traceability.
The FBICRC has built international partnerships and relationships with US NREL, UK Research and Innovation, Indian Energy Storage Alliance, and the Indonesian National Battery Research Institute. We are fortunate to extend our networks via AKBC, AJBCC, AmCham, ILIA and more.

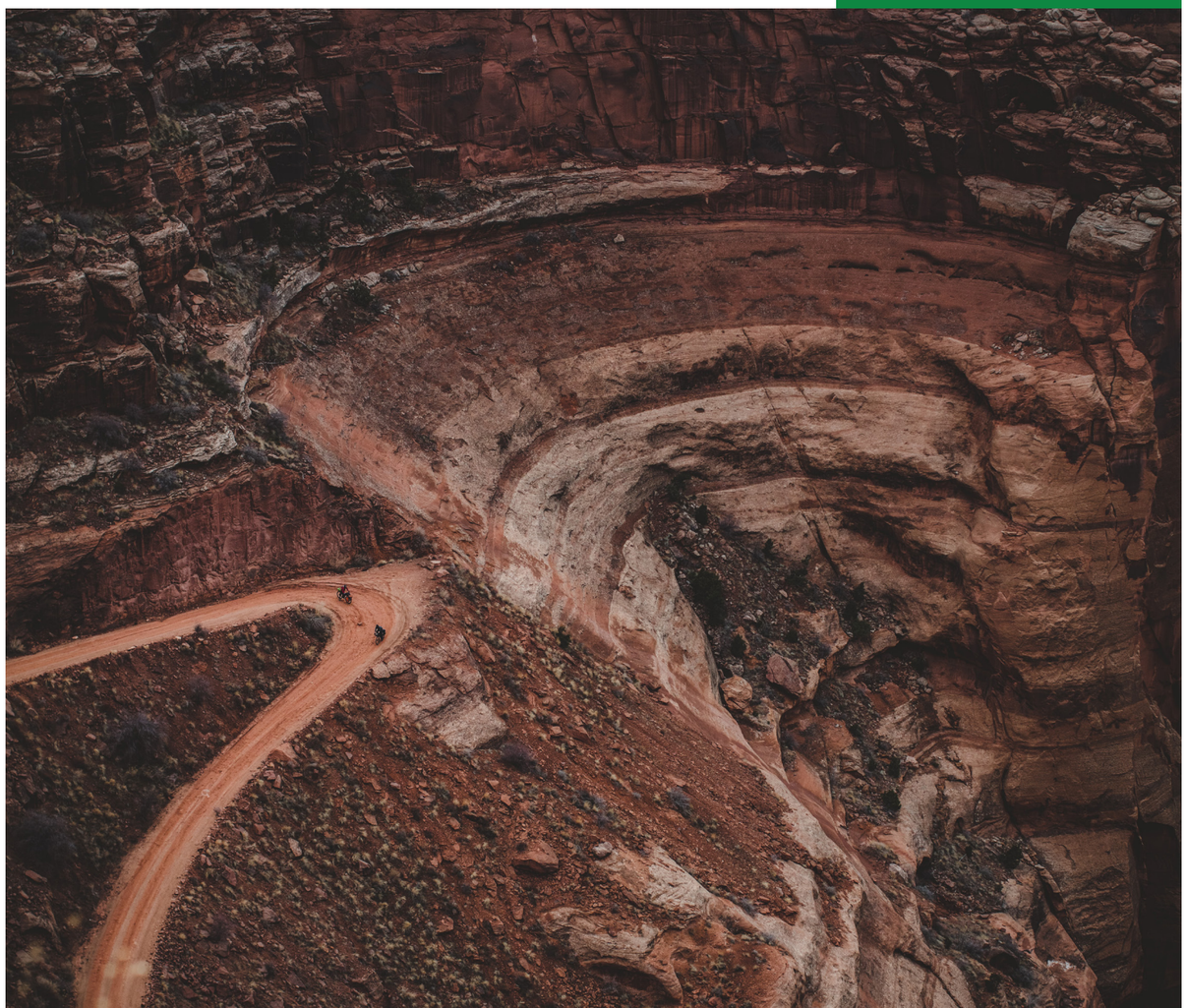
We are a valuable resource for Commonwealth and State Governments to help refine policies and provide expertise.

We contributed to the Critical Minerals and National Battery Strategies, the Queensland and WA Battery and Critical Minerals Strategies, ACCC Battery Safety Enquiry, JSCTIG Inquiry on Australia becoming a Clean Energy Superpower, CER Guarantee of Origin strategy, National Science Priorities, Advanced Manufacturing Enquiry, and more.

Our State of Charge database now tracks 330 mines, manufacturing, research and grid scale battery projects across the nation, the most comprehensive database of its type in Australia.

In our last two years of operation, we are looking to the future. We have successfully completed Round 1 of the Powering Australia Industry Growth Centre process and are bidding to become the Energy Storage CRC to close the gaps on Australia's cell manufacturing and critical minerals process technology.

Thank you for the opportunity to contribute, and I look forward to an exciting 2024.



ACTIVITY REPORT 2023

Introduction

The Future Battery Industries Cooperative Research Centre is Australia's largest partnership of industry, government and academia focused on developing Australia's battery industry. We have 15 research programs valued at $120million that span the battery value chain. We invest in research and commercially available prototyping facilities to support industry development.

Our aim is to capture the significant economic opportunities for Australia from the growing battery industry and address the challenges associated with the energy transition.

Policy

The purpose of the FBICRC's advocacy agenda is to inform the national narrative around the development of the battery industry through fact-based, data-driven policy recommendations. Our voice at a state and federal level is helping to articulate the level of economic opportunity a diversified battery industry could deliver, increase sector visibility and raise the national ambition around a domestic manufacturing capability. Ultimately our objective is to help create an environment that allows our participants to achieve global competitiveness and realise their growth ambitions.
Our advocacy strategy encompasses both domestic and international efforts. Internationally our focus is on creating linkages beyond our shores with like-minded partners which this year has included the UK, the USA, the EU, Indonesia, Korea and Japan.

Domestically we work closely with multiple State Governments to influence policy and investment decisions, and provide direct input into consultation processes to ensure that decision makers have access to latest data and the input from a broad cross section of industry voices.

International engagement

UNITED STATES

This year we entered into a formal partnership with the USA's National Renewable Energy Laboratory (NREL) to explore opportunities for technology sharing and collaboration. The multi-year FBICRC/NREL MoU is the first US/Australian agreement of its kind to drive cooperation on battery technology.

NREL is a national laboratory managed by the Alliance for Sustainable Energy LLC for the United States Department of Energy (DoE) headquartered in Denver, Colorado.

The purpose of the MOU is to encourage coordination in areas of mutual interest and benefit to both parties, providing a framework to coordinate specific, planned program of R&D collaboration including researcher exchange. The agreement also signals an intent for a closer partnership on critical minerals between our two nations.

INDONESIA

The Western Australian Government undertook the largest ever trade mission to Indonesia, with more than 130 representatives across industry and government with the aim of diversifying WA's economy across key sectors of energy transition, creative industries and the digital economy, international education, primary industries and tourism.

During the mission the FBICRC entered into a Memorandum of Understanding (MoU) with Indonesia's National Battery Research Institute (NBRI) witnessed by Bill Johnston, Minister for Energy, Mines and Petroleum and the Hydrogen industry.

The agreement is intended to strengthen collaboration in battery research, technology and innovation between Australia and Indonesia and aligns with the "Plan of Action" signed by the Cook Government and the Indonesian Chamber of Commerce and Industry (KADIN) in July 2023.

During the visit, the WA Government signed a Joint Communique with KADIN where both parties committed to further dialogue in the critical minerals and new energy sectors in pursuit of net zero, across supply chain cooperation, environmental, social and governance (ESG) and skilled workforce development.

Both Governments specifically committed to ongoing engagement with the FBICRC to understand the research skills and industry expertise that will be required to support battery and critical minerals supply chains.

"Both Australia and Indonesia have great potential to accelerate the global energy transition. This collaboration with NBRI is a practical demonstration of turning intent into tangible action and we very much look forward to working together," said Shannon.

Release of Charging Ahead

A highlight of this years' advocacy strategy was the release of our report **Charging Ahead – Australia's Battery Powered Future**, in the grounds of Parliament House Canberra. The report revealed that Australia's battery industry opportunity has doubled in in 18 months and is predicted to deliver $55 billion in GDP and support 61, 400 new local jobs by 2030.

The report builds on important findings released in FBICRC's groundbreaking 2021 **Future Charge Report** which found that $7.4 billion of value and over 34,000 jobs could be created by the battery industry. Increases in clean energy expenditure over the last 18 months has seen these figures double. Decisive action from Australian industry, government and research institutions, through the National Battery Strategy, is essential to capture this much larger opportunity in the context of greater international competition.

The report highlights the impressive growth of Australia's battery industry, across the supply chain and commercialisation spectrum. It makes key recommendations to harness Australia's opportunities from the significantly increased and accelerated demand. We acknowledge the generous sponsors of the report BASF, IGO, South32 and Calix, and Accenture who authored the report.

FBICRC CEO SHANNON O'ROURKE SAID:

"In light of recent geopolitical developments, our report has shown Australian policymakers should explore more aggressive industry policies, target markets that are looking to diversify their supply chains, and partner with geopolitical allies to enable and enhance the potential growth of Australia's battery industry.

"FBICRC stands ready to provide our research expertise and analysis to support Governments across Australia leverage our battery industry's competitive advantage and make the most of the recent and significant global economic, industrial and political shifts."

Official launch of the Cathode Precursor Production Pilot Plant

At the start of the reporting period, we had the opportunity to celebrate the official launch of one of our flagship projects the Cathode Precursor Production Pilot Plant (CPPPP).

The project, involving a consortium of leading industries, government and researchers is a vital step towards the development of technical capability to produce advanced battery materials on an industrial scale in Australia.

The first of its kind in Australia, the Cathode Precursor Production Pilot Plant is establishing the technology and capabilities for Australia to design and build cathode precursor manufacturing facilities on a commercial and industrial scale.

Cathode precursors are precisely engineered materials, the highest cost component of a cell, and a crucial element of the battery value chain. With increasing global demand for lithium-ion batteries, the CPPPP offers Australia a unique opportunity to capture a $55 billion, 61,400 job opportunity from its critical minerals. The CPPPP project has helped to build a cohort of skilled technical operators that have a breadth of chemistry skills and capabilities necessary to run a modern manufacturing facility.

The opening attracted State Government support, wide industry representation and media interest and coverage, the facility is a cornerstone of our external engagement activities. It has attracted interest from a wide range of Federal and State Ministers, senior bureaucrats, ambassadors, international and industry visitors and has played a critical role as a tangible example of CRC funding and highlighting the value of the CRC program more broadly. We are currently exploring opportunities to use the CPPPP for project development work with project participants and other external parties.

"Australia must demonstrate it can manufacture state-of-the-art battery materials at pilot scale before committing to larger scale investment and industry needs pilot facilities to validate feedstocks, train engineers and master synthesis processes above bench-scale. The CPPPP is the culmination of industry and academic collaboration to progress both current and future industry needs and it is a key enabler for Australia to build domestic manufacturing capability," Shannon O'Rourke CEO.

Masterclasses

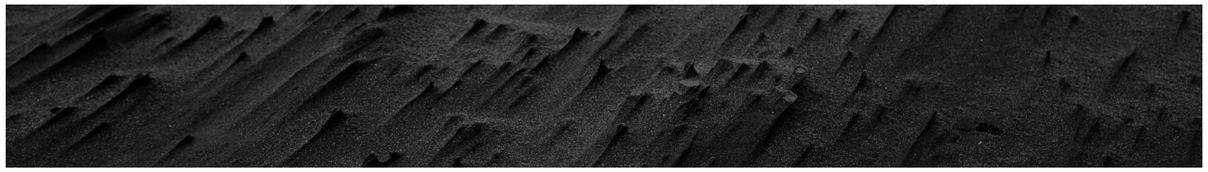
An important function of the FBICRC is to help share the science and engineering research outcomes from our 15 innovative projects for the benefit of the wider Australian industry. We do this through a series of industry masterclasses.

The masterclasses have three main objectives. They help showcase innovative science and technology, help companies implement the latest research, and connect industry stakeholders along the value chain.

Each of the masterclasses present a unique opportunity for university researchers and industry practitioners to interact, to better understand the challenges of the emerging industries, and be inspired to look deeper into new and emerging areas to ensure international competitiveness. Feedback surveys indicate high levels of participant satisfaction which is underscored by repeat attendance.

In 2024 the FBICRC intends to expand the masterclass program and topics are likely to call upon subject matter experts from our Development of vanadium electrolytes, Lithium extraction, Nickel/Cobalt extraction and the Mobile mine electrification projects.

"The Li-ion Battery Materials and Production Processes Masterclass was a great way to provide exposure to my team of the various processing options available within the lithium mining and conversion supply chain that they may not otherwise be exposed to in their current roles."
David Heath, Lithium Study Director.



Next generation leadership

A new generation of science and engineering leaders will be needed to help grow Australia's emerging battery industries. This is a key driver behind the FBICRC's program to support higher degree by research students and postdoctoral research fellows working in Australian universities.

Higher Degree by Research (HDR) students are PhD or Master's students who dedicate several years towards the deep study of a battery-related challenge or opportunity. The FBICRC presently supports more than 40 HDR students within our eight participating Australian universities. Each student's research relates to one of our 15 research projects.

The 2022-23 year has been a ramp-up year for the HDR program with 12 students commencing their studies over that period. We expect that approximately five students will complete their projects next year and have their research theses examined and made accessible to projects' industry participants. Within the research projects there are also more than 20 postdoctoral research fellows (Postdocs) who are intellectual powerhouses conducting and overseeing research and translating research outcomes for the benefit of industry participants. Some postdocs have already finished their terms of appointment and have moved into exciting industry roles, including into industry participant roles.

More than two-thirds of the HDR and Postdoc cohort have come to Australia specifically to work on these FBICRC research projects, and many express a desire to remain in the country.

Examples from industry

NAS BATTERY

Earlier in the year, Australia's first sodium-sulfur NAS® battery provided by BASF was successfully installed at the IGO Nova nickel-copper-cobalt mine site. The 250 kW/1.45 MWh Battery Energy Storage System (BESS) demonstration unit provides long-duration storage.

The installation of the NAS® battery is helping to accelerate Australia's clean energy future, by drawing on mature technology that has been successfully installed and operated at over 250 sites worldwide over the past 20 years.

NAS® batteries have the ability to shift large quantities of energy into periods of low renewable generation and there are more than 250 NAS® battery sites across the world already in operation, with a total storage capacity of approximately 5.0 GWh.

"These field deployments help build market confidence, train our workforce and build capability in the contracting community. We thank both BASF and IGO for their generous commitment to cooperative research, which enables benefits to flow to Australia as a whole."

MAGELLAN INVERTER

Magellan Power have successfully developed a 100kW modular, bi-directional inverter system that has been specifically designed and manufactured to suit the unique requirements of the harshest of Australian environments and an expected life of 25 years. The system has application in Energy Storage, Standalone Power Systems, Microgrid, UPS, and high-power EV chargers.

System reliability is increased through the modular 'plug and play' design which enables short repair times. The system allows control of both active power and reactive power based on the system operating conditions, and also incorporates advanced control features, such as Virtual Synchronous Generator function.

"Magellan Power is a local company successfully operating for more than 30 years with a deep commitment to continuous innovation. The development of the modular inverter system has broad application in tough Australian conditions and is an example of a commercial outcome from a business that has benefited from involvement in the FBICRC and demonstrates how companies large and small can make a very practical contribution to the energy transition".

Nickel and cobalt extraction

THE PROJECT

Nickel and cobalt are essential minerals needed to make lithium batteries used in electric vehicles. This project uses new technology that will allow miners to extract nickel and cobalt from materials previously classified as mining waste.

RESULTS SO FAR

The technical feasibility of nickel and cobalt recovery from various process streams, including flotation slimes and tailings has been demonstrated. Using alkaline glycine leaching technology in combination with precipitation, a mixed sulphide product can be produced with recoveries of more than 80%.

This work allowed the team to develop an optimised process flowsheet that was used to design a pilot plant. The pilot plant is being built by key project participant Draslovka in Fremantle and is expected to be commissioned before the end of 2023.

National Battery Testing Centre

THE PROJECT

The National Battery Testing Centre (NBTC) is the first battery testing facility of its kind in Australia, with local companies previously forced to rely on overseas testing, which is both a costly and lengthy process.

The NBTC allows local battery manufacturers to certify their products to Australian and international standards. The centre has developed world class testing facilities suitable for a range of different battery types, systems and sizes. It is also accelerating the development of safety standards for cells, batteries and energy storage systems.

RESULTS SO FAR

Testing equipment for the UN38.3 has arrived onsite, been commissioned, and the first rounds of testing has commenced. In addition, two new battery testing units (BTUs) have been installed and commissioned. Testing of single cell flow batteries has commenced with an iron flow battery from ESI Asia Pacific.

Testing of large-scale batteries using the Battery Testing Microgrid has commenced with the installation of an iron flow battery from ESI Asia Pacific, and a lithium-ion BESS from RedEarth.

Cathode Precursor Production Pilot Plant

THE PROJECT

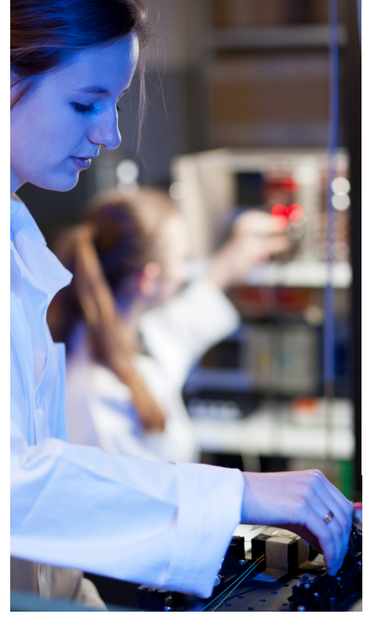
The Cathode Precursor Production Pilot Plant (CPPPP) is producing the current generation of cathode chemistries used in electric vehicles from locally sourced materials for the first time in WA.

The project, involving a consortium of leading industries, government and researchers represents a vital step towards the development of technical capability to produce advanced battery materials on an industrial scale in Australia.

RESULTS SO FAR

The project team has finalised the precipitation production program for NCM 622 cathode pre-cursor material. This material now proceeds downstream for lithiation, conversion into CAM and electrochemical testing.

Batch work on high nickel content cathode pre-cursor material has been completed and precipitation specialists are now working on a program for NCM 811 cathode pre-cursor material.



The FBICRC team is exploring opportunities to use the CPPPP for project development work with project participants and other external parties.

Super anode

THE PROJECT

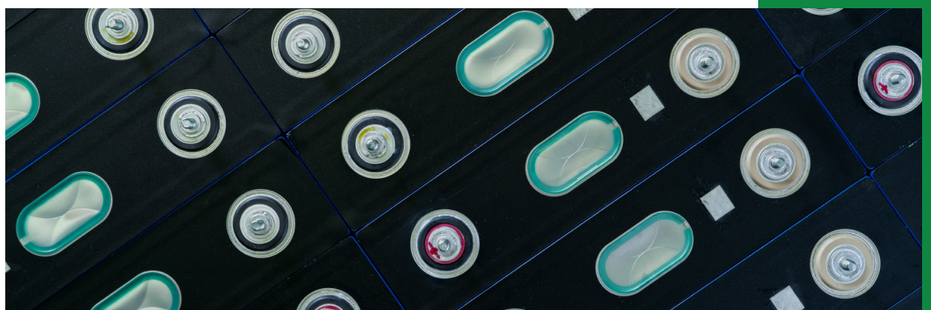
The project is working to produce fast charging, high-capacity anodes, whilst refining the manufacturing process and making recycling practices as sustainable as possible.

The project aims to deliver a reduction in graphite wastage of up to 30% during anode production and improve anode performance by up to 25%.

RESULTS SO FAR

Significant progress has been made towards reaching an anode capacity target of 1,000 mAh/g, achieving a capacity of 800 mAh/g (graphite capacity is 375 mAh/g). Their work is demonstrating the different methodologies for production of hybrid anode material and the impact on anode performance. The recent addition of computational modelling has added a deeper understanding of the mechanisms by which these performance improvements are achieved.

The collaboration with project industrial participants will soon enable the demonstration of the anode material in pouch cell batteries.



Electrochemical testing

THE PROJECT

This project provides a facility for lithium-ion battery construction in Australia that will include performance testing and benchmarking of lithium-ion battery components used in EVs, defence and mining.

The project will deliver a standard set of operating procedures for battery production, ensuring that they are fit for purpose and that Australian produced battery-grade materials are accepted and competitive in a global market.

RESULTS SO FAR

Complete installation of all capital equipment has been delayed by strong global demand for battery manufacturing equipment. The dry room has been constructed and equipment is now being installed and commissioned. Benchmark designs for coin cell, cylindrical cells and pouch cells has been completed and cross-validation testing is underway.

Microgrid deployment

THE PROJECT

The project aims to deliver a stable, reliable and robust microgrid system using a solar array, battery storage and backup diesel generation, at a FIFO accommodation facility in the north west of Western Australia.

RESULTS SO FAR

The project team has made good progress in modelling and optimising the two microgrids being installed at Cherratta Lodge, in Karratha, WA. Installation and commissioning of the distributed solar array has been completed, but completion of the microgrid and installation of the battery has faced commercial and utility approval delays.

Development of power inverters with Magellan Power has progressed well with prototypes of both 100kVA and modular 5kW inverter built and undergoing testing.

Life cycle analysis

THE PROJECT

The project is one of the first of its kind which aims to measure and improve the environmental impacts of mining Australian battery materials. These impacts include carbon emissions, water quality and chemical toxicity over the lifecycle of battery materials.

RESULTS SO FAR

Benchmarking of global systems for certification and sustainability assessment of battery materials has been carried out and two reports published: the 'Life cycle inventory (LCI) data gaps analysis for battery minerals' and 'Certification and sustainability assessment for battery materials.

This project has identified the importance of collaboration between life cycle modellers and process engineers and the criticality of primary data. Assumptions in open access lifecycle analysis (LCA) models can be misleading. Collaboration between Murdoch and Melbourne universities is providing an opportunity to upgrade the LCA models and improve the industry confidence in the result.

Future electrolyte systems

THE PROJECT

The project aims to enhance Australia's development of 'soft' battery components which are electrode binders, separators and the electrolytes.

This work will play a key role in developing the next generation of batteries which will use more stable substances, making them safer.

RESULTS SO FAR

The Future Electrolyte Systems (FES) project has developed new electrolyte systems that are safer than conventional systems and demonstrate improved performance. High purity alumina coated separators have been developed and demonstrate dimensional stability at elevated temperatures in combination with the new electrolyte. New binder systems for anodes, that are water based rather than the conventional solvent based are being developed and are showing increased anode capacity.

Trusted supply chain

THE PROJECT

Sustainable and ethical sourcing of materials is a vital part of the battery supply chain ecosystem, for EV manufacturers as well as consumers.

The Trusted Supply Chain project is developing tools and platforms to connect customers to the sources of battery minerals and provide provenance and traceability.

RESULTS SO FAR

The provenance sub-project has developed a proven method of fingerprinting lithium minerals and demonstrated its effectiveness for Australian lithium sources. The method is now being extended to processed lithium and lithium sources outside Australia.

The traceability subproject has been redefined following the exit of the traceability solution provider. The project will now work to adopt an interoperable platform rather than an exclusive platform.

Mobile mine electrification

THE PROJECT

The Mine Operational Vehicle Electrification (MOVE) Project is using technology to help Australia's mining industry make informed decisions about the adoption of safer, greener and more efficient battery-supported electric vehicles (BEVs).

RESULTS SO FAR

The project team has developed a package for optimising mine charging infrastructure using scenario-based analysis. They have extended this approach to the energy infrastructure supporting the charging infrastructure and have the capability to model conventional fuels-based systems as well as renewable based systems. The project team are working with miners and service providers to develop a user-friendly tool for design of mine electrification.

Lithium extraction

THE PROJECT

The beneficiation and chemical processing of lithium minerals project aims to maximise production of Australia's lithium resource through improved processing.

By building on our chemical processing capabilities, the project will assist Australia to capture a greater share of the battery value chain in mineral refining.

RESULTS SO FAR

The background research work for this project has been incorporated into a well-attended masterclass on hard-rock lithium processing and an entry in the Kirk-Othmer encyclopedia of chemical technology. With twelve sub-projects across five universities this complex research program has commenced and continues to attract interest from new industry participants.

Process legacy

THE PROJECT

The Process Legacy project aims to find new ways of utilising mining 'waste' by turning residue resources into useful products. In doing so, the project aims to reduce mining waste at its source, cut disposal costs while developing new and varied income streams for the mining industry.

RESULTS SO FAR

The Process Legacy project is developing solutions to valorise mine tailings. The use of copper heap leach residue in concrete and road base has produced good results with formulations that match the performance of conventional concrete. The development of new risk-based tools for metalliferous drainage is well underway with 22 samples from a range of mine sites undergoing sequential leaching and column testing.

Recycling, reuse and repurposing

THE PROJECT

The project is developing scalable, recycling and recovery technologies for end-of-life (EOL) lithium ferro phosphate (LFP) batteries. This project supports holistic processing of mixed chemistry black mass and the recovery of the PVDF binder materials and graphite anode materials through sustainable process routes.

RESULTS SO FAR

The project has identified the conditions that are needed for PVDF removal using a green solvent and has also developed an initial flowsheet for the battery recycling process.

Development of vanadium electrolytes

THE PROJECT

Vanadium Redox Flow Batteries (VRFBs) are rechargeable batteries that use vanadium electrolytes to store energy. The electrolyte is one of the key components of a VRFB and has a direct impact on the battery's capacity and energy density.

In this project researchers are investigating the role and impact of additives and impurities to maximise electrolyte performance in a cost-effective manner.

RESULTS SO FAR

This project is in its early stage with researchers completing an extensive literature review which is being developed into content for a masterclass. They are now actively engaged in the experimental phase of the project which continues to attract interest from potential new participants.

Stationary mine electrification

THE PROJECT

This project will help our largest miners transform their mine sites to cleaner power sources.

The project will also develop a virtual 'digital twin' which will allow companies to simulate, track and optimise the performance of their battery infrastructure and thereby reduce real world exposure to risk.

RESULTS SO FAR

The project team has developed a number of machine-learning based control systems which show improved computational efficiency compared to conventional control systems. The installation of the NaS battery system at IGO's Nova mine site earlier this year, has allowed the team to start collecting data on the performance of the batteries with real mine-site loads. The upcoming installation of a vanadium flow battery will allow them to add further depth to the data collected onsite.

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