



Using Renewables to Deliver the Hydrogen Economy

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Presentation Preference: Oral

Career Level: Career Scientist (>5 yrs post PhD)

Aligned with Science Focus: methanol or hydrogen economy, photo-catalysis, renewable energy storage

Abstract: Australia's contribution to the global development of renewable energy (RE) is celebrated and acknowledged worldwide by way of well-known advances in Si-PV technology and notable advances in energy storage (e.g. the red-ox flow battery). These contributions have led to the manufacture of viable commercial products in numerous countries. Many of these products are entering/re-entering Australia and, as is well-known, household consumer acceptance places considerable stress on the national power grid.

Management practices, including introduction of reflective paintings on roofs in topical and sub-tropical regions and "smart" LED street-lighting have measureable impacts on energy demand when deployed across distributed networks. These practices have softened the impact of household PV on network stability but may not solve long-term energy generation or security requirements. Accordingly, the integration of RE technologies to deliver hydrogen and other by-products for the transport and industrial chemicals sectors is under active investigation.

Combining both solar and storage capacities at a network or community scale (i.e. ~MW level) using concentrated photovoltaics (CPV) and Redox Flow (RF) battery storage to power water electrolysis is a demonstrable technology combination. A modular approach to treatment of non-potable water (e.g. reverse osmosis reject streams; bore water) maximises hydrogen production via electrolysis as well as manufacture of salt by-products for commerce. However, the key challenges in this scenario are driven by materials chemistry: (i) improved water treatment membranes, (ii) high capacity water splitting catalysts and (iii) higher density re-dox flow (or similar) batteries. These challenges and progress on solutions will be presented.

Biographical Statement of speaker: Professor Mackinnon is the former Executive Director of the Institute for Future Environments at QUT and previously ED for Engineering and Environmental Sciences at the ARC. He has more than ten years' experience in technology transfer including with two start-up companies in the chemicals and wastewater-treatment industries. <http://staff.qut.edu.au/staff/mackinni/>