BLUE ECONOMY
COOPERATIVE RESEARCH CENTRE

Australian Government
Department of Industry, Science, Energy and Resources

Business Cooperative Research Centres Program

DC Microgrids for Offshore Applications

Research Program

RP3 Offshore Renewable Energy Systems (ORES) Program

Project Leader

Evan Gray, Griffith University

Summary

Photovoltaics, batteries, supercapacitors, electrolysers and fuel cells are all natively DC. DC power is common in marine settings. Networking these components into a microgrid using high-efficiency DC–DC converters is logical, but problematic in practice, and few suitable DC–DC converters are available commercially.

Most microgrids are presently AC coupled with grid connection, therefore, involving multiple AC-DC conversions and issues of frequency synchronisation and voltage stabilisation. This project will examine the barriers to setting up pure-DC microgrids and create a bench-scale pure-DC hydrogen microgrid for experiments aiming to understand and resolve issues including transient response and control of the DC bus voltage.

Objectives

1. In collaboration with P.3.20.002, review the challenges posed by DC microgrids in particular as to architecture and control aspects. These will include the commercial availability of suitable DC–DC converters (voltage, power, bi-directional capability, transient performance), how to set the DC bus voltage and strategies for energy management.
2. Review the barriers to building DC-powered electrolysers.
3. Review the barriers to building DC-output wind turbines, tidal flow turbines and wave generators.
4. Set up a bench-scale pure-DC microgrid at the few-kW scale using configurable electronic components to emulate any desired energy converter.
5. Based on the findings of Task 2 of P.3.20.002, set up a viable DC microgrid architecture and explore the problems of transient behaviour with rapidly changing inputs and loads.
6. Report on the findings of the review, the experimental study and the prospects for scale-up to the 1 MW level and above.

Project ID

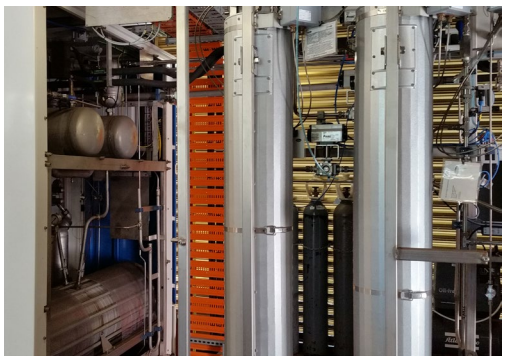
3.20.004

Duration

36 months

Participants

- Griffith University
- Optimal Group Australia Pty Ltd
- Pitt & Sherry (Operations) Pty Ltd
- University of Tasmania



OUR VISION

To enhance the development of Australia's sustainable blue economy through the delivery of world-class, industry focussed research into integrated seafood and renewable energy production systems.

www.blueeconomycrc.com.au
enquiries@blueeconomycrc.com.au
/blueeconomycrc /blueeconomycrc

The Blue Economy CRC is funded in part under the Australian Government's CRC program administered by the Department of Industry, Science, Energy and Resources.