

Mapping UNSW Impact Global Development

Primary SDG	7: AFFORDABLE AND CLEAN ENERGY
Broad theme	Energy solutions
Research	Investigating and developing energy solutions for remote communities in Fiji
Impact region	South Pacific
Faculty	Engineering
School/Institute	Electrical Engineering and Telecommunications, Photovoltaics and Renewable Energy Engineering
Academics	Associate Professor Iain MacGill, Dr Anna Bruce, Dr Jose Bilbao, Atul Raturi (USP)
Project partners	University of South Pacific (USP), New Colombo Plan, Australian Renewable Energy Agency (ARENA) (Innovation Challenge 2; international collaboration), UNSW Institute for Global Development – seed funding of \$73,500
Related SDGs	11: Sustainable Cities and Communities, 15: Life on Land

Elevator pitch

To help remote communities in the South Pacific access affordable and clean energy, Iain and Anna have commenced course and research initiatives in partnership with USP that focus on energy solutions, while also building support in the region for clean energy access.

The Challenge: Remote communities need energy for industry and at home

The South Pacific is blessed with ideal conditions for renewable energy with plenty of sun, but they are also burdened with some tough challenges. Geographic isolation, minimal infrastructure, dispersed populations and transport challenges increase the cost and challenges of providing modern energy services. Larger local communities use diesel to generate energy, but diesel is expensive and difficult to transport. Remote communities use small solar panels to charge lights and mobile phones, but they are unable to provide electricity for larger appliances that can help people improve their productivity and generate income.

Many Pacific Islanders are fisherman and face challenges in storing and transporting produce to market over long distances. The Islands are also at the frontier of climate change. Recognising this, Pacific Island Nations have set ambitious targets for renewable energy, both to reduce fossil fuel consumption on larger grids and to support energy access.

UNSW's solution: Survey communities, focus courses and research on developing solutions

To help remote communities in the South Pacific access more affordable and sustainable electricity, Iain and Anna have teamed up with USP to offer coursework experiences and develop research partnerships. The focus is on designing solutions in partnership with the community, and to collaborate on research that can help build capacity for power system modelling and planning, especially for integrating renewable energy. From the UNSW-side, this project builds on the work of PhD students they have supervised in recent years who worked

on solar, micro grids and renewable energy transitions in Fiji, Malaysia, Indonesia, Nepal, Central America, and Tonga.

Anna and her colleague Jose Bilbao have created two courses at UNS, sustainable energy for developing countries and hybrid renewable energy systems, that focus on Fiji. Around 120 undergraduate and postgraduate coursework students are focussed on generating sustainable energy solutions for remote communities on the Fijian island of Viwa that align with community interests and can be sustained by the community. Surveys conducted by USP and UNSW students will inform the design and implementation of energy solutions that are expected to span from small solar panels to mini grids. Potential project targets include a local nursing clinic and school, the purification of water (instead of having to ship water from the mainland), and refrigeration systems to enable fisherman and farmers to preserve stock. Solutions will be implemented in 2019 by a team of USP and UNSW students.

In the research space joint supervision of one honours thesis student from each university has been initiated, with a potential PhD project also under discussion. This builds on the research strengths of both institutions to build capacity in robust design and planning for off-grid electrification and for the integration of renewable energy into isolated grids. In December 2018, Iain, Anna and Atul Raturi are hosting two workshops on high penetration renewables for off-grid and small grids in the Pacific at UNSW. Utilities experts, consultants, donors and financiers will be in attendance, with the aim of identifying priorities and mobilising support for research.

The Impact: Affordable, sustainable, and clean energy, and better fish and food

The community-led focus of Iain, Anna and Atul's work will see energy solutions designed and implemented for remote communities that match demand and need. A sustainable energy solution will also replace the need for diesel, helping the community to save money and limit emissions. Student projects will have immediate impact by improving energy access, affordability and reliability in the target community, and lasting impact in the Pacific region by building capacity of local engineering graduates.

Capacity will also be built for research within USP, including potentially applying tools developed at UNSW. UNSW researchers and students will benefit from the contributions of USP academics and students fully engaged in energy challenges and opportunities in the South Pacific. Ongoing research and industry collaborations will be pursued with the aim of building regional capacity for energy access and power system planning, including building modelling and robust system design expertise.

Researcher

Dr Iain MacGill is an Associate Professor in the School of Electrical Engineering and Telecommunications at UNSW, and Joint Director (Engineering) for the University's Centre for Energy and Environmental Markets (CEEM). His research over the past seventeen years at UNSW has included investigating the key sustainable energy challenges and opportunities of developing countries including Fiji, Nepal, Malaysia, Bangladesh, Pakistan, the Philippines, East Timor, India, Kenya and Indonesia. He has also researched off-grid electricity options for remote, largely indigenous, communities in Australia who face many of the same challenges.

Dr Anna Bruce is a Senior Lecturer in the School of Photovoltaic and Renewable Energy Engineering. Her energy access research has focussed on sustainable use and management of technology. She has run student projects in support of NGOs in Nicaragua, Nepal, Sri Lanka and Cambodia, across a number of courses including currently 'Sustainable Energy for Developing Countries'. She is currently leading an ARENA International Engagement project contributing to Australia's Mission Innovation Challenge 2 commitment (off grid access to electricity).

Associate Professor Atul Raturi has extensive developing country experience in sustainable energy through academic positions in India, Kenya and Papua New Guinea before he joined USP a decade ago. He teaches a number of courses in the sustainable energy space and supervises both Masters and PhD students working on related topics. He has also consulted to groups including the International Renewable Energy Agency (IRENA) and the World Bank on energy and development issues.

Ben Falkenmire 14.08.18