CEO REPORT

NOVEMBER 2020

FUTURE BATTERY INDUSTRIES CRC

Australian Government
Department of Industry, Science, Energy and Resources

Business Cooperative Research Centres Program

CEO WELCOME

In the second half of 2020, the CRC has been able to step up the pace of its facilitation, assessment and approval of projects to overcome the delays caused by the COVID-19 pandemic. With support from our industry, research and government partners, the CRC has now approved 10 research projects in full or for an initial stage to further develop project scope. As well as the contracting of these projects, a further six projects are in advanced stages of development. The award of scholarships embedded within this project portfolio has also now commenced.

At the same time, the CRC has been able to finalise and release four scene setting reports to help promote its activities and its mission – to grow future battery industries in Australia. These reports have provided a timely contribution to a renewed focus on a modern manufacturing strategy for Australia.

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We appreciate the support of our partners in these efforts. Given the travel restrictions still in place, we are proceeding to plan for a virtual participant summit series of events to coincide with the CRC's AGM on 24 November to showcase our progress.

There have been some important signposts for the development of battery industries recently both at the annual Diggers and Dealers conference in Kalgoorlie and at Teslas annual Battery Day. We have provided some links and commentary in the newsletter given the value of these voices in putting some ambitious stakes in ground for the industry something that the CRC itself is seeking to do as an advocate for the value of growing Australias battery industries.

Thank you for your continued support through this exceptional year. Stay safe, stay well, and please don't hesitate to contact me.

Stedman Ellis
Chief Executive Officer

HIGH ENERGY SUCCESS FOR MARIA FORSYTH

One of FBICRC 's project leaders has won national recognition for her contributions to electrochemistry and its role in the development of sophisticated batteries for new age energy production. Prof Maria Forsyth, has been recognised as a global leader in her field by the League of Scholars, receiving her award in The Australian Research 2020 magazine.

The Director of ARC Industry Transformation Training Centre for Future Energy Systems, storEnergy, and Deakin University Professor is leading the research and development of future electrolyte systems critical to the development of domestic energy programs. She is one of 16 project leaders at the forefront of the Future Battery Industries program.

Working with researchers around the world, she has been refining prototype batteries to identify ideal directions for the future of energy production.

FBICRC Project Leader Prof Maria Forsyth, has been recognised as a global leader in her field by the League of Scholars, published in the Australian Research 2020 magazine.

"Our projects are already generating significant international interest in the development of safe, high energy batteries," she said.

"For example, French company Solvionic is a core participant in the FBICRC and looking to produce the next generation of electrolyte products and potentially set up a chemical industry in Australia. In addition, Australian companies including BHP's Nickel West, Calix, Talga and Blackstone are participating in the electrolyte project to develop the next generation of batteries. High voltage electrode materials will be critical to the delivery of the next generation of Li-ion batteries.

"Australia has emerged as a leading supplier of battery minerals in the development of high energy density batteries which need high capacity cathodes, and new electrolyte systems with improved voltage and thermal stability will only increase the demand. Current Li- Ion batteries are already used for many purposes, but the next step needs new cathode and anode materials that Australia is well poised to deliver," she said this week.

She describes the development of high energy density batteries as the holy grail of modern energy storage – and a game changer for efficient energy production in Australia.

"Our Chief Executive Officer, Stedman Ellis, and Chief Operating Officer Jacques Eksteen have been successful in involving major materials and battery producers in the program and that will be critical to our success in the future," she said.

TESTING CENTRE TO GO AHEAD

A National Battery Testing Centre (NTBC) initiated by FBICRC will play a critical role in the development of commercial and domestic batteries in Australia.

The testing centre is planned for QUT Redlands campus in Brisbane. It will provide testing facilities for capacity, efficiency, safety, and environmental impacts. At present, researchers, businesses and safety agencies have access to selective testing facilities at various locations around Australia. But none provide a comprehensive, sophisticated set of options for a complete suite of tests.

Some local battery producers are relying on overseas facilities to test new batteries but, often, the international facilities are too busy to help out. The advent of a sophisticated local facility will have a major influence on the rapid development of new age energy.

FBICRC Program Lead Prof Peter Talbot believes a complete suite of testing facilities will be essential to the future of the industry in Australia.

“Obviously, we need to be able to test the performance of our new batteries, but it’s just as important to make sure they are safe, long-lasting and environmentally sound. That’s what the National Testing Facility will provide.”

The FBICRC’s NBTC will be part of a combined QUT facility which will feature “plug and play” capability to combine up to 250kW of solar PV, battery storage systems, H2 electrolysers, fuel cells and hydrogen storage systems. It will include both DC/DC and DC/AC microgrids.

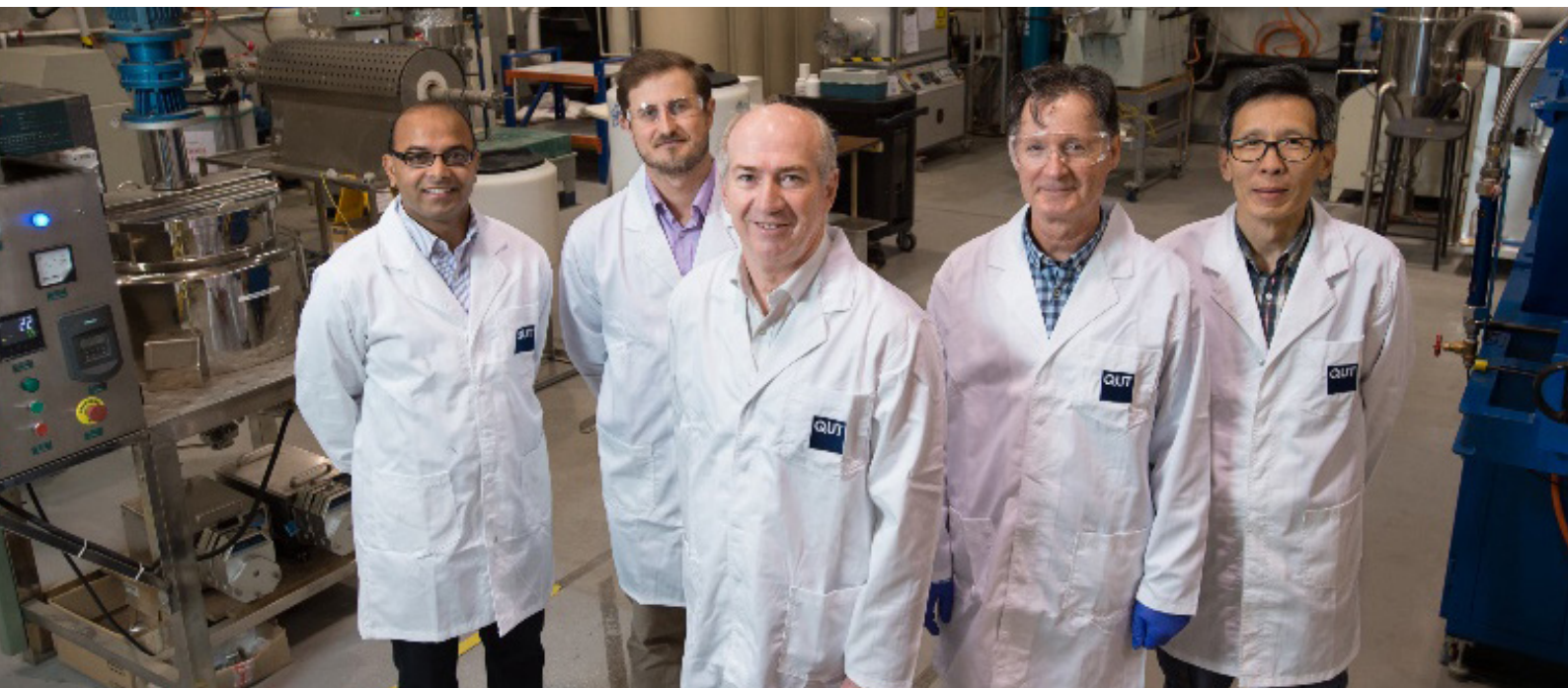
The AC grid will be mains connected which will enable real time (residential) battery testing. This will provide invaluable data on performance and reliability of these systems.

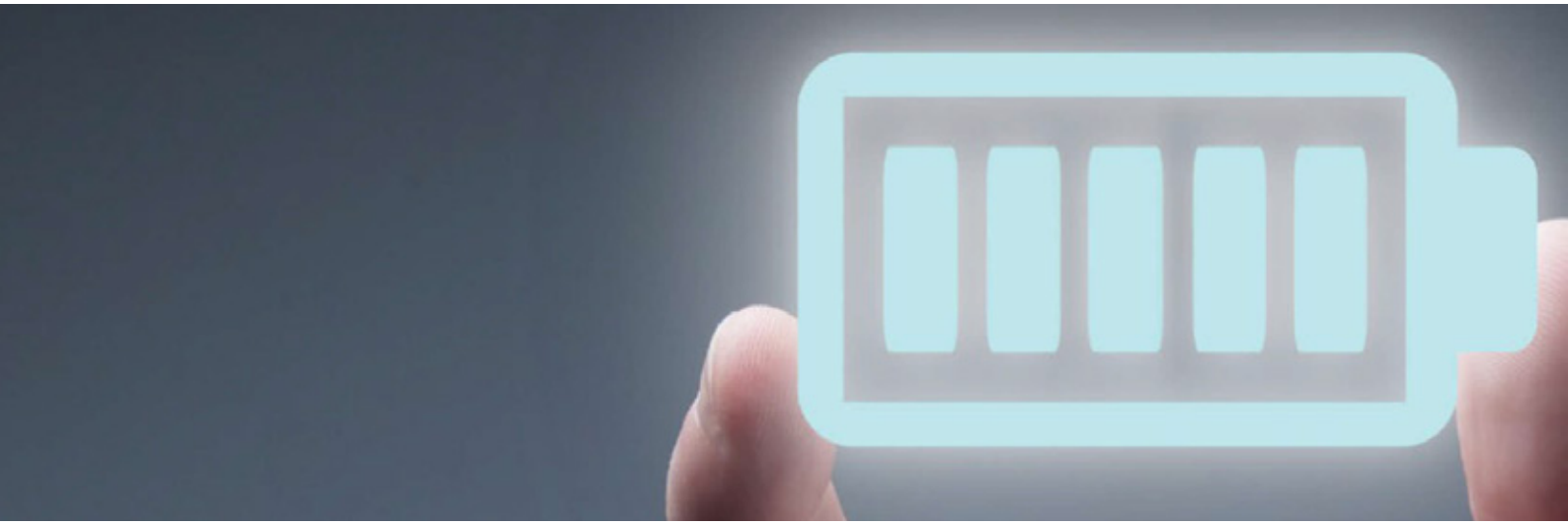
FEDERAL MANUFACTURING RECOVERY PLAN

FBICRC will seek to play a significant role in the consultation now underway to shape the direction of a $1.5 billion Federal Government program to rebuild the Australian manufacturing sector.

In a joint statement with Prime Minister Scott Morrison, the Federal Minister for Industry, Science and Technology, Karen Andrews, said the strategy reflected significant lessons learned during the Covid-19 Pandemic, as well as extensive work with industry before 2020.

The centrepiece of the strategy is a 1.3 billion Modern Manufacturing Initiative (MMI)which will see the Government strategically invest in projects that help manufacturers to scale up and create jobs.





The MMI will support projects within six National Manufacturing Priorities reflecting Australia's comparative advantages or emerging areas of priority.

These include
- Resources technology and critical minerals processing
- Food and beverage
- Medical products
- Recycling and clean energy
- Defence
- Space

FBICRC CEO Stedman Ellis said battery industries provide enabling capabilities across the six priority areas, in particular in resources technology and critical minerals processing, recycling and clean energy, defence and space.

"Our scene setting reports on global supply chains and Australia's battery industries will provide important source material for the proposed manufacturing roadmaps.

"And the nature of our collaboration and the insights of the community of participants across the value chain can make a unique contribution to help realise the government's objectives."

STATE OF PLAY – MEASURING OUR IMPACT, GUIDING OUR PRIORITIES

FBICRC has released a landmark study by a team from CSIRO on Australia's battery industries.

State of Play Australia's Battery Industries was produced for the CRC by CSIRO's Dr Chris Vernon and Dr Adam Best. It establishes a baseline for measuring the impact of the CRC's activities at the start of its six year R&D journey, and also to provides evidence to support setting investment priorities.

The report notes that Australia is on the cusp of developing significant capability and capacity to move further along the battery value chain. This is currently limited to battery grade chemicals but with clear aspirations to move to precursor manufacturer and production of bespoke batteries.

Precursor materials are the first significant engineered products in the manufacture of batteries. The shift to precursor materials would represent a 5-10x uplift in value add.

The report identifies several key objectives and opportunities for future battery industries in Australia:
- Australia's once in a generation opportunity to build a battery industry across the value chain based by leveraging its resources endowment and technical capability downstream, and becoming better integrated

with the clean energy transition.
- The policy framework needed to move along the value chain and capture significant social, environmental and economic benefits
- Predicted increase demand will increase demand for EV battery lithium from 2500 tonnes in 2020 to 150,000 tonnes in 2025 and 100,000 tonnes a year, every year, till 2050
- This growth will be compounded by additional growth in the demand for batteries associated with consumer goods and house and utility grid power storage.
- In the short term, lithium suppliers are under considerable financial pressure with some risks to the required investment to capture market opportunities.

> Science can transform our raw materials from commodities into unique, higher-value products, and keep more of that value here at home, like turning minerals into the next-generation batteries we need to underpin our energy transition.
> - Dr Larry Marshall, CSIRO Chief Executive

The report is available at:
www.fbicrc.com.au/publications

BATTERIES TO POWER ELECTRIC MINES

Electric mine sites will be part of a new era of zero-emissions mineral production in Australia within the next 20 years, research into industrial battery production has forecast.

Batteries of the future will play a key role in the industry clean-up by eliminating diesel fuels and developing large-scale storage of renewable power at modern mine sites.

The strategy for electrification is outlined in the State of Play electrification report published in October.

Some of Australia's leading mining companies, including Rio Tinto, BHP Minerals, South 32 and Oz Minerals - combined with global technology powerhouse Tesla – contributed to the report which was supported by FBICRC.

A survey of corporate leaders found that 89 per cent of producers across the world were looking to electrify mine sites in the next two decades.

The State of Play electrification report said the transition to electric equipment would allow for a shift from the typical underground mine sites seen in Australia today (with many pieces of heavy equipment, powered by diesel, operating underground in confined spaces alongside teams of people) changing to a clean future of mining, not seen before.

Author of the report, Graeme Stanway, described the initiative as a game-changer for the industry

"A future where machinery is safe, automated and battery powered. This would effectively cut out two of the biggest issues in mining - carbon impact and particulate exposure. It would result in zero carbon emission mines."

Stanway says the industry should focus on collaborating to overcome cost barriers and uncertainty in technology choices that may be beyond the capacity of individual companies.

"Here in Australia we have an abundance of renewables that the industry is tapping into, particularly in our most remote operations. Local mine sites have the opportunity to install solar and wind, supported by battery energy storage systems, to power their operations at a much cheaper cost than many global players," he said

The FBICRC is currently supporting R&D in two areas of mine electrification:
- Mobile equipment and battery electric vehicles in mines; and
- Mine electrification through batteries matched to renewables in standalone microgrids.

For more information, contact FBICRC COO and Research Director Jacques Eksteen.

PROJECT PLANS TAKE SHAPE

The FBICRC Board approved a significant new project in September – Future Electrolytes Systems. Led by Professor Maria Forsyth, the project aims to expand available markets by delivering new battery and energy technology materials and products into global markets.

It also approved an expansion of the Microgrid Battery Deployment Project, with the addition of a subproject focussed on battery integrated energy storage for a mining operation. The project is more comprehensive, now covering both residential and industrial (mining) applications/microgrid solutions.

Further projects in development to be reviewed by the CRC program committee and the Board Commercialisation Committee and Research Implementation Advisory Committee for recommendation to the Board in December are shown below:

Full Project Approved	Stage 1 Approved	Seeking Full Funding December 2020
National Battery Testing Centre	Process Legacy	Trusted Supply Chain for Australian Battery Minerals and Products
Super Anode	Battery Industry Hubs	
Electrochemical Testing	Hydrometallurgical processing for nickel and cobalt ores, concentrates, tailings, wastes	Mine Electrification
Microgrid Battery Deployment		Stage 2
Demonstrating market advantage in a circular economy	Beneficiation and chemical processing of lithium materials	Stage 2
Future Electolyte Systems	Cathode Precursor Pilot Plant	Stage 2

WHAT DO THE TESLA BATTERY DAY ANNOUNCEMENTS MEAN FOR THE CRC?

Tesla, a high profile player in battery technology, is setting some ambitious goals for is future in the next decade.

The Tesla strategy was on show at its global Battery Day event on September 22, when CEO Elon Musk and Senior Vice President Andrew Baglino made several announcements.

To achieve its objectives, Tesla plans to transition from gigawatt to terawatt scale production within a decade. The strategy would increase production 80-fold in the next 12 years.

As well as these growth plans, there was a focus on technical innovation in battery production and a growing interest in the raw material supply chain.

FBICRC Chief Operating Officer and Research Director Jacques Eksteen said there is a good alignment overall with the direction set by Tesla and the FBICRC's research portfolio.

"For example, the nature of cathode chemistries we will assess, a focus on clean/green processing approaches and the importance of reliable supply chains all play to Australian strengths that the CRC is seeking to leverage."

COMMONWEALTH AGREEMENT VARIATION ACCEPTED

The Variation Request to FBICRC's Commonwealth Grant agreement was submitted to the Commonwealth in August, after securing in-principle agreement from all CRC Participants and approval by the Board.

The Department of Industry, Science, Energy & Resources completed its assessment and advised in October that they would accept the Variation of our Commonwealth Grant Agreement.

The primary issue addressed in the period of review by the Department since lodgment was whether the CRC retained the overall resources to deliver on its outputs and milestones given the circa 10% reduction in the cash and in kind resources of the CRC since the original grant agreement in October 2019.

The department has noted the CRC's strong track record in attracting further participants to make up for the shortfall which was due to a reduction in contributions primarily from the lithium sector participants. To date, the CRC has been able to cover more than half of this shortfall with new participants at CRC and project level (Anteo, Talga, Lycopodium, Mineral Carbonation, DLG, Solvionic and Cherratta Lodge).

COMMERCIALISATION

FBICRC was able to successfully nurture the commercialisation of some early-stage future battery innovations in Australia through a ClimateLaunchpad 2020 initiative which ran from April to September.

The project helped nine future battery and energy storage teams get out of the lab and into the world as part of a structured competition with training, mentoring and pitching opportunities.

Teams supported by the CRC competed in the South East Asian section of Climate-KIC (Knowledge and Innovation Community), claimed to be the world's biggest cleantech competition. Of the battery business ideas submitted to the Climate Launchpad program, seven teams were accepted into a boot camp and training workshops to develop ideas and pitches. East and West coast pitch nights were held in mid-August and three teams were subsequently selected to compete in the national finals on 26 August. The teams received mentorship from industry and academia in preparation for the national finals, with one battery business idea, Elevenstor, selected to compete in the regional (South-East Asia & Oceania) finals, winning first place and subsequently competing in the Global Grand Final (an Australian first) where they were the Theme winners for Sustainable Mobility, with a €5,000 prize and automatic acceptance into the EIT Climate-KIC Accelerator program.

The CRC would like to thank two CRC Board members, Sarah Ryan and Mark Woffenden who served as judges in the East/West Coast and National competitions, and Professor Jo Staines serving as the mentor for the Elevenstor team in developing their business idea and pitching skills.

To find out more about the finalists, including Elevenstor, go to **https://climate-kic.org.au/clp20/** or **https://www.linkedin.com/company/elevenstore**

VOCATIONAL WORKFORCE SKILLS

South Metro TAFE is on track to provide an initial national skills assessment for the battery industries by mid-November.

The college has completed most interviews with industry and subject matter experts across the battery value chain, including several CRC participants. The next step in this process will be to assess the skills gaps between existing curriculum and new skills needed across the battery industry. The CRC would like to thank everyone engaged in the process to date.

For further information and to participate in the study please contact Nhi Do, Manager Research and Workforce Strategy, South Metropolitan TAFE on (08) 9239 8142 or **nhi.do@smtafe.wa.edu.au**.

APR INTERNSHIPS

The FBICRC will be working with Australian Postgraduate Research (APR) Interns to facilitate matching of industry and Higher Degree by Research (HDR) candidates to undertake short, high-impact industry-based projects and increase industry and university collaborations. The program offers industry access to skill sets to complement their existing teams for 3-5-month industry-research projects, while providing HDR candidates with invaluable industry-based experience and training to increase employability.

These internships are supported by the Australian Government. Industry participants receive significant rebates (50%) that may be increased for small or medium-scale enterprises in target areas. The CRC will assist in identifying projects with our industry partners and profiling our HDR candidates to match to suitable opportunities.

For further information please contact Stacy Osenbaugh, Project Coordinator, FBICRC at **stacy.osenbaugh@fbicrc.com.au**

COMMUNICATIONS AND OUTREACH

We will be holding our Annual General Meeting on Tuesday, 24th November, followed by an opportunity for participants to hear an update from CEO Stedman Ellis, Board Chair, Tim Shanahan and speakers providing insights into a number of topics across the battery supply chain.

In the past few months we have launched a number of scene setting reports, issued a number of media releases, and organised and participated in national and international webinars.

Jenny Shewan, FBICRC Communications Manager said, ''We have been fortunate to be able to connect with some amazing panel members and continue outreach activities to develop partnerships and opportunities for collaboration with a number of organisations, including the Government of WA European Office, Critical Minerals Facilitation Office, BHP, MRIWA and others.'

The FBICRC continues to look for opportunities to participate in conferences and events to advocate on behalf of the industry and raise the profile of the FBICRC. See below for a few of the events we have coming up.

Visit **fbicrc.com.au** for our **publications** and **webinars** or contact **jenny.shewan@fbicrc.com.au**

UPCOMING EVENTS

10 November	**Nickel-Cobalt-Copper Conference**	ALTA Metallurgical Services
19 November	**2020 Symposium on Lithium Supply Chain for a Green and Mobile Energy Future**	University of New South Wales
24 November	**AGM & Participant Summit**	FBICRC - all participants
26 November	**Lithium and Battery Metals Conference**	ALTA Metallurgical Services
14 December	**FBICRC Board Meeting**	

IN THE NEWS

Thursday, 17 September
- 3ME Technology wins first defence industry contracts

Friday, 25 September
- ASX-listed EcoGraf signs option to lease in Rockingham Strategic Industrial Area
- $98 million graphite processing plant to support WA's battery minerals industry
- Project expected to create up to 275 local jobs

Tuesday, 13 October
Energy Renaissance announces that it will build Renaissance One, a new A$28 million battery manufacturing facility at Tomago, in the New South Wales Hunter region. Over 1,700 direct jobs will be created during the construction and operational phase and another 6,500 indirect jobs will be generated for the benefit of the Hunter.

DIGGERS & DEALERS
The following presentations show how these two companies are preparing for the future

Day 1 - 12 October
Pilbara Minerals Limited Ken Brinsden, Managing Director & CEO – Positioned for the future
https://youtu.be/MlhJQ4s8VxU

Day 2 - 13 October
BHP, Eddy Haegel, Asset President Nickel West – Towards a sustainable future
https://youtu.be/ghlIOOVJCYA