Summary of 2025 Research Projects

Research Lead	Summary	Theme/s
Transitioning to Net Zero: Exploring preferences and regional strategies for decarbonisation in QLD		
Lead: **Dr Jeremy De Valck, CQU** Team Members: Professor John Rolfe, CQU Professor Allan Dale, JCU Professor Hurriyet Babacan. JCU	This project explores regional Queensland's preferences for energy transition strategies, comparing views in Central Queensland and the Wet Tropics. It will assess how factors like demographics, proximity to carbon-intensive industries, and economic dependence influence public support for different decarbonisation policies. The findings will help develop tailored, region-specific strategies that align with local priorities, address workforce needs, and support long-term prosperity for regional communities during the energy transition.	Community & Regional Transformations
Analysing workforce implications of renewable energy projects in regional QLD		
Lead: **Professor John Rolfe, CQU** Team Members: Dr Kalpana Pudasain, CQU	This project examines job opportunities in Queensland's solar and wind energy sector. It will first list all projects in the state, then analyse employment data from planning documents, focusing on construction, operations, and regional economic impacts. The research will identify job trends, workforce needs, and regional differences, using statistical analysis to explore how project size affects employment. Findings will be translated into resources for communities and policymakers to support informed decision-making. Deliverables include a workforce report and a policy paper on employment demands across project types and locations. This will help guide job creation and skills development in Queensland's renewable energy transition.	Community & Regional Transformations

Research Lead	Summary	Theme/s
An Outstanding Opportunity: Using solar farms for biodiversity preservation		
Lead: **Professor Lin Schwarzkopf, JCU** Team Members: Dr Myles Menz, JCU Dr Eric Nordberg, University of New England	We are facing a major extinction crisis as human land use expands, often harming wildlife. At the same time, rapid growth in renewable energy—especially solar farms—has sparked community concerns. However, solar farms could offer a unique opportunity to support biodiversity while generating clean energy. While some studies in temperate regions suggest well-managed solar farms can benefit biodiversity, research in Australia's tropical ecosystems is lacking. This project will assess biodiversity within a tropical solar farm and explore ways to enhance it. The findings could help address land-use concerns and guide both industry and government in integrating conservation with renewable energy production.	Nature-based solutions & environmental integrity
Sustainable vegetable cultivation using agricultural waste derived biochar		
Lead: **Professor Mohan Jacob, JCU** Team Members: Professor David Rowlings, QUT Dr Mahmood Sadat Noori, JCU	This project explores using biochar, made from farm waste, to grow vegetables sustainably. By improving soil quality and reducing reliance on chemical fertilizers, biochar can help cut greenhouse gas emissions and lower the carbon footprint of food production. Working with industry partners like Atlas Soils, the study will test different biochar blends to assess their impact on crop growth, water retention, and emissions reduction. Researchers will also evaluate the cost-effectiveness and potential for large-scale use. The findings will provide Queensland farmers with a practical, eco-friendly way to boost yields, enhance soil health, and support climate action, offering valuable insights for policymakers and the agricultural sector.	Technology Nature-based solutions & environmental integrity

Enhancing CO2 Absorption in shotcrete and concrete using mafic-based aggregates		
Lead: **Dr Mehdi Serati, UQ** Team members: Mr Muhannad Al Kalbani, UQ Dr Thierry Bore, UQ Dr Harald Hofmann , CSIRO/UQ	Cement production is a major source of CO_2 emissions, but concrete and shotcrete can naturally absorb CO_2 over time through the "sponge effect." However, little is known about how different aggregates, especially Queensland's mafic and ultramafic rocks, impact this process. This project will investigate whether these rock-based aggregates can enhance concrete's ability to absorb CO_2, potentially reducing emissions from construction materials. The findings will support greener building practices and Queensland's sustainability goals. Key outcomes include: • Analysis of how these rocks affect CO_2 absorption in concrete. • New techniques to improve carbon capture in construction materials. • Practical guidelines for industry use. • A webinar and presentations to share findings locally and globally.	Technology Nature-based solutions & environmental integrity
Unique fire-resistant QLD peatlands: a nature based carbon storage solution		
Lead: **Professor Cathy Yule, University of the Sunshine Coast** Team Members: Dr Adrian McCallum, UniSC Dr Gareth Chalmers, UniSC Professor David Chittleborough, UniSC A/Professor Javier Leon, UniSC	Subtropical wire-rush peatlands in southeastern Queensland store carbon, support wildlife, and resist fires, but little is known about their locations, peat depth, and carbon reserves. Research on K'gari has found methane-producing microbes in deep peat layers, raising questions about methane emissions and the impact of disturbances. This project will study how fire, water levels, and land use affect peatlands. It will map pristine and degraded sites, measure carbon storage and emissions, and assess potential health risks from smoke. Findings will help develop conservation, fire management, and rehabilitation strategies to protect and enhance carbon storage.	Nature-based solutions & environmental integrity

Optimising on-farm carbon footprint measurements for the verification of low-carbon commodities		
Lead: **Dr Naoya Takeda, QUT** Team members: Professor David Rowlings, QUT Professor Mike Bell, UQ	This project aims to make verification of on-farm greenhouse gas (GHG) reduction more accurate and affordable. On-farm emissions, like nitrous oxide (N_2O), make up about 50% of the agri-food industry's carbon footprint, but current verification methodologies for emission reduction are costly and unreliable. The initiative will develop a low-cost, high-accuracy technology to verify emission reductions, adding "low-carbon" value to Queensland's agricultural products and supporting sustainability goals. Outcomes include lower costs, improved verification, and stronger incentives for sustainable farming. Deliverables include an emissions database, optimised on-farm N_2O measurements, designing a verification methodology with industry partners, and a webinar to share the technology with stakeholders.	Nature-based solutions & environmental integrity Technology
Feasibility study of Net-Zero microgrids		
Lead: **Professor Fuwen Yang, Griffith University** Team members: Professor Junwei Lu, Griffith Dr Mohammad Sanjari, Griffith	The project aims to develop a net-zero microgrid simulation platform to investigate new technologies for achieving net zero (pure renewables) in microgrid operation. A data-driven approach will be proposed to establish novel renewable generation models and a data-driven control and optimisation method will be developed to operate the net-zero microgrid simulation platform. The outcomes of this project will not only advance knowledge in renewable energy integration but also support the ambition to achieve net zero of total electricity supply. This should provide significant benefits, such as reliable, affordable and clean energy supply in Queensland, even whole Australia.	Technology