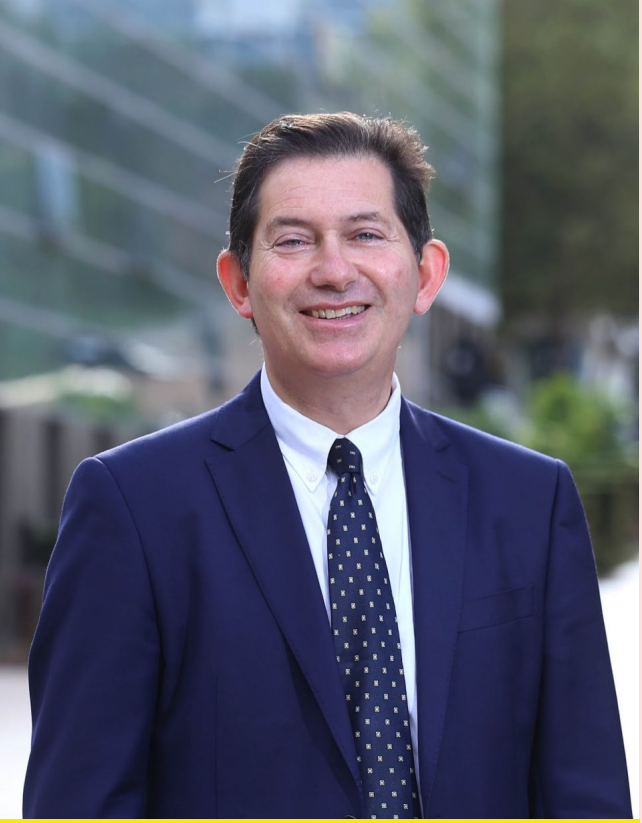
UNSW Énergie Renouvelable Vanuatu

Impact Report

February 2021



Message from the President and Vice-Chancellor

Thank you for your support of UNSW Sydney. Your generosity is making a real and tangible difference to the people and communities our University serves.

At UNSW, we strive to harness our resources in order to maximise our impact on society. Our vision, as set out in our 2025 Strategy, is to be a global leader in discovery, innovation, impact, education and thought leadership – one that can make a significant difference to the lives of people in Australia and around the world.

Gifts like yours play a direct role in enabling us to realise this vision. Thank you once again for your valuable contribution.

Professor Ian Jacobs
President & Vice-Chancellor

Thank you

Message from the Dean

Engineers create the fabric of society, including the buildings we occupy, the energy that powers our world, and the transport networks we use every day.

I am incredibly grateful that donors, like you, recognise the value of engineering to society and feel privileged that you have chosen to support UNSW Engineering in our ongoing efforts to deliver excellence in research and education.

Our Faculty has an important role to play in achieving UNSW's vision to become Australia's global university, as set out in the 2025 Strategy. With your ongoing commitment to this vision, we can continue to strive to build a better world.

Thank you for your support of UNSW Engineering and the wider University.

Professor Stephen Foster
Acting Dean, UNSW Engineering

Creating an immersive intercultural learning experience for students

The School of Photovoltaic and Renewable Energy Engineering (SPREE) at UNSW Sydney has been visiting and supporting the off-grid villages of Tanna, Vanuatu since 2007.

Working directly with the people of Tanna, students, staff and volunteers from SPREE are offered the opportunity to design and implement solutions to real problems, undertaking solar electricity installations to address health and education needs in remote villages.

“It all started in 2007 with eager second-year SPREE students visiting Vanuatu to install roof gutters, rainwater tanks and solar lighting at the school on the village of Louen,” says Dr Richard Corkish, a senior lecturer at SPREE and the project leader.

The project has since evolved to form the UNSW Énergie Renouvelable Vanuatu (UNSWERV), creating a unique learning experience for enthusiastic students who visit Vanuatu once or twice per year. Through this immersive intercultural project, students design and install remote area renewable energy power supplies.

The project addresses both basic communications and basic lighting needs for dispensaries, aid posts and schools in remote villages without electricity. Services in the Tanna villages are so scarce that the simplest solar power systems that the students install can make an immense difference to the local people.

Since Cyclone Pam tore through the region in 2015, accessible and sustainable solar power has become more important than ever. Medical and communication services, already much less available in remote villages, are often compromised in the aftermath of a natural disaster. Injured people and imminent mothers sometimes cannot easily reach support services. Even if support workers are available, the difficulty of working outside daylight hours can impair their capacity. This is all made more challenging when a natural disaster damages infrastructure such as transport, communication, running water and power.

In 2019 the scope of the project was expanded to partner with Professor Klaus Regenauer-Lieb, a geothermal energy expert from the UNSW School of Minerals and Energy Resources Engineering, to include village-scale exploitation of natural heat around the Mount Yasur volcano.

Thanks to the support of generous philanthropic donors, industry sponsors and funding from the Institute of Global Development, 35 undergraduate SPREE students were able to go to Vanuatu to improve the quality of life of people on the island, and kick-start their careers in renewable energy engineering.

Trip achievements 2007-2017

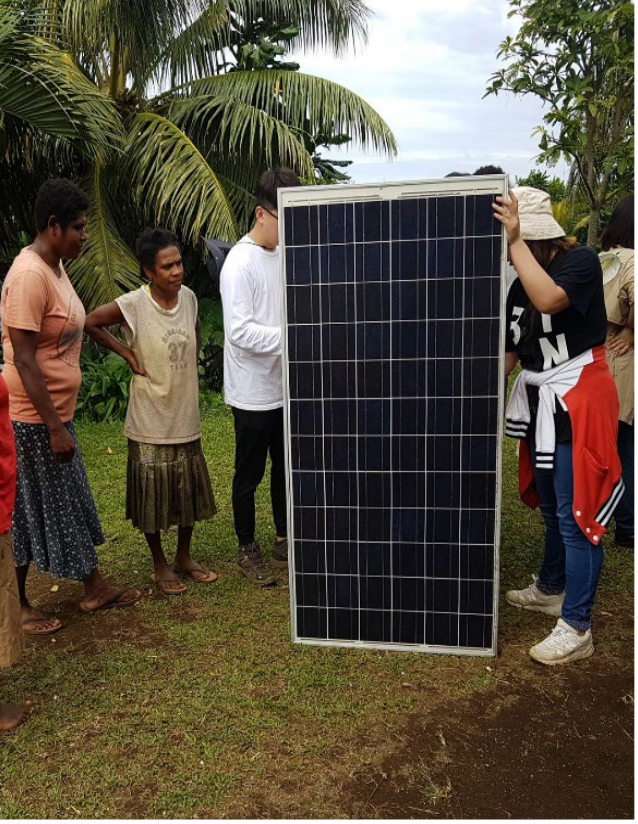
	Location	Achievements
2007 - 2008	Louen	Installed primary school PV lighting and phone charging system Constructed school roof rainwater harvesting and storage
	Imaki	Planned PV lighting for dispensary
2009 - 2010	Imaki	Planned and constructed micro-hydro electricity supply for primary school using existing water supply pipe
	Imaki	Constructed micro-hydro electricity supply for village Constructed weir and new penstock Constructed village micro-grid, including schools, dispensary, staff quarters, church
2010-2012	Port Vila	Implementation of UNSWERV Solar Dryer Project, involving the design and construction of two solar crop dryers in partnership with The Kava Store
April 2016	Iquaramanu	Installed dispensary PV for lighting, phone charging system
January 2017	Imaki	Repaired vaccine fridge PV power system Repaired presbytery PV power system
	Iaonanen	Installed dispensary PV for lighting, phone charging system Repaired/installed vaccine fridge PV power system
	Louen	Repaired school PV lighting and phone charging system
	Lawiaru	Installed/repaired dispensary PV lighting and phone charging system Checked vaccine fridge
	Lamlu	Upgraded/repaired dispensary PV lighting and phone charging system Checked vaccine fridge PV power system
July 2017	Isaka	Installed/repaired dispensary PV lighting and phone charging system
	Iramapu, Kapalpal & Kwamera	Inspected aid post
	Kwaraka	Installed aid post solar lighting and phone charging system
	Kings Cross	Inspected dispensary and planned solar power supply
	Lamlu	Planned upgrade of solar lighting system
	Namilu	Upgraded solar lighting system
	Lautapunga	Inspected dispensary
	Port Resolution	Repaired solar power supply for school’s computer laboratory

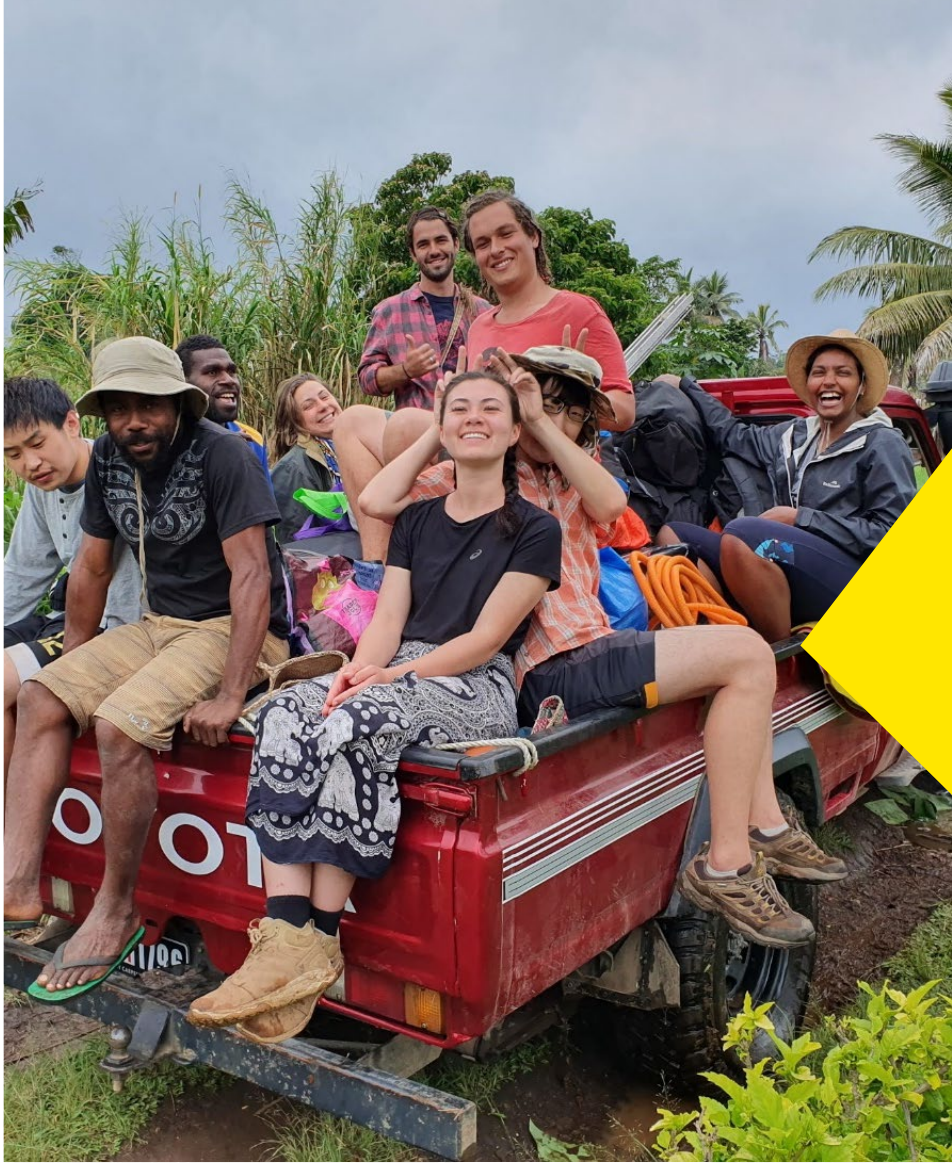
Trip achievements 2018

	Location	Achievements
January 2018	Iaonanen	Repaired failed light (rat damage to wiring) Reported damaged circuit breakers (for vaccine fridge) to Health Department
	Kwamera Aid Post	Installed solar lighting Installed solar phone charging
	Kwaraka Aid Post	Checked operation
	Imaki Village	Dispensary 1. Replaced 24V inverter 2. Checked 12V temporary lights Presbytery 1. Replaced charge controller to suit new solar module 2. Installed replacement PV module Surveyed public buildings for potential solar or hydro power system
	Isaka Aid Post & Imayo Aid Post	Installed solar lighting Installed solar phone charging
	Port Resolution Dispensary	Replaced a failed light Upgraded solar power system, as per Australian Standard AS4509
	Lamlu	School 1. Replaced thin cable between buildings with 16mm^2 2. Replaced charge controller to suit existing PV module 3. Installed lights in office and 4 secondary rooms Dispensary 1. Checked portable light bar 2. Checked lighting in dispensary and maternity building Convent 1. Installed conduit over solar supply cables
	Lawiaru Dispensary	Replaced failed charge controller

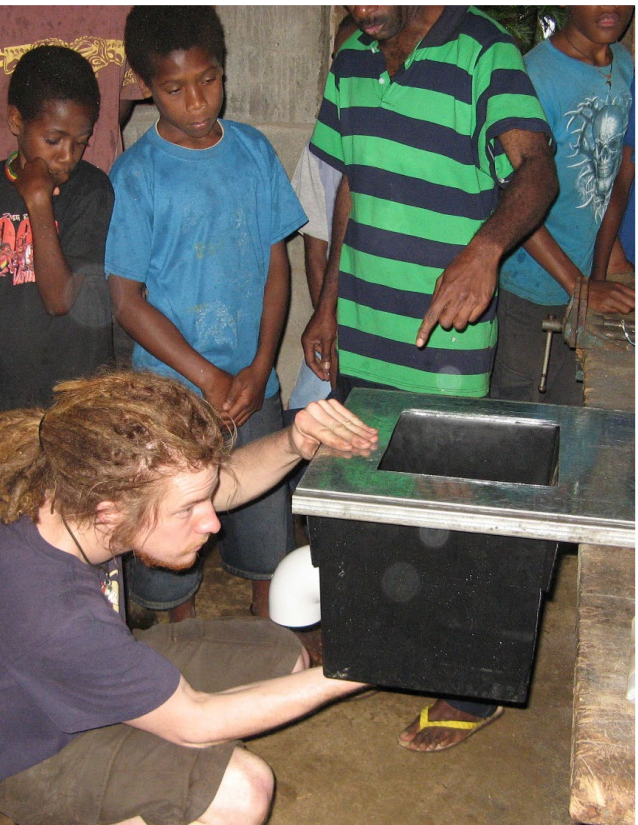
Trip achievements 2018 (cont.)

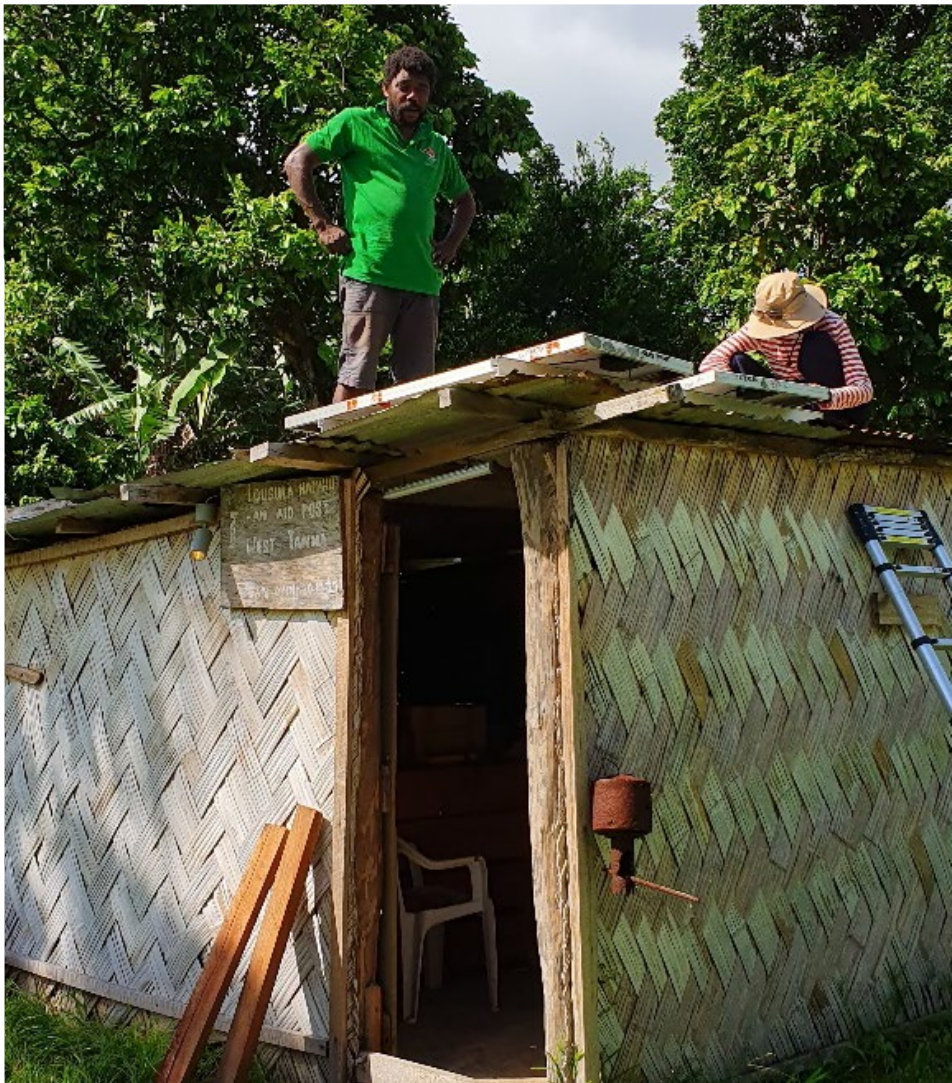
	Location	Achievements
July 2018	Port Vila	Met Ms Jenny Da Rin, High Commissioner and Ms Christelle Thieffry, Senior Program Manager – Education at the Australian High Commission Discussed intended booklet launch for January 2019
	Ianapkasu Aid Post	Installed solar lighting including one bright light for emergency use Installed solar phone charging
	Uruwaren Aid Post	Installed solar lighting including one bright light for emergency use Installed solar phone charging Discussed hydro power opportunity
	Imaki village	Dispensary 1. Installed one bright light for emergency use 2. Removed previously installed 12V temporary lights for use in aid posts Hydro mini grid 1. Surveyed pipe, turbine and control centre for damaged hydro power system (installed by UNSW students in 2010) and identified new weir site for future project 2. Surveyed Local Government Building for future project 3. Identified site for 42-panel solar PV system to add to minigrid 4. Trained local students to fit standard MC4 connectors to 70 PV panels previously delivered from Sydney (42 of which are for above system)
	Etukei Aid Post	Installed solar lighting including one bright light for emergency use Installed solar phone charging
	Isaka Aid Post	Replaced two broken lights Checked previously installed system
	Waisisi village	Inspected solar fish freezer (intend to improve to meet Australian standards and practice in Jan 2019)
	Lavis (Laus) Aid Post	Installed solar lighting including one bright light for emergency use Installed solar phone charging Surveyed sites for projects to relieve critical water shortage for Lavis and surrounding villages
	Lamlu School	Replaced failed charge controller Replaced battery damaged in the past by use of incompatible panel and charge controller Installed brighter lights in 4 secondary rooms Installed conduit over PV supply cables
	UNSW	Created website https://liudan034.wixsite.com/unswerv/ (thanks to alumna, Dan Liu)





UNSW students in action



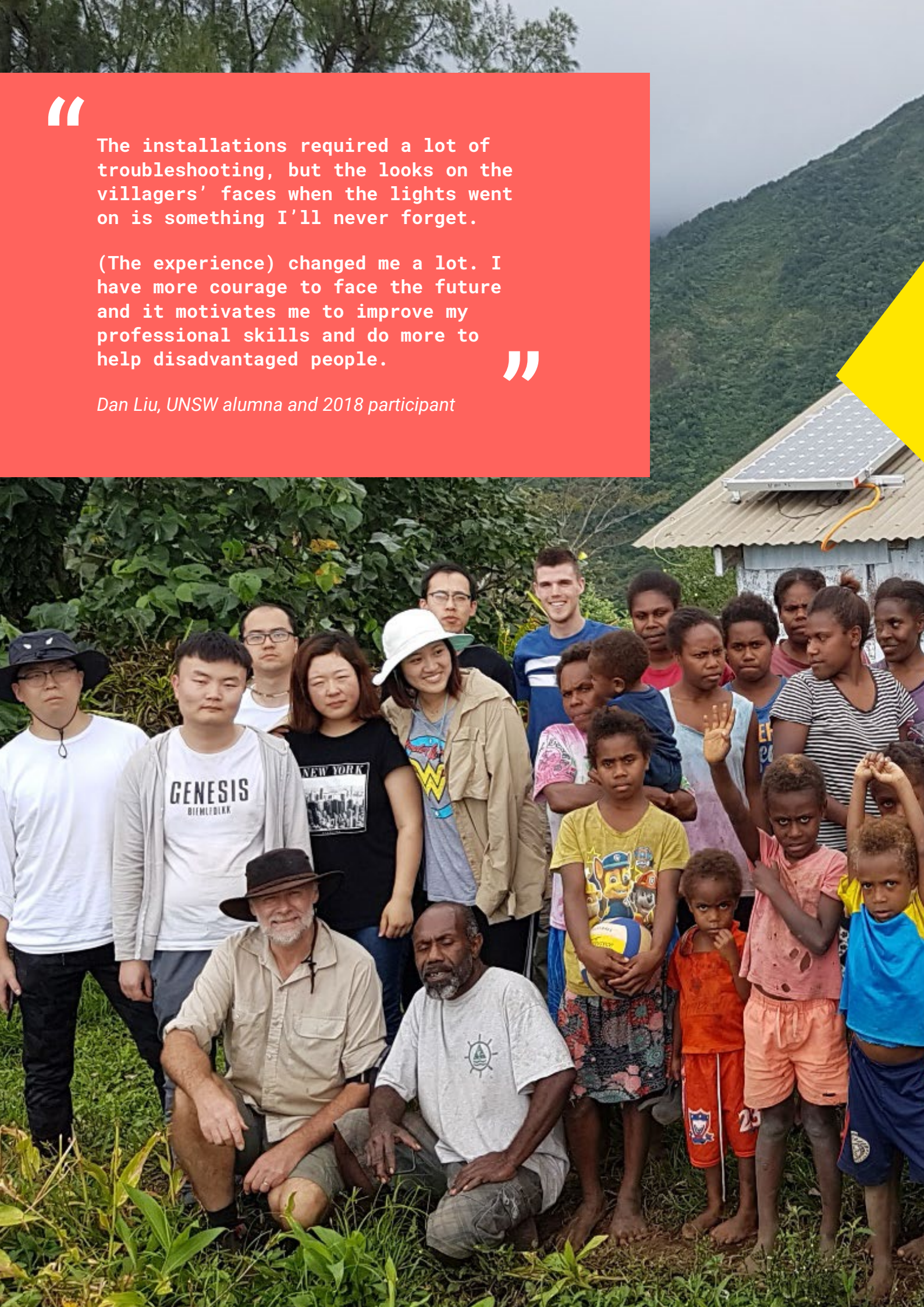


Trip achievements 2019

	Location	Achievements
January 2019	Karamasanga Aid Post, Loanialu (Kapalbal) Aid Post, Lohatan Aid Post & Lounahuru Aid Post	Installed solar lights and phone charging
	Loonoo Aid Post	Installed solar lights and phone charging (pole mount) Checked local solar power systems
	Imaki village	Took delivery of cement (52 bags) and laid out ground mounting for village PV array Checked and repaired local PV and lighting systems Delivered community training
	Iquaramanu	Facilitated community training
	Lamlu	Installed three panels and reconfigured PV system in secondary wing of school
	Lenaken School	Repaired PV lighting system
	Port Resolution, Iquaramanu, Sulphur Bay	Surveyed volcano area for geothermal energy application (led by Prof. Klaus Regenauer-Lieb)
	Etukei Aid Post	Replaced failed charge controller
September 2019	Port Vila	In collaboration with Ministries of Education & Training and Climate Change, launched a new user guide for solar power, in English and Bislama
	Lopakas Aid Post, Launatke Aid Post & Green Hill Dispensary	Installed solar PV power and lights and phone chargers
	Loano Aid Post, Lohaten Aid Post	Repaired failed lighting systems
	Green Hill	Checked and attempted repair small solar lighting system Advised on battery replacement Collected details for future project in Green Hill Medical laboratory, where room lighting and microscope power are needed.
	Imaki village	Started construction of the 7kW PV array, installing one rack section, 10 modules, one inverter, battery (with temporary solar charging, two isolators, most of the wiring)
	Isaka	Collected data for current school/cyclone shelter project
	Loanatom	Collected data for future village water supply project
	Lamlu	Collected data for current Lamlu Secondary School lighting project
	Port Resolution, Iquaramanu, Sulphur Bay	Surveyed volcano area for geothermal energy application

Trip achievements 2020

	Location	Achievements
January 2020	Imaki village	Continued construction of the 7kW PV array, wired 22 modules and started commissioning
	Iquaramanu Dispensary	Repaired dispensary PV for lighting, phone charging system with MC Electrical (of Brisbane)
	Iquaramanu	Kustom ceremony linking the UNSWERV team with the Nepraintata Area Council, representing twelve local tribes from the volcano region of Tanna
	Loanatom	Convert their village water bore pump to solar power with MC Electrical (of Brisbane)
	Green Hill Malaria Laboratory	Replaced most of and old and broken solar lighting and power supply and repaired some failed lights in the dispensary
	Lousula Aid Post	Installed solar PV power and lights and phone chargers
October 2020	Port Vila	Joint presentation by Mr Jackson Iakapas for Vanuatu Community Aid and UNSWÉRV at TAFEA Day celebration in presence of President Obed Moses Tallis and Prime Minister Bob Loughman on 8 October



"The installations required a lot of troubleshooting, but the looks on the villagers' faces when the lights went on is something I'll never forget.

(The experience) changed me a lot. I have more courage to face the future and it motivates me to improve my professional skills and do more to help disadvantaged people."

Dan Liu, UNSW alumna and 2018 participant

Alumni success story

From local installations to a global vision for renewables

UNSWERV has successfully launched many students' careers in renewable energy engineering and giving them a chance to experience humanitarian engineering.

SPREE students Chris McGrath and Eden Tehan participated in the project in 2009 and 2010 respectively, and established a hydro-powered minigrid in Imaki, Tanna.

"Helping provide renewable energy to Imaki is the most awesome thing I've ever done," said Eden.

Inspired by positive social impact outcomes of the UNSWERV project, the duo went on to co-found solar innovation company 5B in 2013.

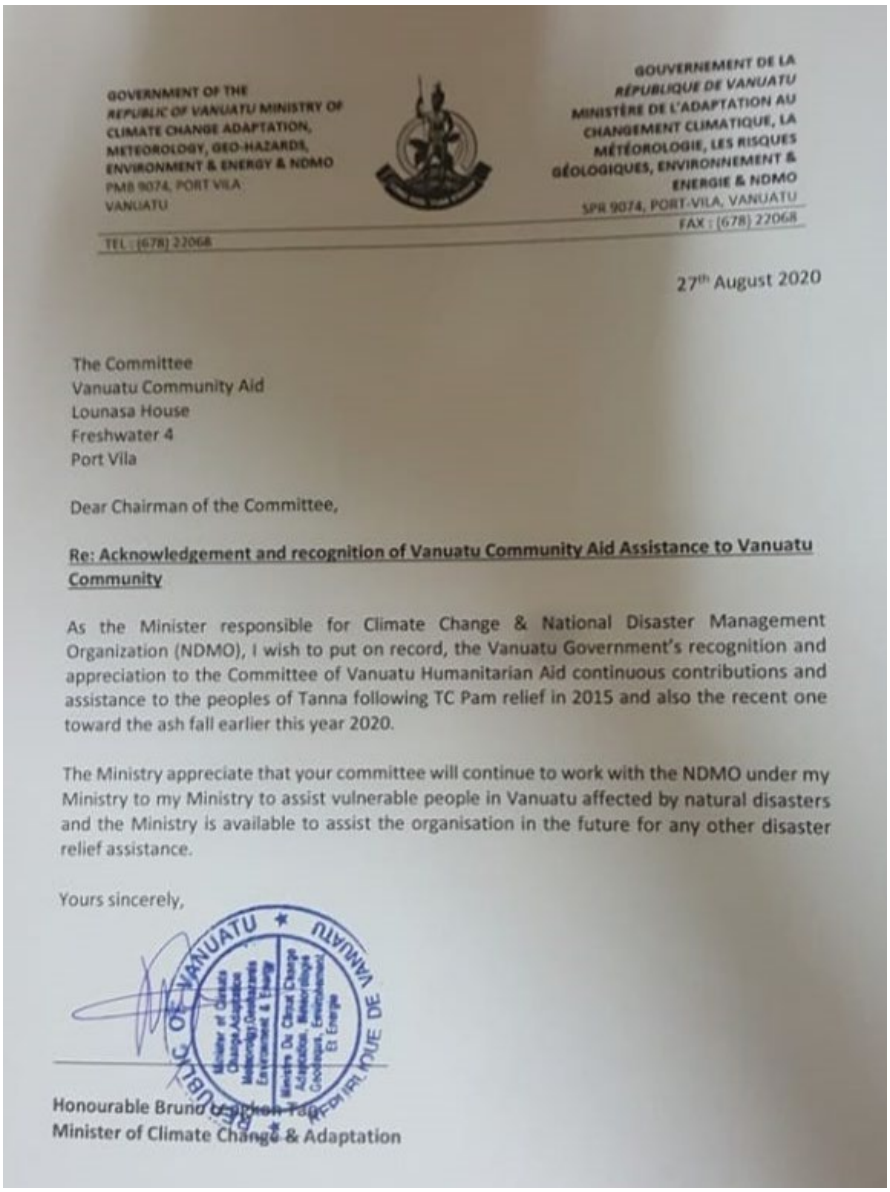
Their vision is for a sustainable global society where all energy comes from renewable sources. The mission of 5B is simple – to transform the world's energy sources by delivering world-class technology that makes clean energy affordable and accessible.

The rapidly evolving start-up has developed a design system that enables solar energy to be deployed three times faster than conventional solar arrays and deliver twice the output from the same geographic footprint, according to Renew Economy.

Vanuatu Community Aid Group

In August 2020, the Vanuatu Community Aid Group was founded as a result of the ongoing success of the UNSWERV project.

Recognised by Vanuatu's Minister for Climate Change & Adaptation, this charity group supports and facilitates the team's work in Vanuatu. In particular, the Minister recognised the valuable contributions and assistance to the peoples of Tanna following Tropical Cyclone Pam relief in 2015, as well as the recent recovery efforts in 2020.



GOVERNMENT OF THE
REPUBLIC OF VANUATU MINISTRY OF
CLIMATE CHANGE ADAPTATION,
METEOROLOGY, GEO-HAZARDS,
ENVIRONMENT & ENERGY & NDMO
PMB 9074, PORT VILA
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27th August 2020

The Committee
Vanuatu Community Aid
Lounasa House
Freshwater 4
Port Vila

Dear Chairman of the Committee,

Re: Acknowledgement and recognition of Vanuatu Community Aid Assistance to Vanuatu Community

As the Minister responsible for Climate Change & National Disaster Management Organization (NDMO), I wish to put on record, the Vanuatu Government's recognition and appreciation to the Committee of Vanuatu Humanitarian Aid continuous contributions and assistance to the peoples of Tanna following TC Pam relief in 2015 and also the recent one toward the ash fall earlier this year 2020.

The Ministry appreciate that your committee will continue to work with the NDMO under my Ministry to my Ministry to assist vulnerable people in Vanuatu affected by natural disasters and the Ministry is available to assist the organisation in the future for any other disaster relief assistance.

Yours sincerely,

Honourable Bruno Leingkon Tour
Minister of Climate Change & Adaptation

Why your support is so important

2020 has been a particularly difficult year for the people of Vanuatu, from COVID-19 halting the tourism industry, to an active volcano on Tanna Island dropping acidic fumes and ash, destroying food gardens and rainforest.

Further to this, in June 2020, Tropical Cyclone Harold inflicted extreme damage on many of the northern islands of Vanuatu. Representatives from Vanuatu Community Aid who host project work in Tanna were asked to travel north to the cyclone-impacted area and provide advice about taking solar energy installation into account in planning for reconstruction.

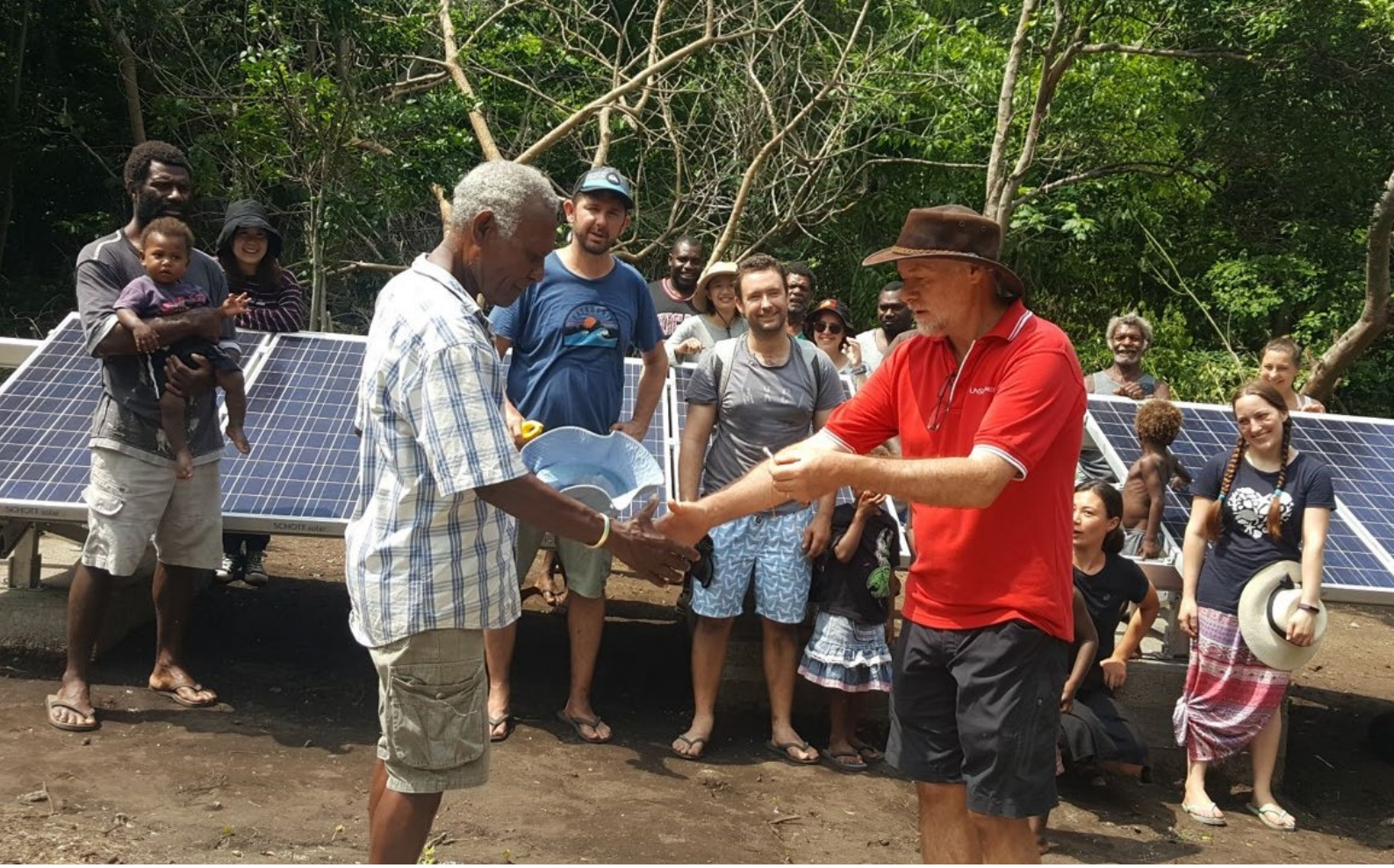
> Through the continuing support of friends and donors, we plan to progress the UNSWERV project in the following ways:

- Solar lighting for schools (a student is planning for Lamlu secondary school now);
- Solar lighting for additional aid posts and upgrades of lighting quality;
- Solar powered water pumping (a current study);
- Cyclone-resilient electrical supply for the National Disaster Management Office;
- Village-scale geothermal crop dryer;
- Pre-feasibility studies on potential community exploitation of geothermal energy on Tanna Island, with the intention to share with the Vanuatu Department of Energy and Vanuatu Department of Geology and Mines. This would include investigation of growing major electrical loads such as grid extension, resorts, agricultural produce processing, electrification of land and water transport, water supply, hydrogen production;
- Feasibility study on wind power.

UNSWERV's ambitious aim

With the support from philanthropic donors, UNSWERV has the ambitious aim to one day convert ground transport in Vanuatu from imported diesel to EVs powered by local renewable energy.

We envisage this will lead to entire resorts powered by renewable energy, and the implementation of quality assurance standards in homes, schools and health centres across the country.



Thank you

2020 has been an incredibly challenging year. The COVID-19 pandemic has had serious financial implications for the University, our students and the breadth of programs we are able to offer. The support from generous philanthropist like you has been even more critical.

On behalf of UNSW Engineering, we extend our deepest gratitude. We are truly fortunate to have friends like you, who understand the importance of supporting talented engineering students to shape a better world.

From empowering young people through education, to producing research that tackles some of the greatest challenges of our time and delivering initiatives that support communities across our region, gifts to UNSW make a real and tangible difference.

We are proud of our achievements to date and are grateful for your generosity.

Dr Richard Corkish
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Make a donation to the Vanuatu Development Student Project fund at Giving to UNSW.