

Mapping UNSW Impact Global Development

Primary SDG	7: AFFORDABLE AND CLEAN ENERGY
Broad theme	Microgrids
Research	Building a microgrid and research lab focussing on microgrid technology
Impact region	Sri Lanka, Tonga
Faculty	Engineering
School/Institute	Electrical Engineering and Telecommunications
Academic	Professor John Fletcher
Project partners	Sri Lanka: Asian Development Bank (over \$115 million in total, of which \$2 million is for the microgrid research lab)
	Tonga: Arup Consultants
Related SDGs	4: Quality Education

Elevator pitch

John is helping to establish a microgrid running on solar power and a research lab focussing on microgrid technology at Sri Lanka's University of Moratuwa, demonstrating the viability and efficiency of microgrids to provide electricity to the majority of Sri Lankans who do not have access to electricity.

The Challenge: Most of Sri Lanka does not have access to electricity

Much of rural Sri Lanka has limited access to electricity. Wood is burned to cook food, and there is minimal access to clean water and power. In more urban settings, Sri Lanka's electricity network has not kept pace with development. Buildings are going up and areas are being populated with limited grid capacity. Microgrids can fill this gap and serve rural communities, providing a reliable and efficient form of energy for these areas. Microgrids typically run on solar, wind or hydro power which is stored in large batteries. They operate independently of the network. The barriers to microgrid adoption include a lack of knowledge about them and what they can deliver, and government-level conflict.

UNSW's solution: Build a demonstration microgrid and research lab focussing on technology

John was contacted by a former PhD student who was putting together an Asian Development Bank project in Sri Lanka in 2016. The project involves the design and construction of a microgrid and research lab focussing on microgrid technology at the University of Moratuwa. Project partners include Sri Lanka's two main electricity distributors (LECO and CEB). John is responsible for designing the research lab and a short course on the basics of microgrids. The lab will investigate microgrid technology development and issues, and will feature six academics and the latest equipment (as good as UNSW's equipment). John has consulted the academics to capture their research interests and develop a research strategy for the lab to further knowledge and interest in microgrids in Sri Lanka. John's course will be taught to academics who will pass on this knowledge to students. The microgrid itself will be 350 kWp generating 560 MWh per year. It will save the university

substantial energy costs. John and his partners are attempting to make its construction and operation as easy as possible to promote interest and replication of it across the country.

Elsewhere, John is working in tandem with Iain MacGill on energy solutions for Tonga. The country has set a 50% renewable energy target for 2020, mainly through solar generation. At the pilot stage, John is developing concepts for the Tongan government and community that include large flow batteries to provide a stable supply of energy and power.

Previously in 2012, John travelled with David Laurence to Laos to help pass on knowledge about sustainable mining practices on a project funded by the World Bank and AusAID. John held a workshop for government workers on sustainable practices and the capacity of hydro power to deliver much of the country's electricity needs (power from Laos' hydro power plants are delivered to neighbouring countries with locals getting little benefit). John also spoke with universities and colleges about developing programs and research around electrical energy systems. He learned that training allowances for government employees (a substantial amount compared to daily pay) were a barrier to progress.

The Impact: Demonstrate viable energy solution, promote further knowledge and replication

Saving the university substantial energy costs, the grid at Moratuwa will serve as a model for how microgrids can deliver cheap, efficient and reliable energy in Sri Lanka. The research lab will generate knowledge and experience on microgrids, furthering the case for their inclusion in Sri Lanka's broader electricity network and more efficient and sustainable electricity. The lab will promote knowledge around how to build and manage grids, and run them sustainably. It will also address some of the political barriers to their adoption. Academics at the lab will be able to leverage this knowledge and experience to consult to industry.

Researcher

John Fletcher is a Professor (Energy Systems Research Group) with the School of Electrical Engineering and Telecommunications at UNSW. He was previously a Senior Lecturer at the University of Strathclyde in Glasgow and Lecturer at Heriot-Watt University, Edinburgh. He has consulted to many global industrial companies in the UK, USA, China, Europe and Japan. John is passionate about working in developing countries and learning about life, governance and business in other countries.

Ben Falkenmire 07.08.18