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ALTA 2020 Nickel-Cobalt-Copper Conference

Including

Hydromet Processing of Ni-Co-Cu Sulphides Forum

10-12 November 2020, Online

ISBN: 978-0-6487739-0-0

ALTA Metallurgical Services Publications

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Nickel-Cobalt-Copper Opening Address

A RESEARCH-BASED STRATEGY FOR ESTABLISHING AUSTRALIA AS A LEADING PLAYER IN THE EMERGING GLOBAL BATTERY INDUSTRY

By

Jacques Eksteen
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Future Battery Industries CRC (Australia)

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ABSTRACT

The rapid shift to a renewable energy future is driving a global battery boom never seen before. Storage technologies will be a cornerstone of future electricity and transport systems.

As a result, many countries are competing for a larger share of the world's battery supply chain at a time when trade tensions and geopolitical issues are a growing influence.

Australia can build on its strengths in this environment to secure an expanded place as a central player in global battery value chains - an abundance of battery minerals, world class skills in mining, processing, research and regulation, and opportunities arising from growing renewable uptake in our electricity grids.

A key pathway in making the most of the opportunity is industry-led research which can help players large and small move further down the value chain in creating new investment and industries in Australia.

This presentation will provide an update on the establishment of the Future Battery Industries CRC which will put Australia at the centre of a national plan to refine, manufacture and supply materials and components for batteries. It will highlight some of the project activities being pursued to extract and refine battery metals such as nickel, cobalt and lithium from diverse resources and to produce nickel-cobalt-manganese (NCM) mixed hydroxide precursors and cathode active materials, as well as the projects involved with battery testing and environmental impact minimisation across the value chain from resources to cathode active materials.

The FBICRC represents a unique and growing collaboration bringing together industry players across the value chain in Australia and overseas, eight universities and the CSIRO, State Governments and many SMEs to further develop the battery industry eco-system in Australia and the research and workforce skills required.

The first wave of potential flagship research projects are under development and several scene setting research projects have already been commissioned.

As a six-year cooperative research centre, FBICRC is trying to rapidly build momentum as it moves into delivering industry-focused research that in turn produces real and measurable outcomes tied to economic growth, new jobs and continued investment in the sector.

With around $130M (cash and in-kind) and nearly 60 participants, we are the largest battery industry collaboration in Australia's history – though a small budget in globally terms we are committed to working with others to leverage existing research activities and resources. We remain open to new participants and supporters.

Keywords: future battery industries, research, education, jobs, investment, nickel, cobalt, lithium

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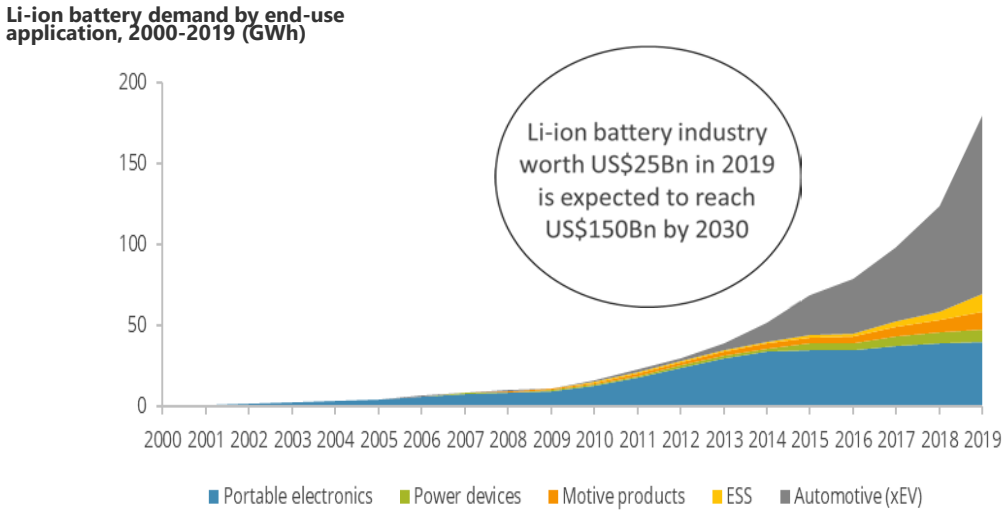
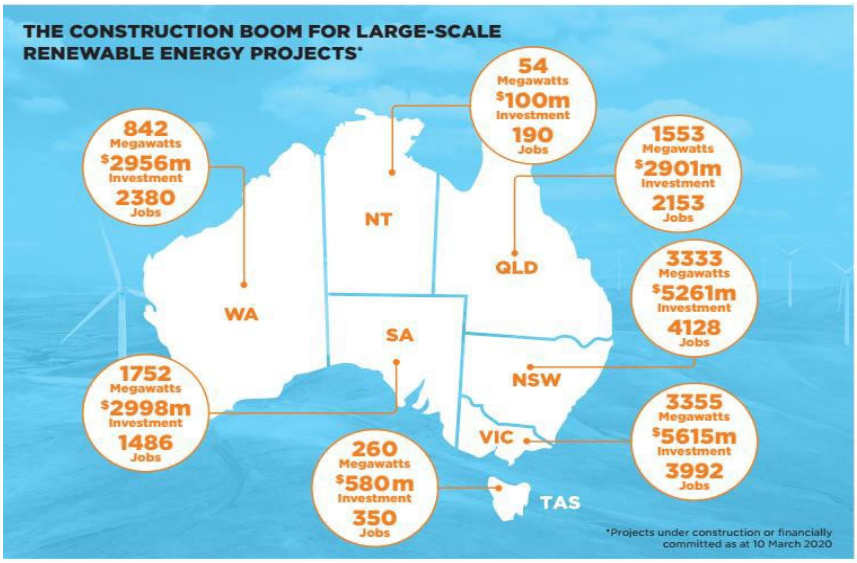
EXOPNENTIAL MARKET GROWTH



INVESTMENT IN CLEAN ENERGY TECHNOLOGIES



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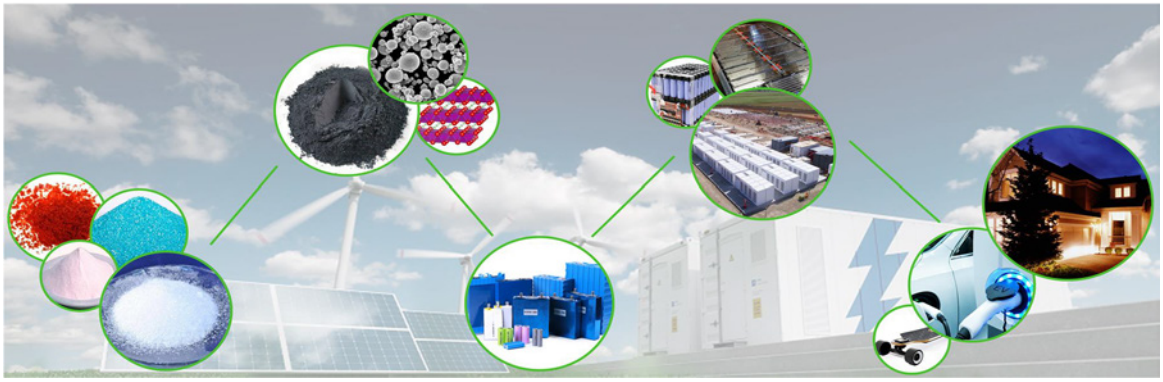
OUR MISSION



We will foster the collaboration and collective action of stakeholders in the battery value chain to enable growth in the Australian battery industries by:

- growing Australian economic activity in the global battery industry ;
- growing exports of Australian battery-related materials, services and technologies;
- growing battery industry jobs with appropriate skills and education.

We aim to achieve this through prudent industry-guided investment in research and development, evidence- based advocacy, and education and training.

The Ramp-up: From bid to operations

2018	– Steering committee formed
	– Stage 1 & 2 CRC bids submitted
	– WA Government commitment of $6M
2019	– CRC selection interview
	– Commonwealth announces funding of $25M
	– Initial Board appointed
	– Participant workshops and a call for research EoIs
	– Commonwealth grant agreement execution
	– First wave of research proposals
	– Inaugural AGM and appointment of full Board
2020	– International battery expert/advisor appointed
	– Participant agreements lodged for execution
	– Current market conditions present some short term challenges
	– A growing community of 50 participants across value chain
	– A pool of over $110 M cash and in kind at foundation
	– Targeting “steady state” research by end of 2020

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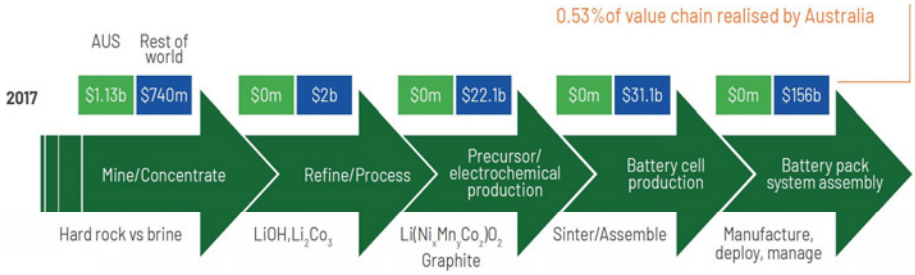
MINING IS OUR STRENGTH, MANUFACTURING OUR WEAKNESS

Li-ion batteries – Lithium Value Chain 2017



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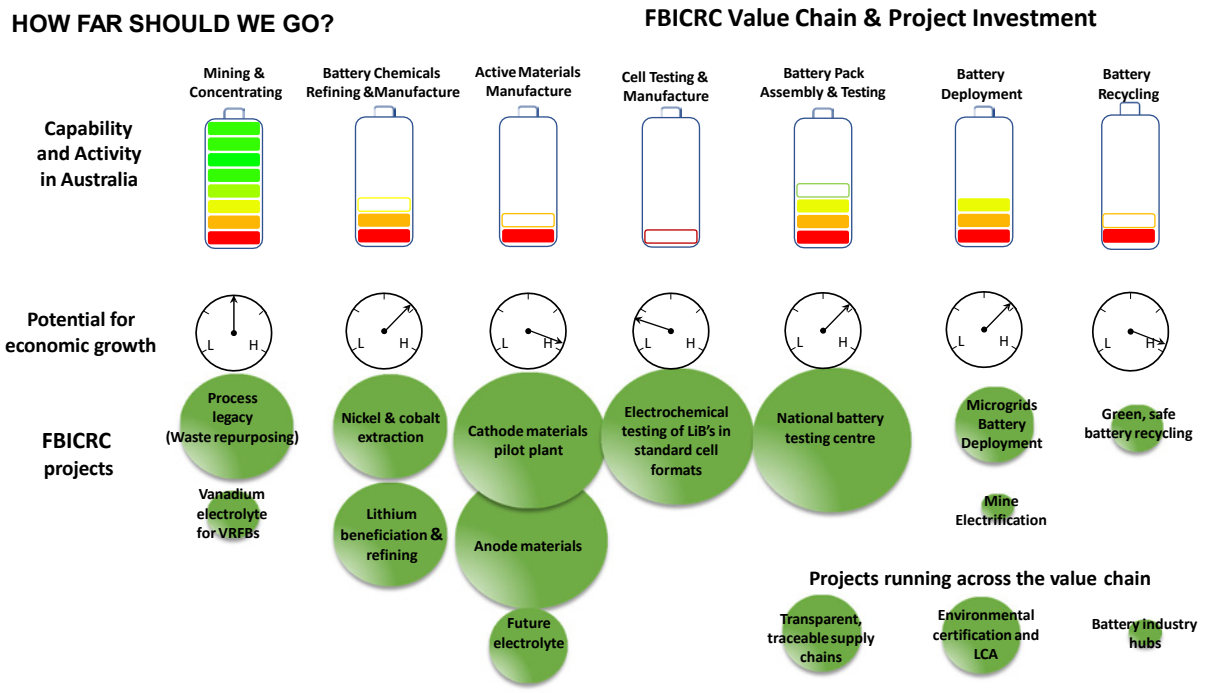
HOW FAR SHOULD WE GO?



FELLOW TRAVELLERS

03/06/2020

GOVERNMENT PROPOSES TO CAPITALISE FINNISH MINERALS GROUP

Capitalisation would provide new opportunities for developing the Finnish battery value chain and mining operations as well as circular economy projects related to them.

The Finnish Government has announced its preparedness to capitalise the State-owned company Finnish Minerals Group. The strategy of Finnish Minerals Group involves being an active owner and technological developer of Finnish mining companies, and increasing the degree of processing of Finnish minerals by strengthening the lithium-ion battery value chain.

A supplementary budget to be submitted to the Parliament in June proposes to Finnish Minerals Group a funding package of EUR 450 million, EUR 300 million of which is based on the mandate procedure. The mandate would give the company a possibility to enter into contracts and give commitments, the costs of which would be covered in subsequent government budgets.

According to CEO **Matti Hietanen**, the planned additional funding would enable the company to invest in developing the Finnish battery value chain and mining industry as well as promoting circular economy projects related to them. Finnish Minerals Group's project company, Finnish Battery Chemicals, is currently focusing on the environmental impact assessment (EIA) procedure on precursor and cathode active material plants, which are part of the battery value chain.

"Investing in the battery value chain gives us an opportunity to create new high-technology industry and boost economic activity. The funding would enable us to finalise the co-investment negotiations regarding the establishment of battery materials plants in Finland. We are highly motivated to pursue for industrial investments that will support Finland in returning to its path of sustainable growth after the corona crises," Hietanen says.

SIGNIFICANT ECONOMIC POTENTIAL IN BATTERY MATERIAL PLANTS

According to an economic impact assessment commissioned by Finnish Minerals Group, the precursor and cathode active material plants with an annual capacity of 50,000 tonnes will create approximately 300 new jobs once in operation. In addition to the direct employment impact, there would be multiplier effects related to production and consumption. All in all, the two new plants would, at this level of capacity, generate approximately

WHY IS $ ¾ BILLION A GOOD INVESTMENT IN FINLAND, BUT NOT IN AUSTRALIA?

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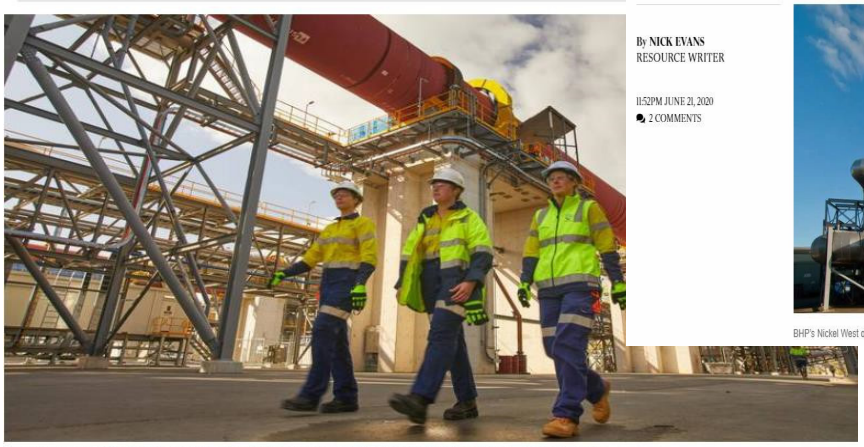
HEADWINDS AND TAILWINDS IN A COMPLEX VALUE CHAIN

Tianqi reveals extent of Kwinana lithium hydroxide plant cost blowout

Sean Smith The West Australian
Thu, 23 July 2020 7:14AM



Regulatory scrutiny in China has forced the lithium produce to reveal the cost of the delayed plant. Credit: Tianqi Lithium

BHP purchase bolsters nickel operation

By NICK EVANS
RESOURCE WRITER

11:52PM JUNE 21, 2020
2 COMMENTS

BHP's Nickel West operation has been revived under boss Eddy Haegel

SETTING THE SCENE FOR A SIX YEAR R&D JOURNEY

- Governments and businesses have identified building the battery sector as a major economic imperative.
- Australia's resources, trusted governance framework and strong international relationships make it an ideal partner to develop more resilient battery value chains.
- Australia's economic opportunity lies in leveraging its competitive advantages to 'move along the value chain' from a mining to processing role.
- Policy design by governments, and project development by businesses, must be informed by governance features and needs of global battery value chains.
- A value-chain informed strategy should focus on building mid-stream capacity through international partnerships with key global players.

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SETTING THE SCENE FOR A SIX YEAR R&D JOURNEY

- A state-of-the-art technical assessment on the process to establish precursor manufacture in WA.
- It confirms its technical and commercial feasibility as a foundation for laboratory and pilot scale testing.
- A number of groups are already advancing from raw materials to battery grade chemicals – these are the source materials for precursor chemistries.
- The reward is a 10 fold increase in value (Austrade).

SETTING THE SCENE FOR A SIX YEAR R&D JOURNEY

- Australia is on the cusp of developing significant capability and capacity to move further along the battery value chain – though the battery minerals sector may need short term support.
- Real value add in moving to cathode and anode materials – chemistries could be reproduced in Australia using local sourced materials and expertise.
- Niche markets exist further down the value chain in cell assembly and power management systems – recycling is relatively primitive.
- Technology to manufacture batteries in Australia is licensed to local companies currently seeking preference or support to establish.
- Policy settings for the growth of battery industries in Australia are not as integrated or strategic as those in other countries.

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SETTING THE SCENE FOR A SIX YEAR R&D JOURNEY

Further Scene Setting Projects Commissioned:

- Certification and Life Cycle Assessment of Australian Battery Materials: Drivers and Options
- Development of a trusted supply chain for Australian battery minerals and products
- Battery reuse, repurposing and recycling
- Battery supported mine electrification

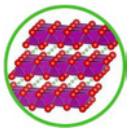
INITIAL RESEARCH PORTFOLIO

Approved projects:

- A National Battery Testing Centre
- Electrochemical Testing of Li-ion Battery Materials in Standard Cell Formats
- Super Anode Materials
- Future Electrolyte Systems
- Microgrid Deployment of Batteries
- Environmental Certification and Life Cycle Analysis of Australian Battery Materials

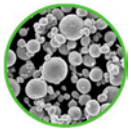
Proposed stage 1 approved :

- Cathode Precursor and Active Materials Production Pilot Plant
- Innovative Nickel and Cobalt Extraction Technologies
- Enhancing Lithium Extraction and Refining
- Process Legacy (Waste Reduction and Reuse)



Proposals still under development:

- Vanadium Electrolyte Production
- Battery Material Provenance and Traceability
- Recycling, Reuse and Repurposing of Spent Batteries
- Australian Battery Industry Hubs
- Battery Supported Mine Electrification



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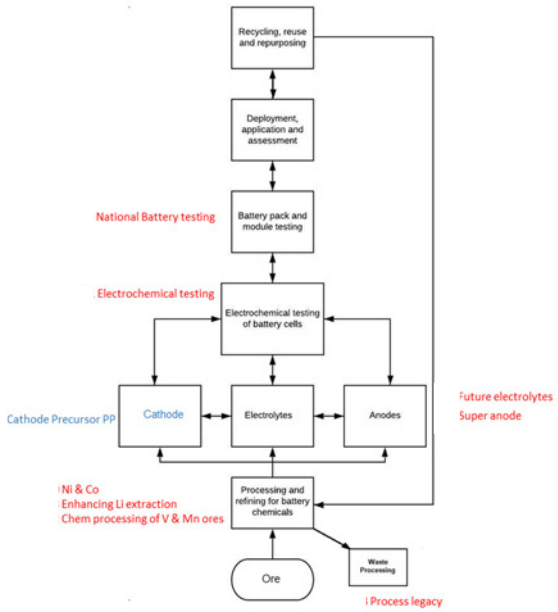
PROJECT INTERCONNECTEDNESS

Projects were selected and designed to cover key areas in the battery value chain where Australia can make a global impact and responding to industry needs:

- Extraction and refining to produce battery grade chemicals from battery mineral resources
- Conversion to high quality battery component materials
- Testing at cell and pack level
- Pack manufacturing and deployment with associated battery management systems
- Applying circular economy principles to all wastes along the value chain, up to end-of-life batteries
- Working towards satisfying WEF Battery Passport certification needs through qualification of:
  - Provenance & Traceability
  - Environmental footprint
  - Quality



KEY MESSAGES

1. Australia is on the cusp of developing significant capability and capacity in industry to move further along the battery value chain
2. The "battery industry" is a multi-stage business with complex supply chains which determine demand – and create challenges for new entrants
3. Competition is in play with Finland, Sweden, the UK and Germany as battery manufacturing goes into an unprecedented growth phase
4. Policy settings for the growth of battery industries in Australia are not as integrated or strategic as those in other countries – a more proactive framework is justified in different segments
5. There is much to do in the R&D space to demonstrate to global battery makers our technical capability and the value of Australian provenance