



HILTCRC



HEAVY INDUSTRY LOW-CARBON TRANSITION

**YEAR ONE IN REVIEW
OCTOBER 2022**



[HILTCRC.COM.AU](https://www.hiltcrc.com.au)

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ABOUT HILT CRC

The Heavy Industry Low Carbon Transition CRC (HILT CRC) is a collaborative venture that brings together industry, research, and government to develop and de-risk technologies that will create a low-carbon heavy industry sector. We were awarded \$39 million of Commonwealth funds over 10 years on 30 June 2021, adding to the investment of approximately \$41.6 million cash and \$118.4 million of in-kind contributions from our partners.

We work with our partners to de-risk the transition of the iron/steel, alumina, and cement and lime industries to a low-carbon future. In doing so we reduce heavy industry's CO₂ emissions which currently account for some 20 percent of Australia's total greenhouse gas emissions. The industrial sector globally accounts for 32 percent of all CO₂ emissions, of which approximately half are from the heavy industrial sector.

The uptake of low-carbon technologies will help meet the Australian Government's obligations to the United Nations Paris Agreement. These technologies will unlock potential value of \$48.7 billion in annual revenue and \$92 billion in investments, safeguarding more than 300,000 existing jobs and creating 90,000 new employment opportunities, while mitigating CO₂ emissions.

VISION

A PROSPEROUS HEAVY INDUSTRY SECTOR AT THE FOREFRONT OF THE GLOBAL LOW-CARBON TRANSITION.

MISSION

TO DE-RISK THE TECHNOLOGY PATHWAYS NEEDED BY AUSTRALIA'S HEAVY INDUSTRY TO BE INTERNATIONALLY-COMPETITIVE IN THE TRANSITION TO LOW-CARBON PRODUCTS.

FIRST YEAR ACHIEVEMENTS

EXECUTED THE CORE PARTNER AGREEMENT AND OTHER PARTNER AGREEMENTS WITH

46 PARTNERS

SECURING A TOTAL OF

\$160M

OF COMMITMENTS (\$42M CASH AND \$118M IN KIND) ON TOP OF THE

\$39M

FROM THE CRC GRANT AND \$1M FROM THE NET ZERO INDUSTRIES GRANT.

\$6.7M

INVESTED IN

16

QUICK-START PROJECTS.

HILT CRC TEAM ESTABLISHED

CEO, COO, STRATEGIC INITIATIVES AND PARTNERSHIPS DIRECTOR, COMMUNICATIONS COORDINATOR AND ADMINISTRATION MANAGER.

PROGRAM LEADERSHIP TEAM ESTABLISHED

RESEARCH DIRECTOR, 3 RESEARCH PROGRAM LEADERS, 3 INDUSTRY PROGRAM LEADERS, EDUCATION AND TRAINING DIRECTOR AND THE EDUCATION AND TRAINING COORDINATOR.

BOARD, STEERING COMMITTEE AND

3 RESEARCH ADVISORY

COMMITTEES ESTABLISHED.

DEVELOPED AND IMPLEMENTED

OUR RESEARCH AND ORGANISATIONAL STRATEGIES.

5 INDUSTRY PhD'S

COMMENCED.





MESSAGE FROM THE CHAIR

I am delighted to present my first Chair's report for HILT CRC.

With just over a year since the incorporation of the HILT CRC we have all made great progress. This progress has been achieved with a united spirit of collaboration, innovation, and commitment to our mission from all involved.

The process to establish HILT CRC has seen the appointment of our multi-skilled Board and its Committees, of our CEO and her team, of our program leadership team and the appointment of our project development and decision-making structure through the Research Advisory Committees and the Steering Committee, providing advice to the Board.

Over the course of the year, we've developed and implemented our Organisational and Research Strategies along with our governance and reporting process and company policies. We have presented our inaugural audited Financial Statements prepared in accordance with Australian Accounting Standards and with the Australian Charities and Not-for-profits Commissions Act 2012. Further, in accordance with our Commonwealth Grant Agreement we submitted all quarterly reports on time detailing our income and expenditure and progress against milestones.

Over the last few years, the world has seen dramatic climate related fires, droughts, ice melts and cyclones alongside this year's IPCC Report which raised concern about the likelihood that global warming can be contained below 2 degrees and the response of governments around the world to tighten emissions targets makes our mission even more critical.

In closing, I thank you all for the professional and collaborative approach that you each bring to building HILT CRC and to developing and implementing our research projects.

With this continued approach we will achieve our vision that **Australia's heavy industry sector not only survives, but thrives over the coming decades with improved technological capabilities and cost competitiveness.**

SUSAN JEANES

Chair
HILT CRC



MESSAGE FROM THE CEO

I am pleased to be writing this report as Chief Executive Officer of HILT CRC. Being our first year, there has been an incredible amount of learning for both HILT and the organisations and individuals involved. We have worked to build an organisation that is governed and structured to deliver relevant outcomes and value to partners over the duration of the CRC whilst accelerating 'QuickStart' projects. Additionally, we have expanded our networks, ensuring that we can deliver on our vision of a heavy industry sector at the forefront of the global low-carbon transition. This includes HILT, working with the federal government to co-lead the Net Zero Industries Mission of Mission Innovation. Together, these activities have created a strong foundation and allowed HILT to transition from the establishment phase into the operational phase.

Since HILT was officially announced in June 2021, the company has been established and grown from an interim board and staff to having its members appoint the full board in February 2022 and building a skilled and proficient team. Between December 2021 and March 2022, we also committed a round of 'QuickStart' research funding. 16 projects across our 3 research programs, Processing Technologies, Cross-Cutting Technologies, and Facilitation Transformation were funded and these projects are already delivering early results. Project commencement was efficient thanks to the continuing collaborative approach that exists within HILT to work together towards our common goal. In parallel we developed an additional layer of detail in our research pathways and updated our research strategy. This will guide our future research investments and be updated periodically to ensure we invest in projects that deliver for our partners.

“THE FOUNDATIONS HAVE BEEN SET FOR SUCCESS AND THE NEED TO DE-RISK THE TECHNOLOGY PATHWAYS TO DECARBONISE HEAVY INDUSTRY IS INCREASINGLY IMPORTANT.”

This year has also seen rapid progression of the Education and Training program with the commencement of higher degree research scholarship students. A Training Needs Analysis, completed in late 2022 is an important project in this area and will provide insights to enable the development of short courses and micro-credentials.

Our bid partners, the bid team and interim board and staff did an exceptional job in setting the original strategy and direction for HILT and this has extended into operations. I would like to thank everyone involved in delivering the outcomes described in this report. The foundations have been set for success and the need to de-risk the technology pathways to decarbonise heavy industry is increasingly important.

I look forward to working with all involved to deliver on our vision.

FELICITY LLOYD

CEO
HILT CRC

OUR PARTNERS

As a collaborative group of industries, researchers, and government organisations we share the responsibility for the big shift of decarbonisation. We also have the scale to make a difference.

Together with our partners, we are seeking to develop and demonstrate low-carbon technologies that will help transition the steel, iron, alumina, and cement industries to decarbonise heavy industry and grow Australia's economy.

We currently have 46 partners, and we will continue to grow our partner base as we launch more projects in 2023. These projects will attract attention and interest that will help to position us as the leader in decarbonising heavy industry in Australia with enormous opportunities for new partners to join us and play a key role in developing low-carbon technologies.

CORE PARTNERS



KEY PARTNERS



AFFILIATE PARTNERS



ASSOCIATE PARTNERS



OUR RESEARCH

Our world-leading research is focused on decarbonisation technologies that can be commercialised and lead to low carbon production. HILT CRC is a vehicle through which there are true collaborations of the best minds in industry, research, and government working together for a low-carbon heavy industry.

We have developed the capacity to quickly respond to opportunity and need, as demonstrated by our rapid establishment of the first round of QuickStart projects. We were able to deliver the first round of project proposals to our Steering Committee within a few days of the agreements being signed – and all within 4-5 months from the announcement of the success of the bid.

The 16 QuickStart projects are largely scoping in nature with durations ranging from 6-12 months, and the results of these projects are expected to directly lead to new larger and longer duration projects within HILT.

This year we have also:

- Established an effective structure to manage HILT's research program, comprising of:
 - An industry-led Steering Committee, which is responsible for recommending the research strategy, management frameworks and research projects to the independent board
 - 3 Research Advisory Committees (RACs), who manage the process of project development, review, and recommendation to the Steering Committee
- Developed the first Research Strategy Update to prioritise the Milestones and Outputs, to establish a process for seeding new projects and to develop an infrastructure plan
- Established the processes and criteria for developing and approving projects, including the project application forms and guidelines
- Conducted a series of effective project ideation workshops to seed the establishment of new projects in financial year 2022-23
- Organised and facilitated the first round of industry round tables to ensure research is industry-led
- Organised and ran a series of effective workshops, including online meetings and a series of face-to-face meetings, to seed the establishment of new projects and foster strong collaborations.

OUR RESEARCH AT A GLANCE

16 QUICKSTART PROJECTS WITH A TOTAL VALUE OF **\$6.7M** ENGAGING 29 HILT CRC PARTNERS

\$3.2M TOTAL CASH FUNDING

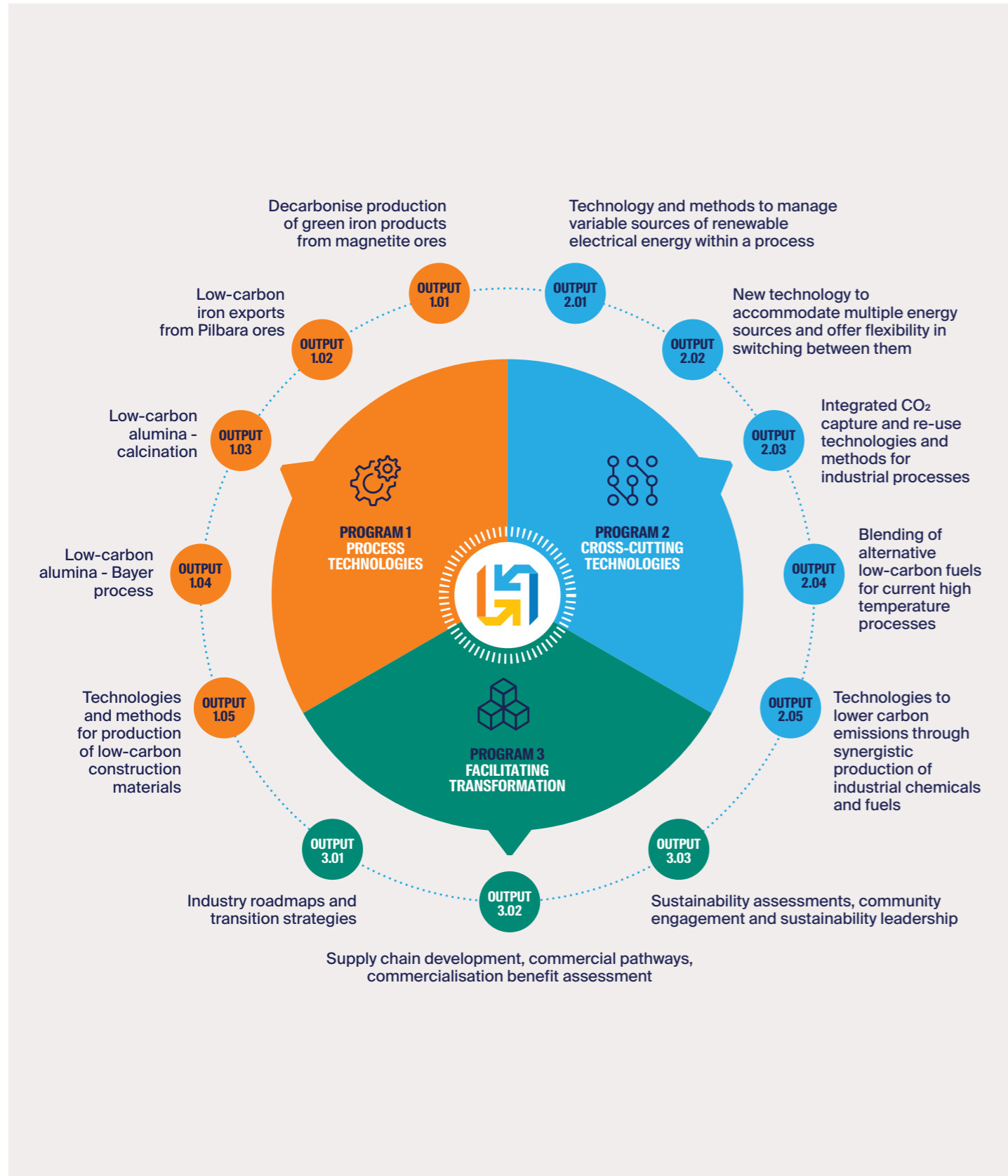
\$3.5M TOTAL IN KIND FROM PARTNERS

AVERAGE OF **6 PARTNERS** PER PROJECT

ESTABLISHED AN **INDUSTRY-LED** STEERING COMMITTEE

ESTABLISHED **3 RESEARCH** ADVISORY COMMITTEES

OUR RESEARCH PROGRAMS AND OUTPUTS



OUR PROJECTS

16 QuickStart projects were initiated with a total value of \$6.7M, engaging 29 HILT CRC Partners. One project has been completed in 2022, with the remainder due for completion by mid-2023.

RESEARCH PROGRAM	PROJECT	PROJECT LEAD	HILT CRC PARTNERS	STATUS	\$ VALUE (CASH NO IN-KIND)
ALL	RD.001 Defining framework for outcome/deliverables for CRC Projects (minimum standards)	Dr Alan Monaghan, Worley	HILT CRC, The University of Adelaide, Worley	In progress	\$209,605
1. PROCESS TECHNOLOGIES	RP1.001 Understanding and eliminating adverse materials behaviour during and after direct reduction in shaft and fluidised bed processes	Tom Honeyands, The University of Newcastle	CSIRO, FMG, Liberty, Roy Hill, The University of Newcastle	In Progress	\$329,006
1. PROCESS TECHNOLOGIES	RP1.002 Evaluation of Thermal Storage and MVR use to allow variable renewable input for steam in alumina production	Dr Andrew Beath, CSIRO	Alcoa, CSIRO, South32, The University of Adelaide, Worley	In progress	\$402,860
1. PROCESS TECHNOLOGIES	RP1.003 Scoping study assessing potential of clay, bauxite residue and iron making by-products for producing alternative construction materials for HILT partners	Mehdi Jafarian, The University of Adelaide	Adbri, CSIRO, The University of Adelaide, Calix, FCT Combustion	In progress	\$526,963
1. PROCESS TECHNOLOGIES	RP1.004 Impact of Hydrogen DRI on Melting in an Electric Furnace	Professor Geoffrey Brooks, Swinburne University of Technology	Australian National University, FMG, Grange Resources, Liberty, Roy Hill, Mitsubishi Heavy Industries Group, Swinburne University of Technology	In progress	\$401,642
1. PROCESS TECHNOLOGIES	RP1.005 Hydrogen Ironmaking: fluidised bed H ₂ DRI with Australian focus	Professor John Pye, Australian National University	Australian National University, FMG, Grange Resources, Liberty, Roy Hill, Mitsubishi Heavy Industries Group, Swinburne University of Technology	In progress	\$405,912
1. PROCESS TECHNOLOGIES	RP1.006 Scoping study of the viability of high flux thermal pre-treatment of low-grade iron ores for improved liberation, beneficiation, and quality	Alfonso Chinnici, The University of Adelaide	CSIRO, FMG, Liberty, Roy Hill, The University of Adelaide	In progress	\$420,371
1. PROCESS TECHNOLOGIES	RP1.007 Preliminary assessment of technical and economic feasibility of key options for low carbon alumina calcination	Woei Saw, The University of Adelaide	Alcoa, CSIRO, South32, The University of Adelaide, Calix, Worley, 1414*, Queensland University of Technology, TEK7	In progress	\$518,537

OUR PROJECTS

RESEARCH PROGRAM	PROJECT	PROJECT LEAD	HILT CRC PARTNERS	STATUS	\$ VALUE (CASH NO IN-KIND)
2. CROSS-CUTTING TECHNOLOGIES	RP2.001 Green hydrogen supply modelling for industry	Joe Coventry, Australian National University	Australian National University, Grange Resources, 1414', Hatch	Completed September 30th, 2022	\$120,456
2. CROSS-CUTTING TECHNOLOGIES	RP2.002 Assessing carbon utilisation and recycling opportunities for the Australian heavy industry sector from a regional hub perspective	Greg Metha, The University of Adelaide	Adbri, The University of Adelaide, The University of Newcastle, DIMER	In progress	\$515,705
2. CROSS-CUTTING TECHNOLOGIES	RP2.003 Green Heat for Industry	Professor John Pye, Australian National University	Adbri, Australian National University, CSIRO, FMG, Grange Resources, South32, The University of Adelaide, Mitsubishi Heavy Industries Group, Worley, Hatch, Heliogen, WSP	In progress	\$812,652
2. CROSS-CUTTING TECHNOLOGIES	RP2.004 A roadmap for carbon capture, utilisation and storage for production of low emission cement and lime in Australia	Hai Yu, CSIRO	Adbri, CSIRO, The University of Adelaide, Calix, UNO Technology, Cement Industry Federation	In progress	\$454,894
2. CROSS-CUTTING TECHNOLOGIES	RP2.005 Hydrogen utilisation in industrial processes: understanding technical risks and impacts on demand	Liezl Schoeman, CSIRO	CSIRO, Grange Resources, Worley, Hatch, Queensland University of Technology	In progress	\$425,900
3. FACILITATING ACTIVITIES	RP3.001 Review of Regional Hub Development (and the transition to a Zero-Carbon Heavy Industry)	Liam Wagner, The University of Adelaide	Curtin University, FMG, The University of Adelaide, Government of South Australia – Department for Energy and Mining	In progress	\$356,375
3. FACILITATING ACTIVITIES	RP3.002 Lifecycle analysis of current Australian heavy industrial processes	Professor Michele John, Curtin University	Curtin University, FMG, South32, The University of Adelaide, Queensland University of Technology	In progress	\$391,300
3. FACILITATING ACTIVITIES	RP3.003 Review of Trade and regulatory implications (and emerging international government and trade policies in relation to emission-reduction objectives)	Peter Draper, The University of Adelaide	Curtin University, FMG, South32, The University of Adelaide, GPA	In progress	\$346,120

Refer to hiltcrc.com.au for more details on each project.

STUDENT PROJECTS

RESEARCH PROGRAM	PROJECT TITLE	STUDENT	POSTGRADUATE PROGRAM	RESEARCH INSTITUTION	COMMENCEMENT DATE	EXPECTED COMPLETION DATE
1. PROCESS TECHNOLOGIES	Hydrogen Driven Alumina Calcination Process	Daniel Ang	PhD	The University of Adelaide	May 2022	March 2026
1. PROCESS TECHNOLOGIES	Low-Carbon Alumina Calcination	Siyun Ning	PhD	The University of Adelaide	August 2022	December 2024
1. PROCESS TECHNOLOGIES	Modelling of the Direct Reduction of Iron Ore in a Shaft Furnace	Renae O'Hara	PhD	The University of Adelaide	May 2022	June 2026
3. FACILITATING ACTIVITIES	Development of the first low-carbon transition roadmap for iron ore and steel	Matthew Rumsa	PhD	Curtin University	July 2022	October 2025
3. FACILITATING ACTIVITIES	Development of the first low-carbon transition roadmap for industry partners	Marcus Byrne	PhD	Curtin University	July 2022	December 2025

OUR PEOPLE
BOARD



SUSAN JEANES, CHAIR



ANTHONY WOOD, DEPUTY CHAIR



NEIL GOODMAN



RICHARD HILLIS



KYRA REZNIKOV



MIKKO HUPA



BILL TE KLOOT



JENNY SELWAY



RAY MOSTOGL

PROGRAM LEADERSHIP



DR DAVID COCHRANE, STEERING COMMITTEE CHAIR



DR ANDREW BEATH, RESEARCH LEAD – PROGRAM 1



ADRIEN GUIRAUD, CO-RESEARCH LEAD - PROGRAM 1



BRIAN MCDONALD, INDUSTRY CHAIR – PROGRAM 1



PROFESSOR PETER ASHMAN, RESEARCH LEAD – PROGRAM 2



MATT DIXON, INDUSTRY CHAIR – PROGRAM 2



PROFESSOR MICHELE JOHN, RESEARCH LEAD – PROGRAM 3



SAINDHAV TAMHANE, INDUSTRY CHAIR – PROGRAM 3



DR ALAN MONAGHAN, GLOBAL MISSION COORDINATOR - NET ZERO INDUSTRIES MISSION

TEAM



FELICITY LLOYD, CEO



IAN HARDWICK, COO



DR JORDAN PARHAM, STRATEGIC INITIATIVES AND PARTNERSHIP DIRECTOR



PROFESSOR GUS NATHAN, RESEARCH DIRECTOR



PROFESSOR MAZIAR ARJOMANDI, EDUCATION AND TRAINING DIRECTOR



LOUISE BEAZLEY, ADMINISTRATION MANAGER



REBECCA BIRZER, EDUCATION AND TRAINING COORDINATOR



JOANNE NIKOLAS, COMMUNICATIONS COORDINATOR





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Connect with us
hiltcrc.com.au/connect

Acknowledgement of Country

HILT CRC would like to respectfully acknowledge the Traditional Owners of the ancestral lands throughout Australia and their continuing connection to the land, waters and culture and pay our respects to them, their cultures and to their Elders past, present and emerging.



Australian Government
Department of Industry,
Science and Resources

AusIndustry
Cooperative Research
Centres Program