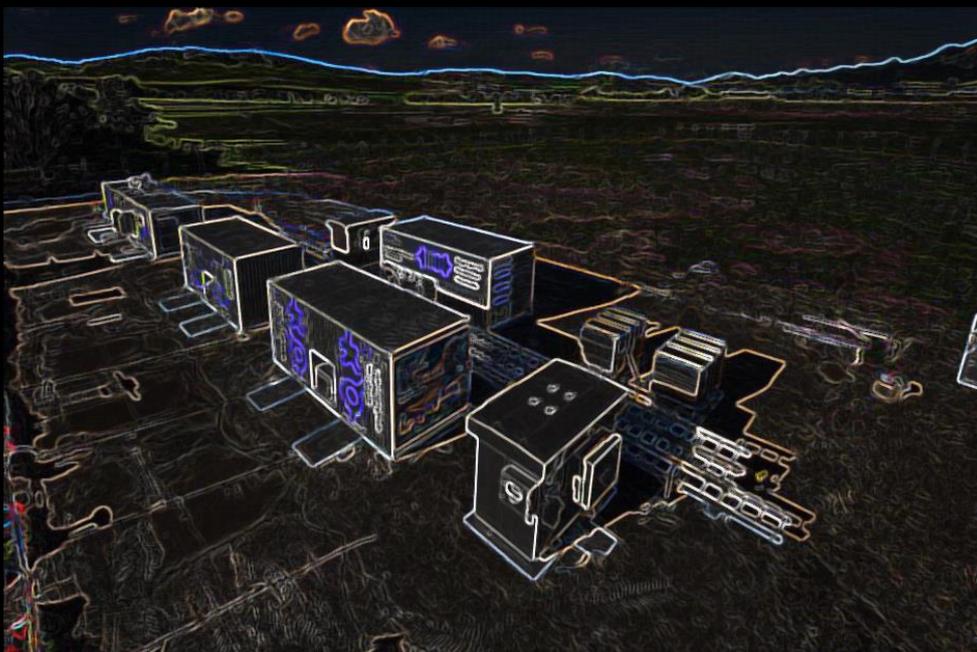


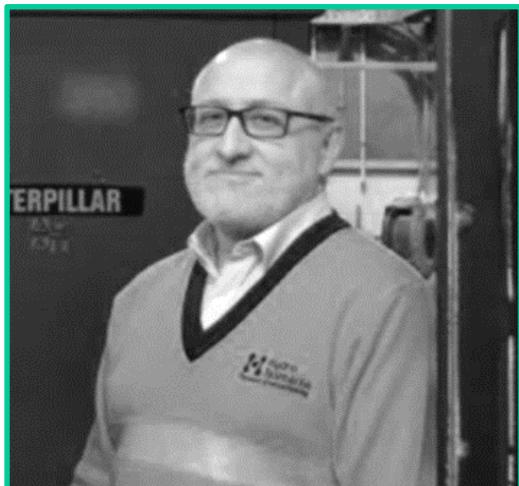
# ISOLATED POWER SYSTEM CONNECT 2019



## Ray Massie

### Manager Off-Grid Hybrid Solutions, Hydro Tasmania

#### *Isolated Power System Modernisation*



Hydro Tasmania are Australia's largest renewable generator, and have a comprehensive track record in assisting remote island communities switch to reliable clean energy systems. The Flinders Island development involves integration of wind and solar generation with the existing diesel power station and the installation of enabling technology, such as a control system, flywheel, dynamic resistor and battery energy storage. Hydro Tasmania has worked with Tasmanian manufacturers to develop a series of modular units to house and ship the enabling technologies essential to the energy solution. Since commissioning in late 2016 the Flinders Island hybrid energy hub has run 100% renewable for approximately half of the time.

With 30 years' experience, Ray continues to be a key player in developing Hydro Tasmania's renewable energy technology expertise. He currently manages a multi-disciplined team of people, identifying and developing project solutions and design innovations for hybrid energy solutions for both internal and external customers.

He managed the development phase of the Hydro Tasmania iconic King Island Renewable Energy Integration Project (KIREIP) and continues to undertake a similar role for a number of projects covering a wide geographic spread.

## Attilio Pigneri

### CEO at H2U - the hydrogen utility

#### *Renewable Hydrogen Demonstrator*



*South Australian Renewable Hydrogen and Ammonia Supply Chain Demonstrator is one of four projects included in the South Australia's recent Hydrogen Action Plan. Hydrogen infrastructure developer H2U is developing the project, which is located in Port Lincoln, South Australia*

*H2U won the AUD\$117.5 million greentech project in partnership with German-based thyssenkrupp. Partially funded by \$4.7M in grants and \$7.5M in loans from the South Australian Government's Renewable Technology Fund, the project will integrate new hydrogen technologies, including a 30MW electrolyser plant, a distributed ammonia production facility, two 16MW hydrogen-fired gas turbines and a 5MW hydrogen fuel cell, which will both supply power to the grid.*

Attilio brings fifteen years of experience at the interface between R&D and commercialization for sustainable energy technologies and alternative energy infrastructures. Attilio currently sits on the AEMO expert advisory panel, the International Association for hydrogen Energy board and is president of the Australian Association for Hydrogen Energy.

## Mark McNee

### Technology Development Manager, Energy Developments

#### *Cobber Pedy Hybrid Renewable Energy Project*



*Cobber Pedy is an iconic mining town in South Australia and, like many remote locations, relies on diesel-fired generators to provide electricity. EDL has supplied power to Cobber Pedy since 2004. This project integrated 1MW solar, 4MW wind generation, a 1MW, 0.5MWh battery storage and inverter system as well as a range of additional proven technologies, integrated with Energy Developments Ltd's (EDL) existing 3.9MW diesel power station in Cobber Pedy.*

*EDL has been operating the plant, a mix of wind, solar, batteries, flywheels, diesel and resistors, since 2017 – and it says that the average share of renewables in the town's electricity supply since then has been 70 per cent.*

**Mark is a degree qualified mechanical engineer with a background in project finance. He has experience across the full lifecycle of development and operations of infrastructure, with a long suit in identifying new opportunities to combine mature and emergent technologies to safely deliver value for all involved. Mark has detailed knowledge on HDPE & steel pipelines, small to medium sized compression and modular power generation..**

## Trevor Gleeson

### Senior Project Engineer, Energy Developments

#### *Cobber Pedy Hybrid Renewable Energy Project*



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**Trevor Gleeson is a Mechanical Engineer with 20 years experience in the electricity and renewable industry. In 2013 Trevor joined EDL Energy and has primarily focussed on integration of renewable energy into EDLs existing and potential new remote generation sites including mines and communities. Trevor has been intimately involved in all EDL's renewable projects to date including; Cobber Pedy Renewable Hybrid, Cannington Solar, Weipa Solar and the Agnew Hybrid and a host of new project assessments.**

## Laura Jones

### Innovation Engineer, TasNetworks

#### *Bruny Island Consort Battery Trial*



*Bruny Island might be best known for its rugged coastline, wildlife and its cheese and oysters beloved by daytripping foodies, but this tiny Tasmania island is on the cutting edge in Australia's energy transition.*

*The project is exploring how effectively solar and batteries can manage household energy demand and also support the broader network. The fully automated Network-Aware Coordination (NAC) system being used is the first of its kind. In the trial, it coordinates batteries equipped with Reposit controllers, to support the network when and where it is needed. In the future, it will also have the capacity to integrate EVs, smart appliances and other distributed resources as they come online.*

Laura is an experienced Innovation Engineer with a demonstrated history of working in the utilities industry. She has delivered large customer-focussed projects such as the CONSORT Bruny Island Battery Trial (<http://brunybatterytial.org/>). She also has experience in economic analysis, power system analysis, stakeholder management, and some web development experience.

## Paul Fulton

### Flinders Island Renewable Energy & Joule Logic, Director

#### *Flinders Island Renewable Energy*



*Fire Developments, a joint venture between Joule Logic and Blowing in the Wind, was established to develop renewable energy projects on Flinders Island. Fire Developments currently produces 20-25% of Flinders Island's electrical energy requirements. Since 2012 Fire has been the largest independent power producer on Flinders Island. The unique approach to islanded systems exploits refurbished wind turbine technology to deliver a low cost yet robust renewable integration pathway.*

Paul is an electrical engineer with extensive development and managerial experience across wind, solar and hydro markets. Paul has led the development of numerous wind and solar projects across Tasmania, from single turbine installations to large utility scale projects. Paul has previously held roles with Hydro Tasmania, Roaring 40's and Alstom.

## John Titchen

### Goldwind Australia, Managing Director

#### *Wild Cattle Hill and Agnew Microgrid Projects*



*Established in 2009, Goldwind Australia offers comprehensive wind and solar power solutions, including investment, construction, and operational and maintenance services.*

*Goldwind Australia is a wholly owned subsidiary of Xinjiang Goldwind Science & Technology; a leading vertically integrated global wind power company offering comprehensive wind power solutions. Goldwind Australia currently operate White Rock, Gullen Range, Mortons Lane, Gullen and White Rock wind and solar farms.*

John has been managing director of Goldwind Australia since 2009, having previously held roles with the Electricity Commission of NSW, Hydro Tasmania, Roaring 40's and Pacific Power. His passion for renewable energy and innovation has led to his robust understanding of current and emerging issues in the Australian energy market.

## Gwen Holdmann

### Director, Alaska Centre for Energy and Power, University of Alaska Fairbanks

#### *Alaska Hybrid Diesel Application*



*ACEP's mission is to develop and disseminate practical, cost-effective, and innovative energy solutions for Alaska and other regions with similar energy struggles. As Director of ACEP, Gwen spearheaded the creation of several programs within the organization to help it accomplish its goals. These programs vary in purpose and scope and have allowed ACEP to delve into research specialties such as hydrokinetics, power systems integration with a focus on microgrids, development of innovative data collection techniques, and creation of economic analysis for a variety energy related purposes.*

**Gwen Holdmann is the Director of the Alaska Center for Energy and Power (ACEP), which is an applied energy research program based at the University of Alaska Fairbanks focusing on both fossil and renewable/alternative energy technologies. Prior to joining the University of Alaska, Gwen served as the Vice President of New Development at Chena Hot Springs Resort near Fairbanks. While at Chena, Gwen oversaw the construction of the first geothermal power plant in the state, in addition to numerous other innovative energy projects ranging from hydrogen production to cooling a 10,000ft<sup>2</sup> ice museum year-round using 150°F hot water.**

## Richard Rocheleau

### HNEI Director, Hawaii Natural Energy Institute

#### *Hawaii's Energy Resilience*



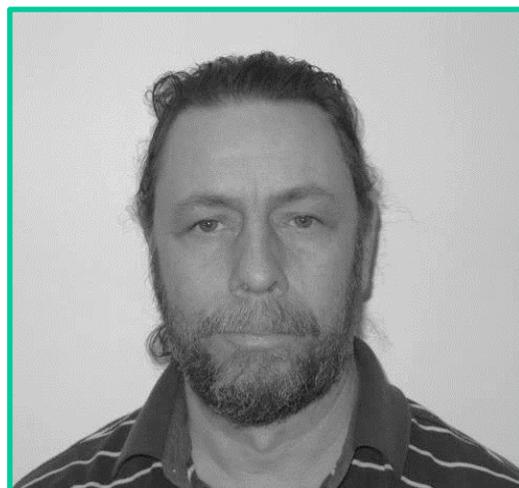
*Although the Hawaiian Islands are blessed with an abundance of renewable energy sources, and have the nation's most aggressive renewable energy standards, the state still rely heavily on fossil fuels. With isolated (unconnected) island grids and sparse systems on some islands, integration of the intermittent renewable generation systems has been challenging. The Hawaii Natural Energy Institute (HNEI) at the University of Hawaii has initiated an integrated effort involving modeling, testing, and demonstration to identify and validate pathways to higher renewable integration. In this talk, I will discuss the analysis being used to identify strategic paths forward and will describe several projects currently underway including the Maui Smart Grid Demonstration Project, the Smart Grid Inverter Project and several grid-scale battery energy storage projects.*

Richard Rocheleau (PhD, Chemical Engineering, University of DE), has over 35 years of experience in renewable energy, with an emphasis in the areas of photovoltaics, hydrogen fuel cells, and energy systems. Dr. Rocheleau joined the faculty of the Hawaii Natural Energy Institute at the University of Hawaii in 1988 and was appointed Director in 2000. Under his direction, the Institute is leading the development of public-private partnerships focused on the development, testing and integration of alternative energy technologies into the electrical grid. HNEI has major funding from the US Department of Energy and the Office of Naval Research.

## Luc Marcouiller

### Ingénieur en recherche chez Hydro Québec

#### *Off Grid Conversions and Associated Research*



*Hydro-Québec operates some 60 hydroelectric generating stations, making us one of the largest hydroelectricity producers in the world. Close to 100% of our electricity is generated using water and wind. We also have 22 isolated networks supplying power to people living too far from our main network most of which are based on thermal power stations. HQ has been working hard in the last few years to lesser it's GHG footprint in these networks while maintaining its highest standards of electrical supply's reliability. Several projects involving PV's, storage, wind, small hydro or connection to the main grid are worked on in several locations. The company's research centre, IREQ: the largest utility owned one in North America, is a key contributor to the deployment of these projects across the province.*

Luc has been part of IREQ's workforce for the last 30 years as a research engineer (ME) working mostly on the production side of the business, inevitably dedicating a good bit of his career to hydroelectric machinery. In the last 10 years, he has taken on studies on diesel engines aimed at knowing more about them and facilitating the integration of renewables to isolated networks whilst not making dents in the reliability and robustness of the electrical supply powered by these.

## Ben Kroposki

### Direct Power Systems Engineering, NREL

#### *Can Solar save the Grid*



Throughout much of the world, electric utilities are facing an unprecedented challenge. Growing numbers of customers are installing solar PV systems on their homes or businesses. In the United States alone, the installation of PV systems has seen a compound annual growth rate of nearly 60 percent since 2010, resulting in an installed capacity exceeding 50 gigawatts. The power they're injecting into distribution lines is causing voltage- and frequency-control problems, with inverter function the issue. Increasingly however, smart inverter control can provide some relief, with emergent inverter technologies offering a potential pathway for increased grid resilience under high renewable penetrations.

**Dr. Ben Kroposki leads strategic research in the design, planning, and operations of electrical power systems. His expertise is in the design, testing, and integration of renewable and distributed power systems, and he has authored more than 100 publications in these areas.**

## Dane Thomas

### Isolated Networks Manager, Energy Queensland

#### *Increasing Distributed Energy Resources*



*Energy Queensland manages electricity supply for 38 remote and isolated Queensland communities. These communities are predominately powered by 33 diesel generator power stations with capacity of 21.3MW, these networks also have an installed capacity of 1MW of centralised and 2.5MW decentralised (DER) renewables.*

*One of the current challenges faced by Energy Queensland's Isolated communities is increasing the level of DER while maintaining system reliability, stability and safety. A trail project in Lockhart River implemented a system which enable 750 solar panels installed on government buildings, including council and school roofs (209kW), and a small amount of battery energy storage (60kWh). The solar power generated will be used by everyone in the community, providing around 10% of the community's energy needs. Following the success*

*of this project EQL is now implementing similar architecture but at lower capital and O&M cost at other communities. The first of these being completed in 2019, with a rollout to most other sites.*

**Dane Thomas is a Charter Professional Engineer and Registered Professional Engineer of Queensland, he holds Bachelor of Electrical Engineering from James Cook University with first class honours, having previously held positions across Ergon Energy and Energy Queensland.**

## Shervin Fani

### Principal Engineer - Grid Transformation, Western Power

#### *Kalbarri Microgrid*



*Western Tourists flock to Kalbarri to enjoy the natural environment but the remoteness of the coastal town provides a challenge to maintain a reliable power supply. The Mid West town currently receives power via a 140km long rural feeder line from Geraldton which is exposed to the elements.*

*Interference on the line can cause extended outages. This has a knock-on effect to local businesses – it's hard to keep tourists happy when they can't dine out, use the air conditioner (it gets hot up there!) or even take money out of the ATMs. This is set to change next year. Kalbarri will be powered by its own microgrid. At 5MW, it will be one of Australia's largest microgrids to run in complete renewable mode, which means it can draw energy solely from the connected wind farm and feed-in from residential rooftop solar panels.*

Shervin is a chartered engineer, fellow of Engineers Australia and Adjunct Associate Professor at The University of Western Australia. He has been actively practicing in the Power Systems discipline for the last 15 years and in that time has been engaged in a variety of distribution and transmission roles. Shervin also sits on the CIGRE Australia C.6 working group focusing on Distribution Systems & Dispersed Generation, the UWA School of Engineering Industry Advisory Panel and the Clean Energy Council's Energy Storage Directorate.

## Chris Pye

### Division Manager – Renewable Energy, ComAp

#### *Willinga Park Microgrid*



*Remote places are often located outside of the national electricity grid reach and therefore, have to use their own micro-grids to generate electricity. Usually these micro-grids rely heavily on diesel gensets. However, when the gensets are combined with renewable energy sources we speak about hybrid systems. With hybrid systems two goals are always crucial - save fuel and system reliability. ComAp have recently completed projects in Vanuatu, Kiribati and Australia which demonstrate some of the integration challenges unique to hybrid systems.*

*Willinga Park is located on the south coast of New South Wales, Australia, 4 hours drive south of Sydney. The mains electricity supply is able to supply the park's electricity demands during normal operation, but during events the electricity demand increases 10-20 times, far outside the*

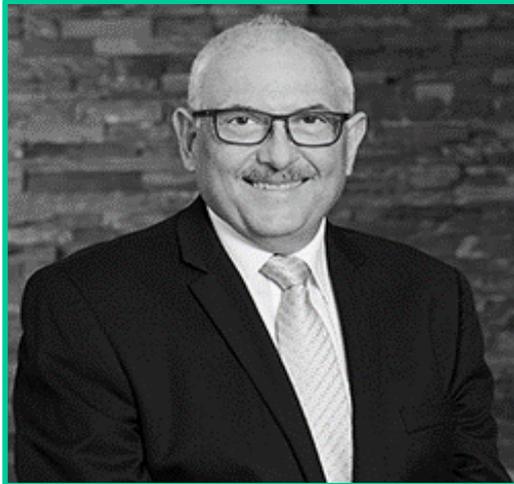
*capacity of the available mains connection. A hybrid power system (installed behind the meter) comprising of diesel generators, photovoltaic panels and batteries provides a solution to supplement the mains capacity during events and to operate as a backup power supply, should the mains become unavailable.*

Chris is a chartered electrical engineer with over 10 years experience. Chris has designed, tested & commissioned packages to suit a wide array of applications, industries and customer specific requirements. Chris joined ComAp Pty Ltd in 2015 and is now focused on project design & delivery into AUS Pacific regions.

## Laurie Curro

### General Manager Power System Services, Horizon Power

#### *Onslow Distributed Energy Resource (DER) Project*



*The Onslow DER Project will connect traditional energy sources with distributed solar and battery solutions, to maximise the amount of renewable energy in Onslow. The project involves the construction of a centralised 1 megawatt solar farm and a 1 megawatt-hour network bulk energy storage system completed earlier this year. The project aims to generate 50% of Onslow's electricity from renewable energy sources, by providing Onslow residents and businesses with access to low-cost solar and battery storage systems.*

**Laurie Curro holds a Bachelor of Electrical Engineering from WAIT (now Curtin University) and a Master of Engineering Science (UWA) as well as Graduate Diploma Technology Management (Deakin). He has over 30 years' experience working in the Power Transmission and Distribution**

**industry, with particular interest in distribution and power system planning, distribution design, distribution reliability power quality, system operations and maintenance and smart grid planning. He has also established and managed a distribution control and fault management centre. Laurie is currently General Manager Power System Services at Horizon Power. He is a Fellow of the Institute of Engineers and a Graduate Member of the Australian Institute of Company Directors.**

## James Hamilton

### Centre for Renewable Energy and Power Systems, University of Tasmania

#### *King Island Low Load Diesel Pilot Program*



*Australian utilities are at the fore of innovative diesel based enablers, able to substantially reduce the cost and complexity of high penetration renewable integration. The technology progression can be traced back to 2003, with low load diesel units commissioned at Denham, WA. More recently the application has been validated across a range of utility application, including Rottnest Island and King Island. This presentation also covers the development of variable speed diesel platforms, a natural extension to low load application, providing for efficiency improvements of 40% at low load. The technology provides a pathway to renewable integration without a requirement for battery storage, significantly reducing the cost and complexity of system hybridisation.*

**James Hamilton is a research fellow at the University of Tasmania, leading implementation low load and variable speed diesel research programs. He is currently a Fulbright post doctoral research scholar within the Hawaii Natural Energy Institute, a director with Renewable Ready and a senior research fellow within the Centre for Renewable Energy and Power Systems**

## Dow Airen

### Manager Energy Strategy at Power and Water Corporation

#### Storage in Mining



*The Daly River High Penetration Project delivered under the ARENA/NTG funded SETuP program has delivered an advanced MW scale battery – solar – diesel power system able to be replicated at multiple sites with minimal re-engineering. Located in the remote NT community of Daly River (Naiyu), this initiative has transformed the power system that was once 100 per cent reliant on diesel power, into one that operates 'diesel off' on a daily basis. During the first two months of operation the diesel engines have regularly remained off up to 16 hours / day saving ~ 65% of daily diesel consumption. The project design goal is a minimum 50% total fuel savings averaged over the year.*

**Dow Airen is the Manager of Energy Strategy for PowerWater Corporation and was also the Technical Project Manager of the SETuP Daly River High Penetration project. Dow has broad experience in solar-diesel hybrid and energy storage system development. Past career episodes include extensive experience in medium voltage switch-gear development & medical device microelectronics. Career highlights include an Australian Design Award and an Engineering Excellence award recognition.**

## Choo Fook Hoong

### Technical Director - Enercal Energies Nouvelles

#### Quatom Solar and Storage Project



*Off-grid microgrids will increasingly become the key energy infrastructure to address the need for better and more affordable energy access in Southeast Asia. To support development of microgrids in Southeast Asia, NTU is leading the Renewable Energy Integration Demonstrator - Singapore (REIDS) project, which will be the largest hybrid microgrid test and research platform in the tropics. REIDS is strongly supported by the Singapore Economic Development Board (EDB) and the National Environment Agency (NEA). REIDS and its partners are testing and demonstrating the integration of solar, wind, tidal, diesel, storage as well as waste-to-energy and power-to-gas technologies as well as other production, storage, end-use technologies and solutions suitable for deployment in Southeast Asia.*

**Prof Choo is the Co-Director of Energy Research Institute @ Nanyang Technological University (ERI@N) and the Director of the REIDS project. He joined as a faculty in Nanyang Technological University (formerly NTU) in the School of Electrical and Electronics Engineering in 1984. He graduated from the University of Leeds and Manchester University (UMIST), UK in 1977 and 1979 respectively. His experience and research interests span over the following areas: Converters, Inverters, Power Electronics and Drives, EV and Electromobility, Smart Grids (He pioneered the Hybrid DC/AC Microgrid in NTU) and Renewable Energy Systems (Solar PV, Battery and Thermal Storage systems), Energy Management, Data Analytics, MVAC and LDAC Air-conditioning Systems. He founded Vortec Pte Ltd, a spin-off company from ERI@N, which develops and produces the patented energy efficient vortex ventilator.**

## Andrew Daka

### Executive Director, Pacific Power Association

#### *Renewable Ready Pacific*



*The PPA is an inter-governmental agency and member of the Council of Regional Organisations in the Pacific (CROP) to promote the direct cooperation of the Pacific island power utilities in technical training, exchange of information, sharing of senior management and engineering expertise and other activities of benefit to the members.*

*The PPA's objective is to improve the quality of power in the region through a cooperative effort among the utilities, private sector and regional aid donors. The PPA's members pool their resources and expertise for their common benefit, gain international representation and improve access to international power sector assistance programmes.*

**Andrew Daka is currently Executive Director of the Pacific Power Association (PPA) an inter-governmental agency and member of the Council of Regional Organizations in the Pacific (CROP) to promote the direct cooperation of the Pacific island power utilities in engineering expertise, technical training, exchange of information, sharing of senior management and and other activities of benefit to the members.**

## Nicolas Caze

### Technical Director - Enercal Energies Nouvelles

#### *Ouatom Solar and Storage Project*



*The Wi Hâche Ouatom project is the first of its kind in the southwest Pacific French overseas territory. The facility includes a 10 MW solar pv array, and 7.5MW/MWh LG Chem storage power plant in Ouatom, in the southern province of the archipelago. The plant uses EDF's Store & Forecast autonomous control software, which optimizes the operation of electric systems by leveraging forecast and energy storage technology. New Caledonia has a total of 75 MW of large-scale solar plants in operation, with the first 2 MW connected to the grid in May 2010, a total of 46 MW already authorized and to be installed in the next 2 years, and 60 MW more to be authorized in the near future, with an objective of 100% renewable for the public distribution of electricity in 2030.*

**Nicolas organizes and manages all the activities of Enercal Energies Nouvelles, a subsidiary of Enercal focused on renewable energies development of projects (from feasibility and financing to commissioning), operation of the installations (solar, hydroelectric, ...), and innovation in identification and development of new technologies and markets (Smartgrids, business services, etc.)**

## James Mason

### Renewable Energy Engineer, Entura

#### *Tonga Renewable Energy Development Project*



*Although solutions combining solar power with battery storage are already available and can provide 100% renewable energy in small off-grid systems, new commercially viable solutions are needed to achieve safe and reliable renewable penetration and dispatchability in larger off-grid and on-grid systems.*

*Smart control and integration of generation assets, storage and other enabling technologies are at the heart of any successful hybrid renewable energy project.*

*The Yap remote area power system reduces Yap's dependence on diesel generation via a combination of 825kW of wind and 500kW of solar generation.*

**James Mason is the International Business Development Manager for Entura-Hydro Tasmania and holds a Bachelor of Engineering degree (Mech/Elec) and an Advanced Diploma in Project Management. James is the Project Director for all Entura's renewable projects in the Pacific including Cook Islands, Micronesia, Marshal Islands, Tonga, Samoa and Tuvalu and was instrumental in Entura's engagement with the pacific region. He has strong skills in overall Renewable Energy planning, Development and Implementation of projects in the pacific.**